World Heritage Nomination
Natural Heritage. **China**

XINJIANG TIANSHAN

Ministry of Housing and Urban-Rural
Development of the People's Republic of China
2012.1

Executive Summary

State Party	The People's Republic of China
State, Province or Region	The nominated serial property of Xinjiang Tianshan is located in Xinjiang Uygur Autonomous Region: • Tomur: Wensu County in Aksu Prefecture. • Kalajun-Kuerdening: Tekesi County and Gongliu County, in Ili Kazakh Autonomous Prefecture. • Bayinbuluke: Hejing County in Bayangol Mongol Autonomous Prefecture. • Bogda: Fukang County in Changji Hui Autonomous Prefecture and Urumqi City.
Name of Property	Xinjiang Tianshan
Geographical Coordinates (Central Point)	General Coordinates: N41°30'00"—44°00'00", E79°30'00"—88°30'00" Central coordinates of each component: • Tomur: N41°58'06" E80°21'15" • Kalajun-Kuerdening: Kalajun, N42°57'30" E82°22'35" Kuerdening, N43°04'15" E82°58'44" • Bayinbuluke: N42°47'53" E84°09'50" • Bogda: N43°50'00" E88°17'12"
Description of the Boundary of the Nominated Property	The nominated serial property of Xinjiang Tianshan has four components. Demarcation of the nominated property follows the principles below: (1) take into account the relationship with the existing protected areas such as nature reserve and national park, to keep the boundary of the nominated property the same as or part of that of the existing protected areas; (2) in accordance with the topography and physical boundaries such as a mountain ridge, valley, river, forest line, topography unit, etc. to make the boundary easy to recognize and manage; (3) encompass the essential physical elements such as; major peaks and glaciers, red beds, intermontane basins, representative vegetation, habitats and outstanding scenic areas; (4) minimal interference from human activities in order to keep the nominated property in its natural state.

In particular, the boundary of the Tomur component is the same as that of Tomur Peak National Nature Reserve; the boundaries of the Kalajun-Kuerdening component is respectively the same as that of West Tianshan National Nature Reserve and that of Kalajun Provincial Park; the boundary of the Bayinbuluke component is the same as that of Bayinbuluke National Nature Reserve; and the boundary of the Bogda component is part of Tianshan Tianchi National Park with the southern sector being part of Bogda Provincial Nature Reserve (See 3.d-2 for details).

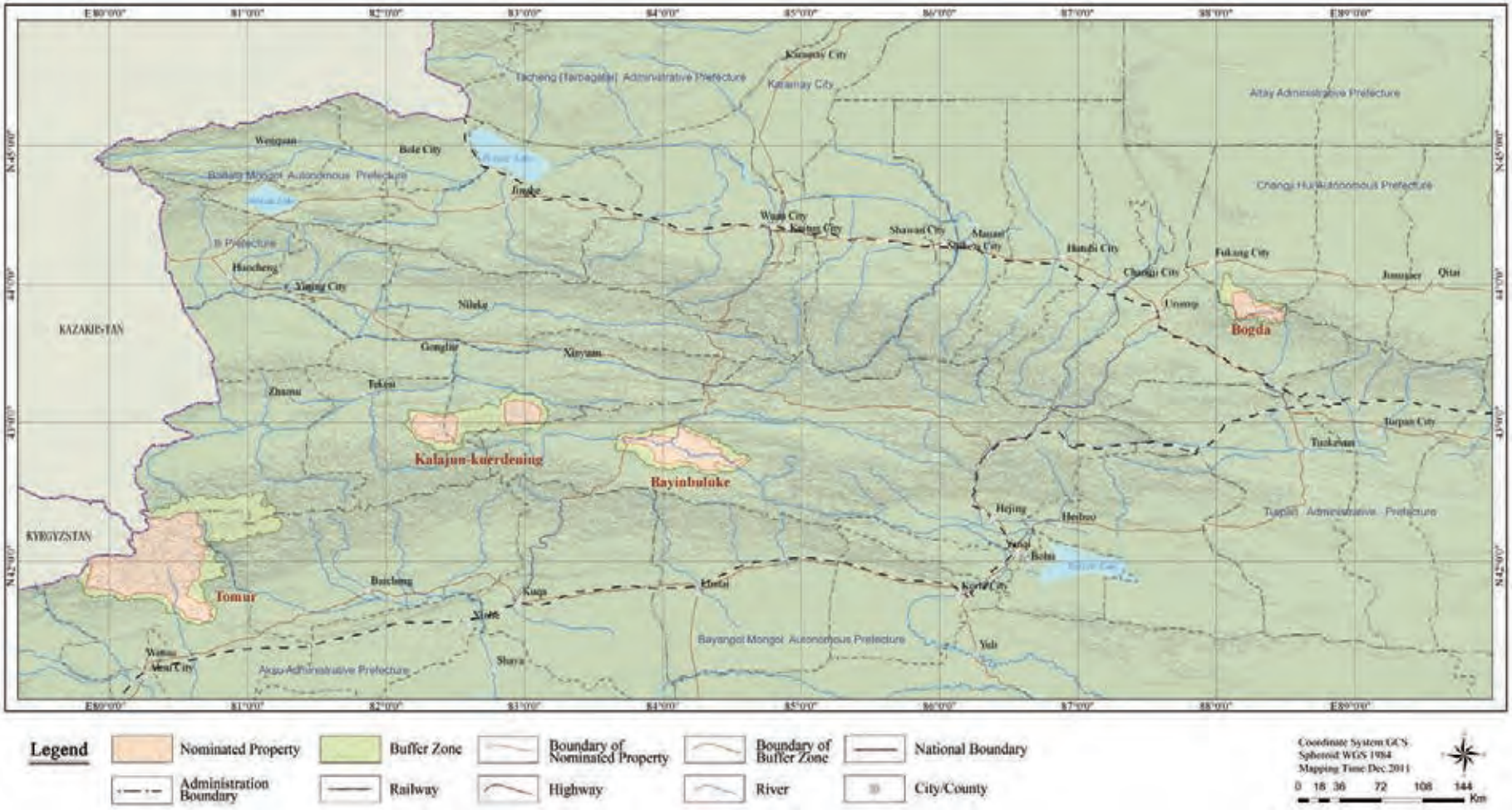
The buffer zones are located in the surrounding area to provide a buffer and extra protection for the nominated property. Demarcation of the buffer zone also takes into account the continuality of physical elements, topography, interference of human activity, and so on. Each nominated component property has enough buffer zone, although there is no buffer zone in the west of the Tomur component because this is the border of China and Kyrgyzstan along the glacier and snow mountain crest above 6,000m elevation (See 3.d-2 for details).

A4 Size Map of the Nominated Property, Showing Boundaries and Buffer Zone

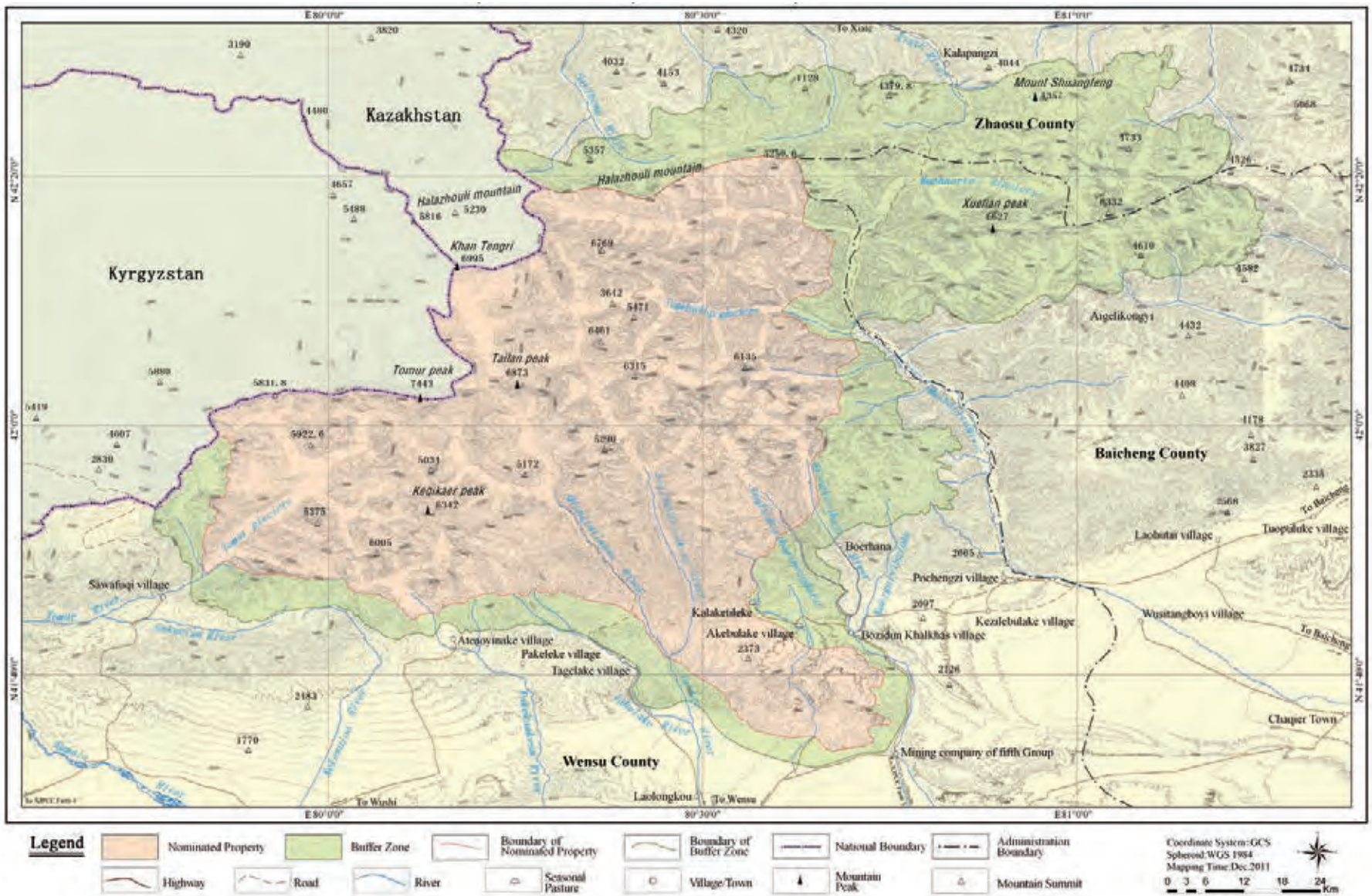
See following maps:

- Map 1.e-3 Detailed Map of the Serially Nominated Xinjiang Tianshan
- Map 1.e-4 Detailed Map of the Tomur Component
- Map 1.e-7 Detailed Map of the Kalajun-Kuerdening Component
- Map 1.e-10 Detailed Map of the Bayinbuluke Component
- Map 1.e-13 Detailed Map of the Bogda Component

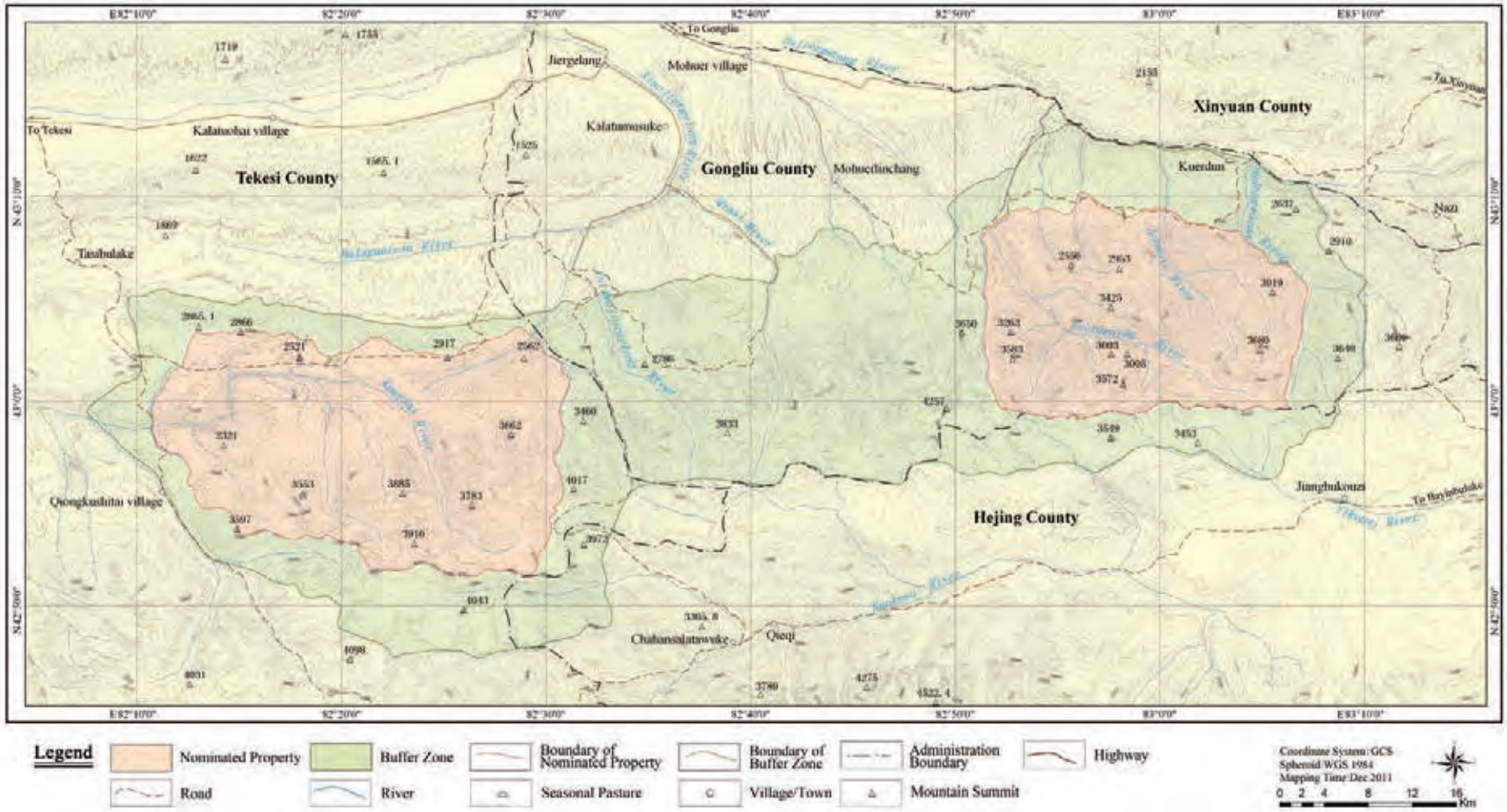
Map 1.e-3 Detailed Map of the Serially Nominated Xinjiang Tianshan



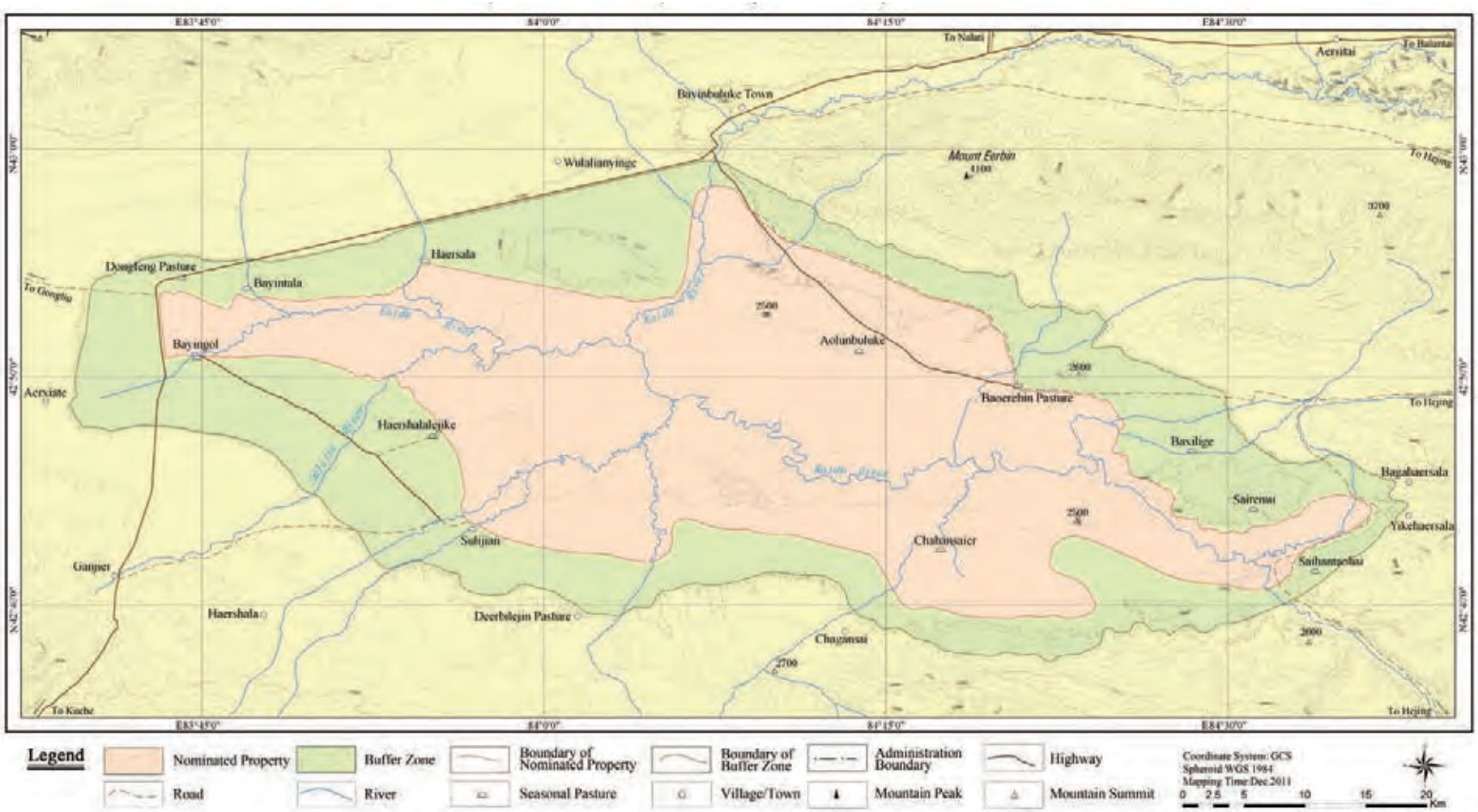
Map 1.e-4 Detailed Map of the Tomur Component



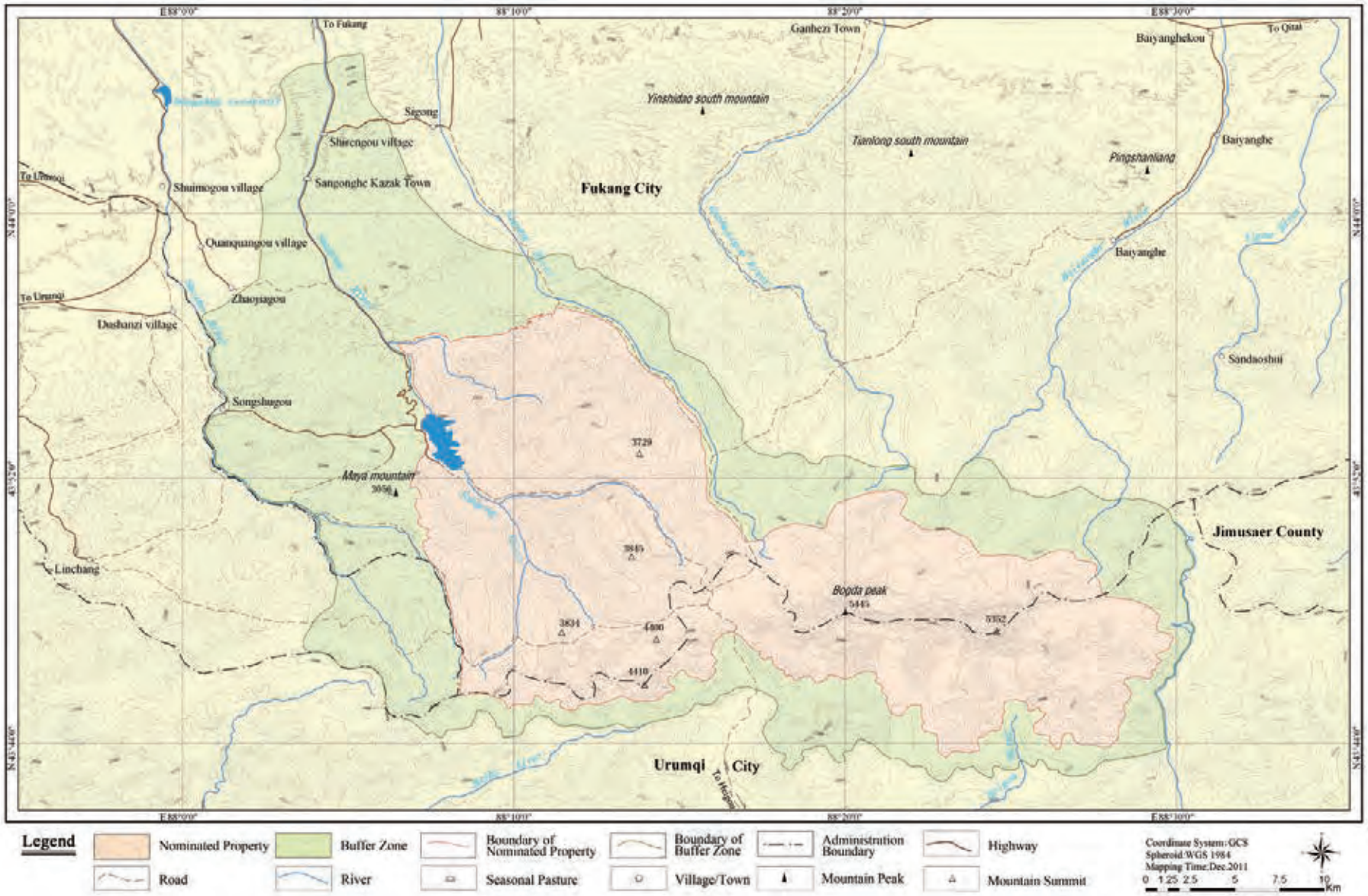
Map 1.e-7 Detailed Map of the Kalajun-Kuerdening Component



Map 1.e-10 Detailed Map of the Bayinbuluke Component



Map 1.e-13 Detailed Map of the Bogda Component



The nominated serial property of Xinjiang Tianshan has four components with a total area of 575,922 ha, and that of the buffer zones is 515,592 ha.

Tianshan is a huge mountain range in Central Asia, and the east-west length of Tianshan Mountains in Xinjiang is 1,760km, with Tomur (7,443m) as its highest peak. Xinjiang Tianshan is different from other mountains in many respects and it presents unique physical geographic features.

The beauty of Xinjiang Tianshan lies not only in the spectacular snow-capped mountains and glacier-capped peaks, beautiful forests and meadows, clear rivers and lakes and grand red bed canyons, but also in the combination and contrast between the above-mentioned mountain elements and the vast desert. They are all superlative natural phenomena and of outstanding natural beauty.

Xinjiang Tianshan is an outstanding example of a mountain ecosystem in the temperate arid zone, with a diversity of landform features and ecosystems.

- The Tomur-Khan Tengri area is one of the three largest mountain glacier distribution areas within Central Asia, and boasts the most complete altitudinal natural zones on the south slope of the Tianshan. The Kalajun-Kuerdening component is where the endemic *Picea schrenkiana* is concentrated in Tianshan, along with large areas of wild fruit forest and montane steppe and meadow. The Bayinbuluke component is the outstanding representative of a high intermontane basin in the Tianshan, with typical alpine meadows and alpine wetlands. The Bogda component encompasses the physical features in the eastern part of Tianshan, with the most typical altitudinal natural zones and snow-capped mountains, glaciers, lakes, rivers, forests, meadows, etc., with these many natural features coexisting with each other over a short distance.

- Xinjiang Tianshan is the best representative of a major mountain ecosystem in the temperate arid zone. There are seven first level habitat types according to IUCN/SSC, including forest, grassland, shrubland, wetlands, etc. as well as 22 second level habitat types. As for the vegetation, there are nine types, 25 sub types and 82 formations.

- The Tianshan Mountains in Xinjiang belongs to the Global 200 Ecoregion 111 “Middle Asian Montane Steppe and Woodlands”. Also, the nominated property is the typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, and Tian Shan foothill arid steppe.

- Xinjiang Tianshan has all the typical mountain altitudinal natural zones of a temperate arid

zone. In Tomur, there is a complete range of altitudinal zones on the south slope of Tianshan, from the ice-snow zone to warm temperate desert zone across an elevation drop from 7,443m to 1,450m. In Bogda, there is a range of altitudinal zones on the north slope of Tianshan, from the ice-snow zone to mountain steppe zone across an elevation drop from 5,445m to 1,380m.

- Xinjiang Tianshan is the outstanding representative of biological and ecological evolution on the Pamir-Tian-Shan Highlands. Xinjiang Tianshan extends across the Eurasian forest floristic subregion and Asian desert floristic subregion. Its features of altitudinal vegetation distribution, significant differences between north and south slopes, and diversity of flora, all illustrate the biological and ecological evolution of the Pamir-Tian-Shan Highlands. Due to its special location and climate, the Kalajun-Kuerdening component became a refuge for relic species in the Paleogene period. There are large areas of wild fruit forest with 52 species of wild fruit tree. It is the only place where the wild *Padus avium* originated. This area also exhibits evidence of biological evolution and succession under the influence of the global climate change.

- Xinjiang Tianshan has outstanding biodiversity and it is an important habitat for relic species, and numerous rare and endangered species, as well as endemic species. The site contains 2,622 species of vascular plants (from 635 genera and 106 families) and 550 species of vertebrate animals (from 276 genera and 90 families and 36 orders). There are 94 relic plant species from before the Quaternary Glaciation. There are 110 species of rare and endangered plants and 367 species of rare and endangered wild animals. There are 118 species of endemic plants and 22 species of endemic animals in the nominated property.

Criteria Under Which the Property is Proposed

Criterion (vii): contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.

- Xinjiang Tianshan is the world's best natural mountain landscape in the temperate arid zone. It has outstanding landscape diversity and spectacular natural beauty.

- The east-west stretching Xinjiang Tianshan lies between the Junggar Desert in the north and the Tarim Desert in the south, to form a superlative scene, *two deserts flanking a mountain*.

- From Tomur Peak (7,443m) in the west to Bogda Peak (5,445m) in the east , Xinjiang Tianshan forms a beautiful skyline over the vast deserts of Central Asia.

- Xinjiang Tianshan has the stark contrast of bare rocks on its south slope and luxuriant forest and meadow on the north, giving a striking visual contrast of environments which are hot and cold, dry and wet, desolate and luxuriant, as well as the spectacular and exquisite.

- The Tianshan are not only the *Mountains of Heaven* in China and Central Asia, but also a green corridor on the Silk Road. In history, the mountains were eulogized in numerous fairy stories, legends, poems, songs and paintings. Today, Xinjiang Tianshan is still one of the most iconic symbols in China.

Criterion (ix): be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals.

Compared with similar mountainous regions in the world, Xinjiang Tianshan is an outstanding example of ongoing biological and ecological evolution process in a temperate arid zone. Since the Pliocene epoch (5Ma), the landforms, ecosystems, habitats and landscapes have been preserved in a better way because of the pattern of two deserts flanking one mountain, the location deep in Asia's hinterland and the arid continent climate, which is unique among the world's mountain ecosystems.

- The ongoing development of vegetation influenced by diverse landforms and climates can be clearly found in the nominated property. It is the typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, Tian Shan foothill arid steppe, which belong to the Global 200 Ecoregion 111 “Middle Asian Montane Steppe and Woodlands”.

- Xinjiang Tianshan has all the typical mountain altitudinal zones of a temperate arid zone. Their distribution reflects the moisture and heat variations at different altitudes, gradients and slopes. The nominated property is an outstanding example for the study of biological community succession in mountain ecosystems in an arid zone undergoing global climate change.

- Xinjiang Tianshan is the outstanding representative of biological and ecological evolution on the Pamir-Tian-Shan Highlands. Xinjiang Tianshan extends across the Eurasian forest floristic subregion and Asian desert floristic subregion. Its features of altitudinal vegetation distributions, significant differences between north and south slopes, and diversity of flora, all illustrate the biological and ecological evolution of the Pamir-Tian-Shan Highlands.

- Xinjiang Tianshan has outstanding biodiversity and it is important habitat for relic species, and numerous rare and endangered species, as well as endemic species. It is a significant representative of the process whereby the original warm and wet flora has gradually been replaced by modern xeric Mediterranean flora.

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1. Identification of the Property

1. a Country
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1. f Area of Nominated Property (ha.) and Proposed Buffer Zone (ha.)

1. Identification of the Property

1.a Country

The People's Republic of China

1. b State, Province or Region

The nominated serial property of Xinjiang Tianshan (it is also called Xinjiang Tianshan in this text) is located in Xinjiang Uygur Autonomous Region, and it encompasses four components, details below:

- Tomur: Wensu County in Aksu Prefecture.
- Kalajun-Kuerdening: Tekesi County and Gongliu County, in Ili Kazakh Autonomous Prefecture.
- Bayinbuluke: Hejing County in Bayangol Mongol Autonomous Prefecture.
- Bogda: Fukang County in Changji Hui Autonomous Prefecture and Urumqi City

1. c Name of Property

Xinjiang Tianshan

1. d Geographical Coordinates to the Nearest Second

General Coordinates：N41°30'00"—44°00'00"，
E79°30'00"—88°30'00"

Table 1-1 Coordinates of the nominated serial property of Xinjiang Tianshan

No.	Nominated property	Location	Center coordinates
1	Tomur	Wensu County	N41°58'06" E80°21'15"
2	Kalajun-Kuerdening	Tekesi County	N43°04'15" E82°58'44"
		Gongliu County	N42°57'30" E82°22'35"
3	Bogda	Fukang County	N43°50'00" E88°17'12"
		Urumqi City	

1. e Maps and Plans, Showing the Boundaries of the Nominated Property and Buffer Zone

- Map 1.e-1 Location of the nominated Xinjiang Tianshan in China
- Map 1.e-2 Location of the nominated Xinjiang Tianshan in Xinjiang Uygur Autonomous Region
- Map 1.e-3 Detailed map of the serially nominated Xinjiang Tianshan
- Map 1.e-4 Detailed map of the Tomur Component
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- Map 1.e-12 Satellite image of the Bayinbuluke component
- Map 1.e-13 Detailed map of the Bogda component
- Map 1.e-14 Map showing relationship of the Bogda component to the existing protected areas
- Map 1.e-15 Satellite image of the Bogda component

1. f Area of Nominated Property (ha.) and Proposed Buffer Zone (ha.)

The total area of nominated Xinjiang Tianshan is 575,922 ha, and that of the buffer zone is 515,592 ha.

Table 1-2 Area of the nominated serial property of Xinjiang Tianshan

Property		Area of the nominated property (ha)	Area of the buffer zone (ha)
Tomur		344,828	280,120
Kalajun-Kuerdening	Kalajun	47,768	35,296
	Kuerdening	35,139	82,539

Bayinbuluke	109,448	80,090
Bogda	38,739	41,547
Total	575,922	515,592

Summary table of the nominated serial property of Xinjiang Tianshan

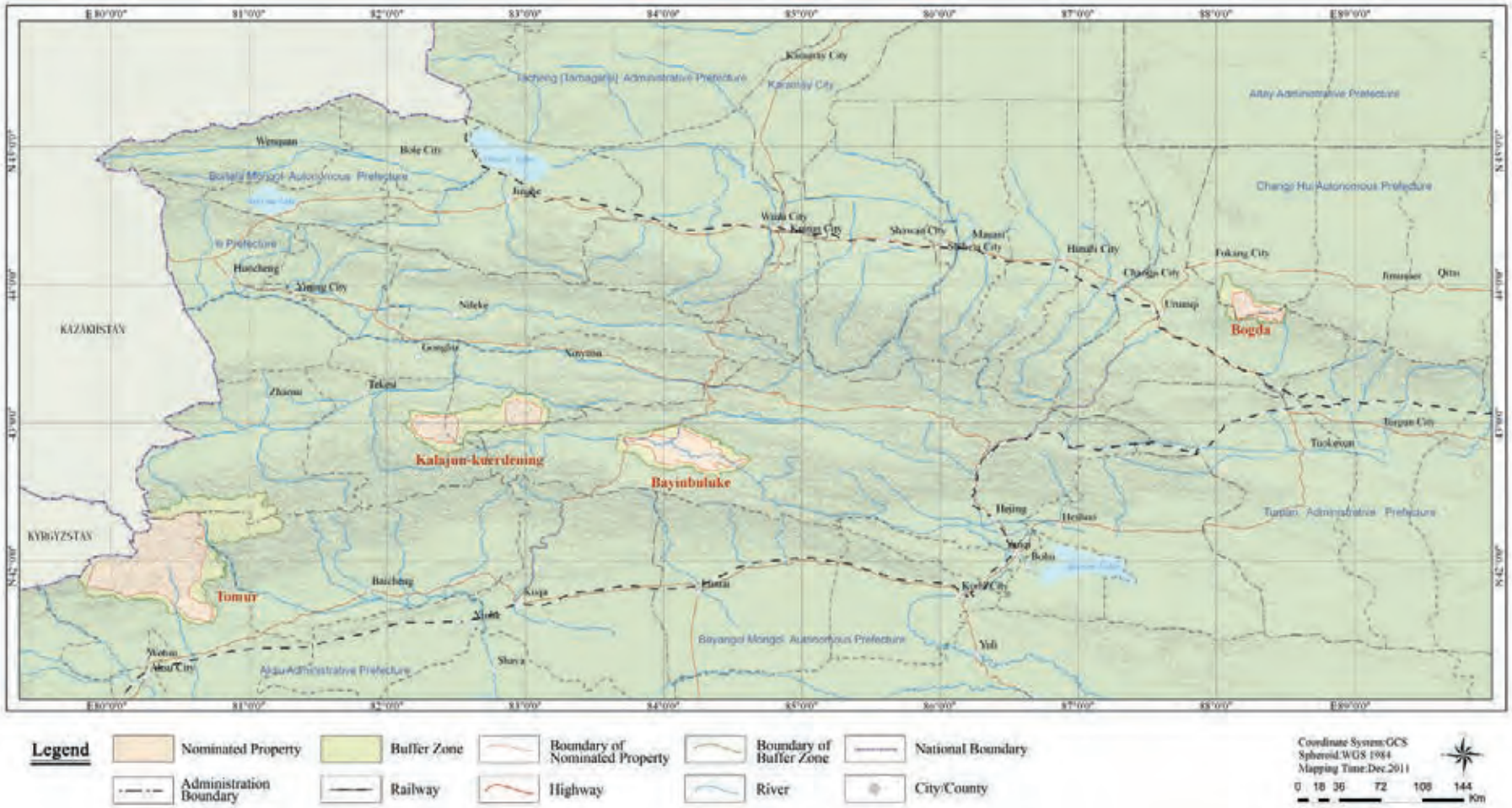
Table 1-3 Summary of the nominated serial property of Xinjiang Tianshan

Property		Location	Center coordinates	Area of the nominated property (ha)	Area of the buffer zone (ha)	Map No.
Tomur		Wensu County	N41°58'06" E80°21'15"	344,828	280,120	Map. 1.e-4 Map. 1.e-5 Map. 1.e-6
Kalajun-Kuerdening	Kalajun	Tekesi County	N42°57'30" E82°22'35"	47,768	35,296	Map. 1.e-7 Map. 1.e-8 Map.1.e-9
	Kuerdening	Gongliu County	N43°04'15" E82°58'44"	35,139	82,539	
Bayinbuluke		Hejing County	N42°47'53" E84°09'50"	109,448	80,090	Map.1.e-10 Map.1.e-11 Map.1.e-12
Bogda		Fukang County	N43°50'00" E88°17'12"	38,739	41,547	Map.1.e-13 Map.1.e-14 Map.1.e-15
		Urumqi City				
Total area (ha)				575,922	515,592	

Map 1.e-1 Location of the nominated Xinjiang Tianshan in China

Map 1.e-2 Location of the nominated Xinjiang Tianshan in Xinjiang Uygur Autonomous Region

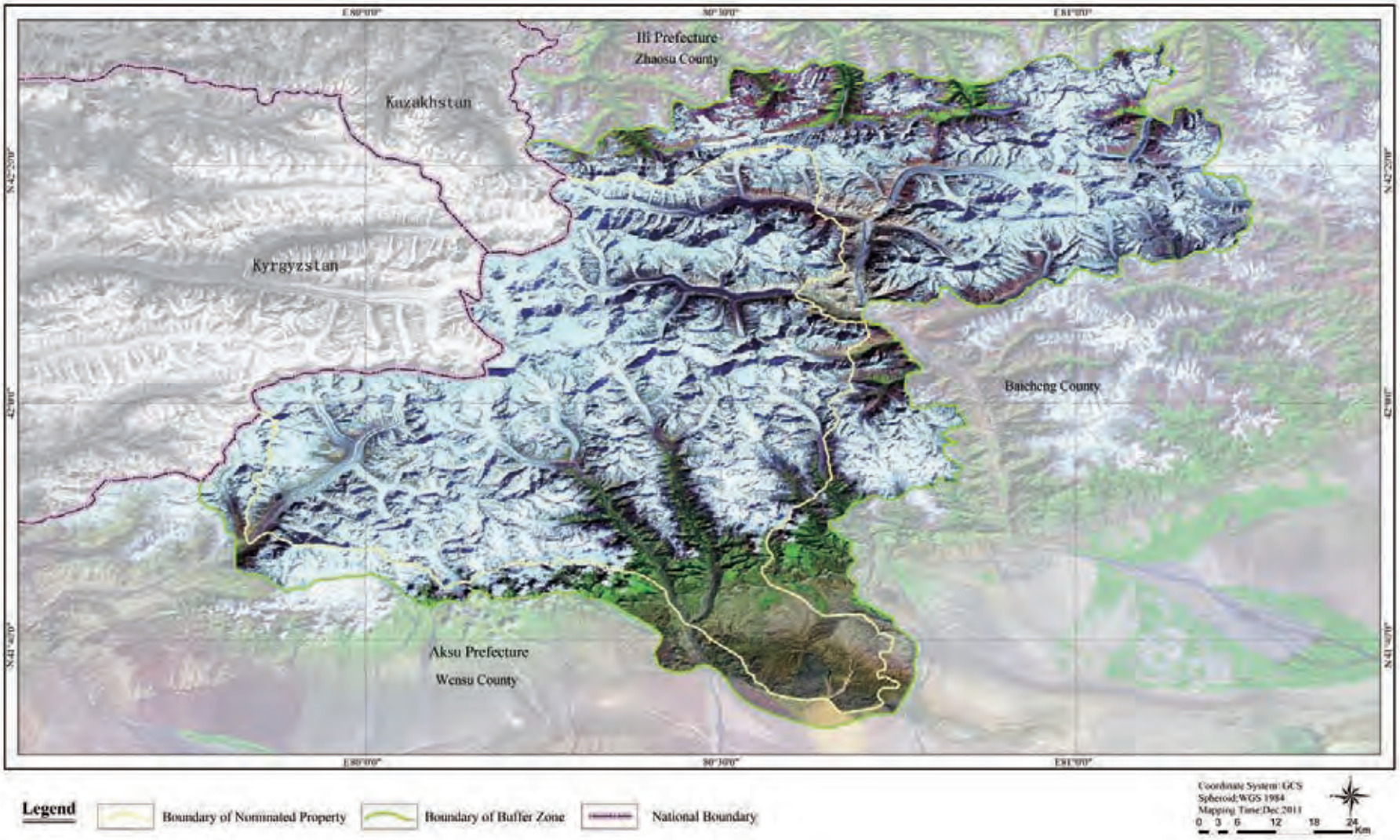
Map 1.e-3 Detailed map of the serially nominated Xinjiang Tianshan



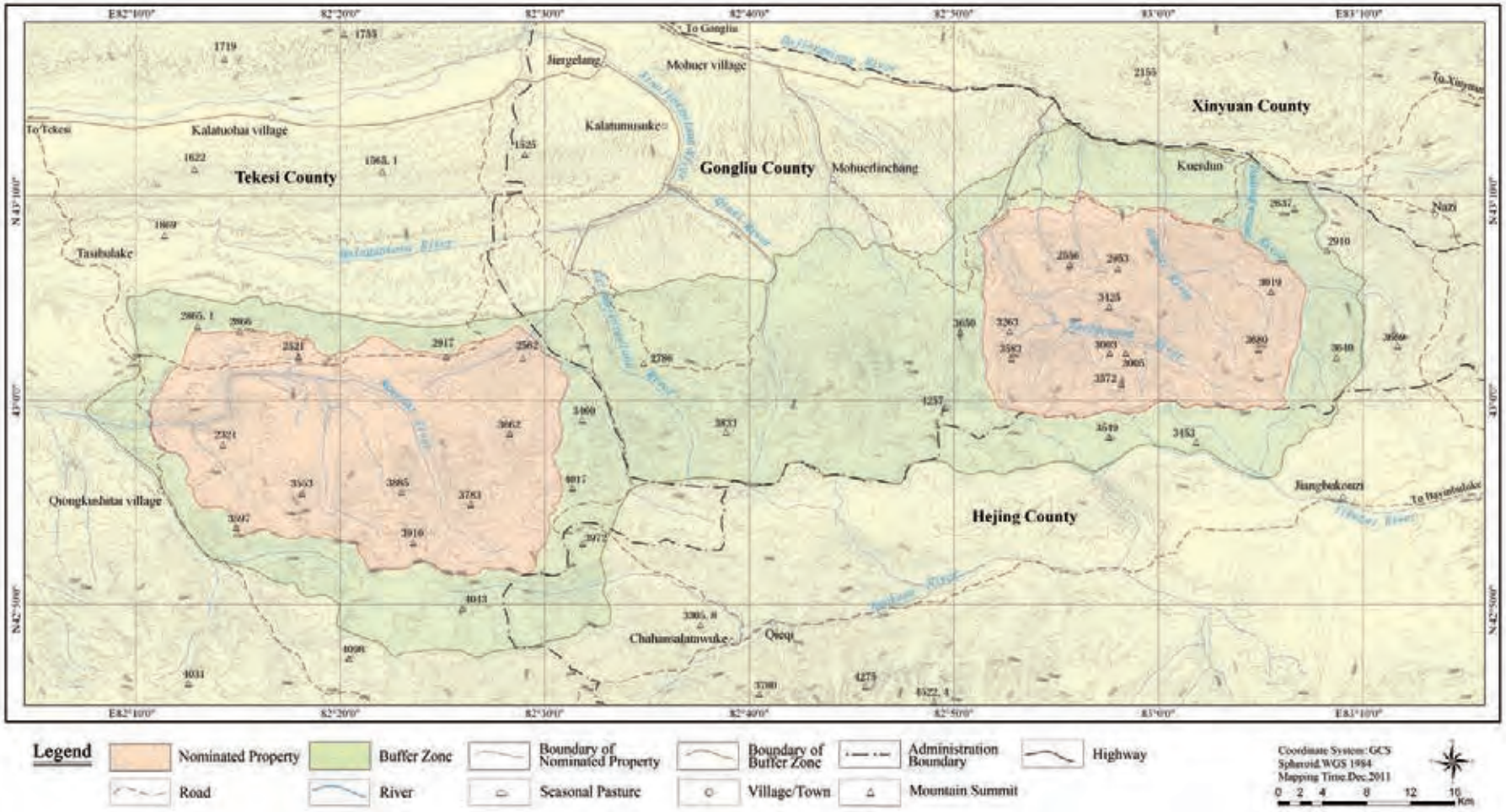
Map 1.e-4 Detailed map of the Tomur Component

Map 1.e-5 Map showing relationship of the Tomur component to the existing protected area

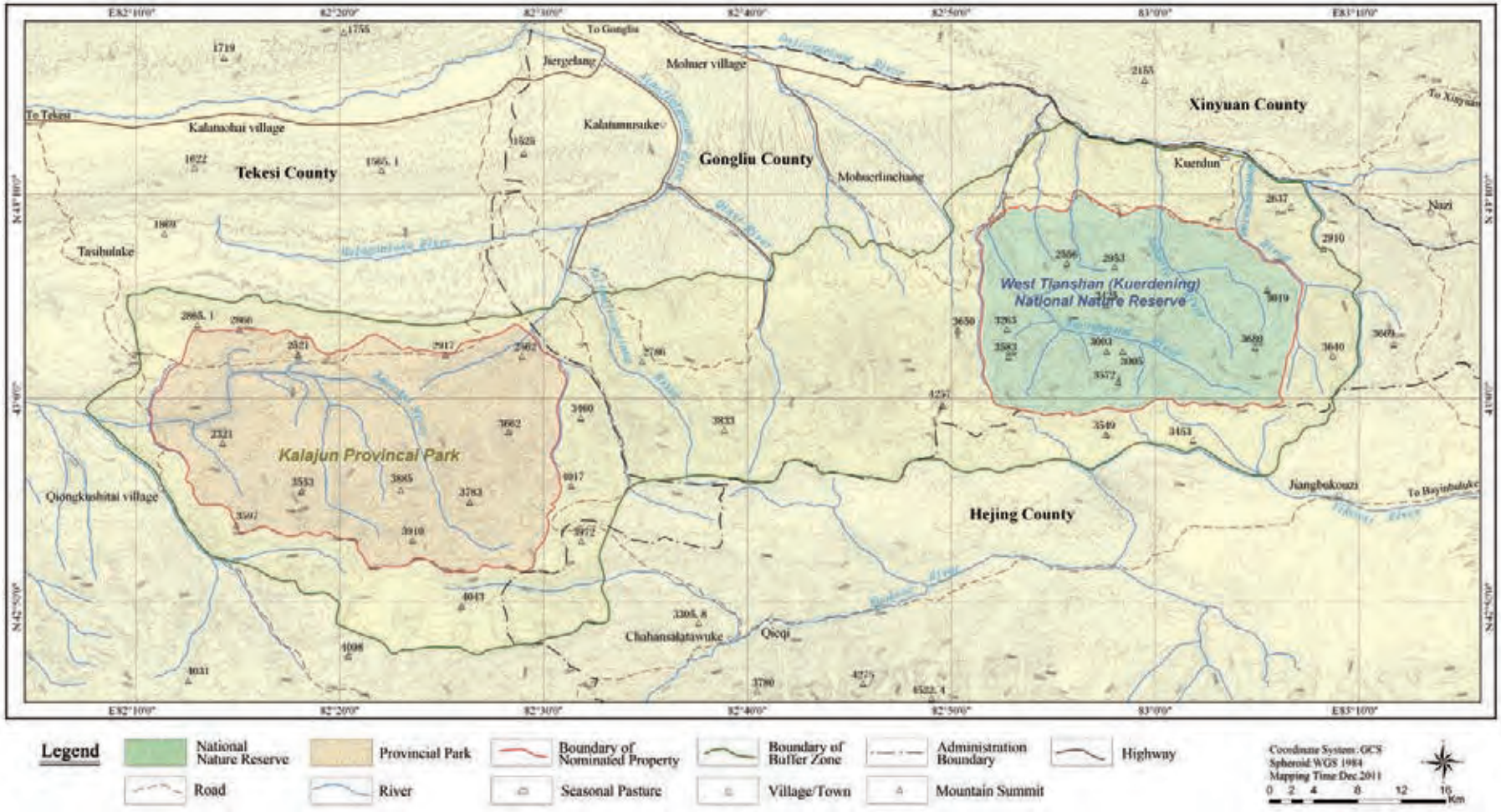
Map 1.e-6 Satellite image of the Tomur component



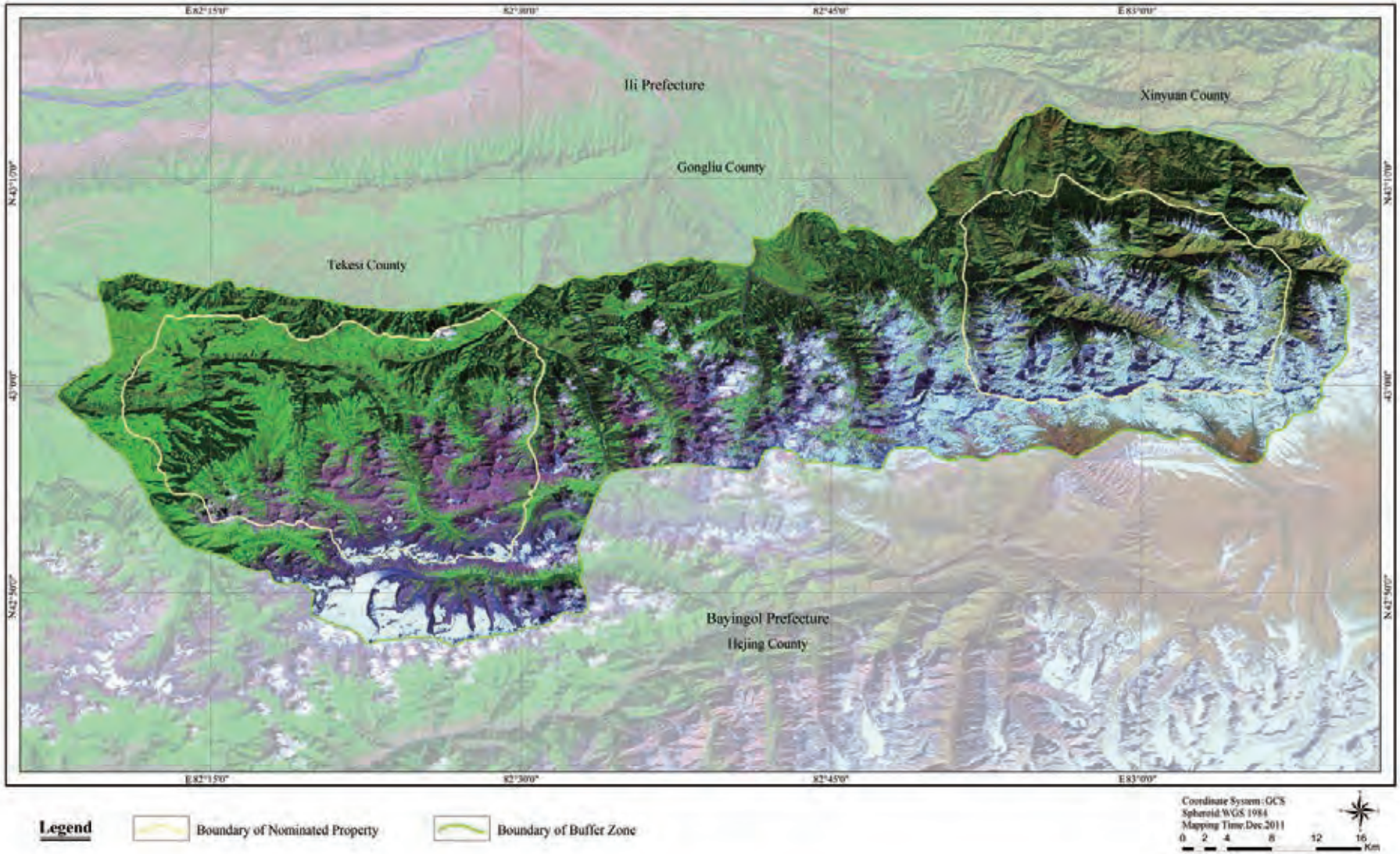
Map 1.e-7 Detailed map of the Kalajun-Kuerdening component



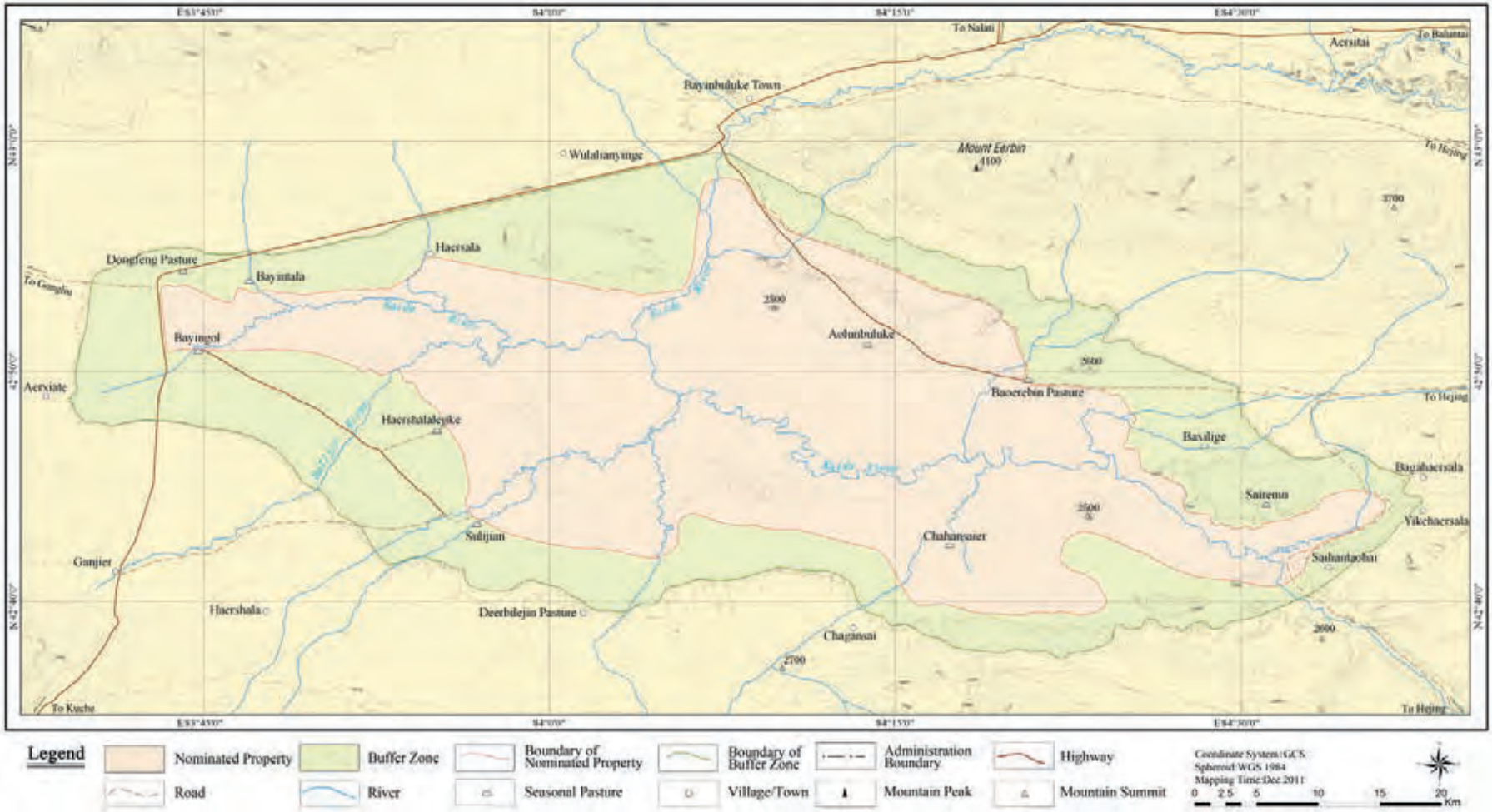
Map 1.e-8 Map showing relationship of the Kalajun-Kuerdening component to the existing protected areas



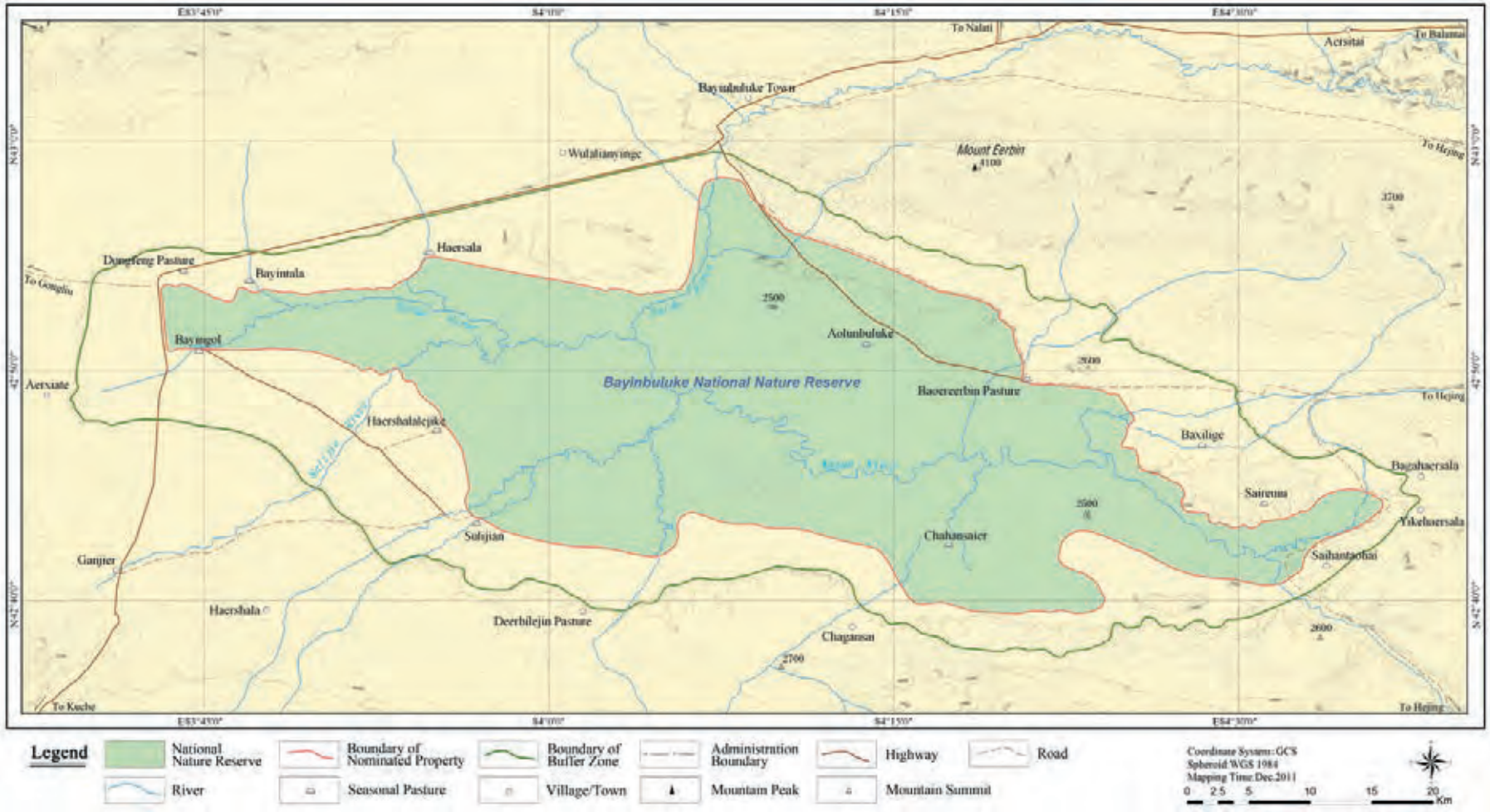
Map 1.e-9 Satellite image of the Kalajun-Kuerdening component



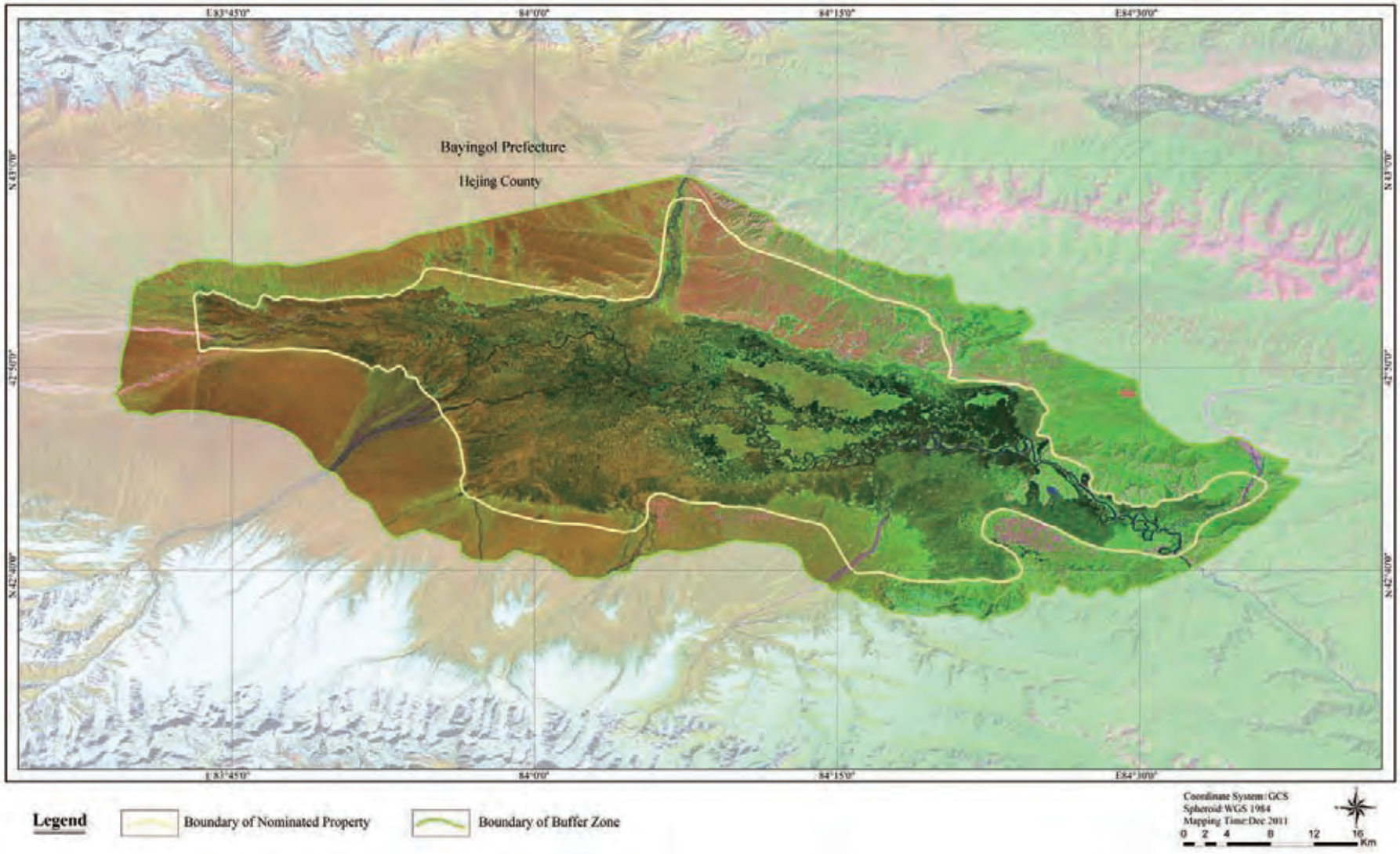
Map 1.e-10 Detailed map of the Bayinbuluke component



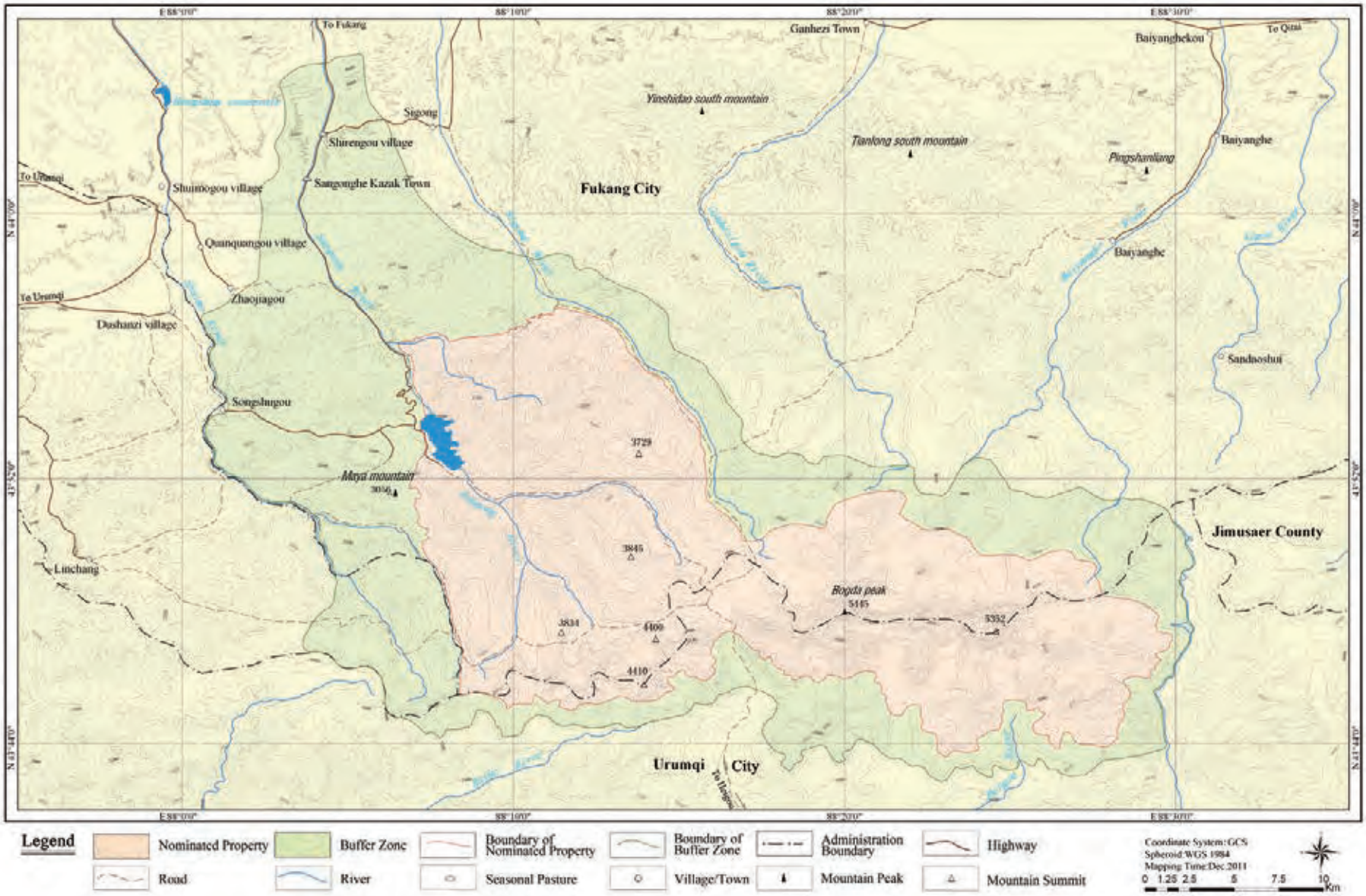
Map 1.e-11 Map showing relationship of the Bayinbuluke component to the existing protected area



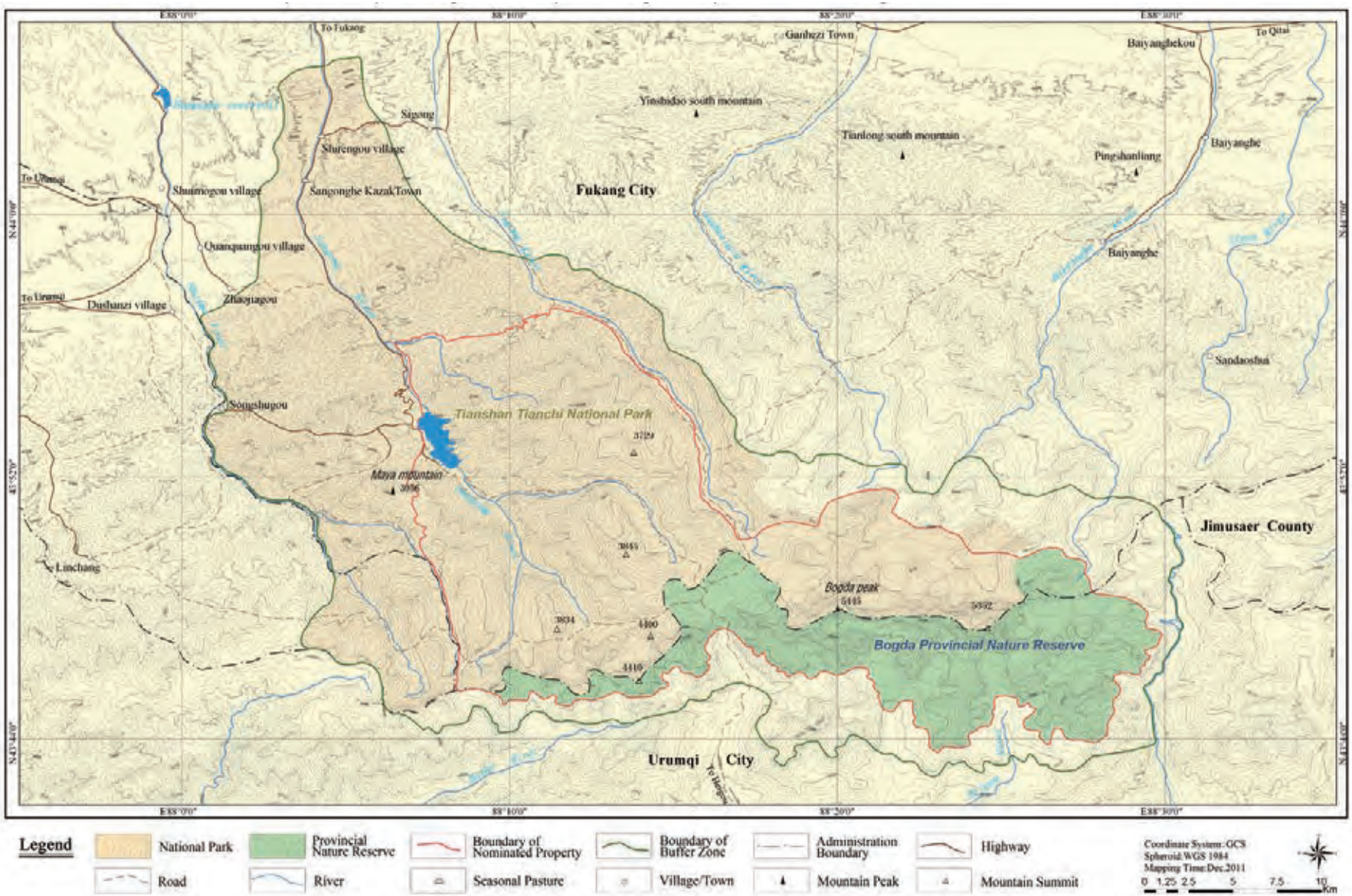
Map1.e-12 Satellite image of the Bayinbuluke component



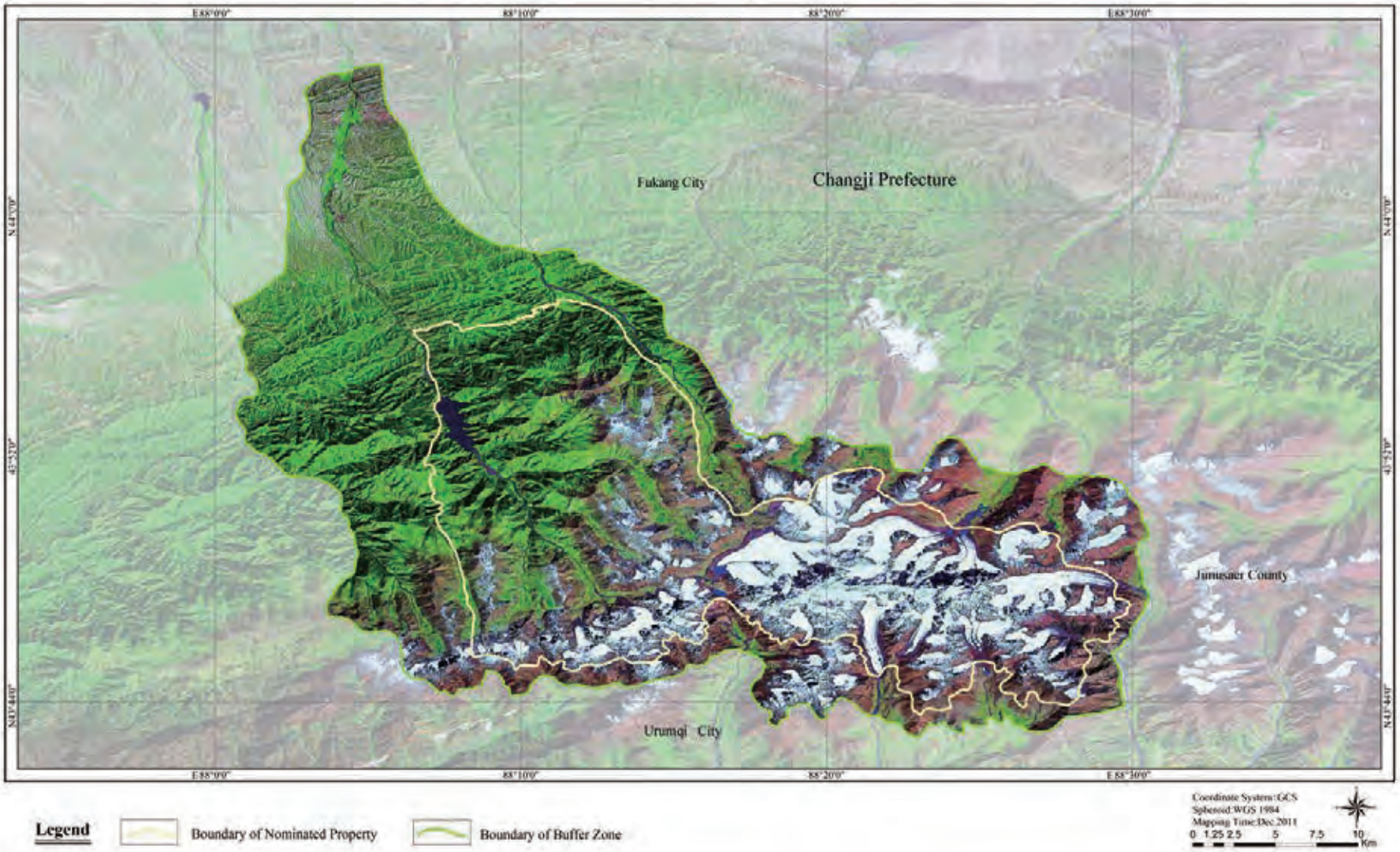
Map 1.e-13 Detailed map of the Bogda component



Map 1.e-14 Map showing relationship of the Bogda component to the existing protected areas



Map 1.e-15 Satellite image of the Bogda component



2. Description

2. a Description of Property

2. b History and Development

2. Description

2.a Description of Property

2.a-1 Tianshan Mountains

The Tianshan Mountains lie in the hinterland of the largest continent named Eurasia in the world. Together with the Altay Mountains in the north, the Kunlun Mountains in the south and the Pamir in the west, they make up the mountainous backbone of Central Asia. The Tianshan mountain chain is one of the seven largest ones in the world. It is the largest mountain chain in the world's temperate arid region, and also is the largest isolated east-west streching mountain range globally.

The Tianshan mountain range extends from the eastern Xingxingxia Gobi in Hami, Xinjiang to the western Kyzylkum Desert in Uzbekistan, encompassing the four countries of China, Kazakhstan, Uzbekistan and Kyrgyzstan. It is aligned almost trans-meridionally, with a total length of 2,500km. The average width is 250-350km meridionally, with the maximum width being 800km. It is surrounded by six deserts in three directions, including the world's largest flowing desert Taklimakan Desert, as well as Gurbantunggute Desert, Atirau Desert, Moinkum Desert, Kyzylkum Desert, and Karakum Desert (Figure2-1). The Tianshan mountain range is composed of a series of mountains and inter-mountain basins. Trans-meridionally, it can be divided into the eastern Tianshan Mountains in China and the western Tianshan Mountains abroad.

Standing out in a vast, dry and hot desert, the grand mountains of Tianshan

Figure 2-1 Location of Tianshan Mountains

feature year-round snow caps above green forest and meadow grassland vegetation. As a mountain range lies in the arid region of Central Asian, it acts as a large water tower that sustains human civilization and life-supporting ecological systems by delivering to downstream areas adequate fresh water. This has created a unique landscape of diverse mountain ecosystems, as well as oases and deserts.

2.a-2 Tianshan Mountains in Xinjiang

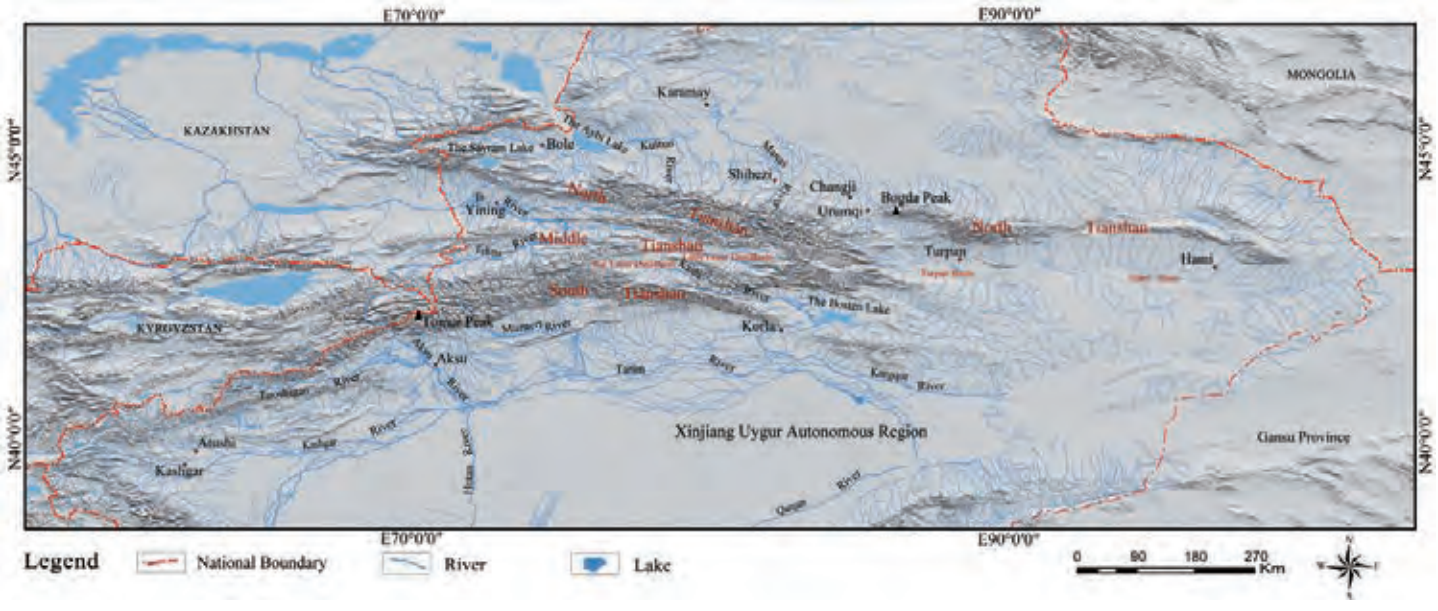
2.a-2-1 Physical Geographical Features

2.a-2-1-1 Location

Tianshan Mountains in Xinjiang is located in the central part of the Xinjiang Uygur Autonomous Region, China. In the west, it reaches Kyrgyzstan, and in the east it reaches Xingxingxia Gobi in Hami, Xinjiang. It extends from E74º to E95º, with a length of 1,760km within Xinjiang. Its southmost part is occupied by the Bashensuogong Mountain and the northmost is the Alatao Mountain. The average width is about 300km, from N40º to N45º (Figure 2-2).

Tianshan Mountains in Xinjiang stretches from west to east and is the natural boundary of Tarim Desert on the south and Junggar Desert on the north, covering Kashgar Prefecture, Aksu Prefecture, Ili Kazakh Autonomous Prefecture, Boertala Mongol Autonomous Prefecture, Bayangol Mongol Autonomous Prefecture, Changji Hui Autonomous

Figure 2-2 Location of Tianshan Mountains in Xinjiang



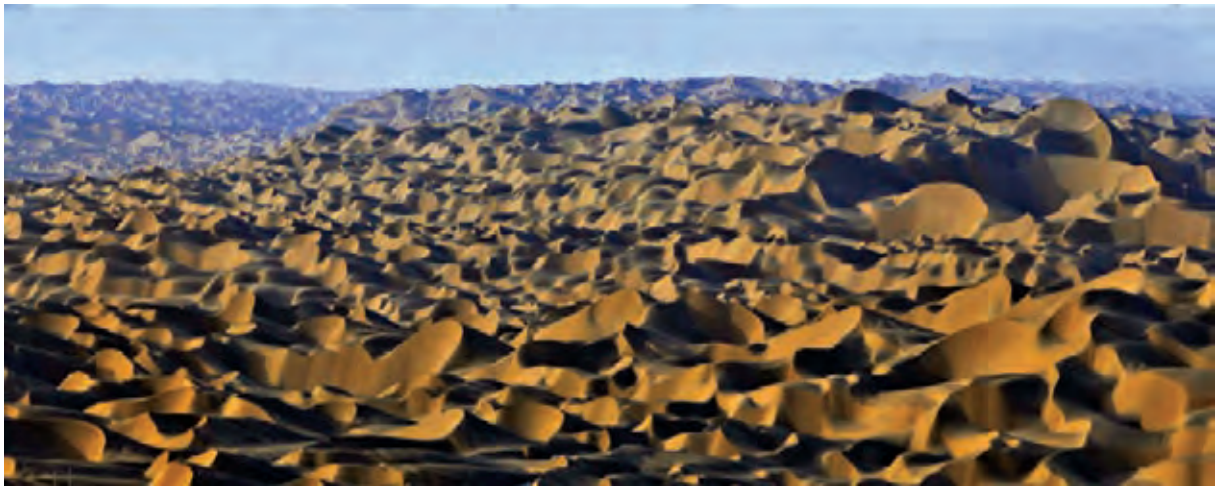


Figure 2-3 Taklimakan Desert

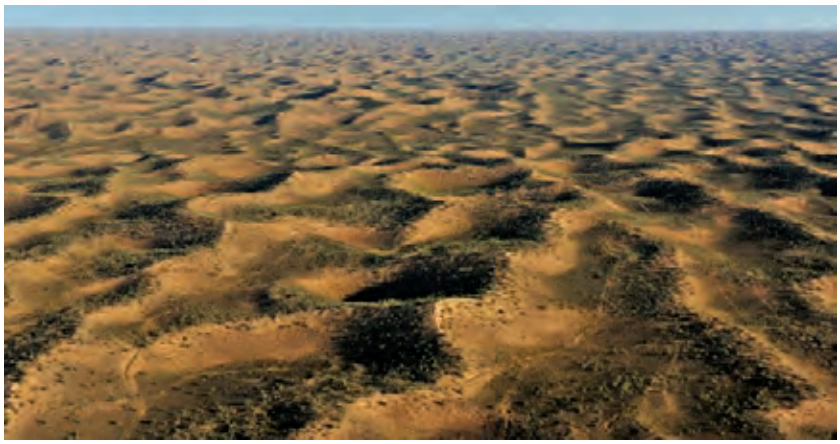


Figure 2-4 Gurbantunggut Desert

Prefecture, Urumqi City, Turpan Prefecture and Hami Prefecture.

2.a-2-1-2 Topography

With a length of 1,760km, the Tianshan Mountains in Xinjiang accounts for two thirds of the whole mountain chain. There are three sections named North Tianshan Mountains, the Middle Tianshan Mountains and the South Tianshan Mountains, more than 20 subsidiary mountain ranges and 10 inter-mountain basins or valleys.

The North Tianshan Mountains can be separated into the western and eastern parts, with a total length of 1,300km. The highest peak of the eastern part is the Bogda Peak with an elevation of 5,445m; the highest peaks in the western part lie in the Ilianhabierga mountain conjunction area, where 21 peaks are over 5,000m (with the highest one being 5,289m). This is the most concentrated area of modern glaciers in the North Tianshan Mountains.

The total length of the Middle Tianshan Mountains is about 800km, with

an average elevation of 3,000m. The highest peak in this area is Aierbin mountain, with an elevation of 4,835m. The topography is relatively gentle, with the mountain planations most prominent in its western part.

The total length of the South Tianshan Mountains is about 1,100km, and its average elevation is about 4,000m. The Tomur-Khan Tengri conjunction area is the highest of the South Tianshan Mountains, where 15 peaks exceed 6,000m.

The average elevation of the mountain ridge line of Tianshan Mountains in Xinjiang is 4,000m, which exceeds Junggar Basin in the north by 3,500m and the Tarim Basin in the south by 3,000m. The highest peak is Tomur Peak with an elevation of 7,443m.

2.a-2-1-3 Climate

Tianshan Mountains in Xinjiang extends across a large area and shows great differences in elevation, resulting in complicated and varied local climates. Located amidst deserts, the huge mountain range is an obvious natural boundary that modifies the regional airflow, resulting in large differences in physical geography between the north and south slopes. Most of the Tianshan Mountains in Xinjiang lie in the semi-arid region with a typical temperate climate. The piedmont area on the south slope belongs to the warm-temperate arid zone with altitudinal climate zones, including frigid, sub-frigid, cold temperate, temperate and warm temperate zones from top to bottom. Temperature differences between different areas are high and so is the annual temperature range. Generally, the average temperature of the south slope is higher than that of the north, and that of the east is higher than that of the west. The annual average temperature of the south slope is 7.5-10.0 degrees Celsius and that of the north is 2.5-5.0 degrees Celsius. The annual average temperature of the Turpan Basin is 12.5 degrees Celsius, and that of the Ili Valley in the west is 7.5 degrees Celsius. The lowest temperature could be below minus 50.0 degrees Celsius on Tomur Peak, while the highest temperature that has been observed is 49.7 degrees Celsius (August 3rd, 2008) in the Turpan Basin.

The climate of Tianshan Mountains in Xinjiang is evidently more humid than the adjacent areas of Central Asian deserts and the Tarim Basin and Junggar Basin, and so it is a huge ‘wet island’ in a ‘desert sea’. It is mainly influenced by western air currents, with most of the precipitation coming from the Atlantic Ocean; further moisture comes from the Arctic air

Figure 2-5 Arid South Slope of Tianshan Mountains in Xinjiang

Figure 2-6 Humid North Slope of Tianshan Mountains in Xinjiang

currents leading to higher rainfall in the western parts and nothern slopes. For example, the annual rainfall in the Gongnaisi River in the upper reaches of the Ili River is 1,500-1,800mm, in the southern slope of Tomur peak it is less than 100mm and that in the Turpan Basin is 16.4mm.

2.a-2-1-4 Hydrology

The huge mountains block off a mass of water vapor, forming a large water tower in the arid area, especially in the headstreams of many inland rivers. There are 373 rivers and 160 streams with a total runoff of $474\times108m^3$, accounting for 53.6% of the total runoff of rivers in Xinjiang Uygur Autonomous Region. These rivers support oasis ecosystems which are essential to the survival of human beings. Of them, eight rivers have a runoff over $10\times108m^3$; they include the Kash River, Gongnaisi River, Tekesi River, Manasi River and Kaidu River in the drainage area of the Ili River, the Muzhaerte River in the drainage area of the Weigan River, and the Kunmalike River and Tuoshigan River in the drainage area of the Aksu River. The water system of Tianshan Mountains in Xinjiang is like a feather, with most veins transverse to the mountain ridges and flowing from south to north. Several rivers in the western part, e.g. the Ili River, are controlled by the land tectonics; they are parallel to the ridges and flow east-west. The average elevation of the river drainage areas in Tianshan Mountains in Xinjiang is above 2,000m, while some larger rivers that originate from the high mountains could reach 3,500m. The main streams of these rivers are

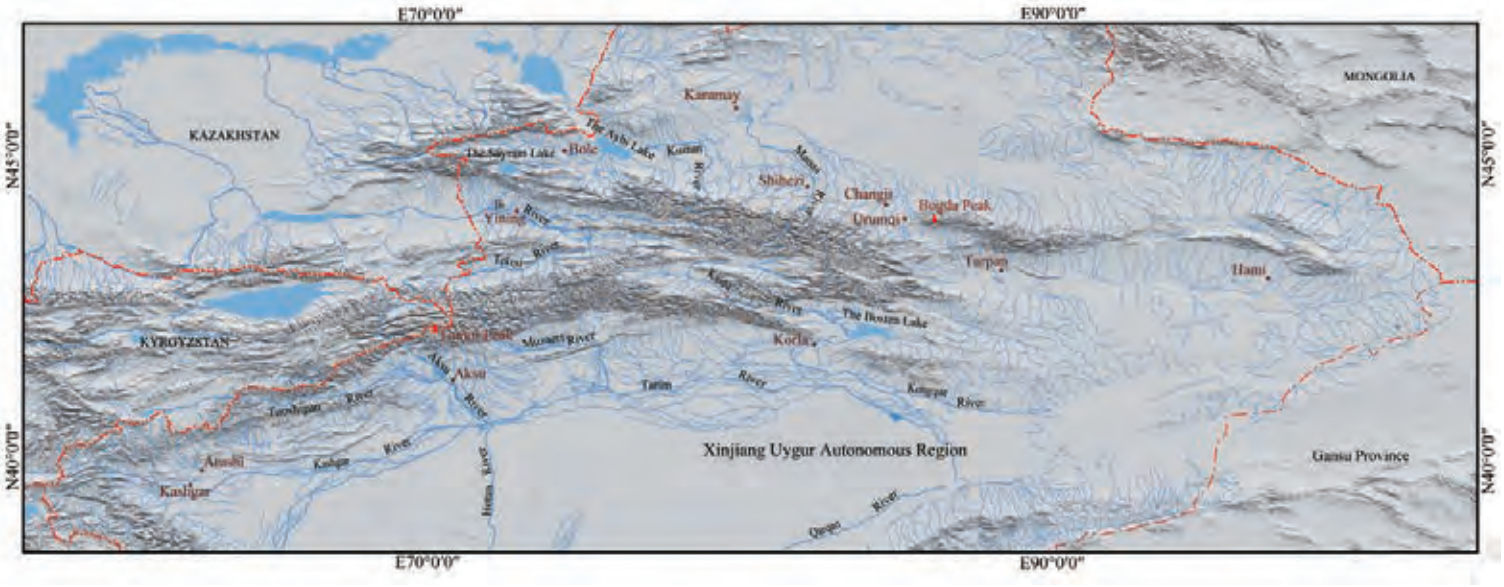


Figure 2-7 Water system of Tianshan Mountains in Xinjiang

relatively short, for example most rivers in the middle of the north slope of Tianshan Mountains in Xinjiang are less than 100km in length. Most river beds have steep gradients and the density of the river network on the north slope is larger than that on the south slope (Figure2-7).

Rainfall and seasonal snow melt-water, underground water and ice melt-water are the main sources of the runoff in the nominated properties, accounting for 37%, 33%, and 30% of the total runoff, respectively. In spring and summer, the groundwater is plentiful, while autumn and winter are dry seasons. The north slope of the Tomur component is in the drainage area of the Ili River, and the south slope is in the drainage area of the Tarim River. The Kalajun-Kuerdening component lies in the drainage area of the Ili River. The Bayinbuluke component lies in the drainage area of the Kaidu River. The Bogda component lies in the drainage area of the Sangong River, Sigong River, and Shuimo River.

2.a-2-1-5 Soil

The serial sites of nominated Xinjiang Tianshan lie in different biological-climatic zones. The southern part of the Junggar Basin is temperate desert, while the Tarim Basin is warm temperate desert. Because of the differences of water storage capacity and evapotranspiration in various climatic zones, the changes in soil composition with altitude on the north and south slope are very different. The altitudinal zones of soil on the north slope is rather complete, from the lower to extremely high elevation, there are mountain grey brown desert soil, mountain brown desert soil, mountain chestnut soil, mountain chernozem, mountain grey cinnamonic soil, subalpine meadow soil, alpine meadow soil and alpine primitive

soil. In the south slope, the mountain chernozem is lacking, and most of the places have no forest soil and subalpine meadow soil, except for the watershed of the Tailan River on the south slope of the Tomur Peak. In the Tomur Peak area, the altitudinal soil zones (from lower to higher elevation) include mountain brown desert soil, mountain brown desert steppesoil, mountain chestnut soil and grey brown soil on shady slope, alpine meadow soil and the alpine primitive soil.

2.a-2-2 Geological Features

2.a-2-2-1 Geotectonic Backgrounds

Tianshan Mountains in Xinjiang is located in the Central Asia and is part of the latitudinal tectonic zone of the Tianshan-Yinshan Mountains. In particular, it is composed of the synclinal fold of the North Tianshan Mountains, the uplift belt of the Middle Tianshan Mountains and the fold belt of the South Tianshan Mountains. Geotectonically, Tianshan Mountains in Xinjiang is in the junction area of the Kazakhstan-Junggar plate and the Tarim plate, on the south of the Siberian plate and the East European plate and on the north of the South China plate and Turkey-Mid Iran-Gangdise plate. Under the effect of the collision between Kazakhstan-Junggar plate and the Tarim plate in the late Paleozoic era, a Paleozoic orogenic belt was formed by interaction of different continental plates, minor plates and a magmatic island arc, involving the processes of subduction, collision and growth. It experienced denudation and planation in the Mesozoic era and Paleogene period, and then a peneplain landform was formed. The modern Tianshan Mountains are the product of the south-north subduction, shortening and uplifting of the Tarim plate and the Kazakhstan-Junggar plate caused by the collision of the Indian plate and the Qinghai-Tibet plate since the Neozoic era. The lithosphere of the Kazakhstan-Junggar plate and Tarim plate dived beneath the Tianshan Mountains. The depths of the subduction were 46-60km and 70km respectively. In the border areas of the mountains and the basins on the south and north edges of the Tianshan Mountains, bidirectional thrust folds and faults were formed and a series of west-east trending strike-slip and cropping faults, which cut through the main ridge of the Tianshan Mountains, were developed. Under the effect of the intense overlaying and uplifting of the subsequent tectonic transfiguration, this huge mountain system with large elevation differences and a mosaic of mountains and basins was finally formed (Figure2-8).

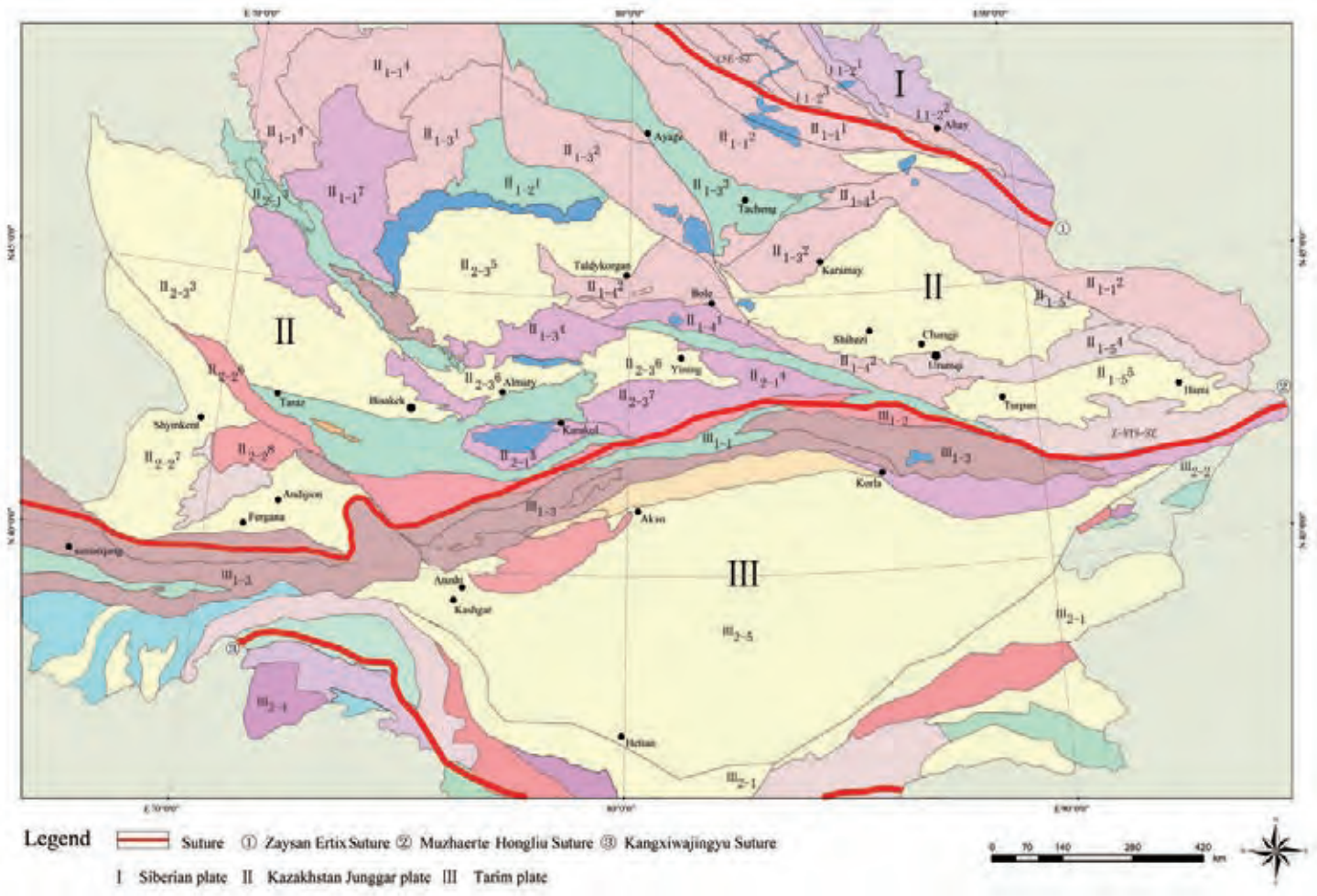


Figure2-8 Plates tectonics of Tianshan Mountains in Xinjiang

2.a-2-2-2 Stratigraphic Features

(1) Stratum

The nominated properties are all located in the fold tectonic zone of the Tianshan Mountain. From west to east, although the strata are different because of the differences in the dominant tectonic movements in different stages, the stratigraphic sequences and the paleobiogeographic regions are similar. The dominant stratum of the Archean erathem is metamorphic rocks and that of the Proterozoic erathem is littoral and neritic clastic rocks, covered by carbonatite. In the Paleozoic erathem, marine clastic rocks and carbonatite have been broadly generated with some as volcanic rocks or volcanic clastic rocks. The only exception is that of the lower Permian, which is composed of continental volcanic rocks. The strata of the Mesozoic erathem are the product of the continental deposition, which are mainly composed of fluvial and lacustrine clastic rocks, fluvial and lacustrine rocks, swamp clastic rocks with coal seams interbedded, fluvial and lacustrine rocks and piedmont clastic rocks. In the Paleogene

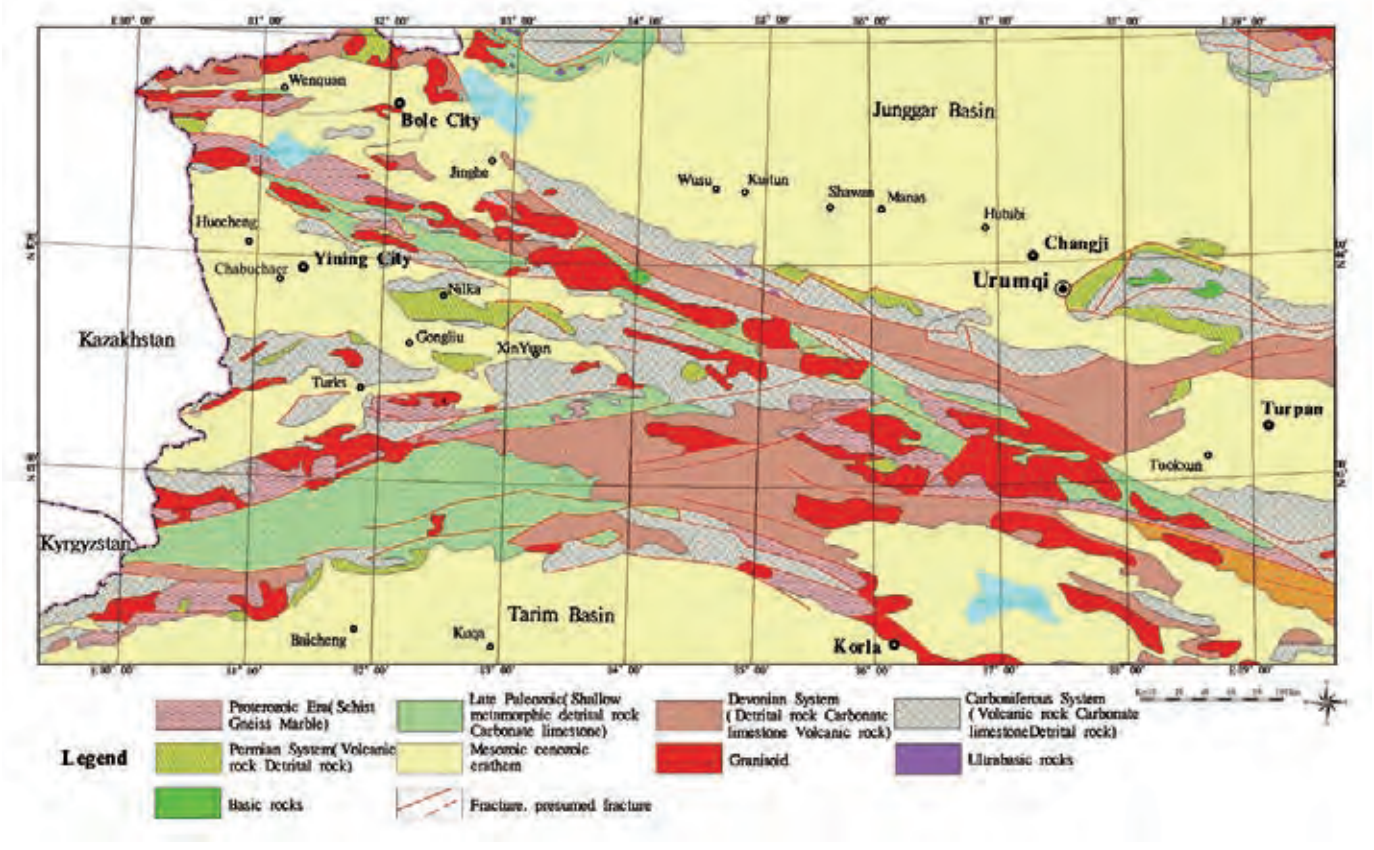
systemof the Cenozoic erathem, the Tianshan Mountains were under the effect of denudation and planation. In front of the mountains and in the inter-montane basins, there are lacustrine and fluvial sandstones with a fuchsia color, siltstones and conglomerates, and so on, which are continental clastic sediments; the depositions of the Quaternary are complicated, including moraines, alluvial fans, slope wash, aeolian, lacustrine sediments and so on, that are broadly distributed in the basins, on lake and river banks and in the piedmont areas of the Tianshan Mountains.

(2) Lithology

There are some regularities and differences in the sedimentary lithology of the nominated properties both altitudinally and horizontally (Figure 2-9):

① The lithology of the Tomur Peak area of the Southern Tianshan Mountains is ancient. In the Proterozoic erathem, the neritic carbonate was deposited. The sediments of the Paleozoic erathem are relatively sequential, showing the transitional characteristics from coastal to neritic and then to continental-coastal. The main types of rocks include clastic rocks and carbonatite, and the less important types are

Figure 2-9 Geological Sketch of Tianshan Mountains in Xinjiang



continental medium-acidic lava rocks, including volcanic rocks or volcanic clastic rocks, incarnadine rhyolite, purple andesite and so on.

② The strata of the Middle Tianshan Mountain area are discontinuous. The depositions of the Paleozoic erathem are in sequence, transitioned from neritic to coastal, then to marine-terrigenous and, finally, to the continental sediments. In the late Carboniferous period, the dominant process was erosion. In this area, there are no strata of the Permian period. Marble, crystalline limestone, chlorite schist, gneiss, andesitic porphyrite, rhyolite porphyry, tuff, sandstone, conglomerate and limestone are the main lithological types.

③ The strata of the Bogda area is also discontinous, with the rocks of the Paleozoic erathem showing the characteristics of intense volcanic processes and the transitional features from coastal depositions to neritic depositions and secondary marine depositions. Composed of marine volcanic rocks and volcanic clastic rocks, the sediments of the Carboniferous period are widely distributed in this area, accounting for 60% of total of the Bogda area, with a depth of 6,300m. The lithologic types mainly include purplish-red and grey green andesite, diorite pophyrite, tuff, volcanic breccia and agglomerate and so on.

④ On the north and south slope of the Tianshan Mountains, the sediments of the Mesozoic erathem and Cenozoic erathem are sequential and show similarity in their distribution. While the mountains uplifted intensely, the piedmont area on both the north and south slope depressed and the inter-mountain basins sank, accompanied by sedimentation of the Mesozoic and Cenozoic. The main type of sediments is detrital deposition with river and lake forms dominant, including sandy conglomerate, sandstone, siltstone, carbonaceous shale, coal seams and so on.

⑤ The marine and coastal-neritic rocks of the Tianshan Mountains are compact and hard, such as clastic rocks, carbonatite, volcanic rocks and sandstones and so on, whereas the rocks in the depressions in the piedmont on the north and south slope and in the inter-mountain fault basins are more susceptibe to weathering and erosion. They are mainly composed of calcareous and silty cementations, such as sandy conglomerate, sandstone and siltstone,etc.

2.a-2-2-3 Orogeny

The oldest rocks that have been found in Tianshan Mountains in Xinjiang are the metamorphic rocks of lower green schist-lower amphibolite facies located in area of Kuluketage Xingeer. They are the original ancient continent nucleus with a geological age of three billion years. Since three billion years ago, Tianshan Mountains in Xinjiang has undergone a long term orogeny, including the subduction of ocean basins and the folding and uplifting movement of the continental edges and so on.

In the Paleoproterozoic era (1.7-2.5 billion years ago), Tianshan Mountains in Xinjiang was covered by the broad ocean of Tianshan. In the Mesoproterozoic era and Neoproterozoic era (0.6-1.7 billion years ago), under the effect of subduction of the Junggar and Tarim plates, the ancient continental nucleus expanded with the gradually disappearance of the Tianshan Ocean. Finally, the ancient continent of Tianshan formed and the scale of it is similar to the outline of the modern Tianshan Mountains.

In the early Paleozoic era (0.41-0.54 billion years ago), the oceanic basin of the Tianshan Mountains developed. From the Precambrian to the Ordovician period, the tension movements from west to east made the ancient continent of Tianshan became a part of Tethys Ocean, surrounded by the Ili, Junggar and Tarim ancient continents. In the late of middle Ordovician, the Ili plate accreted southwardly with the close of the western oceanic plates.

In the Late Paleozoic era(0.25-0.41 billion years ago), folding and uplifting movements happened to the Tianshan. In the upper Paleozoic era, plate movements were intense with frequent volcanoes. In the late upper Paleozoic era, the Variscides changed violently forming a mass of granite, and the plate movement became faster. The Siberian plate moved southwardly rapidly and collided along the subduction zone, causing the uplifting of the Paleozoic strata. And the ancient Tianshan Mountains formed with an average elevation of 2,000m.

In the Mesozoic era (0.065-0.25 billion years ago), erosion and pedimentation were the main actions that happened to the Tianshan Mountains. The Tianshan Mountains folded and uplifted in the Paleozoic era became gentle and low-elevation peneplains under long-term erosion and pedimentation when the crustal movement was relatively stable.

Since the Paleogene period especially the Neogene period in the 65

million years ago, under the far-field effect of the collision between the Indian plate and the Eurasian plate, huge differential uplifting-subsidence movement had happened to the peneplains of Tianshan, forming the basic outline of the modern Tianshan Mountains with huge mountains and basins distributing interlaced.

2.a-2-3 Landforms

The formation and development of the geology and landforms of Tianshan Mountains in Xinjiang are the outcome of the interaction of internal and external processes. Three stages of development were experienced, including a folding and upheaval stage, an erosion stage and a block uplifting stage. Landforms of the modern Tianshan Mountains are based on fault blocks. Under the effects of various exogenous forces since the Quaternary period, such as glaciation and fluviation, as well as drying and erosion, many kinds of landforms have been formed in Tianshan Mountains in Xinjiang, including fault blocks and basins, the grand mountainous plains and terrace landforms, as well as typical modern glacial landforms, ancient glacial landforms, canyons and the red terrains and so on.

2.a-2-3-1 Basin-Mountain Tectonics

The most obvious characteristic of the Tianshan Mountain system is the alternating distribution of the mountains and basins, which trend west-east on a large scale. The Tianshan mountain system was composed of three huge mountain ranges and more than 20 subsidiary mountain ranges, as well as 10 or more inter-mountain basins or valleys (Tables 2-1, 2-2). Horizontally, the Tianshan Mountains look like a huge irregular X, with the intersection in the Ilianhabiga Mountain. The altitudinal features of the mountains are obvious, and from top to bottom, there are: extremely high mountains, high mountains, middle mountains and lower hills. The Tomur - Khan Tengri Mountain and Bogda Mountain, where the nominated Tomur and Bogda are located, are in the summit areas of the southern Tianshan Mountains and northern Tianshan mountains respectively. The Ili Basin, where the nominated Kalajun-Kuerdening lies, is the most typical inter-mountain valley in the Tianshan Mountains. Youerdusi basin, where the nominated Bayinbuluke lies, is the most typical large scale intermontane basin.

Table 2-1 Representative mountains of Tianshan Mountains in Xinjiang

Name	Highest peak	Main landform features
Tomur-Khan Tengri Mountain	Tomur Peak (7,443m)	This area includes the main peaks of the Southern Tianshan Mountains, which is the highest mountain junction - of the Tianshan Mountain range. The mountains are very high, with deep valleys. Within an area of 3,000km^2, the mountain area over 4,000m accounts for 60%. There are 15 mountain peaks over 6,000m. The altitudinal land-form belts of the Tomur-Khan Tengri mountains are obvious.
Bogda Mountain	Bogda Peak (5,445m)	Bogda is the main mountain in the east part of the Northern Tianshan Mountains, with the south slope short and sharp while the north slope long and more gentle. On the north slope, intact altitudinal landform belts have developed.
Nalaty Mountain	Kabanbayi Peak (4,258m)	Generally, Nalaty Mountain trends east-west, with an average elevation of about 3,000m. The alpine zone is relatively small and most of the peaks lie in the sub-alpine zone. The mid-mountain area is broadly distributed. Most of the tops of the mountains are plain and rounded, with planations widely distributed and remaining well-formed. This area is the most typical area for the distribution of planations of the Tianshan Mountains.

Table 2-2 Landforms of the representative basins of Tianshan Mountains in Xinjiang

Name	Bottom elevation	Main features
Ili valley	500-780m	The Ili valley is a westward bell-mouthed basin. From east to west, the length is 150km and, from north to south, the width is 50km.
Youerdusi Basin	2,400-2,600m	It is an inter-mountain basin with an area of 3,480km^2, which is composed of the Big Youerdusi Basin and the Small Youerdusi Basin. The shape of the Big Youerdusi Basin is oval, with a length of 100km from east to west, and a width of 25km from north to south. It slants from northwest to southeast, with the Kaidu River meandering through it.

2.a-2-3-2 Terrace Landforms

During the neo-tectonic movement, intense differential uplift and deline of fault blocks broke up the plains of the ancient Tianshan and formed the terrace landform belts with huge elevation differences, which complicated the altitudinal landform structure. Three different planation surfaces developed from the mountain ridge line to the piedmont of Xinjiang Tianshan. The first level of planation is found in the alpine zone above 4,000m, the second level in the subalpine mountains with an elevation of 2,800-3,200m, and the third level is found in some of the intermediate and low mountain zones with an elevation of 1,800-2,200m (Figure 2-10).

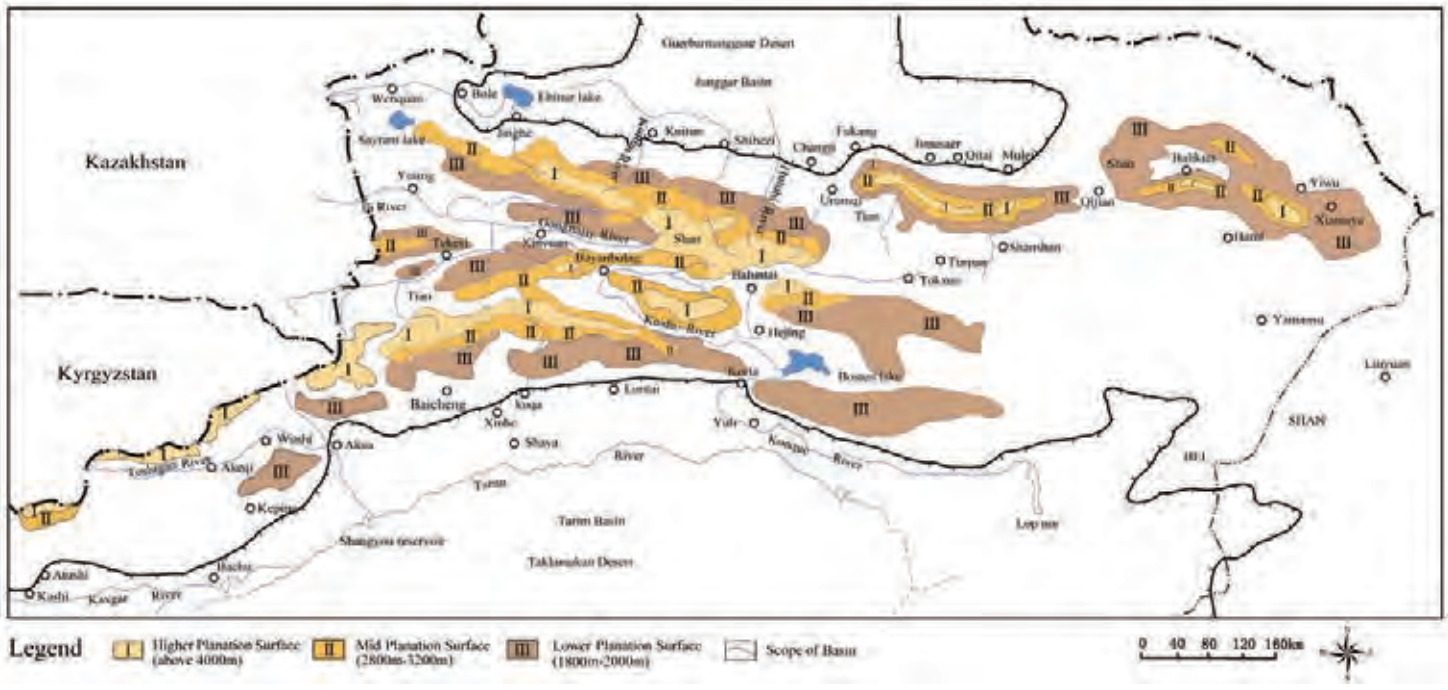


Figure 2-10 Planations of Tianshan Mountains in Xinjiang

Figure 2-11 Planation of the Middle Tianshan Mountains

2.a-2-3-3 Modern Glaciers

There are 15,953 glaciers in the whole Tianshan mountain range with a total area of 15,416km^2 and an ice volume of 1,048km^3. On a global scale, the Tianshan Mountains have relatively abundant mountain glaciers. Within the Chinese part, there are 9,081glaciers with an area of 9,236km^2, accounting for 57%, 59.9% and about 90% respectively of that of the whole Tianshan mountain system. So Tianshan Mountains in Xinjiang is the main zone of the whole Tianshan's glaciers. The mountain junction of Tomur-Khan Tengri peaks, where Tomur component is located, is the largest center for glaciation in the Tianshan Mountains, with two glaciers over 300km^2 in area (Figure 2-12).There are various types of glaciers, including valley glaciers, cirque-valley glaciers, cirque glaciers, hanging glaciers and slope glaciers and so on.

Figure 2-12 Modern glaciers and ancient glacial relics of Tomur area

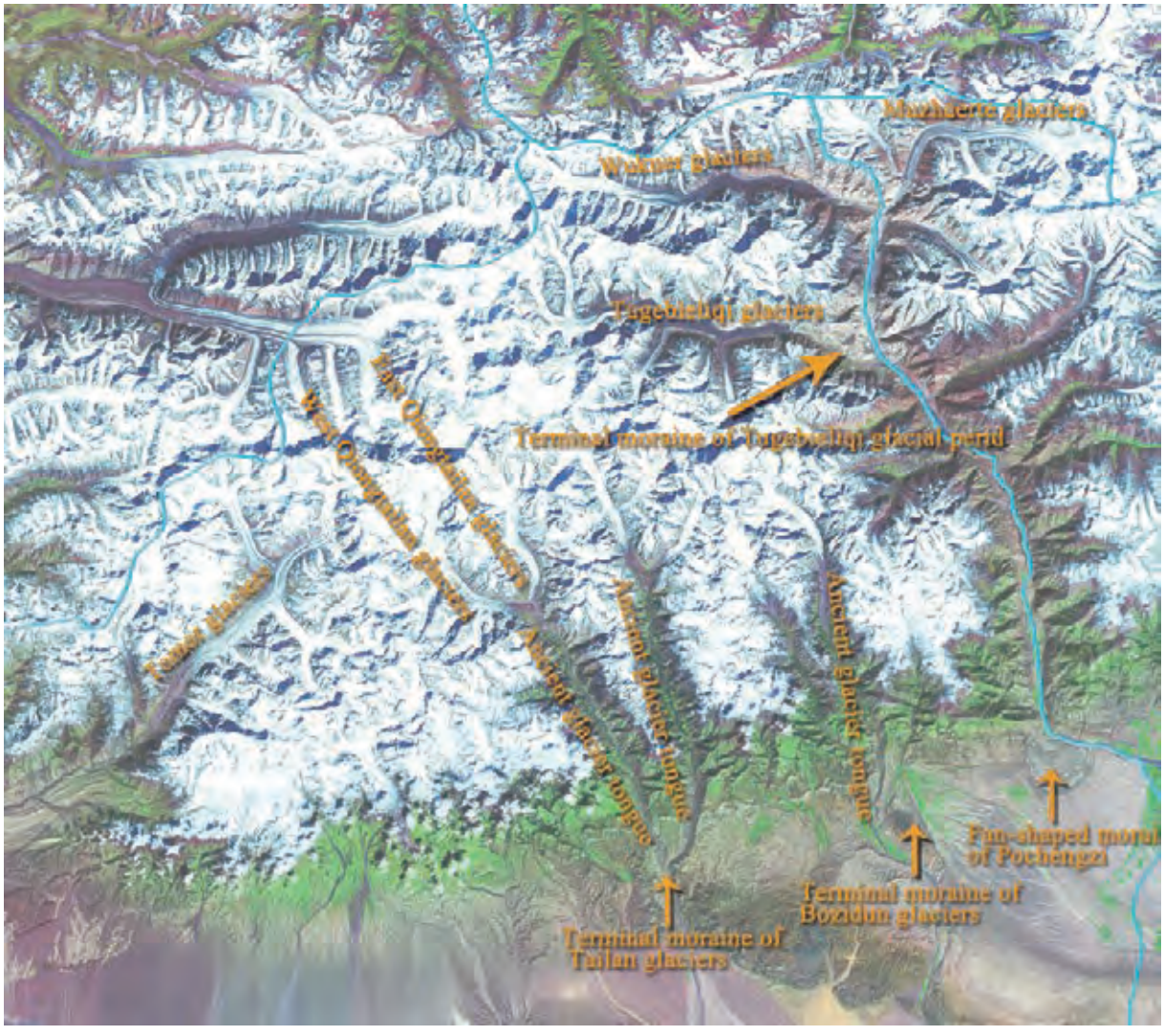


Figure 2-14 Glaciers in the Kalajun-Kuerdening component

Figure 2-13 Glaciers in the Tomur component

Figure 2-15 Glaciers in the Bogda component

2.a-2-3-4 Quaternary Glacial Landforms

In the high mountain area of Tianshan Mountains in Xinjiang between 3,000m to 5,000m, ancient glacial remnants are widely distributed. In the nominated Xinjiang Tianshan, glacial erosion landforms, such as ancient cirques, U-type valleys, arêtes, horns, whaleback rocks, sheepback rocks, ice grooves and glacial striaes, are preserved. In addition, glacial drift landforms are widespread, including glacial blocks, lateral moraines, terminal moraines, glacial moraine plains and glacial moraine hills and so on. These landforms not only have significant aesthetic values but also important scientific values, for they provide a natural laboratory for the research on the environmental evolution of the Quaternary Ice Age and inter-glacial periods. In the Quaternary period, huge glaciers developed in the nominated Tomur component and

extended from the top to the piedmont area. They formed ancient glacial landforms in the mountain valley mouth, such as the terminal moraine of the Tailan River, Bozidun terminal moraine and the Pochengzi fan-like terminal moraine and so on. In the nominated Bogda component, the Quaternary glacial erosion and glacial moraine landforms have been preserved intact. From high mountains to lower mountains, there are horns, arêtes, U-shaped valleyes, cirques, whaleback rocks, sheepback rocks, boulders, ice striaes, glacial moraines and glacial moraine-dammed lakes and so on. Of them, the Tianshan Lake is a typical alpine dammedi lake formed by blocking terminal moraines.

Figure 2-16 Pochengzi fan-like glacial moraine in Tomur

Figure 2-17 Glacial striaes in Bogda

Figure 2-18 Wetland in Youerdusi

2.a-2-3-5 Lakes and Wetlands

Lakes of Tianshan Mountains in Xinjiang are mainly distributed in the inter-mountain basins, depressions and river-ends. With the different elevations of the inter-mountain basins, lakes are distributed on different terraces. Youerdusi Basin is a high inter-montane basin, with an elevation of 2,400-2,600km. The Kaidu River meanders in through the basins forming graceful landscapes. In the center of the basins, there are swamps and lakes with an area of about 1,370km², providing perfect habitat for the existence and breeding of swans and other birds, and thus the locality is known in China as the Swan Lake. The region between 1,000-2,000m is the main area for lakes. The lake surface elevation of the Tianshan Tianchi Lake is 1,910m, with the deepest point of 102m below the water surface and an area of 2.48km^2.

2.a-2-3-6 Red Beds Landform

During the erosion and planation of the ancient Tianshan Mountains, extremely thick red lake-river sediments of the Paleogene period and Neogene period were deposited in the depression basins in the piedmont on the south slope of Tomur Peak. Under the intense effects of the neo-tectonic movement, the east-west zonal fold mountains were uplifted. Under the effects of the folding and fracturing and exogenic forces such as water erosion, the mountain rocks were incised into scattered but organized canyons and cliffs by vertical joints and differential weathering. Consequently, various landforms were developed.

Figure 2-19 Red bed landform of Tomur

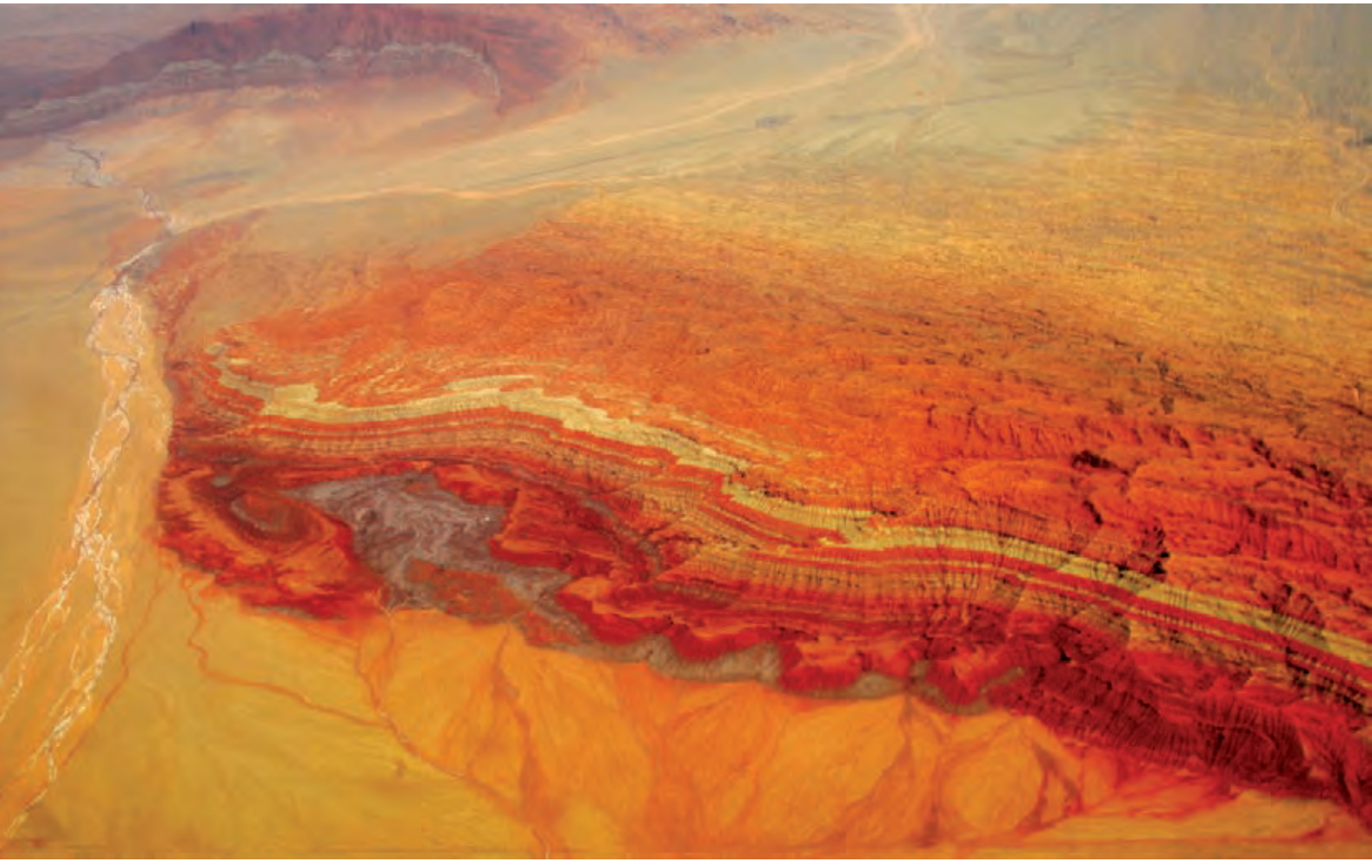


Figure 2-20 Castle-like red cliffs of Tomur

2.a-2-4 Biology and Ecology

2.a-2-4-1 Biogeography

According to the by Udvardy (1975), Xinjiang Tianshan is located in the Palaearctic Realm of the world's eight biogeographical realms and belongs to the Pamir-Tian Shan Highlands which is one of the 193 biogeographical provinces (Table 2-3, Figure 2-21).

Table 2-3 Location of Xinjiang Tianshan according to Udvardy biogeographic classification systems

No.	Biogeographical realm	Biogeographical province	Biome
2.36.12	Palaearctic Realm	Pamir-Tian-Shan Highlands	Mixed Mountain Systems

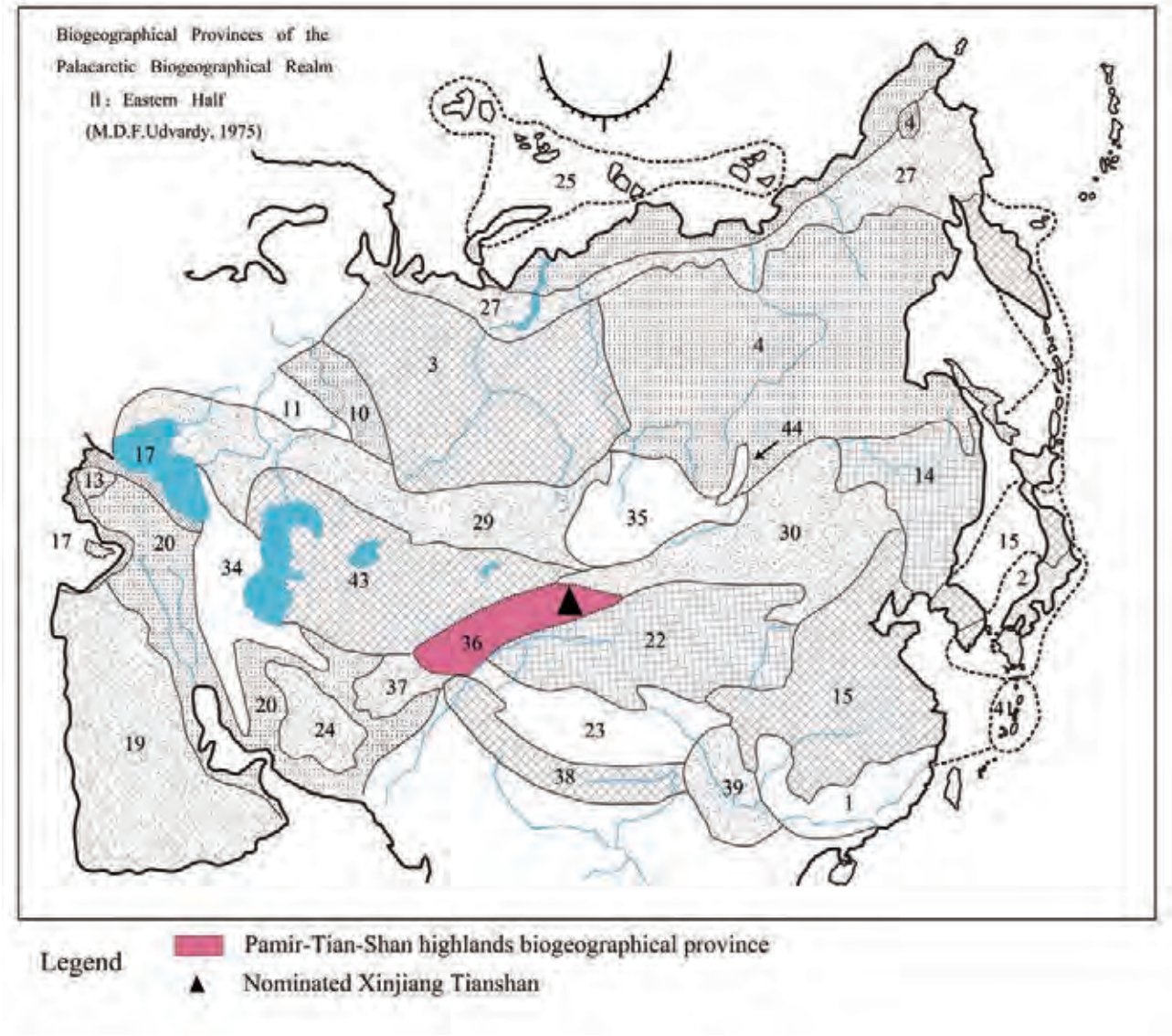


Figure 2-21 Pamir-Tian-Shan Highlands (Udvardy,1975)

2.a-2-4-2 Ecosystems

As already stated, Xinjiang Tianshan stands against the background of vast deserts, with a relative altitude difference of 4,000-6,000m. This geographical condition brings up various combinations of environment factors such as humid environment, semi-humid environment, arid environment and semi-arid environment. Distinct climate zones composed of warm temperate zone, mid-temperate zone, cold temperate zone, cold zones and alpine zone of permanent ice-snow have been formed, and an altitudinal zonality of biomes, including deserts, mountain steppe, deserts, mountain steppe, mountain forests, sub-alpine meadow, alpine meadow, alpine cushion vegetation and ice-snow zone have developed, providing good habitats and healthy living condition for wildlife, as well as resulting in unique vegetation types. Thus, complex ecosystems have developed in Xinjiang Tianshan.

(1) Habitat types

According to IUCN/SSC categories of global habitats, there are seven types of first-level IUCN/SSC habitat in the nominated site. The main habitats include forest, shrubland, grassland, and wetlands, which form diverse mixtures of terrestrial, aquatic and wetlands ecosystems (Table 2-4).

Table 2-4 First-level IUCN/SSC habitat in Xinjiang Tianshan

First-level IUCN/SSC Habitat	Nominated property
1. Forest	●
2. Savannah	●
3. Shrubland	●
4. Grassland	●
5. Wetlands (inland)	●
6. Rocky barren areas	●
7. Caves and Subterranean	
8. Desert	●
9. Sea	
10. Coastline/Intertidal	
11. Artificial–Terrestrial	
12. Artificial–Aquatic	
13.Introduced Vegetation	

(2) Ecosystems

Important ecological types of Tianshan Mountains in Xinjiang include mountain evergreen coniferous forest ecosystem, mountain deciduous coniferous forest ecosystem, mountain deciduous broad-leaved forest ecosystem, prairie ecosystem (including meadow-steppe ecosystem, dry steppe ecosystem, desert steppe ecosystem, and alpine steppe ecosystem), meadow ecosystem (including alpine meadow ecosystem, sub-alpine meadow ecosystem and montane meadow ecosystem), evergreen coniferous fruticose ecosystem, deciduous broad-leaved fruticose ecosystem, desert ecosystem and wetland ecosystem.

● Mountain evergreen coniferous forest ecosystems

The mountain evergreen coniferous forest ecosystems of Tianshan

Mountains in Xinjiang are dominated by *Picea schrenkiana* which is widely distributed, with the largest biomass. The *Picea schrenkiana* forests play the most important role in the altitudinal mountain vegetation structure and shows distinct altitudinal zonality. This forest also plays a decisive role in water conservation, soil conservation and maintenance of montane ecosystems of the Tianshan Mountains. In all, this kind of forest formation is critical for the water conservation of the *Wet Island* in the Tianshan Mountains. The *Picea schrenkiana* forests are distributed from the South Tianshan Mountains, in the east direction, all the way to the Balikun Mountains which are located to the north of the Hami basin, This distance from the west to the east is 1,700km. *Picea schrenkiana* are a continuous forest zone in the shady regions of the north slope of the Tianshan Mountains and dominate the mid-mountain and lower sub-alpine zone. On the northern slope, the lower distribution limit of *Picea schrenkiana* is 1,500-1,900m and the upper distribution limit is 2,700-2,800m. On the south slope, the lower distribution limit of *Picea schrenkiana* is usually over 2,300m and the upper distribution limit is 3,000m. However, no continuous distribution of *Picea schrenkiana* exists on the south slope of the Tianshan Mountains.

Figure 2-22 Mountain evergreen coniferous forest ecosystems in kuerdening

Because the habitats between the eastern part and western part of the

Tianshan Mountains, as well as that of the south and north slopes, is significantly different, community types of *Picea schrenkiana* are varied. The varieties include: fruticose Tianshan-spruce forests, weedy Tianshan-spruce forest, mossy Tianshan-spruce forest, mixed broadleaf Tianshan-spruce forest, cypress thicket Tianshan-spruce forest and alpine, subalpine weedy Tianshan-spruce forests. The Kuerdening component is where the endemic *Picea schrenkiana* is concentrated in Tianshan Mountains.

● Mountain deciduous coniferous forest ecosystems

The mountain deciduous coniferous forests of Tianshan Mountains in Xinjiang feature Siberian larch forest associations. Larch forests are only distributed along the Balikun Mountains, the north slope of the Kalik Mountains and the south slope of the Bogda Mountains in the east. The larch forest communities are mainly composed of grass-Siberian larch, fruticose-Siberian larch and subalpine grass-Siberian larch forest.

● Mountain deciduous broad-leaved forest ecosystems

The mountain deciduous broad-leaved forest ecosystems mainly include mountain wild fruit forests, mountain small-leaved forests and the river-valley poplar forests. Among them, the Tianshan wild fruit forest is a special forest ecosystem which is a characteristic of oceanic deciduous

Figure 2-23 Wild fruit forest

forests. There are large scale distribution of wild fruit forests in Tianshan Mountains in Xinjiang and they are an important part of the Central Asian wild fruit forests. There are many relic species living in the wild fruit forests that can date back to the Paleocene period. Thus, Xinjiang Tianshan is one of the key areas which is unmatched in biological diversity in arid zones. The wild fruit forests mainly include three types of plant formation: Form. *Malus sieversii,* Form. *Armeniaca vulgaris* and Form. *Juglans regia.* The Kuerdening component is where the typical mountain deciduous broad-leaved forest ecosystems are distributed.

● Steppe ecosystems

The steppe ecosystems include desert steppe, arid steppe, mountain steppe and alpine steppe ecosystems. Steppes occur widely on both the south and north slopes of Tianshan Mountains in Xinjiang. On the north slope from west to east, the altitude of steppe distribution gradually goes up with the more arid climate. In the Ili region, the altitude of grassland distribution is 1,000-1,500m. The altitude at the mid part of the north slope is 1,200-1,800m, and in the Qitai and Balikun regions, the altitude goes up to 1,700-2,100m. On the south slope, the steppe distribution is broader in comparison with that of the north slope. While at the south slope, because of its arid climate, mesophytic mountain meadow and subalpine meadow both disappear and are replaced by arid steppe between the altitude of 1,600-2,400(2,800) m. The most typical steppes on the north and south slopes are distributed in the Tomur and Kalajun components.

Figure 2-24 Mountain steppe

Figure 2-25 Sub-alpine meadow

● Meadow ecosystems

The meadow ecosystems of Tianshan Mountains in Xinjiang include alpine meadow, sub-alpine meadow and mountain meadow ecosystem. Meadow vegetation grows widely with three subtypes existing in the north slope: mountain meadow, subalpine meadow and alpine meadow. As the south slope is more arid, mountain meadow and subalpine meadow are replaced by mountain steppe and alpine steppe in the altitudinal vegetation structure. There is only alpine meadow on the south slope while the lower distribution limit at the south slope is higher than that of the north slope. Lowland meadow only exists in some intermountain basins on the south slope on a small scale. Mountain meadow mainly exists at mid-mountain zone on the north slope, which is above the steppe zone and below the spruce forests, from 1,600 (1,800)-1,900 (2,100)m. The altitude of subalpine meadow distribution is 2,500-3,000m, and, at the bottom of the distribution, subalpine meadow intermingles with spruce forests or lies justabove the spruce forests. Alpine meadow on the north slope exists above 2,700m and the upper limit of its distribution neighbors the ice-snow zone. On the south slope, even the lower limit of its distribution is above 2,800m. Alpine meadow is a kind of

plant community based on various frost-resistant *Kobresia*. There is also some distribution of alpine flowered meadow, which is mainly comprised of weed species and mostly exists on the north slope. The most typical meadow ecosystems on the north and south slopes are distributed in the nominated Tomur and Kalajun components.

● Evergreen coniferous fruticose ecosystem

Valuable species in the mountain evergreen coniferous shrub communities include species belonging to *Sabina*, *Juniperus* and *Pinus*. These plants have small stems and sometimes grow creeping along the ground, so they can form short but dense (or thick) shrub. They are adaptable against mountain ecological conditions such as strong wind, low temperature, drought and strong radiation. Mountain evergreen coniferous shrub communities are mainly composed of *Juniperus sibirica* scrub, *Sabina pseudosabina var, Turkestanica* scrub and *Sabina vulgaris* scrub. The most typical evergreen coniferous fruticose ecosystems in Xinjiang Tianshan are distributed in the Tomur and Bogda components.

Figure 2-26 Evergreen coniferous fruticose in Bogda

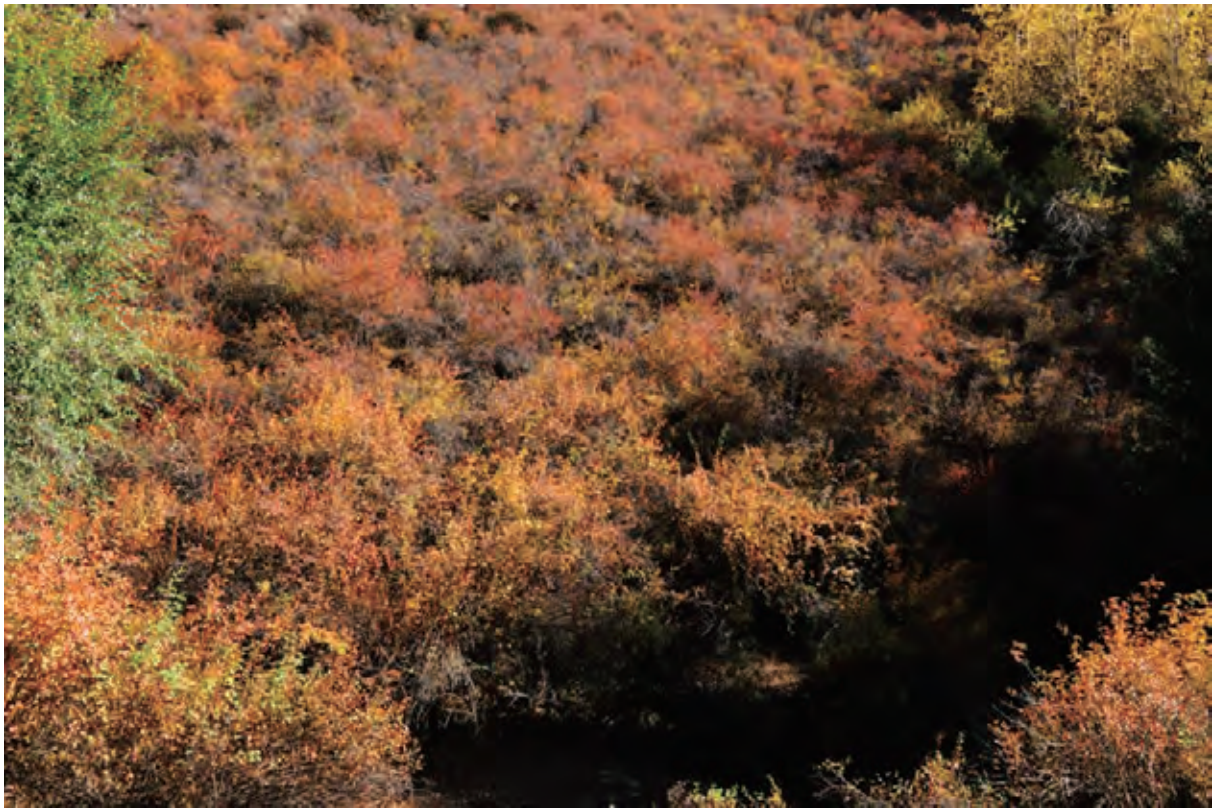


Figure 2-27 Deciduous broad-leaved fruticose in Bogda

● Deciduous broad-leaved fruticose ecosystem

The valuable species of the temperate deciduous broad-leaved fruticose ecosystem are shrubs that are denuded of their leaves in winter. This kind of vegetation mainly grows in mountains and hilly regions in temperate and warm temperate zones of Tianshan Mountains in Xinjiang. Some of this type of vegetation are original and others are secondary. Most of the shrubs belong to secondary vegetation that is formed after forest degradation, as well as being a relatively stable vegetation ecosystem. The soil below these communities is mostly dark brown soil, brown soil and cinnamon, or brown earth in mountains or hilly region, and there is mainly light-salted alkali soil in the plains. The main composition includes, *Malus baccata*, *Prunus padus* scrub, *Hippophae rhamnoides* scrub, *Rosa* spp., *Cotoneaster* spp. scrub, *Myricaria spuamosa* scrub and *Betula rotunaifolia* scrub etc. The most typical deciduous broad-leaved fruticose ecosystem in nominated Xinjiang Tianshan is in the Bogda and Kuerdening components.

Figure 2-28 Wetland in Bayinbuluke

Wetland ecosystem

Wetland ecosystems of Tianshan Mountains in Xinjiang mainly include rivers, lakes, and marshes. The Bayinbuluke component is the biggest marsh wetland in Tianshan Mountains in Xinjiang. This is a typical alpine wetland ecosystem in an arid region in the temperate zone, and includes alpine marsh wetland, alpine meadow and alpine steppe.

Desert ecosystems

There are various types of desert communities existing in the foothill zones along the south and north slopes of the Tianshan Mountains. These desert communities constitute the baseband of the altitudinal vegetation structure of the Tianshan Mountains. The most typical desert vegetation includes fruticose desert, semi-fruticose desert and small-semi-fruticose desert. Small-semi fruticose deserts are mainly composed of various *Seriphidium* spp. dominating the northern slope with the upper limit of its distribution being 1,200-1,300m. There is mainly fruticose desert or semi-fruticose desert growing on the southern slope of the Tianshan

Figure 2-29 Semi-fruticose desert in Tomur

Mountains and the upper limit of desert distribution is generally 1,500m, the maximum upper limit up to 1,800m. Desert ecosystems on north and south slopes are most typically distributed in the Tomur and Bogda components.

2.a-2-4-3 Altitudinal Zonality

The natural conditions of the Tianshan Mountains vary greatly with altitude and in north-south and east-west directions. As a result, the altitudinal zonality is different for the south, north and the west parts of the Tianshan Mountains in Xinjiang. There are three typical patterns of altitudinal zonality in Xinjiang Tianshan (Table 2-5).

Table 2-5 Altitudinal zonality of Xinjiang Tianshan

North Slope	South Slope	West Ili Basin
Alpine ice-snow zone	Alpine ice-snow zone	Alpine ice-snow zone
Alpine cushion vegetation	Alpine cushion vegetation	Alpine cushion vegetation
Alpine meadow	Alpine meadow	Alpine meadow
Sub-alpine meadow	Sub-alpine meadow	Sub-alpine meadow
Mountain coniferous forest	Mountain steppe	Mountain coniferous forest
Mountain steppe	Temperate desert steppe	Mountain steppe
Temperate desert (baseband)	Warm temperate desert (baseband)	Temperate desert steppe (baseband)

(1) Desert zone (Baseband)

The baseband determines the structural characteristics and the position of the altitudinal zonality. Temperate desert is the baseband of the altitudinal zonality along the north slope of Tianshan Mountains in Xinjiang, warm temperate desert zone is the baseband of the altitudinal zonality on the south slope, temperate desert steppe is the baseband of altitudinal zonality of the Ili basin which is in the western part of Tianshan Mountains in Xinjiang.

The zonal soil of temperate desert is made of mountain grey desert soil. The vegetation is typically represented by Form. *Seriphidium borotalense*, Form. *Reaumuria soongorica and* Form. *Haloxyon ammodendron*, and the animals mainly include *Eremias multiocellata, Phrynocephalus grumguizimailoi, Vulpes vulpes, Felis silvestris ornata, Felis manul, Gazella subgutturosa, Meriones meridianus*, *Meriones tamariscinus*, *Meriones libycus, Rhombomys opimus.*

The zonal soil of the warm temperate desert is mountain brown desert soil. The vegetation is mainly composed of semi-fruticoses and small-brush desert, such as Form. *Gymnocarpos przewalskii*, Form. *Reaumuria soongorica,* Form. *Anabasis aphylla*, Form. *Ephedra przewalskii* and Form. *Salsola junatovii*. The animals mainly include *Natrix tessellate*, *laudakia stoliczkana Eremias vermiculata*, *Eremias multiocellata*, *Phrynocephalus forsythia, Gazella subgutturosa, Meriones meridianus, Dipus sagitta.*

Figure 30 Warm temperate desert zone in Tomur

The zonal soil of temperate desert steppe is made up of mountain grey calcium soil. The vegetation is typically represented by *Stipa capillata, Stipa glareosa, Seriphidium gracilescens, Seriphidium terrae-albae* and *Nanophyton erinaceum*. The animal species mainly include *Rana chensinensis, Terotoscincus scincus, Eremias velox, Glaydius intermedius, Vipera ursinii, Psammophis lineolatus, Natrix tessellate* and *Meriones tamariscinus, Meriones libycus*, etc.

(2) Mountain steppe zone

Mountain steppes have developed in the lower parts of Tianshan Mountains in Xinjiang and there is a large and continuous distribution of mountain grassland on both the south and north slopes as well as in the Ili basin, making it the dominant altitudinal zone. The zonal soil is mainly mountain chernozems and chestnut soils. Plant species are abundant, mainly including *Stipa* spp., *Festuca* spp., *Artemisia* spp., *Alopecurus* spp., *Elymus* spp., *Agropyron* spp., *Poa* spp., *Phlomis* spp., *Anemone* spp., *Pulsatilla* spp., *Astragalus* spp. etc. Because this zone ineracts with the montane coniferous forest zone, animals which inhabit the montane coniferous forest can also be found in the upper parts of this zone. The animals in this zone mainly include rodents, such as *Ellobius talpinus, Sicista tianschanica, Alticola argentatus, Microtus socialis, Microtus arvalis, Lagurus lagurus and Apodemus sylvaticus, Mus musculus,* etc. In addition, there are carnivores taking the rodents as major food,

Figure 2-31 Mountain steppe zone

such as: *Mustela nivalis, Mustela eversmanni, Mustela erminea, Meles meles, Felis manul pallas,* etc. The birds are mainly steppe birds, forest birds and some prey birds taking rodents as major food. For the steppe birds and forest birds, there are *Melanocorypha bimaculata, Galerida cristata, Eremophila alpestris, Alauda arvensis, Carpodacus erythrinus, Pyrrhocorax pyrrhocorax,* etc. For the prey birds taking rodents as major food, there are *Haliaeetus leucoryphus, Aquila rapax, Accipiter gentiles, Circus macrourus, Falco cherrug, Falco subbuteo, Falco tinnunculus,* etc.

(3) Montane coniferous forest zone

Montane coniferous forests are distributed as an continuous altitudinal zone on the north slope of Tianshan Mountains in Xinjiang and in the Ili basin. On the southern slope, coniferous forests usually have only a patchy distribution. The zonal soil is mountain grey-brown forest soil and the vegetation communities are dominated by *Picea schrenkiana.* In some parts of the lower montane coniferous forests, such as shady slopes, half shady slopes and river terraces, mountain broadleaved deciduous forests (*Betula tianschanica, Populus tremula*), montane wild fruit forests (*Malus sieversii*) and river-valley forests (*Populus* spp., *Salix* spp.) are interspersed with the montane coniferous forests. The common undergrowth plants include *Cotoneaster melanocarpus, Sorbus tianschanica, Aegopodium alpestre, Thalictrumcollinum* etc..

Figure 2-32 Montane coniferous forest zone

This montane coniferous forest zone boasts the most abundant animal population of Tianshan Mountains in Xinjiang, with thousands of species of insects. The common species of forest birds are: *Certhia familiaris, Corvus corone, Pica pica, Oriolus oriolus, Accipiter nisus, Falco subbuteo, Falco naumanni, Falco tinnunculus, Aquila chrysaetos, Aquila heliacal, Milvus korschun, Columba palumbus, Streptopelia orientalis, Asio otus, Bubo bubo, Jynx torquilla, Picoides majo, Lyrurus (Tetrao) tetrix,* etc. In this zone, there are forest and steppe animals and ones which live at the lower limit of the sub-alpine meadows, such as: *Sus scrofa, Meles meles tianschanensis, Mustela niminea, Mustela eversmann, Mustela altaica, Martes foina, Lynx lynx, Canis lupus, Vulpes vulpes, Ursus arctos isabellinus,* etc. Rodents, such as *Clethrionomys frater, Clethrionomys centralis, Microtus gregalis, Lagurus lagurus, Marmota bobak, Lepus capensis, Sicista tianschanica,* etc, are the typical ones of this zone, and *Microtus sppm, Lagurus lagurus, Marmota bobak, Lepus capensis* and *Sicista tianschanica* usually inhabit the grasslands among the forests.

(4) Sub-alpine meadow zone

Sub-alpine meadows are widely distributed in the western region of Tianshan Mountains in Xinjiang and the sub-alpine zone of its north slope. The zonal soil is made of sub-alpine meadow soil. The vegetation

Figure 2-33 Sub-alpine meadow zone

formations are dominated by forb meadows and the common plants include *Leontopodium* spp., *Phlomis alpine, Helictotrichon hookeri, Galium boreale, Aegopodium alpestre, Anthoxanthum odoratum subsp. alpinum, Polygonum viviparum, Thalictrum minus, Geranium saxatile* and so on. This zone merges with the lower montane coniferous forest and animals that inhabit grassland and forests coexist in this zone. Many species of animals are abundant and there is an increase of the number of insect species, such as bees, butterflies, flies and *Tabanidae. Pyrrhocorax pyrrhocorax, Pyrrhocorax graculus,* and *Aquila chrysaetos, Accipiter gentiles, Falco cherrug and Falco tinnunculus* can be frequently observed. Typical rodents include *Lagurus lagurus* and *Ellobius talpinus.* Larger animals, including *Ursus arctos, Sus scrofa, Lynx lynx, Mustela eversmanni, Canis lupus* and *Vulpes vulpes,* which take on spotty distribution at the upper limit of forest as well as animals with non-fixed habitats, usually inhabit this zone.

(5) Alpine meadow zone

Alpine meadows occur widely in the alpine zones of Tianshan Mountains in Xinjiang. The zonal soil is alpine meadow soil which supports alpine meadow vegetation, composed mainly of *Kobresia(Kobresia humilis, Kobresia capillifolia), Carex(Carex stenocarpa, Carex melanantha),*

Figure 2-34 Alpine meadow zone

Polygonum(Polygonum viviparum), etc. The forb meadows in flower are very colorful and the number of species of *Lepidoptera*, such as bees and *Rhopalocera*, sharply increase. This zone is the main feeding grounds of PASSERIFORMES, such as *Alaudidae, Prunellidae, Sturnus roseus, Leucosticte brandti* and *Pyrrhocorax pyrrhocorax.* FALCONIFORMES such as, *Aegypius monachus, Gyps himalayensis, Gypaegus barbatus*, and *Milvus korschun* can frequently be seen. This zone is also an important habitat for RODENTIA such as *Marmota bobak, Cricetulus migratorius, Alticola argentatus* and so on. Because of the increase of herbivores, CARNIVORA such as *Canis lupus, Ursus arctos, Vulpes vulpes and Martes foina* usually exist in this zone to prey on them.

(6) Alpine cushion vegetation zone

Below the ice-snow zone, there is a large scale alpine cushion vegetation zone which is the second highest zone in the altitudinal zonality of these

Figure 2-35 Alpine cushion vegetation zone

arid mountains. The soil of this zone is made of mountain primitive soil, and the plants mainly include lower plants such as lichens and bryophytes. It is very cold in this region. Patches of alpine meadow and mat vegetation are sparsely distributed among rocks. The main plants include: *Saussurea involucrate, Thylacospermum caespitosum, Sibbaldia terandra, Potentilla biflora* and so on. The number of species of insects and animals increases, such as *Tetraogallus himalayensis, Pyrrhocorax graculu* and as well as *Capra ibex* and *Ovis ammon* which are the main prey of snow leopards.

(7) Ice-Snow zone

There is a large scale ice-snow zone, at the top of the altitudinal zonality. Because of permanent snow and ice accumulation, soil has not developed and there are no plants and rare animal species. The "cold type" species that live on animals inhabiting alpine mat plants, sub-alpine meadow and grassland, such as *Uncia uncia, Gyps himalayensis, Tetraogallus himalayensis* and *Pyrrhocorax graculus,* occasionally appear in this zone.

Figure 2-36 Ice-snow zone

2.a-2-4-4 Plants

(1) Flora

Tianshan Mountains in Xinjiang is located at the intersection of Central Asia, Mongolia, Siberia, and China–Himalaya. The transition in natural and geologic environments has provided the opportunity for the various flora types to interact and specialise. Thus, the nominated properties are featured by transitivity and many species of plants are spatially concentrated. In comparison with the Altay Mountains, Kunlun Mountains and Altun Shan Mountains within Xinjiang Uygur Autonomous Region, Xinjiang Tianshan has a more abundant flora, totalling 2,622 species of wild vascular plants. Of these species, there are 2,566 kinds of angiosperms which account for 98.44% of the total number.. The flora of Xinjiang Tianshan is typical of the temperate zone. There are 566 species in 65 genera of spermatophyte that are widespread all over the world and 29 genera belonging to the tropics. Nearly all the remaining species are temperate types. The exchange of plant species between Tianshan Mountains in Xinjiang and Central Asia, the Mediterranean and West Asia is relatively more than that with East Asia. Of the distribution of spermatophytes, there are 270 species of Central-Asia type (20.14% of the total number of genera). There are 114 species of Mediterranean types and West Asia-Central Asia type (accounting for 15.37% of the total number of genera). There are only 13 species of East-Asian types, which account for 1.82% of total genera.

(2) Vegetation types

According to the classification principles of *Vegetation in China*, the vegetation of Xinjiang Tianshan can be divided into 9 vegetation types, 25 vegetation subtypes and 82 formations (Table 2-6). According to the comparative analysis with other huge mountains in temperate arid areas, Xinjiang Tianshan has the most vegetation types.

Table 2-6 Vegetation types in Xinjiang Tianshan

Vegetation	Sub-vegetation	Formation
I. Mountain coniferous forests	1. Mountain evergreen coniferous forests	(1) Form.*Picea schrenkiana*
	2. Mountain deciduous conifers	(1) Form.*Larix sibirica*
II. Broadleaved deciduous forest	1. Mountain deciduous broadleaved forest	(1) Form. *Betula pendula*
		(2) Form.*Betula tianschanica*
		(3) Form.*Populus tremula*
	2. Mountain wild fruit forest	(1) Form.*Malus sieversii*+*Armenica vulgris*
		(2) Form.*Juglans regia*
	3. River-valley deciduous broadleaved forest	(1) Form. *Fraxinus sogdiana*
		(2) Form. *Populus densa*
		(3) Form. *Populus laurifolia*
	4. Desert riparian forest	(1) Form. *Populus euphratica*
		(2) Form.*Ulmus pumila*
		(3) Form. *Elaeaguns oxycarpa*
III. Evergreen coniferous thickets	1. Evergreen coniferous thickets	(1) Form. *Juniperusu sibirca*
		(2) Form.*Sabina pseudosabina*
		(3) Form. *Juniperus sabina*
IV. Broad-leaved deciduous thickets	1. Alpine deciduous broad-leaf thickets	(1) Form. *Caraganajubata*
	2. Temperate deciduous broad-leaved thickets	(1) From. *Salix alatavica*
		(2) Form. *Pentaphylloidesfruticosa*
		(3) Form. *Spiraea hypericifolia*
		(4) Form. *Caragana* spp.
		(5) Form. *Rosa* spp.
		(6) Form. *Salix* spp.
		(7) Form. *Hippophae rhamnoides*
	3. Saline thickets	(1) Form.*Tamarix* spp.
		(2) Form. *Nitraria* spp.
		(3) Form. *Lycicum ruthenicum*

V. Grassland	1. Alpine steppe	(1) Form.*Stipa purpurea*
		(2)Form.*Stipa subsessiliflora* subsp.*subsessiliflora*
		(3) Form. *Festuca ovina* subsp.*sphagnicola*
	2. Meadow	(1) Form. *Bothriochloa ischaemum*
		(2) Form.*Stipa kirghsorum*
		(3) Form. *Stipa capillata*
		(4) Form. *Festuca alatavica*
		(5) Form. *Poa* spp.
	3. Arid Steppe	(1) Form. *Stipa capillata*
		(2) Form. *Festuca valesiaca* subsp.*sulcata*
		(3) Form. *Festuca ovina*
		(4) Form.*Stipa krylovii*
		(5) Form. *Artemisia frigida*
		(6) Form. *Agropyron cristatum*
	4. Desert steppe	(1) Form. *Stipa glareosa*
		(2) Form. *Stipa caucasica*
VI. Desert	1. Small arbors desert	(1) Form. *Haloxyon persicum*
		(2) Form. *Haloxylon ammodendron*
	2. Fruticous desert	(1) Form. *Ephedra przewalskii*
		(2) Form. *Zygophyllum xanthoxylum*
		(3) Form.*Convolvulus fruticosus*
		(4) Form. *Calligonum* spp.
		(5) Form. *Atraphaxis spinosa*
		(6) Form. *Ammodendron bifolium*
	3. Semi-fruticoses and small-brush desert	(1) Form. *Reaumuria soongarica*
		(2) Form.*Ceratoides latens*
		(3) Form. *Gymnocarpos przewalskii*
		(4) Form. *Nanophyton eriaceum*
		(5) Form. *Anabasis* spp.
		(6) Form. *Salaola* spp.
		(7) Form. *Sympegma regelii*
		(8) Form. *Iljinia regeli*
		(9) Form. *Seriphidium* spp.
	4. Juicy woody salty-wood desert	(1) Form. *Halocnemumstrobilaceum*
		(2) Form. *Kalidium schrenkianum*

VII. Meadow	1. Alpine meadow	(1) Form. *Kobresia* spp.
		(2) Form. *Carexspp*.
		(3) Form.*variiherbae*
	2. Sub-alpine meadow	(1) Form. *variiherbae*
	3. Mid-montain meadow	(1) Form. *Festuca* spp.,*varii herbae*
		(2) Form. *variiherbae*
	4. Lowland and washland meadow	(1) Form.*Calamagrostispseudophragmites* subsp. *pseudophragmites*
		(2) Form. *Cynodondactylon*
		(3) Form. *Sophora alopecuroides*
		(4) Form. *Achnatherum splendens*
		(5) Form.*Phragmitrs australis*
		(6) Form.*Leymus secalinus*
		(7) Form. *Aeluropus pungens*
		(8) Form.*Alhagi sparsifolia*
		(9) Form. *Karelinia caspica*
VIII. Marshes and aquatic vegetation	1. Mire/swamp vegetation	(1) Form.*Carex* spp.
		(2) Form. Phragmitrs australis
		(3) Form.*Typha* spp.
	2. Aquatic vegetation	
IX. Alpine vegetation	1. Alpine cushion vegetation	(1) Form. *Thylacospermum caespitosum*
		(2) Form. *Potentilla biflora*
	2. Alpine debris conesparse vegetation	

(3) Vegetation distribution

Tianshan Mountains in Xinjiang has diverse landforms and varied soil types and the climate exhibits significant altitudinal divergence. The

diverse environment and habitats are suitable for various plants, so the species and vegetation types are abundant. From the lower to the higher mountains and from west to east, the vegetation pattern and distribution show significant diversity.

- All the montane vegetation zones begin with desert vegetation at the baseband. The desert vegetation covers the broad platform and vast alluvial plains and extends over all the piedmont alluvial plains, ancient alluvial cones, deltas and terraces. In some regions, the desert vegetation even extends up the low mountains and piedmont mountains.

- Mountain steppe vegetation grows well in all the montane vegetation zones. Along the north slope of Tianshan Mountains in Xinjiang, grassland vegetation generally grows from the low-mountains to mid-mountains. Along the south slope, mountain forest and meadow zones hardly exist, but mountain steppe dominates most altitudinal vegetation zones. Furthermore, mountain grassland goes high up the southern slope due to the invasion of the desert in the lower altitude zones.

- The distribution of mesophytic mountain forest and meadow is limited, only existing in the moist zone of the windward slope of the relatively large hills. In areas that are far away from the moist currents or rain, mountain forests and meadows take on the characteristics of steppes to different degrees and change into a mountain forest - steppe zone with a combination of patches of meadow and steppe vegetation. Along the south slope of the Tianshan Mountains in Xinjiang, which is extremely continental, the zone of mountain forest and meadow gradually disappears, with only small patches of forests existing in part of the sub-alpine steppe.

- From north to south horizontally, the altitude limitations of each mountain vegetation type increase and, from wet mountains to arid mountains; there is also an apparent increase.

- From north to south, as it becomes more arid, the hierarchical structure of montane vegetation zonality is simplified. The forest and meadow zones gradually shrink and even disappear while, at the same time, steppe and desert correspondingly enlarge. Finally, deserts dominate the vegetation zonality.

(4) Types of plants

There are 2,622 species of 635 genera from 106 families of vascular plants in Xinjiang Tianshan (Table 2-7).

Table 2-7 Vascular plants in Xinjiang Tianshan

Class	Families	Genus	Species	Percentage (%)
Fern	14	19	41	1.56
Gymnosperm	3	4	15	0.57
Angiosperm	89	612	2,566	97.87
Total	106	635	2,622	100

(5) Rare and endangered plants

There are 110 species of rare and endangered plants in Xinjiang Tianshan. Among them, there are 18 species listed on the Red List by IUCN (2010), such as *Ammopiptanthus nanu* (CR), *Cistanche deserticola* (CR), *Betulatianschanica* (EN), *Armeniaca vulgaris* (EN), *Tulipa sinkiangensis* (EN), *Malus sieversii* (VU) and so on. There are 16 species included in the Appendix I, II and III of CITES (2010), such as *Neottia camtschate*, *Corallorhiza trifida Chatel*, *Listera ovata*、*Epipactis helleborine*, *Goodyera repens*, *Platanthera minutiflora*, *Orchis 1atifolia*, *Orchis umbrosa* and *Orchis cruenta* (Table 2-8).

Table 2-8 Rare and endangered plants in Xinjiang Tianshan

Class	Included in IUCN red list (2010)	Included in CITES list (2010)
Fern	-	-
Gymnosperm	4	-
Angiosperm	14	16
Total	18	16

(6) Endemic species

Due to the special location, diverse landforms and advantageous climate of Xinjiang Tianshan, there are abundant endemic plant species, 118

Figure 2-37 *Cistanche deserticola*

Figure 2-40 *Zygophyllum kaschgaricum*

Figure 2-38 *Populus pruinosa*

Figure 2-41 *Epipactis palustris*

Figure 2-39 *Berberis kaschgarica*

Figure 2-42 *Orchis fuchsia*

species described to date accounting for 4.50% of the total number of wild vascular plants in the nominated property (Table 2-9). They include: *Asplenium tianshanicum, Salix pyrolifolia, Calligonum roborovskii, Delphinium wuqiaense, Arabidopsis tuemurica, Ferula sinldangensis, Pyrola xinjiangensis, Physochlaina capitata, Hippolytia kaschgarica, Seriphidium borotalense, Saussurea tuoliensis, Saussurea involucrata, Triticum petropavlovskyi, Ixiolirion songaricum* and *Tulipa sinkiangensiss.*

Table 2-9 Number and percentage of endemic plants in Xinjiang Tianshan

Class	Total species of plants	Number of endemic species	Percentage of endemic species (%)
Fern	41	7	17.10
Gymnosperm	15	0	0
Angiosperm	2,566	111	4.33
Total	2,622	118	4.50

(7) Relic species

Tianshan Mountains in Xinjiang was an important biological refuge in the hinterland of Eurasia during the Quaternary glaciation. In the nominated

Figure 2-43 *Pyrola xinjiangensis*

Figure 2-44 *Hippolytia kaschgarica*

Figure 2-45 *Ixiolirion songaricum*

site, there are many montane relic species remaining, including relic broad-leaved wild fruit forests and lots of plants of *Ephedra Tourn. ex L., Artemisia.spp* and *Chenopodiaceae* (Table 2-10). The nominated site is the sole centre of origin of wild European Prunus, which is now in imminent global danger. For example, *Ammopiptanthus nanu*, which belongs to Central Asia biogeographically, is a unique evergreen broad-leaved shrub in the modern desert. It is also a climatic relic species and 'living fossil' that reflects the process of climate change in this area. It has the same ancestor with *Piptanthus* which belongs to China - Himalayan biogeographically. *Gymnocarpos przewalskii*, which belongs to the *Caryophyllaceae*, is a relic species and has its origins in the ancient Mediterranean flora; its existence indicates that this area was part of the original ancient Mediterranean and great changes subsequently happened to the terrain.

Table 2-10 Relic plants in Xinjiang Tianshan

Class	Families	Genus	Species
Fern	1	1	1
Gymnosperm	3	4	5
Angiosperm	31	73	88
Total	35	78	94

Figure 2-46 *Ephedra przewalskii*

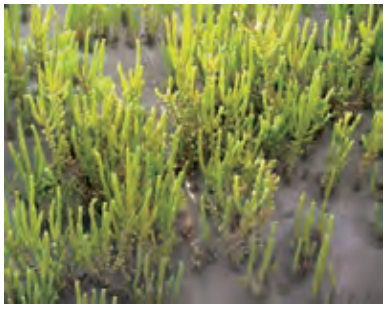


Figure 2-47 *Halocnemum strobilaceum*

Figure 2-48 *Cerasus tianschanica*

Figure 2-49 *Gymnocarpos przewalskii*

Figure 2-50 *Reaumuria kaschgarica*

Figure 2-51 *Ceratocarpus arenarius*

2.a-2-4-5 Animals

(1) Fauna

The geographical distribution of fauna in Xinjiang Tianshan belongs to the Palearctic Realm, the Central-Asia Subrealm, the Mongolia-Xinjiang Region and Tianshan Mountian Subregion. As for wild animals, especially birds and mammals, Tianshan Mountains in Xinjiang is a barrier to species exchange between the Altay Mountains in the north and Kunlun-Altun Mountains in the south, while it also bridges the two regions for species exchange. As for terrestrial vertebrate fauna, it belong to the Palaearctic type and Central-Asia type, while mixed with Plateau, Northeast type and Oriental type. The birds and mammals belonging to the Palaearctic region dominate the fauna of Xinjiang Tianshan (Table 2-11), reflecting the old age of the biom and the diversity of wild animal species. Mammals in the nominated site all belong to the Palearctic Realm and some belong to Northern widely-distributed species with *Cervus elaphus, Capreolus caprelous, Ursus arctos, Microtus arualis* etc. being of Eurasian Northern Forest types, which is in sharp contrast with the surrounding Central Asian desert fauna.

Table 2-11 Geographical composition of terrestrial vertebrates of Xinjiang Tianshan

Type	Amphibians	Reptiles	Birds	Mammals	Total
Total Species	6	32	370	102	510
Palaearctic type (U)		4	110	30	144
Holarctic type (C)			62	9	71
Northeast type (M)			16		16
Northeast-NC type (X)	1				1
Central-Asia type (D)	3	28	43	44	118
Plateau type (P)			21	8	29
Himalaya-Hengduan Mountains type (H)			4	1	5
South-China type (S)			1		1
Oriental type (W)			11	2	13
Northern widely-distributed type (O)	2		102	8	112

(2) Animal species

There are 550 species of wild vertebrate animals, belonging to 90 families of 36 orders in the nominated site (Table 2-12).

Table 2-12 Wild vertebrate animals in Xinjiang Tianshan

Class	Orders	Families	Genera	Species	Percentage (%)
Fishes	6	10	30	40	7.27
Amphibians	2	3	3	6	1.09
Reptiles	2	8	16	32	5.82
Birds	19	52	163	370	67.27
Mammals	7	17	64	102	18.55
Total	36	90	276	550	100.00

(3) Mammals

Based on survey and existing scientific research, there are 102 species of mammals in Xinjiang Tianshan, including a large number of rare and endangered species such as *Panthera uncia, Ursus arcios, Martes foina, Lynx lynx, Felis manul. Capra sibirica, Ovis ammon, Ochotona iliensis, Vormela peregusna, Mustela altaica,* etc.

● Snow leopard *Uncia uncia (Panthera uncia)*

Figure 2-52 *Uncia uncia*

Snow Leopard, a large and rare alpine mammal, belongs to the cat family of Carnivora. They often inhabit the permanent snow line where there are open rocky areas, living in pairs at an elevation of 2,000-6,000m. They also occasionally appear at the low mountain grassland zone, at an elevation of 600-1,500m. They mainly live on Capra ibex, argali, blue sheep, snowshoe, marmot and other rodents. Tianshan Mountains in Xinjiang is the typical region

where the snow leopards' distribution is most concentrated, with the largest population in Central Asia, and Tomur region is the most typical zone of leopards' distribution. According to recent research by George Shaller and Maming etc, the population of snow leopards in Xinjiang Uygur Autonomous Region is only about 700 to 1,000, while the population of Tianshan Mountains in Xinjiang is about 500 to 600, and in Tomur area, the population is about 80-100. Due to global warming in recent years, the ecological environment of glaciers and the snow leopard's habitat has changed tremendously, which has caused the decline of the quality and quantity of the snow leopard's food resources. Snow leopard is listed on the IUCN Red List (2010) as endangered (EN) species, also included in CITES Appendix I. They are key protected wild animals of Class I according to *National Key Protected Wild Animals* which is the appendix *List of Wildlife Protection Act of* People's *Republic of China*.

● Brown bear *Ursus arctos*

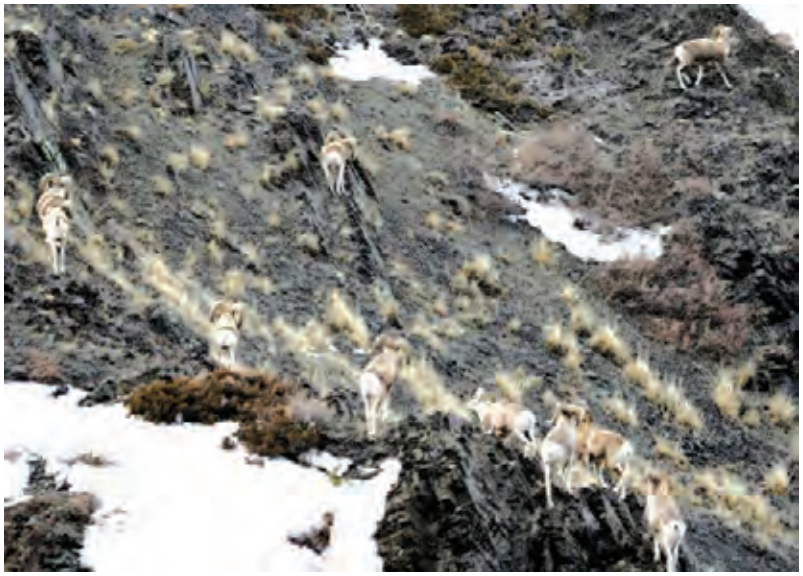
Ursus arctos is a type of large animal belonging to carnivora bears. Tianshan Mountains in Xinjiang is the original habitat of *Ursus arctos*, with the most concentrated distribution and a large population. The *Ursus arctos* that inhabit Tianshan Mountains in Xinjiang and Central Asia as well as neighboring countries are also known as "Tian Shan Ursus arctos". Tianshan Ursus arctos in the west Tianshan Mountains are mainly distributed in the mountain steppe, forest steppe, coniferous broad-leaved forest, coniferous forest, subalpine shrub and meadows at elevations of 1,500-3,300m; in the east Tianshan Mountains they are

Figure 2-53 *Ursus arctos*

found in coniferous forest, forest steppe, desert steppe zone at elevations of 1,500-2,300m; and in the south Tianshan Mountains their habitat is desert steppe, mountain steppe, coniferous broad-leaved forest, forest steppe, coniferous forest, subalpine meadow at elevation of 2,200-3,400m. Ursus arctos is included in the IUCN Red List (2010) as a risk-free world-class species. They are also included in CITES Appendix I and are key protected wild animals of Class Ⅱ according to *National Key Protected Wild Animals* which is the appendix of *List of Wildlife Protection Act of* People's *Republic of China.*

● Argali *Ovis ammon*

Figure 2-54 *Ovis ammon*



Ovis ammon sheep are also called the large- or big-horn sheep, belonging to the Artiodactyla Bovidae. They have evolved into distinct geographical subspecies. They are widespread throughout the Tianshan Mountains and inhabit both the alpine cold desert at elevations of 3,000-5,000m and the desert and semi-desert at elevations of 1,000-3,000m. They usually occupy open spaces on gentle slopes and are good at climbing mountains and ridges. The habitat overlaps with that of *Capra ibex* at the higher elevation and *Gazella subgutturosa* at the lower elevation. The males have large horns and are sought after by the world's most important museums for exhibition as well as trophies by international game hunters. According to the survival status of *Ovis ammon*, they are listed by the IUCN Red List (2010) as a Near Threatened (NT) species and included in CITES Appendix II. They are also designated by *China Red Data Book of Endangered Animals* (Red Book) as endangered (EN) species, and are key protected wild animals of Class Ⅱ according to *National Key Protected Wild Animals* which is the appendix of *List of Wildlife Protection Act of* People's *Republic of China.*

● Ibex *Capra ibex*

Capra ibex is also called Asian Yuan Yang, under the Artiodactyla Bovidae. They are found throughout Central Asian mountains and usually inhabit alpine meadows at elevations of 3,000-6,000m where

Figure 2-55 *Capra ibex*

there are rocky cliffs. In Tianshan Mountains in Xinjiang *Capra ibex* is the main prey of the snow leopard and wolf, as well as the main target of poachers. The Tomur region and the bare rocky cliffs in the mid Kalajun-Kuerdening area are where *Capra ibex* are concentrated with a patchy distribution. *Capra ibex* is included in the IUCN Red List (2010) as a world-class risk-free species, but should at least to be considered as a less common (LC) species. They are also included in CITES Appendix II, and designated by *China Red Data Book of Endangered Animals* (Red Book) as endangered (EN) species. They are key protected wild animals of Class I according to *National Key Protected Wild Animals* which is the appendix of *List of Wildlife Protection Act of* People's *Republic of China*.

(4) Birds

According to expedition records and existing scientific research, there are 370 species of birds in Xinjiang Tianshan. It is also an important transit station on the migration routes of migratory birds. Rivers that originate from Tianshan Mountains in Xinjiang can provide safe migration channels with adequate food for migratory birds.

● Whooper swan *Cygnus cygnus*

Cygnus cygnus belong to the duck family of anseriformes usually inhabiting large lakes, pools, reservoirs, and other wetlands. Wetlands of Xinjiang Tianshan are an important breeding place and habitat for *Cygnus cygnus*. With a total area of 1,368km^2, Bayinbuluke National Nature Reserve is the largest breeding base and habitat for *Cygnus cygnus* in China. It is also a breeding base for *Cygnus cygnus* at a relatively southern latitude. There are about 3,000-7,000 *Cygnus cygnus* in the breeding season. *Cygnus cygnus* is designated as a species of least concern (LC)

Figure 2-56 *Cygnus cygnusx*

by IUCN, and listed as vulnerable (VU) by *China Red Data Book of Endangered Animals* (Red Book). They are also key protected wild animals of Class II according to *National Key Protected Wild Animals* which is the appendix of *List of Wildlife Protection Act of* People's *Republic of China.*

● Golden eagle *Aquila chrysaetos*

Aquila chrysaetos, or Golden Eagles, are large birds of prey, belonging to the group of falconiformes and hawks. They can be observed above montane forests and alpine grasslands, but are rarely seen over plains. Tianshan Mountains in Xinjiang is the main habitat for *Aquila chrysaetos*. *Aquila chrysaetos* is concentrated in three of the nominated properties, Tomur, Kalajun-Kuerdening and Bogda areas. *Aquila chrysaetos* is a bird hunted and domesticated by Kazakh, Kirgiz, Tajik and other nomads. *Aquila chrysaetos* is included in the IUCN Red List (2010) as a world-class risk-free species but at least should be considered as a less common (LC) species. It is also listed by the *China Red Data Book of Endangered*

Figure 2-57 *Aquila chrysaetos*

Animals (Red Book) as a vulnerable (VU) species. They are also key protected wild animals of Class I according to *National Key Protected Wild Animals* which is the appendix of *List of Wildlife Protection Act of* People's *Republic of China.*

● Himalayan snow cock *Tetraogallus himalayensis*

Figure 2-58 *Tetraogallus himalayensis*

Tetraogallus himalayens, also called the Himalayan Snowcock or Tianshan Snowcock, is a large terrestrial bird belonging to Galliformes Phasianidae. They inhabit rocky alpine zone or sub-alpine meadows and screes at the elevation of 2,000-5,000m. In Xinjiang Uygur Autonomous Region, more than 80% of the *Tetraogallus himalayens* population live in the Tianshan Mountains, evenly distributed in the alpine zone of the Tianshan Mountains. As *Tetraogallus himalayensis* is a kind of well-known bird of prey, as well as a type of rare bird being captured for zoos, in addition to their harsh living conditions, there is now only a small population of these birds. *Tetraogallus himalayens* is included in the IUCN Red List (2010) as the world-class risk-free but at least to be considered as the (LC) species. They are also key protected wild animals of Class I according to *National Key Protected Wild Animals* which is the appendix *List of Wildlife Protection Act of* People's *Republic of China*.

(5) Reptiles

According to expedition records and existing scientific research, there are 32 species of reptiles in Xinjiang Tianshan currently.

(6) Amphibians

According to expedition records and existing scientific research, there are only six species of amphibians in Xinjiang Tianshan currently.

(7) Rare and endangered animals

There are a total of 367 species of rare and endangered animals in Xinjiang Tianshan. Among them, there are 355 species included in the Red List of IUCN (2010), 10 species are included on the Appendix I CITES (2010) and 47species are included on the Appendix II CITES (2010) (Table 2-13).

Table 2-13 General survey of rare and endangered animals in Xinjiang Tianshan

Class	Included in IUCN red list (2010)	Included in CITES Appendix (2010)	
		I	II
Fishes	10	-	-
Amphibians	4	-	-
Reptiles	6	1	-
Birds	310	7	3
Mammals	84	2	2
Total	414	10	5

Figure 2-59 *Anser anser*

Figure 2-60 *Crex crex*

Figure 2-61 *Motacilla cinerea*

(8) Endemic species

In the nominated property there are 22 animal species endemic to Xinjiang, accounting for 4% of the total number of wild vertebrate species in the nominated site (Table 2-14).

Table 2-14 Numbers and percentages of endemic animals in Xinjiang Tianshan

Class	Total species of animals	Number of endemic species	Percentage of endemic species (%)
Fishes	40	5	12.50
Amphibians	6	0	0
Reptiles	32	3	9.38
Birds	370	21	5.68
Mammals	102	36	35.29
Total	550	65	11.82

2.a-2-5 Natural landscape and natural beauty

2.a-2-5-1 Natural landscapes of Tianshan Mountains in Xinjiang

(1) Landscape resources

Xinjiang Tianshan has a diversity of natural beauty which makes it the most outstanding representative of a major montane landscape in an arid desert zone. The most prominent landscape features include snow peaks, glaciers, rivers, marshes, alpine lakes, meadows, forest and grassland, wetlands, red canyons and Gobi (stony) desert.

● Glaciers and snow peaks

Tianshan Mountains in Xinjiang has three major mountain chains, that is, South Tianshan Mountains, Middle Tianshan Mountains and North Tianshan Mountains, as well as more than 20 mountains, with dense distribution of snow peaks and glaciers. There are five snow peaks over 6,800m high, 15 snow peaks over 6,000m high and dozens of snow peaks over 5,000m high They form a magnificent landscape of high mountains and snow peaks rising above arid deserts. Tomur peak (meaning ‘iron peak’ in Uygur) is covered by snow and is hidden beyond cloud all the

Figure 2-62 Tomur Peak- Khan Tengri Peak-Tailan Peak

Figure 2-63 Glaciers and snow lotus in Bogda

year around, like a white-haired old man sitting majestically between heaven and earth. Khan Tengri peak stands on the border of China, Kazakhstan and Kyrgyzstan and its snow fields extend hundreds of kilometers, which is just like the meaning of its Turkic name, that is, 'king of heaven peak'. Xuelian peak, graceful and beautiful, looks like a lotus blooming in the Tianshan Mountains. The three peaks of Bogda, snow-capped and silver-coated all the year around, stand majestically in the eastern Tianshan Mountains.

● Alpine lakes

Tianchi Lake in the Bogda component is a typical alpine glacial lake. In summer, streams and rivers flow over the alpine wetlands and across the forests. Surrounded by high mountains and with snow peaks reflected in the water, the lake looks like pools of crystal jade. The water, with the sky and snow-covered peaks reflected in it, is exceptionally beautiful. In autumn, the deep valleys and colorful slopes are covered with different forests, together with the lake, exhibiting a different kind of natural beauty. In winter, snow-covered conifers provide a magnificent prospect, endowing this site with even more beauty. The natural beauty changes with the alternates of seasons, which prominently shows the beauty and serenity of the alpine lakes, rivers and marshes.

Figure 2-64 Summer in Tianchi Lake

Figure 2-65 Meandering Rivers in Bayinbuluke

Figure 2-66 Mid-lake island in Swan Lake

● Rivers and swamps

The Bayinbuluke component is a typical lowland alpine wetland ecosystem. There are 1,370km^2 of marsh and lakes in big Youerdusi basin, forming a complex of twisting and bending water landscapes. At dawn, sun will be reflected in the water to present a shining scene. Groups of swans and wild ducks swim in the water to make the scene more vivid.

Figure 2-67 *Picea schrenkiana* forest in Kuerdening

● Snow spruce (*Picea schrenkiana*)

Tianshan *Picea schrenkiana*, an ancient tertiary species, only grows in the Tianshan Mountains. During 40 million years of geological transformation and climate change, *Picea schrenkiana* has gradually evolved into a species that is endemic to the Tianshan Mountains. These trees grow on the shady or semi-shady mid-slopes and subalpine mountains at an elevation of 1,300-2,800m, forming the discontinuous distribution of montane forest which extend for thousands of kilometers. The snow spruce stand upright, evergreen all year round, stretching along the slopes. Their distribution resembles water waves in the ocean, also like a great green wall which blocks the scorching summer and freezing winter from the Gobi desert.

Kuerdening was ranked first of the top 10 most beautiful forests in China in 2006. Seen from a distance, the pure *Picea schrenkiana* forests cover the whole mountain outline. Inside the forest, ancient and towering *Picea schrenkiana* intercept the sunlight and fallen trees covered with moss lie criss-crossed in the shade. Incised into the planation of Kalajun,

deep valleys have been formed, in which the *Picea schrenkiana* forests are dense and extend altitudinally for hundreds of meters. Along the valleys, the forest- grassland mosaic forms a splendid picture, celebrated as a 'Floral Forest'. This forest belt extends for more than a hundred kilometers in the east-west direction, with grasslands floating, full of flowers, and grasslands and forests blending with each other, below snow peaks.

Figure 2-68 Spring view of the wild fruit forest

● Wild fruit forest landscape

Xinjiang Tianshan is an important component of Central Asia wild fruit forest. The wild apple, wild walnut, wild apricot, wild cherry, wild hawthorn and wild bramble trees especially flourish here. The landscape changes with the seasons, with spring blossoms, summer fruits, colorful autumn foliage and winter snows creating an annual cycle of scenic vistas.

● Grassland landscapes

Alpine meadows and mountain steppes are broadly distributed in Xinjiang Tianshan, mainly including alpine meadow, sub-alpine meadow, mountain meadow, mountain steppe, and desert steppe, etc. The vegetation in the Kalajun-Kuerdening and Bogda components is dominated by flowering plants, such as P. *nudicaule* L, *radix gentianae, Chinese globeflower, Albiflorum* Ldb., *Primula malacoides, Aster alpinus* L, *Saxifraga stolonifera, Saussurea salsa* and *Ligularia sibirica.* During April and May, the earth is covered with a green carpet. From June to July, when flowers bloom, the grasslands change into a sea of flowers. From August

Figure 2-69 Meadow with flowers

to October, the grasslands become yellow and the maple trees turn red, completing the colorful cycle.

● Red-bed canyon

The streams on the south slopes of the South Tianshan Mountains flow into the red sandstone and have carved sculptures out of the red layer. Because of fluviation along the direction of strata, vertical joints cutting, or the collapse of strata, gully erosion has formed a spectacular canyon landscape. Because of different terrane hardness, strata angles, and folds, an extraordinary variety of landform shapes have been formed. Red beds in this region is rich in monomeric landscape types, including cliffs, pinnacles, stone walls, stone pillars, peak cluster, peaks, valleys, valley lane, groove, groove rock, cave, etc. Wensu Canyon (also named Tomur Canyon), located in the Tomur component, is several kilometers long from east to west and about seven or eight meters wide from south to north. It is a tectonic zone of folds and faults which is composed of Tertiary red

Figure 2-70 The ruined city-like red bed in Tomur Component

Figure 2-71 The Castle-like red bed in Tomur Component

glutenite, with cliffs dozens of meters, or even 100m, high that are formed by incision on both sides of the valley. It is the most typical and the largest red-bed canyon landscape along the northern and southern parts of the Tianshan Mountains, with the highest aesthetic value. Extraordinary valley views, magnificent steep cliffs, castle and labyrinth-like rock features on a large scale, awe-inspiring and solemn 'Buddha statues and stupas', vivid landforms like ships with sails, and landforms resembling animals contribute to the beauty of the canyon.

Figure 2-72 Vertical landscape of north slope in Xinjiang Tianshan

2-73 Vertical landscape of north slope in Xinjiang Tianshan

(2) Landscape features

The most prominent landscape feature of Tianshan Mountains in Xinjiang is the majestic size of the whole landscape, the diverse forms of landscape, and the perfect combination of scenery with strong contrasts between different landscapes.

● Grand scale

On the whole, the Tianshan Mountains in Xinjiang are magnificent. The mountains stretch for 1,760km from east to west, with an altitude up to 7,597m. The western Tomur has an elevation of 7,443m and the eastern Bogda Peak has an elevation of 5,445m, which constitutes a vast, magnificent, beautiful 'skyline', lying in the vast desert just like the name 'Mountain in the sky', which is one of China's most recognizable landmarks.

● Varying types

There are numerous high qulified monomers of landscape in Xinjiang Tianshan. Within one mountain range, there are snow peaks, silver

Figure 2-74 Spring wetland in Tomur

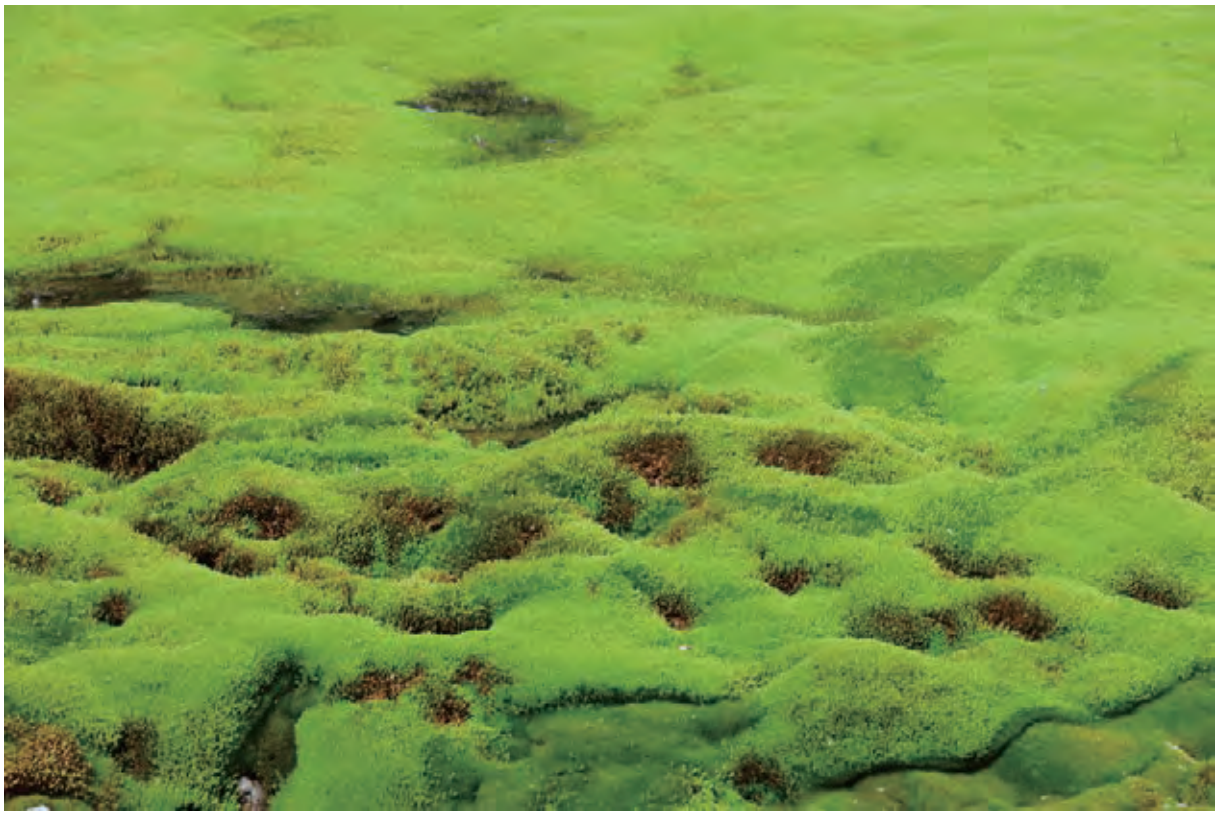


Figure 2-75 Small water fall in Tianshan Tianchi

Figure 2-76 Papaver nudicarule grassland in Kalajun

Figure 2-77 Flower-like forest in Kalajun

waterfall like glaciers, colorful meadows, great expanse of forests stretching thousands of miles, lush grasslands, beautiful rivers and lakes, quaint red layered canyons; furthermore,Tianshan Mountains in Xinjiang is the world's unique great mountain range that is surrounded by two vast deserts.

● Diverse combination of landscapes

Tianshan Mountains in Xinjiang has an integral altitudinal vegetation spectrum, from glacial and snow peaks, to alpine meadows, sub-alpine meadows, cypress shrubs, pure spruce forest, mixed broadleaf and coniferous forest, wild fruit forest, valleys forests, shrubs and desert grassland. The rich combination of so many levels makes Xinjiang Tianshan a very colorful natural landscape. At the small scale, there is also a variety of intricate landscapes. For instance, there are hundreds

Figure 2-78 Combination landscape of snow-meadow-forest

Figure 2-79 Combination landscape of snow-meadow-forest

of different scenic features in the Tomur red valleys. This perfect combination of nature is rarely so well expressed anywhere else in the world, making Tianshan Mountains in Xinjiang one of China's iconic landmarks.

Strong contrast

The landscape on the north and south sides of the Tianshan is significantly different. Through the impact of the moister prevailing wind, the north slope is more humid, while the south slope is relatively arid and desertified. The elevation of desert on the south slopes is higher than the north slopes, up to 1,000m or more. The forests along the north slopes are zonal in distribution, while those of the south slopes are patchy in distribution. The western and eastern landscapes are also quite different. Ili Valley in the western part of the Tianshan Mountains is the most humid area, the forests growing to a low elevation of about 1,100m, while that of the eastern section rises to 2,000m above sea level.

Figure 2-80 The north slope of Tomur

Figure 2-81 The south slope of Tomur

2.a-2-5-2 The Aesthetic Importance of the Tianshan Mountains in Xinjiang

From an aesthetic viewpoint, Tianshan Mountains in Xinjiang is majestic as a whole, but also is marked by serenity and grace, with many distinct levels and dimensions. Morphologically, Tianshan Mountains in Xinjiang shows smooth lines but also angularness, exhibiting a rolling gentle outline and always displaying its unique naturalness. Its combination of mountain lakes as clear as a mirror, endless streams and rivers, splendid waterfalls and vast grasslands and woodlands, against the majestic peaks of the Tianshan, constitute a three-dimensional natural painting. The deep azure sky, white glaciers, jade-coloured lakes, dark green spruce, green grasslands, and colorful wild flowers all bring up strong visual contrast. The natural composition of different shapes, colors and other aspects result in a unique landscape, a perfect combination of the spectacular, desolate, and mysterious which makes it an outstanding symbol of Chinese beauty.

For the ordinary Chinese, Tianshan takes Tian, which means heaven in the Chinese language, as its surname. It was called 'the mountain accessing heaven' in ancient times and it is regarded as sacred mountain nowadays. A lake in Tianshan is called 'Tianchi' (Heavenly Lake). *Picea schrenkiana* in Tianshan is called 'the Tianshan pine' (pine of the Heavenly Mountain). A horse in Tianshan has been given the name 'heavenly horse' and people of all ethnic groups in Xinjiang are known as the 'the children of the

Figure 2-82 Hanging carpet (with the pattern of Tianshan) in China Great Hall

Tianshan Mountains'. Down the ages people have respected the Tianshan Mountains as gods. In volume 50 of the classical literature of *Tai Ping Yu Lan*, it states that 'people will descend from their horses to worship it when pass by'. In the people's view, Tianshan Mountains in Xinjiang is a holy mountain with beauty, holiness, and vitality. It is described by countless myths, poems, music and paintings. Such as: 'In the vast cloud sea, the moon rising from Tianshan'; 'It seems that you climb up to the cloud in Tianshan when you leave by horse'; 'The moon rises from Tianshan, and this makes Tianshan lakes become the origin of many species'; 'The Gobi is vast and you can see the Tianshan stand in the top of cloud'.

Tianshan Mountains in Xinjiang has been an important channel connecting the East and West since ancient times. It is a bottleneck of the world famous Silk Road, which has contributed to the development of human civilization and cultural exchanges between East and West. Tianshan Mountains in Xinjiang stretches many hundreds of kilometers along the historic desolate, mysterious ancient Silk Road. Together with the many oases formed by its waters, Tianshan Mountains in Xinjiang provided an important refuge for the constant streams of merchants passing to and fro, between East Asia, Central Asia, West Asia, South Asia, as well as Europe.

The special geographic position of Tianshan Mountains in Xinjiang has brought many nationalities, different civilizations and diverse religions into contact here. The people living in the northern and southern Tianshan Mountains have been through many hardships but are still resilient. Throughout history, well-known poets, such as Li Bai, Cen Shen, Lu You, Qiu Chuji, Ji Xiaolan, Lin Zexu etc, had left their footprints here. Since ancient times, nomadic tribes, Persian civilization, Greek civilization, Indian civilization, Chinese civilization, as well as ancient religions like Zoroastrianism, Buddhism, Manichaeism, Hinduism, Christianity, Islam etc, have all used Xinjiang as a conduit through which they extended their teachings, leaving behind a rich cultural heritage. Tianshan Mountains in Xinjiang is located at the center of Eurasia and is the intersection of East-West civilization and culture between south and north.

2.a-3 Description of the Serial Property of Xinjiang Tianshan

(1) Justification of serial properties

According to the *Operational Guidelines for the Implementation of the World Heritage Convention*, the definition of *serial properties* is as follows (III. C, section 137th):

> ***137. Serial properties will include component parts related because they belong to:***
>
> *a) the same historico-cultural group;*
> *b) the same type of property which is characteristic of the geographical zone;*
> *c) the same geological, geomorphological formation, the same biogeographic province, or the same ecosystem type;*
>
> *and provided it is the series as a whole – and not necessarily the individual parts of it – which are of outstanding universal value.*

Xinjiang Tianshan obviously meets b) and c), because:

- The four nominated properties are located in the same mountain chain of Tianshan, with similar tectonic background and geological evolution processes;
- The four nominated properties belong to the same biogeographic province, that is, the Pamir-Tian-Shan Highlands biogeographic province, and they have significant similarities in natural geographical features.
- The natural heritage values show commonality, that is, the same arid temperate montane climate condition in Eurasian hinterland, an altitudinal difference averaging 4,000m for each component, and similar vertical natural zones. They all belong to desert-oasis-mountain ecosystems of the arid temperate zone. The nominated properties together excellently represent the complete ecosystem of Tianshan Mountains in Xinjiang.

(2) The selection of component properties

The Tianshan Mountains in Xinjiang are a huge mountain system composed of a series of mountain ranges and there are significant differences in physical geography and biological features in different parts. No single component can completely represent its outstanding universal values. It took three years of research and consultation for the selection processes. Selection criteria depend on the representativeness of natural features such as geological features, ecological features and natural landscapes, as well as the integrity of the natural environment, the level of negative impact from human activities, and the current protection and management status.

As already stated, the Tianshan Mountains in Xinjiang are a huge mountain range extending in an west-east direction. The four component properties (Tomur, Kalajun-Kuerdening, Bayinbuluke and Bogda) are respectively located in the west, middle and east of the Tianshan Mountains in Xinjiang. The four parts reflect the natural characteristics in different sections of the Tianshan Mountains in a latitudinal direction. Overall, the four component properties contain the peaks and alpine areas of the South Tianshan Mountains and the North Tianshan Mountains, as well as the valleys of the Middle Tianshan Mountains that boast rich biodiversity. They are rich in geological, biological and scenic diversity. From the south to the north and from the west to the east, the four nominated properties are the most representative areas of Tianshan Mountains in Xinjiang. They complement each other and together constitute the complete picture of the serial properties of Xinjiang Tianshan.

- The Tomur component is where the main peaks of the Tianshan Mountains are located and it is the largest center of glaciation. It is the representative of the South Tianshan Mountains and possesses the most typical altitudinal natural zones on the south slope of the Tianshan Mountains. This is also the site with the natural beauty of the red canyons of Tianshan Mountains in Xinjiang. It is also the best representative of foothill arid steppe, within the Global 200 Ecoregion 111 “Middle Asian montane woodlands and steppe”. It is also a major center of distribution of snow leopards in Central Asia.

- The Kalajun-Kuerdening component is located on the south side of the Ili River valley and it is the representative of the middle Tianshan Mountains with the richest biodiversity in the serial properties. The

Kalajun-Kuerdening component is the best habitat for snow spruce and it is also one of the world's most important localities where the Central Asian wild fruit forests originated. It is the most outstanding representative of the integrated natural scenic beauty of arid temperate mountains. It is also the best representative of Tian Shan montane conifer forests and Tian Shan montane steppe and meadows, within the Global 200 Ecoregion 111 "Middle Asian montane woodlands and steppe".

- The Bayinbuluke component is the best representative in the Tianshan Mountains of an intermountain basin, an alpine wetland ecosystem in the temperate arid zone and a beautiful water landscape.

- The Bogda component is where the main peak of the north Tianshan Mountains is located and it is the representative of the north Tianshan Mountains. It has the best altitudinal zone on the north slope of the Tianshan Mountains. It is the most typical representative of montane altitudinal zone in temperate arid zones in the world, and it also represents the alpine lake landscapes of Tianshan Mountains in Xinjiang.

Xinjiang Uygur Autonomous Region have formulated *Management Plan of Nominated Xinjiang Tianshan (2010)* and issued *Regulations Concerning the Protection of Nominated Natural Heritage Property of Xinjiang Tianshan (2011)*. Unified management mechanisms have been established, all of which will enhance the protection, legal support and management effectiveness.

2.a-3-1 Tomur

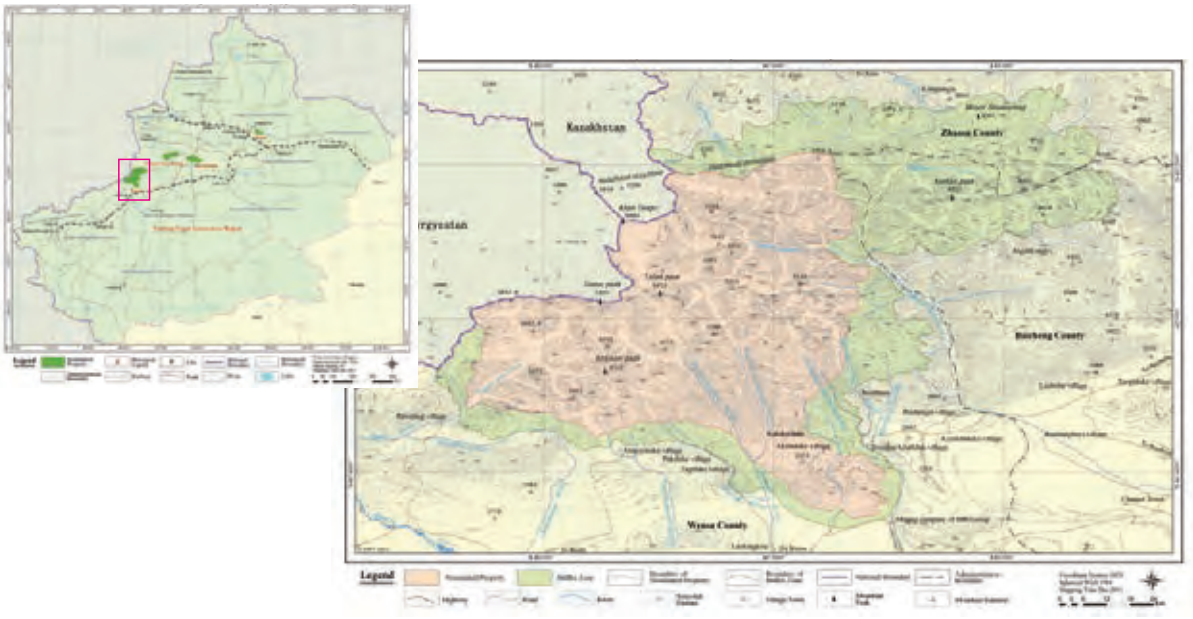


Figure 2-83 The location of Tomur component in Xinjiang Tianshan

Table 2-15 Main features of the Tomur component

Location	Wensu county, Xinjiang Uygur Autonomous Region
Center coordinates	N41°58'06" E80°21'15"
Area of the nominated property	344,828 ha
Area of buffer zone	280,120 ha

2. a-3-1-1 Physical Geological Features

(1) Location and topography

The Tomur component is the western part of Xinjiang Tianshan, located in the South Tianshan Mountains. The northern part of it is higher than the southern part. The elevation of the highest peak, Tomur, is 7,443m and the lowest point is 1,450m, and so the vertical difference within the Tomur component is 5,993m. The mountains in the northern part are extremely high, covering three transmeridional mountains (Tomur mountain, Khan Tengri mountain and Halazhouli mountain) from south to north. Modern glaciers are widely distributed in this area and horns, ridges, ice cirques and ice valleys can be found everywhere. Besides, the moraine landforms are well developed. The lower mountain area in

the southern part of the Tomur component has been incised by rivers frequently, so river valleys are common and in the hilly area in front of mountains, various unique red bed landforms have been formed.

(2) Climate

The Tomur component experiences a temperate continental climate, which is strongly affected by topography. The climatic elements like temperature and precipitation change with the elevation, and the heat and humidity are different on the north and south slopes. The south slope and piedmont area belong to the semi-arid region and arid region respectively, whereas the north slope of the Tomur site belongs to the sub-humid area. The area above 3,700m on the north slope is covered with snow all the year round, with an average air temperature below minus 24℃ in the coldest month (January) and below 0℃ in the hottest month (July). In the piedmont area on the north slope, average temperature is below minus 12℃ in the coldest month (January), and above 14℃ in the hottest month (July). The area above 4,200m on the south slope is covered with snow all the year round and the average temperature is below minus 23℃ in the coldest month (January) and below 2℃ in the hottest month (July). In the piedmont area on the south slope, the average temperature is minus 17℃ to minus 14℃ in the coldest month (January), and is 15℃ to 22℃ in the hottest month (July).

The precipitation in Tomur site is concentrated in summer and autumn with more rainfall on the north slope than the south slope. In the mid-mountain zone on the north slope, the precipitation is about 500-600mm and in the alpine mountain zone at 4,000-5,000m, it is 800-1,000mm. In the area around Tomur Peak and Khan Tengri Peak, it is about 900mm and can reach 1,000 in areas facing the wind. Under the effect of the Tarim desert climate, in the piedmont area on the south slope, the precipitation is less than 100mm. With elevation rise, the effect of the desert climate decreases. At an elevation of 2,400-2,900m and around 4,200m, there are two larger precipitation zones with an annual precipitation above 700mm and, in particular areas, the total precipitation can reach 1,000mm.

(3) Hydrology

Rivers in the Tomur component are mainly supplied by snow melt water, which accounts for 59% of the total supply. Other water sources include underground water, accounting for 22%, and seasonal snow melt water and rainfall, accounting for 19%. Water supply from rivers is determined

by temperature to a large extent, with most water in the summer flood season. For example, in June to September, the runoff can account for 80% of the annual total amount, while in March to May, it only accounts for 10%. Under the effect of geological tectonic and topographical features, the width-depth ratio of the river bed is large. Rivers on the north slope of the Tomur site, such as the Kayinte-Muzaerte River and the North Muzaerte River, are in the catchment area of the Ili River. Those on the south slope are in the catchment area of the Tarim River, where five relatively larger rivers flow from north to south. From west to east, there are the Kumalike River, Ateyinake River, Tailan River, Kalayuergun River and South Muzaerter River.

(4) Soils

The types, properties and the altitudinal zones of the soil in the Tomur component are typical in the Tianshan mountain system. Soils on the north and south slope of the Tomur Peak are obviously different as a result of different climates. From the lower to alpine mountains, there are mountain desert soil (1,450-1,900m), mountain calcic brown soil (1,900-2,200m), mountain chestnut soil (2,200-2,600m), sub-alpine steppe soil (2,600-2,900m), alpine meadow soil (2,900-3,600m), alpine primitive soil (3,600-4,250m) and permanent ice-snow zone.

2.a-3-1-2 Geological Tectonic Features

(1) Geological tectonic features

The Tomur component is located in the geosynclinic fold belt of the Tianshan Mountains. It belongs to the western part of the Halitao anticlinorium of the South Tianshan Mountains folds. It connects with the North Tianshan Mountains folds on the north and the Tarim Platform on the south. The main body of the Tomur Peak is a kind of anticlinorium. The nucleus of the anticline lies in the Khan Tengri mountain, with an east-west oriented fold axis. The faults are dominated by a large east-west reverse fault. Among these faults, the Tulasudaban-Changwuzi valley deep fault is the western part of the Nalaty Fault, extending from the northeast to the east.

(2) Strata lithologic features

The outcrops of the nominated properties and surrounding areas mainly include groups of the Silurian system, Devonian system, Carboniferous

system and Permian system in the Paleozoic erathem, groups of the Triassic system and Jurassic system, and groups of the Paleogene system and Neogene system and the Quaternary system in the Cenozoic erathem. The dominant rocks consist of metamorphic rocks and volcanic rocks of the Silurian system, which are composed of marbleized limestone, siliceous limestone, marble with mica schist, chlorite schist, rhyolite slate and quartz slate and so on. These rocks are hard, forming high mountain conjunction zones. The processes of glacial and periglacial denudation and fluvial incision are widespread and the landforms are characterized in the high mountain area by snow cover and the middle mountain area has valleys and glacial relicts. The deposition strata of the Mesozoic erathem and the Cenozoic erathem are located on the north and south slope of the Tianshan Mountains, which are composed of fluvial and lacustrine conglomerate integrated with sandstone, siltstone, and purple red sandstone and siltstone and so on, forming the alternating landscape of red bed canyons and low mountains and hills.

2.a-3-1-3 Landform Features

The altitudinal zonality of landform inthe Tomur component is obvious. From the top of the mountain to the piedmont area, there are 12 types of landforms, including: alpine and extreme alpine mountains with snow cover, alpine mountains, middle mountains, low mountains, hills, till plain, outwash plain, pluvial clinoplain in front of the mountains, pluvial-alluvial clinoplain in front of the mountains, alluvial plain, marsh plain and aeolian landforms. The main features of the landforms in this area are as follows:

(1) The outline of the landform is determined by geological tectonics. The Tomur Peak area is a huge anticlinorium, with the Tomur-Khan Tengri Peak as its axis. Radiating from the core area are planation plains with descending elevation; these form the basic landform framework of the Tomur Peak area.

(2) Large modern glaciers have developed. The Tomur Peak area is the largest center of modern glaciers of the Tianshan Mountains. There are 670 glaciers, with an area of 2,706km^2 and a volume of 474km^3, which is the third largest area for mountain glaciers in the world (only surpassed by the Everest and the Qogir (K2). Three of the 15 huge glaciers (each has an area over 300km^2) in the mid latitude are in this area, and two of them (the Tomur Glacier and the Tugebiliqi Glacier) are in the Tomur site. The geological tectonics, the dendritic valley glaciers, and the flat-topped glaciers in this area are of outstanding universal value.

(3) The relic glacial landforms have remained intact. In this area, the Quaternary glaciers reached out into the piedmont, with a length of tens or hundreds of kilometers. There are typical glacial valleys,

Figure 2-84 The south side of Tomur peak

Figure 2-85 The north side of Tomur peak

terminal moraines on largest scale, and large glacial blocks.

(4) As a result of faulting and fluvial incision, valley landforms have been broadly developed in the middle mountain area. In the low mountains and hilly area on the south slope, red bed landforms are well developed. In the Paleogene system and Neogene system, extremely thick lacustrine and fluvial red sediments of the Cenozoic erathem were deposited in the depression basins in front of the mountains. Under the intense effect of the neo-tectonic movement and fluvial processes, large scale cliff and red bed landforms developed.

Figure 2-86 Stelae-like cluster of red bed

(5) Avalanche landforms are common in the alpine mountain area. As an important exogenic force in the alpine area of Tomur Peak, avalanches have contributed to the landform formation processes by erosion, transportation and deposition.

(6) Pluvial and alluvial fans are well developed. In the piedmont area of Tomur Peak and on both sides of the valleys, there are broad pluvial and alluvial plains formed by the combination of large or small pluvial and alluvial plains. In some areas, four to five terraces can be found.

2.a-3-1-4 Biology and Ecology

(1) Flora

● Vegetation flora features

The vegetation in the Tomur component is typical of Central Asian western mountains. The main parts of the south and north slopes of Tomur peak support pan-north flora, Eurasian forest flora and Tianshan flora. There are 1,218 species of 397 genera of higher vascular plants. The number of species is relatively poor but the diversity is relatively rich. There are 1,202 species of 388 genera of angiosperms which account for 98.69% of the total number and are absolutely dominant. There are 319 genera of flora typical of the temperate zone, including 3 types representing the north temperate zone, old world temperate and Asian temperate zone; these which account for 82.2% of the total genera in this region and are dominant. The exchange of plant species between this site and Central Asia, the Mediterranean and West Asia is relatively more than that between East Asia and North America.

● Vegetation types

According to the classification principles of *Vegetation of China*, the natural vegetation in the Tomur component can be divided into eight vegetation types, 14 vegetation subtypes and 27 formations. Widely-distributed typical vegetation types include: alpine cushion vegetation, alpine meadow, sub-alpine meadow, meadow steppe, foothill arid steppe, desert steppe and shrub desert (Figure 2-87).

Alpine cushion vegetation is dominated by cushion vegetation and alpine desert types, such as Form. *Potentilla biflora*, the distribution area of which is the largest. Alpine meadow vegetation is mainly *Kobresia, Carex* and various herbs of the Ranunculaceae, Crassulaceae, Primulaceae and Gentianaceae families.

Sub-alpine meadow, which commonly occurs along with coniferous forests, is composed of typical mesic high grass or high forbs. This kind of vegetation belongs to montane (or mid-mountain) Form. *varii herbae*.

Meadow steppe mainly grows between true steppe and sub-alpine meadow, sometimes interspersed with forests and rarely forming a continuous distribution. The main plants are true xerophytic plants and

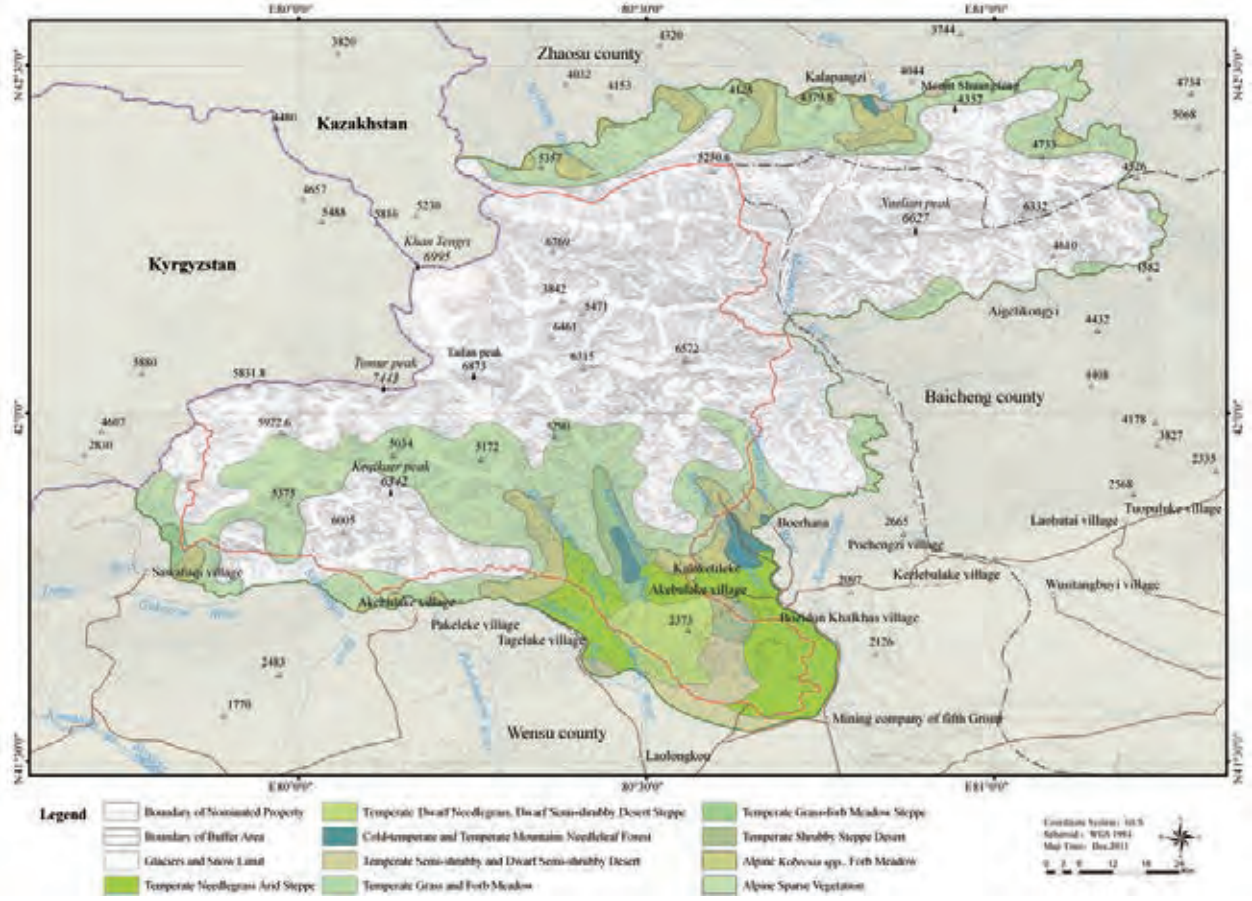


Figure 2-87 Vegetation type of the Tomur component

mesoxerophytes, such as Capillata grass. The community is commonly infiltrated and mixed with forbs and grass.

Foothill arid steppe is composed of Form. *Stipa capillata*, Form. *Festuca ovina* and Form. *Stipa krylovii.*

Desert steppe is among the most xerophytic prairie and is featured by mixing with xerophytic bunch grass species such as *Stipa gobica, Stipa plareosa* and *Ephedra przewalskii.*

Shrub desert is mainly dominated by typical xerophytic shrubs and semi-shrubs such as *Sarcozygium xanthoxylon, Reaumuria soongorica, Nitraria sphaerocarpa, Anabasis aphylla, Kalidium foliatum* and *Sympegma regelii.*

● Altitudinal structure

In the Tomur component, the altitude rises from 1,450m to 7,443m within 70km horizontal distance and seven altitudinal zones have developed on

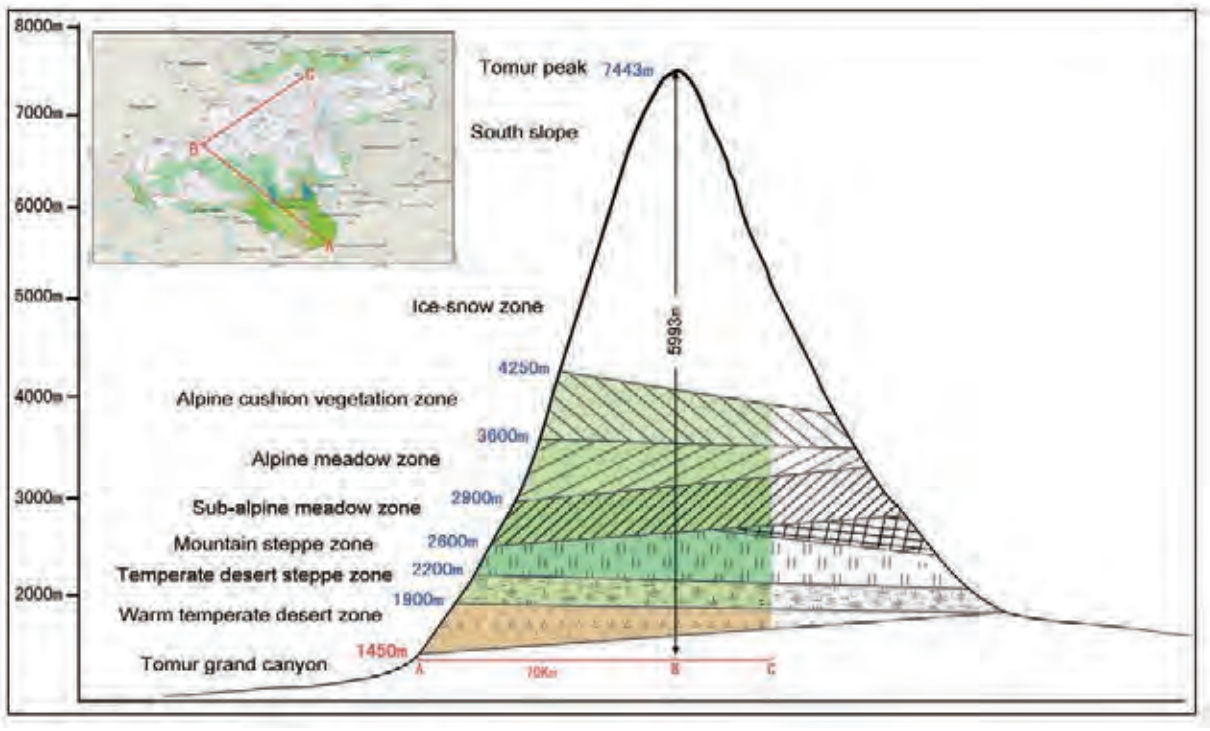


Figure 2-88 Altitudinal zone of the Tomur component

the south slope (Figure 2-88), including: warm temperate desert zone (1,450-1,900m), temperate desert steppe zone (1,900-2,200m), mountain steppe zone (2,200-2,600m), sub-alpine meadow zone (2,600-2,900m), alpine meadow zone (2,900-3,600m), alpine cushion vegetation zone (3,600-4,250m) and ice-snow zone (4,250-7,443m).

● Plants species

According to a preliminary survey, there are 1,218 species of 397 genera from 78 families of higher vascular plants in the Tomur component.

Table 2-16 Higher vascular plants in the Tomur component

Class	Families	Genus	Species	Percentage (%)
Fern	5	6	9	0.74
Gymnosperm	3	3	7	0.57
Angiosperm	70	388	1,202	98.69
Total	78	397	1,218	100

● Rare and endangered species, endemic species

Of the vascular plants in the Tomur component, there are three species included in the Red List of IUCN (2010), such as *Rhodiola pamiro-alaica* and *Tulipa sinkiangensis*. There are 10 species included on the Appendix I, II and III of CITES (2010), such as *Orchis umbrosa* and *Orchis cruenta*. There are 28 species of Class I and Class II provincial key protected plants, as well as 26 species endemic to the Tianshan Mountains in the Tomur site, such as *Calligonum roborovskii, Hexinia polydichotoma, Eritrichium sinomicrocarpum, Phlomis chinghoensis.* There are still some relic species such as *Populus tremula* and *Asparagus officinalis.*

Figure 2-89 *Rhodiola pamiro-alaica*

Figure 2-90 *Tulipa sinkiangensis*

Figure 2-91 *Orchis cruenta*

Figure 2-92 *Orchis latifolia*

Figure 2-93 *Calligonum roborovskii*

Figure 2-94 *Hexinia polydichotoma*

Figure 2-95 *Eritrichium sinomicrocarpum*

Figure 2-96 *Populus tremula*

Figure2-97 *Phlomis chinghoensis*

Figure2-98 *Asparagus officinalis*

(2) Fauna

● Fauna features

For terrestrial vertebrates in the Tomur site, the north wide-distribution type, the Palaearctic type, the Central-Asia type, the Holarctic type and the Plateau type are dominant and uniformly distributed. Though the Tomur site lacks the Northeast and Oriental types, it is generally considered to be an ancient biota as well as biodiversity of wild animals.

● Animal species

According to field surveys and data processing, there are 136 species of wild vertebrates, of which birds and mammals are dominant (Table 2-17).

Table 2-17 Vertebrates in the Tomur component

Class	Orders	Families	Species	Percentage (%)
Fish	2	3	13	9.56
Amphibians	1	2	3	2.21
Reptiles	1	3	7	5.15
Birds	10	24	76	55.88
Mammals	6	15	37	27.21
Total	20	47	136	100

● Rare and endangered species, endemic species

The Tomur site is the natural habitat and breeding ground for some rare and endangered animals, especially those which prefer or tolerate the cold. There are 87 species included in IUCN Species Red List (2010), such as, *Falco cherrug, Panthera uncia, Tetraogallus himalayensis, and Canis lupus*. Two species are included on Appendix I and two species are included on the Appendix II of CITES (2010). Twenty-two species are included in the CNRD (2004) and there are four species of Class I national key protected animals as well as 16 species of Class II national key protected animals according to *the List of National Key Protected* Wild Animals. In addition, there are six species endemic to the Tianshan Mountains. Of the animals in the Tomur area, golden eagles, vultures,

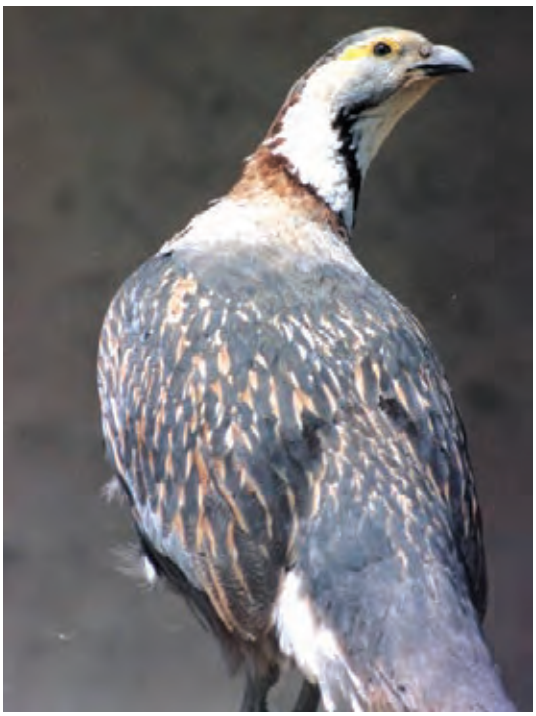


Figure 2-99 *Tetraogallus himalayensis*

Figure 2-100 *Falco cherrug*

Figure 2-101 *Laudakia stoliczkana*

Figure 2-102 *Canis lupus*

Figure 2-103 *Ovis ammon karelini*

Figure 2-104 *Capra ibex alaiana*

Figure 2-105 *Panthera uncia*

Gypaetus barbatus, griffon vultures, mountain snow cocks, brown bears, lynx, snow leopards, argali and ibex are the most typical ones inhabiting the alpine barren rocks, glaciers and snowfields.

2.a-3-1-5 Landscape Features

(1) Snow peaks and glaciers

Towering and steep mountains in the Tomur component form a grand and splendid view of clusters of snow peaks and glaciers, making it the most

Figure 2-106 Glacier on north side of Tomur

Figure 2-107 Glacier on south side of Tomur

concentrated region of high peaks in Tianshan Mountains. There are 15 peaks standing over 6,000m high and five over 6,800m. Impressive and highly scenic modern glaciers radiate from the mountain conjunction of the Tomur-Khan Tengri peaks.

(2) Red bed canyons

Tomur Grand Canyon is a typical narrow valley, 20km long and 25km wide. The valley has developed in the hilly areas of deep red layer

Figure 2-108 Ribbon red beds fold layer

Figure 2-109 Ruined city-like red beds in Tomur

Figure 2-110 Palatial precipice

Figure 2-111 Ruin castle-like red bed

Figure 2-112 Pen-like red bed

Figure 2-113 Castle-like precipices

deposition. The Tomur Grand Canyon area is composed of three main valleys, 12 branch valleys and several small branch valleys.

Landforms mainly include valleys, folds, red cliffs, stonewallings, single pillars, pillar clusters, isolated peaks, peak clusters, soft stone forest, caves, etc.. As for shapes and figures, there are some which look like castles, flocks of birds, palace columns, sailing boats, and various animals and human figures. These landforms and figures are dramatic and vivid, and together with the large scale of the red bed canyon in the fold and fault zones of the Tianshan Mountains, combine to give a landscape of the highest aesthetic value. In a word, this valley is the best representative of the red bed canyon landforms of the Tianshan Mountains.

2.a-3-1-6 Summary of Values Which Contribute to the Serial Properties of Xinjiang Tianshan

(1) The Tomur site is a huge conjunction area where the main peaks of the Tianshan Mountain are located. These include Tomur Peak, Khan Tengri Peak, Tailan Peak and Xuelian Peak. The Tomur region stands

highest in the Tianshan Mountains and it is the best representative area of the Tianshan Mountains.

(2) Tomur is the largest center of modern glaciers of the Tianshan Mountains, and is internationally recognized as one of the most concentrated areas of extremely large mountain glaciers in the world.

(3) Tomur is the most typical representative of the altitudinal zones on south slope of Tianshan Mountains.

(4) Tomur is also the best representative of foothill arid steppe within the Global 200 Ecoregion 111 “Middle Asian montane woodlands and steppe”.

(5) Tomur has exceptional aesthetic values with its perfect juxtaposition of grand snow peaks and glaciers, red bed canyons and desert landscapes..

(6) Tomur is one of the important habitats for snow leopards in the world, as well as their distribution center in Central Asia.

2.a-3-2 Kalajun-Kuerdening

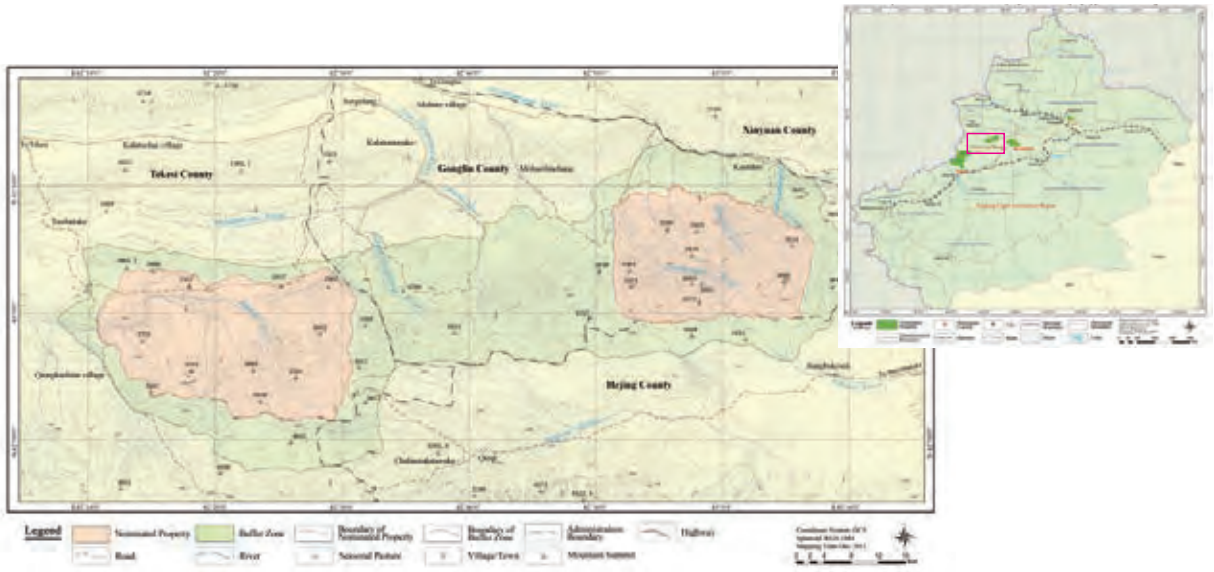


Figure 2-114 Location of the Kalajun-Kuerdening component in Xinjiang Tianshan

Table 2-18 Main features of the Kalajun-Kuerdening component

Location	Tekesi county, Xinjiang Uygur Autonomous Region	Gongliu county, Xinjiang Uygur Autonomous Region
Center coordinates	N42°57'30" E82°22'35"	N43°04'15" E82°58'44"
Area of the nominated property	Kalajun, 47,768 ha	Kuerdening, 35,139 ha
Area of the buffer zone	Kalajun, 35,296 ha	Kuerdening, 82,539 ha

2.a-3-2-1 Physical Geological Features

(1) Location and topography

Kalajun-Kuerdening is the central part of Xinjiang Tianshan, located in the Middle Tianshan Mountains. The general topography of this area is that the southern part is higher than the northern part. Kuerdening is located in the Qiapuke Valley on the north slope of the Nalaty Mountain. The western part of the valley is broad with low elevation, while the eastern part is narrow with high elevation, formed by the intersection of the transmeridional mountain of Nalaty and the nearly north-south mountain of Taxuba. The elevation of Kuerdening is between 1,600m and 3,830m, with the largest relative relief of 2,230m. In this area, there are three parallel north-south valleys: Wulekenkuerdening, Satebulake

and Xietiande. The elevation of Kalajun is between 1,820m and 3, 910m, with the largest relative relief reaching 2,090m. The topography of the northern part of Kalajun is relatively gentle, whereas it is incised by rivers in the southern part, forming huge valleys. The Kalajun Mountain extends transmeridionally. The top of the mountain is a kind of planation surface, which was incised by nearly north-south river valleys.

(2) Climate

Kalajun-Kuerdening lies in the Ili Valley and is characterized by a temperate continental semi-humid climate. It is cool and humid, with a late autumn and early spring. In winter, the climate is relatively warm. The annual average temperature is 5-7℃, with mean temperatures of minus 8℃ in January and 18℃ in July. The annual evaporation is 1,100-1,200mm, and annual average relative humidity is 70% with climate dryness less than four. The total number of frost-free days is 120. The precipitation is relatively abundant, with an annual precipitation of 600-800mm, which is the largest rainfall in the Tianshan Mountains. The snow is thick in the mountain area, with an average winter depth of 70-90cm.

(3) Hydrology

As already stated, Kalajun-Kuerdening is in the catchment area of the Ili River. In this area, there are the big Jiergalang, small Jiergalang, Kekesu and Kuerdai rivers, all of which flow into the largest branch of the Ili River drainage, named the Tekesi River. These rivers are mainly supplied by rainfall and seasonal snow melt water, accounting for 45% of total. Other supplies includes underground water, accounting for 31%, and ice and snow melt water, accounting for 24%. The water flow is mainly concentrated in summer, when 55% of the year's runoff can occur. In spring, the runoff is about 37% of the total and, in winter, 8% of the total. From east to west, the main river branches include the Erbotu, Kuerdening, Big and Small Mohe, Qiaxi, Tarim Jiergalang and Qingbulake. The many river branches and scattered springs and streams form a huge water system.

(4) Soils

Intact altitudinal mountain natural zones have developed in the Kalajun-Kuerdening component and the soils change regularly with elevation. From the top of the mountain to the piedmont, there are alpine meadow soils (2,800-3,500m), sub-alpine meadow soils (1,800-2,800m), mountain

taupe forest soils (1,600-2,600m), mountain chernozems (1,600-1,800m) and mountain chestnut soils. Most of the surface soils are neutral to acid but the process of humus deposition is obvious, forming soils with high organic matter. The surface soils possess much nitrogen, phosphorous and potassium.

2.a-3-2-2 Geological Features

(1) Geological tectonic features

Kalajun-Kuerdening lies in the eastern part of the West Tianshan Mountains fold belt and the middle part of the South Tianshan Mountains fold belt. It is composed of a series of anticlines and synclinorium, associated with upheaval and depression, including the Nalaty upheaval belt and the Tekesi depression belt. The fault tectonic structure in Kalajun-Kuerdening is well developed. The main faults include the Nalaty ridge deep fault, a deep fault on the north slope of the Nalaty Mountain and the deep valley fault of the Tekesi River.

(2) Lithology

The oldest stratum that has been discovered in this area is located along the zone from Qiaxi to Jiergalang and belongs to the Paleozoic erathem. The stratum is represented by phyllite, schist and marbleized limestone. The strata of the Silurian system, Carboniferous system of the Paleozoic erathem and the Paleogene system and Quaternary system of the Cenozoic erathem are widely distributed in Kalajun-Kuerdening.

2.a-3-2-3 Landform Features

The Kalajun-Kuerdening component is located on the north slope of the Biyike-Nalaty Mountains, with the north slope of the mountain extending for hundreds kilometers. It is the most typical area of the second and third level of planation surface in the Tianshan Mountain system. The peak of this area is Kabanbayi, located on the south edge of Kalajun-Kuerdening, with an elevation of 4,275m. The mountain body is oriented almost east-west, with an average elevation of 3,000m. The top of the mountains belong to the sub-alpine zone and is flat and rounded with a second level of planation surface that is widely distributed and well expressed. The Paleozoic strata is covered by that of the Mesozoic erathem to form a gentle terrain, with a third level of planation surface developed.

Figure 2-115 Planation surface of the Kalajun

2.a-3-2-4 Biotic Ecotypes

The Kalajun-Kuerdening component is located in the west-facing Ili Valley, which has a wet and temperate climate. The Kuerdening component has the most abundant precipitation in the Tianshan Mountains. This environment has created good living conditions for wild animals and plants, and has formed a refuge for many ancient relict species. As a result, the wildlife resources are very rich. It is the key centre of biological diversity in the Tianshan Mountains in Xinjiang.

In Kuerdening, there are the tallest and densest original forests of *Picea schrenkiana* in the world. *Picea schrenkiana* is a Neogene period remnant species which only inhabits the north slope of the Tianshan Mountains in all the world. *Picea schrenkiana* is endemic to the Tianshan Mountains and has gone through 40million years history of evolution. They are the *living fossil* indicating the formation and biological evolution of the Tianshan Mountains.

In Kalajun-Kuerdening, there are large areas of wild fruit forests in the river valleys at an elevation around 1,650m. There are many Neogene period remnant species in this region, as well as concentrated distribution of wild relatives of apple trees, walnut, apricot and plum trees. It is the only distribution area where the now-endangered wild *Prunus Domestica* originated in the world.

The Kalajun grassland, where the nominated property lies, is just on the

vast third level planation at the latitude of 2,200-2,400m, making it the most expansive mountain steppe and meadow in the whole Xinjiang Tianshan site. The Kalajun grassland is about 25km wide from north to south and 40km long from east to west.

(1) Flora

● Flora features

Kalajun-Kuerdening is located in the hinterland of Eurasia where various floras converge. Because of changes that have happened to the natural environment, it is favorable for the interaction, mixing and specialization of different flora. Thus, this area features the transition of many plant species found concentrated in this area. According to preliminary investigations, there are 1,594 species in 467 genera from 92 families of higher vascular plants. The number of species is relatively poor but the diversity is high. There are 1,558 angiosperm species, which account for 97.74% of the total number and they are absolutely dominant. In Kalajun-Kuerdening, the flora generally features the attributes of the temperate zone. The 185 genera of north temperate distribution types and their variants are the largest distribution type followed by 79 genera of old world temperate distribution type and their variants. There are also a total of 61 genera of plants of Mediterranean and West Asia-East Asia types and their variants. The exchange of plant species between the Middle Tianshan and Central Asia, the Mediterranean and West Asia is relatively more than that between East Asia and North America. In this site, there is no genus endemic to China, but there are species endemic to China.

● Vegetation types

According to the classification principles of *Vegetation of China*, the natural vegetation in Kalajun-Kuerdening can be divided into eight vegetation types, 17 vegetation subtypes and 39 formations. Representative vegetation types include: alpine cushion vegetation, alpine meadow, subalpine meadow, mountain evergreen coniferous forest, mountain deciduous broadleaved forest, xeric evergreen coniferous shrub and mountain steppe（Figure 2-116）.

Alpine meadow is composed of Form. *varii herbae*, Form. *Carex* spp., *Poa* spp., *Varii herbae* and Form. *Kobresia* spp., *varii herbae*, which are the relatively large type of vegetation in this area.

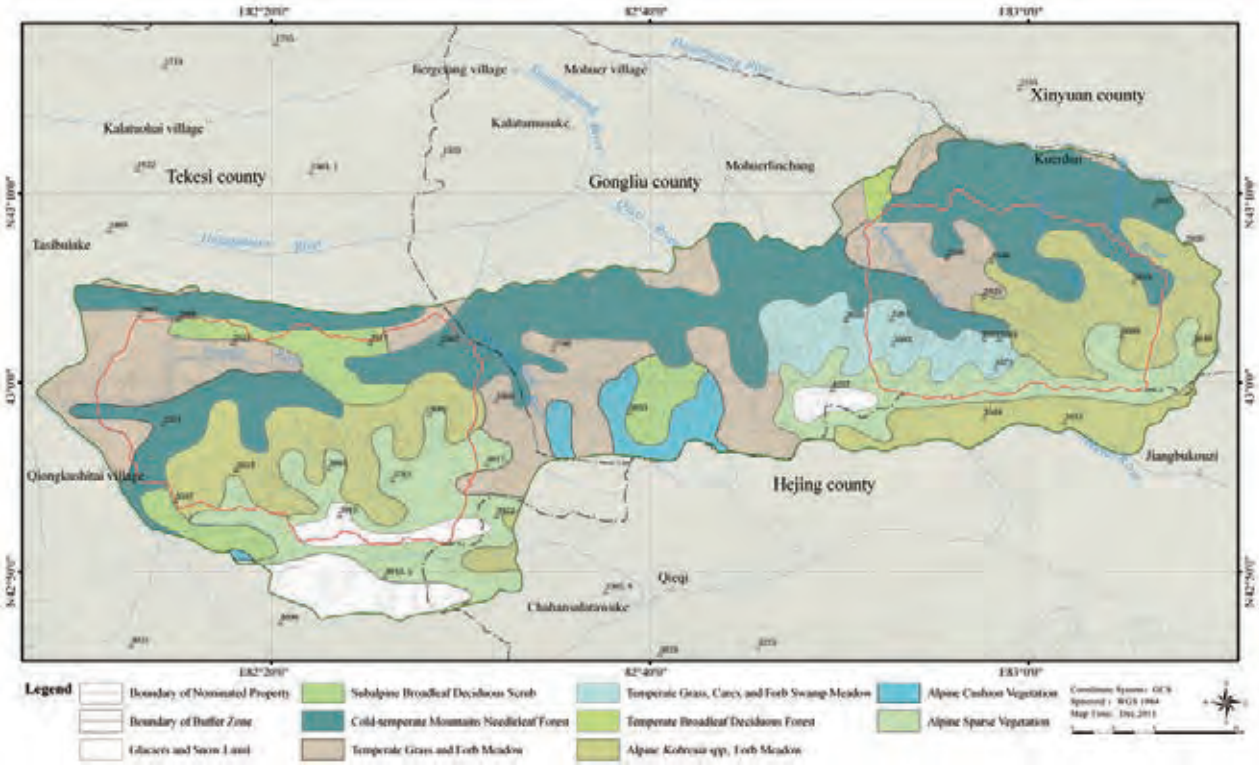


Figure 2-116 Vegetation type of the Kalajun-Kuerdening component

Montane meadow grows well and meadow is distributed from the low mountains to the high mountains. Kalajun is the typical representative of montane meadow in the Tianshan Mountains.

Temperate mountain evergreen coniferous forests composed of Form. *Picea schrenkiana* occupy the shady slops of the mid mountains at the elevation of 1,500-1,600m, forming a unique landscape in the vertical structure of Central Asian mountain vegetation. Inside and outside of this forest zone, there is distribution of Form. *Betula tianschanica* and Form. *Populus tremula*. On the flood plain and in the river valleys, there is a distribution of valley deciduous broadleaved forest composed of Form. *Populus densa*.

Central Asia mountain wild fruit forests, composed of Form. *Malus sieversii*、*Armenica vulgris*、*Juglans regia,* are the components of the deciduous broadleaved forests， which have the highest landscape and aesthetic values.

Evergreen coniferous shrubs are mainly dominated by Form. *Juniperus sabina and* Form. *Juniperus pceudosabina.*

The dominant species of mountain steppe is *Stipa* spp. and *Festuca* spp.,

Figure 2-117 Sub-alpine meadow in Kalajun

Figure 2-118 Coniferous and broad-leaved forests in Kuerdening

Figure 2-119 Wild apple forest in Kuerdening

within a narrow distribution belt. Mountain/mid-mountain meadow is intermixed with evergreen coniferous forest and alpine vegetation. This kind of vegetation is mainly composed of Form. *Festuca* spp.， *Varii herbae* and Form. *Varii herbae*.

Alpine vegetation is dominated by Form. *Thylacospermum caespitosum*, which is also the dominant vegetation in Kalajun. This kind of vegetation commonly intermixes with alpine meadow and mountain/mid-mountain meadow, distributed at the steep gravel slopes from the mountain forest line to the snow line (2,800-3,600m).

● Vegetation distribution

In Kalajun-Kuerdening, the topography is complicated and diverse, the soil types are varied, the altitudinal difference in climate is significant, plant species are abundant and vegetation types are diverse. From low to high altitude, there are different vegetation patterns. Thus, typical Central Asian montain altitudinal vegetation zones have been formed, which are very unique:

① Wild fruit forests constitute the special altitudinal zone of mountain deciduous broadleaved forests being the zonal vegetation in mountain landscape which exhibits the characteristics of maritime (oceanic) vegetation.

② Meadows are well developed and widely distributed from low to high altitude.

③ The mountain steppe zone is relatively narrow, and the desert steppe is replaced by steppe desert, with the dominant species of *Artemisia*.

Figure 2-120 Vegetation distribution in Kalajun

Plant species

According to preliminary investigations, there are 1,594 species of high vascular plants, from 457 genera and 92 families in Kalajun-Kuerdening (Table 2-19).

Table 2-19 Higher vascular plants in Kalajun-Kuerdening component

Class	Name	Families	Genus	Species	Percentage (%)
Fern	Pteridophyta	11	14	27	1.69
Gymnosperm	Gymnospermae	3	3	9	0.57
Angiosperm	Angiospermae	78	450	1,558	97.74
Total		92	467	1,594	100

Rare and endangered species, endemic species

Among vascular plants, there are 12 species listed on the Red List of IUCN (2010), such as *Juglans regia, Armeniaca vulgaris, Fraxinus sogdiana, Sorbus tianschanica* and *Juniperus sabina*. There are 10 species that are included in the Appendix II (2010) such as *Orchis umbrosa* and *Corallorhiza trifida*. There are 10 species that are included in the List of National Key Protected Wild Plants. There are 23 species of Class I and six species of Class II protected species according to the Xinjiang Uygur Autonomous Region Key Protected Wild Plants. In addition, there are 38 species endemic to Tianshan Mountains such as *Ligularia tianshanica* and *Gagea stepposa*, as well as relic species such as *Crataegus songorica, Acer semenovii*, and *Prunus sogdiana.*

Figure 2-121 *Juglans regia*

Figure 2-122 *Armeniaca vulgaris*

Figure 2-123 *Juniperus sabina*

Figure 2-124 *Sorbus tianschanica*

Figure 2-125 *Crataegus songorica*

Figure 2-126 *Acer semenovii*

Figure 2-127 *Fraxinus sogdiana*

Figure 2-128 *Orchis umbrosa*

Figure 2-129 *Ligularia tianshanica*

Figure 2-130 *Gagea stepposa*

Figure 2-131 *Corallorhiza trifida*

Figure 2-132 *Prunus sogdiana*

(2) Fauna

● Faunal features

The Kalajun-Kuerdening component is located at the junction between western and eastern floral and faunal communities. In addition, it is a wet island between arid zones and a rich and unique fauna has been formed. Geographically, the fauna in this area belongs to the Palaearctic Realm, Central Asian Sub-realm, Tianshan Sub-region and North Tianshan Province. Species of the Palaearctic Realm are absolutely dominant. Northern widely-distributed type and Central-Asia type are dominant, mixed with Holarctic types, Plateau types and Orential types, showing that the fauna originated from the north (Table 2-20).

Table 2-20 Terrestrial wild vertebrates in the Kalajun-Kuerdening component

Type	Palaearctic type (U)	Holarctic (C)	Northeast type (M)	Central-Asia type (D)	Plateau type (P)	Himalaya-Hengduan mountains type (H)	Orential type (W)	Northern widely-distributed type (O)
Total	64	33	2	51	9	2	7	55

● Animal species

There are 223 species of wild vertebrates in Kalajun-Kuerdening: 21 species of fish, 5 species of amphibians, 15 species of reptiles, 123 species of birds and 59 species of mammals, belonging to 156 genera, 66 families , 29 orders, accounting for 40.54% of the total number of vertebrates in Xinjiang Tianshan (Table 2-21).

Table 2-21 Wild vertebrates discovered in the Kalajun-Kuerdening compoment

Class	Orders	Families	Species	Percentage (%)
Fishes	3	5	21	9.4
Amphibians	2	3	5	2.2
Reptiles	3	7	15	6.7
Birds	15	34	123	55.2
Mammals	6	17	59	26.5
Total	29	66	223	100

Rare and endangered species

Kalajun-Kuerdening is a significant part of the key areas of biodiversity in China. It is an important habitat and breeding for many rare and endangered species, with 55 species of rare and endangered animals belonging to 38 genera, 20 families from 14 orders. There are 144 species of animals listed on the Red List of IUCN (2010), such as *Gyps himalayensis, Asio otus, Cuculus canorus, Sturnus roseus, Marmota bobak, Vipera ursinii, Aquila heliaca, Aquila clanga, Falco cherrug, Coracias garrulus, Mustela Altayca, Vormela peregusna, Lutra lutra, Panthera uncia, Ovis ammon and Ochotona iliensis.* Five species are included in Appendix I of CITES (2010) and three species are included in Appendix II of CITES (2010). There are 50 species of Class I and II on the *National Key Protected Wild Animals List* (1988) and 48 species included in CNRD (2006). The rare and endangered wild species in

Figure 2-133 *Gyps himalayensis*

Figure 2-134 *Egretta alba*

Figure 2-135 *Ardea cinerea*

Figure 2-136 *Asio otus*

Figure 2-137 *Bubo bubo*

Figure 2-138 *Cuculus canorus*

Figure 2-139 *Grus grus* and *Anthropoides virgo*

Figure 2-140 *Sturnus roseus*

Kalajun-Kuerdening include large and medium-sized predatory birds and herbivorous species, such as *Accipitridae, Falconidae, Strigidae, Canidae, Mustelidae, Felidae, Cervidae* and *Bovidae*. This indicates that the biotype of animals in Kalajun-Kuerdening is relatively special, the food chain is complete, the environment is diverse and provides a variety of habitats for species. There is coordination and restriction between different species, populations and communities, ensuring the original uniform distribution pattern of varied species.

● Endemic species

In Kalajun-Kuerdening, there are 15 species of wild animals that are endemic to the Tianshan Mountains, including four species of fish, one species of amphibian, three species of reptile, and seven species of mammal, such as *Ochotona iliensis*. This property plays an important role in scientific research on the genetics of wild species in China and even in the world. The site also plays a significant role in research on

Figure 2-141 *Panthera uncia*

Figure 2-142 *Marmota bobak*

the evolution of critical wildlife groups of temperate arid deserts and mountains in China and other parts of the world.

2.a-3-2-5 Natural Landscapes

The natural landscapes of Kalajun-Kuerdening have some of the highest aesthetic values in biological landscape of Tianshan Mountains in Xinjiang. There are exquisite scenic views of alpine meadows, sub-alpine meadows, pure snow spruce forests, spruce and broadleaved mixed

Figure 2-143 Morning senery of Kuerdening

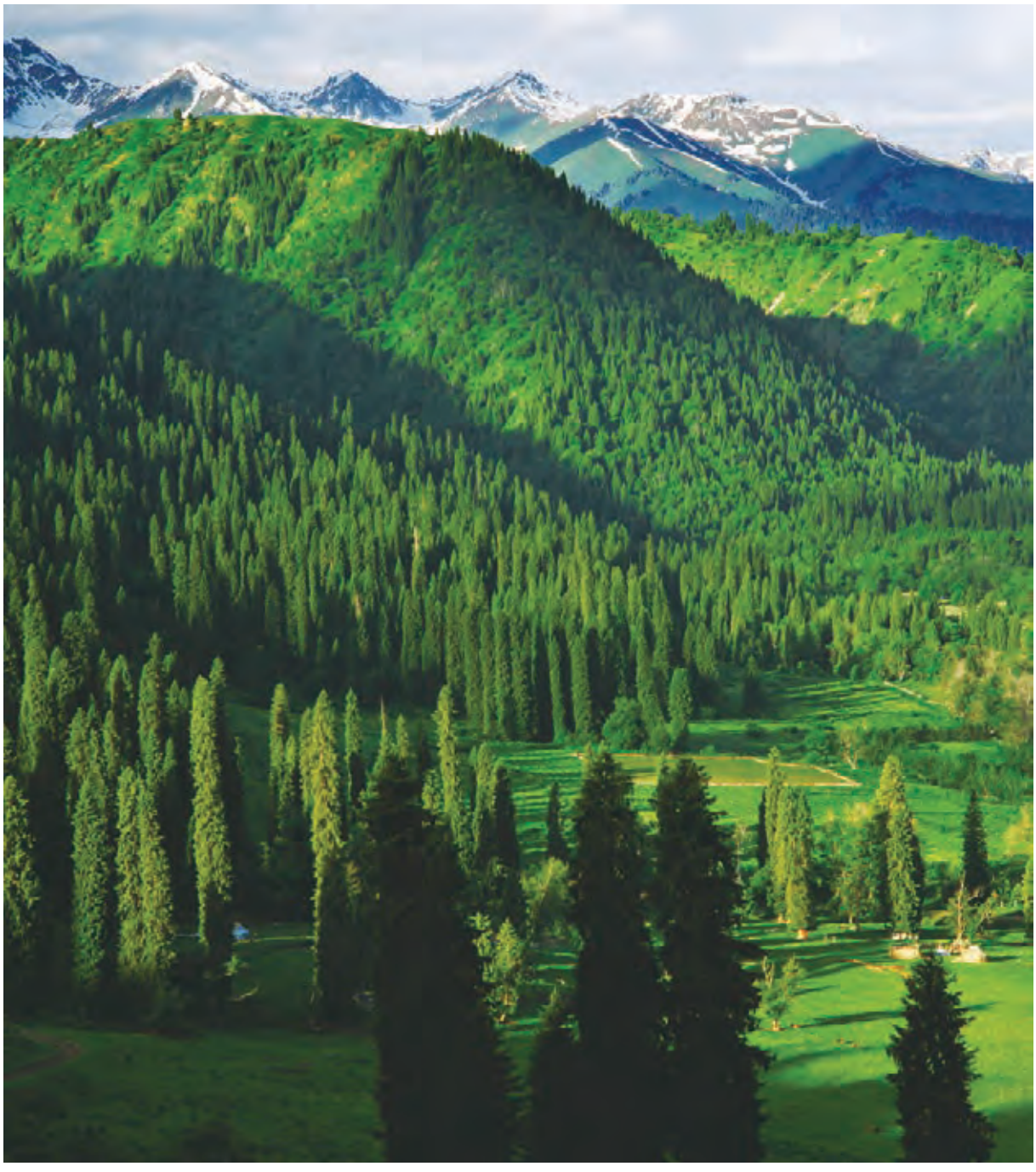


Figure 2-144 Valley forest-meadow-spruce forest

Figure 2-145 Wild fruit forest

Figure 2-146 Forest-grassland in Kalajun

Figure 2-147 Meadow-forest-cloud

forests, wild fruit forests, and mountain steppes. The abundant and diverse types of landscape combine to give an overall landscape that is majestic and graceful.

2.a-3-2-6 Summary of Values Which Contribute to the Serial Properties of Xinjiang Tianshan

(1) Kalajun-Kuerdening boasts the most abundant biodiversity of the Xinjiang Tianshan. It is an important part of the Central Asian wild fruit forest. It is also the original area and the distribution centre of wild apple, wild walnut and European plum and other species. The site is the best habitat and original place for snow spruce forest globally.

(2) Within the Global 200 Ecoregion111 “Middle Asian montane woodlands and steppe”, Kuerdening is the most tyical representative of Tian Shan montane conifer forests; and Kalajun is the most typical representative of Tian Shan montane steppe and meadows.

(3) Kalajun-Kuerdening has the highest aesthetic values of biological landscape in Tianshan Mountains in Xinjiang. Rich biodiversity, landform diversity and climate diversity combine to form the variety of landscape aesthetics. It is the most outstanding representative of integrated mountain landscapes in temperate arid zone.

2.a-3-3 Bayinbuluke

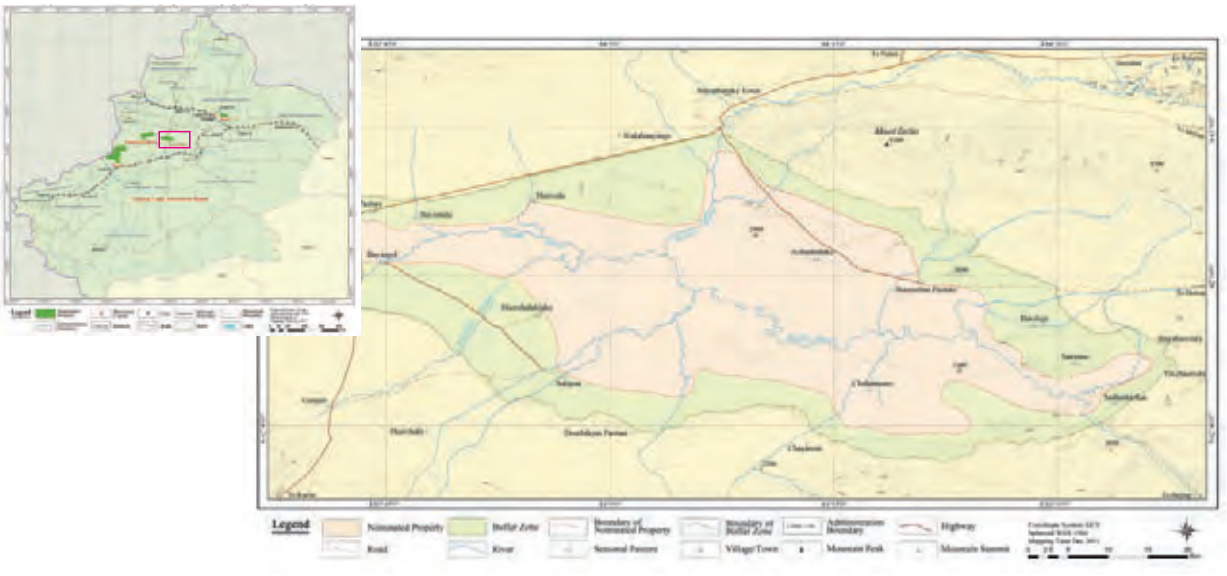


Figure 2-148 The location of Bayinbuluke component in Xinjiang Tianshan

Table 2-22 Main features of the Bayinbuluke component

Location	Hejing county, Xinjiang Uygur Autonomous Region
Center coordinates	N42º47'53" E84º09'50"
Area of the nominated property	109,448 ha
Area of the buffer zone	80,090 ha

2.a-3-3-1 Physical Geological Features

(1) Location and topography

The Bayinbuluke component is the central part of Xinjiang Tianshan, located in the Middle Tianshan Mountains. The tpography of Bayinbuluke is gentle with the western part higher than the eastern one. The highest point of Bayinbuluke is 2,600m and the lowest point 2,390m, with a vertical relief of only 210m. It is located in the intermontane Youerdusi Basin, and surrounds the Kaidu River originating from Aierbin Mountain across its central part from west to east.

(2) Climate

Bayinbuluke is surrounded by mountains, and belongs to arid continental climate, with a short summer, a long and freezing winter, and a very short frost-free period. The annual average temperature of this area is -4.6℃, with an extreme high temperature of 28.3℃ and extreme low temperature of -48.1℃. The annual average precipitation of this area is 276mm, mainly from from June to August, which accounts for 50-70% of the total. The snow is concentrated between January to March, and the annual average snow amount is about 70mm. Annual evaporation is 1,128mm, and average relative humidity is 69%.

(3) Hydrology

Bayinbuluke is in the upriver catchment of the Kaidu River. The water is mainly supplied by snow melting and rainfall, but certain parts of the

Figure 2-149 Topography of Bayinbuluke

basin is supplied by groundwater. Many smaller rivers originate in the surrounding snow mountains and flow into the Kaidu River, forming swamps and lakes (with an area about 1,000km^2) along the river bank meanders.

(4) Soils

The soils of the nominated property are predominantly alpine basin swamp soil. Other soil types have developed as landforms and water conditions change. The muddy alpine basin swamp soil is mainly located in the spillover area of springs and permanent water pools. The alpine valley peat mire soil lies in the water area of the central swamp lands and river flooding area. The alpine basin meadow swamp soil is located in a higher place bordering on the peat mire soil. The alpine basin meadow soil is distributed in the joint area of swamps and grasslands and central lowlands.

2.a-3-3-2 Geological Tectonic Features

(1) Geological tectonic features

The Youerdusi Basin, where the nominated property is located, lies in the eastern part of a geogynclinal fold belt of the Western Tianshan Mountains and in the center of a geosynclinal fold belt of the Southern Tianshan Mountains. Geologically, this area is a kind of inter-mountain fault depression. The basin has experienced subsidence since the Triassic and was uplifted and eroded during the Cretaceous. In the late Tertiary, The Tianshan's basins were gradually depressed and enlarged. Glaciation during the different phases of the Quaternary Ice Ages, gradually developed the landforms of today.

(2) Strata lithology

The bed rock of Bayinbuluke is composed of limestone, mudstone, metamorphic rock and igneous rock of the Devonian and Carboniferous Systems. Devonian and Carboniferous strata of the Paleozoic erathem outcrop abundantly, with few strata of the Mesozoic erathem. A few strata of the Neogene system of the Cenozoic erathem can be found in this area, with the upper part composed of brown and fulvous piedmont fluvial clastic rocks and the lower part composed of red fluvial and lacustrine sand, mudstone, mudstone combined with sandstone and gypsum. Quaternary strata are broadly distributed throughout the nominated property. The central part of the basin is covered by unconsolidated Quaternary sediments, while the surrounding alluvial fans are mainly composed of gravels and gravelly sandy soils covered by loess. The swamps in the center are dominated by silt rich in organic matter.

2.a-3-3-3 Landform Features

The Yuerdusi Basin where the Bayinbuluke is located is a typical alpine inter-mountain fault basin. The topography in the center of the basin is explanate, and the surrounding piedmont is a clinoplain composed of alluvial fans and proluvial fans. In the peripheral area of the basin, there are hills composed of a mass of moraine sediments, and in the area below the Quaternary moraine terrace, there are proluvial fans. The meandering Kaidu River crosses the center of the basin, forming a broad floodplain and swamp grasslands.

2.a-3-3-4 Biology and Ecology

(1) Flora

● Vegetation flora features

According to the vegetation classification in China, the vegetation in Bayinbuluke is typical of Xinjiang deserts, eastern Xinjiang - southern Xinjiang desert sub-zone, mountain grassland province of Tianshan south slope and the Youerdusi basin sub-district. The number of plant species is relatively poor but the diversity is relatively rich. There are 681 species of 245 genera from 54 families of angiosperms which account for 96.74% of the total number of wild vascular plants. In terms of the origin of the flora elements, there are 161 genera of north temperate flora zone and old-world temperate zone which account for 75.94% of the total number. The exchange of plant species between this site and Central Asia is relatively more than that with East Asia.

● Vegetation types

According to the classification principles of *Vegetation of China*, the natural vegetation in Bayinbuluke can be divided into three vegetation types, three vegetation subtypes and 14 formations (Figure 2-151). Because of frosty weather and frozen soil, there are hardly any large trees in this region, with the main vegetation typical alpine swamp and meadow. On the slopes and pediment of the mountains, there is widespread alpine *Stipa purpurea* steppe; on the wet basin floor there is marsh meadow and marsh vegetation, consisting of moss grass, hair grass, rushes and other kinds of grass. The evenness and dominance of the marsh plant community is higher than that of dome swamp. The main vegetation types from the high to the low altitude are respectively.

Figure 2-150 Alpine marsh meadow of Bayinbuluke

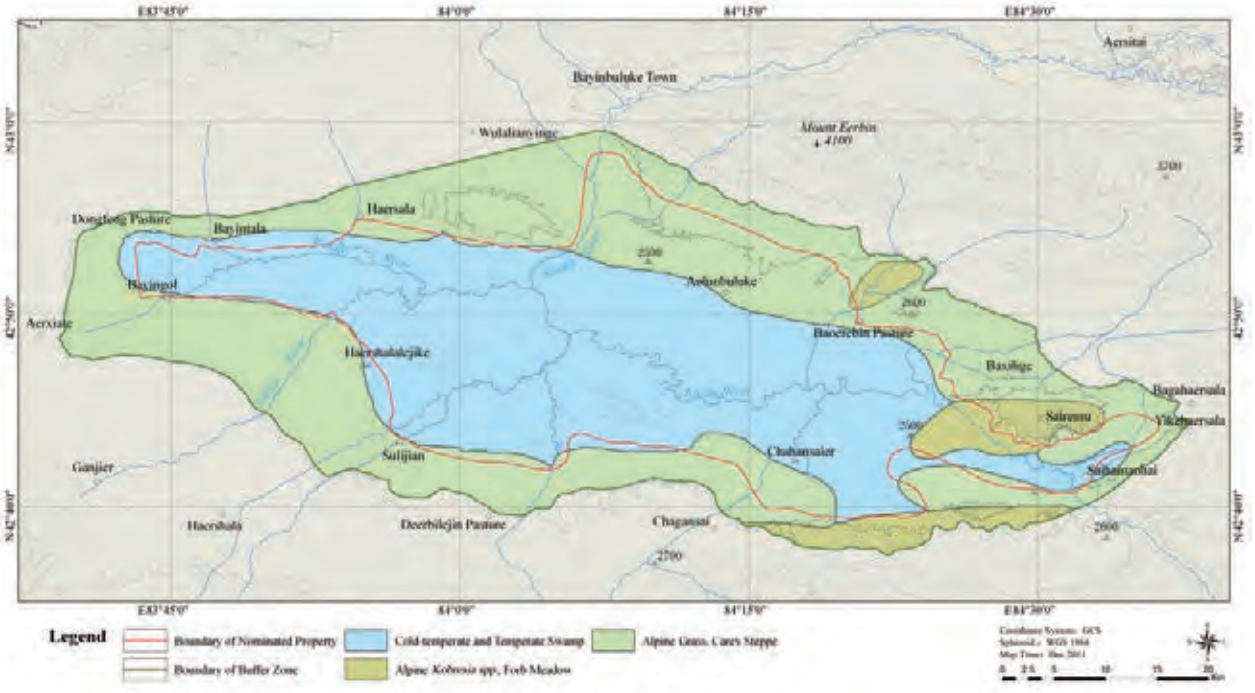


Figure 2-151 Vegetation type of the Bayinbuluke component

Alpine steppe: the main types include Stipa purpurea steppe, Stipa grandis steppe and miscellaneous grass prairie. This kind of vegetation grows at an elevation of 2,500-2,600m, and the community is composed of cold-tolerant plants such as *Stipa subsessiliflora*, S.*purpurea*, S.*krylovii*, *Festuca pseudovina, Gentiana decumbens, potentilla bifurca, Agropyron cristatum, poa* sp. and *Schultzia* sp.

Alpine marsh meadow: the types mainly include *Carex* meadow which is located in the basin bottom. Herb species growing in marsh meadow account for more than 60% of all plant species in the nominated property, mainly various *Carex* such as *Carex uesicaria* and C.*microglochin*, as well as wet and mesic grass and weeds such as *Potamogeton lucens, Utricularia* sp., *Hippuris vulgaris, Trigloch* in palustre, *Alopecurus arundinaceus* and *Deschampsia caespitosa*. There is also an abundant distribution of submerged plants and emergent plants in the lakes and rivers, such as calamus and dock along the waterfront as well as *Utricularia, Halerpestes cymbalaris and Potamogeton malaianus* in the water.

● Plant species

According to preliminary investigation, there are 704 species of higher vascular plants, from 254 genera and 6 families (Table 2-23).

Table 2-23 Higher vascular plants in Bayinbuluke component

Class	Families	Genus	Species	Percentage (%)
Fern	6	7	17	2.41
Gymnosperm	2	2	6	0.85
Angiosperm	54	245	681	96.74
Total	62	254	704	100

● Rare and endangered species, endemic species

Of the 704 species of vascular plants in Bayinbuluke, there are three species that are included on the Appendix I, II and III of CITES (2010), that is, *Coeloglossum viride, Orchis latifolia* and *Orchis umbrosa*. In addition, there are 19 plant species endemic to Xinjiang such as *Asplenium chingianum, Delphinium tianshanicum, Ligularia tianshanica* and *Poa florida*.

(2) Fauna

● Fauna features

Based on the analysis of the animal distribution, there are 103 species of terrestrial vertebrates with Paleoarctic type and Holarctic type accounting for more than 50%, followed by lower amounts of Central-Asia types and Plateau types (Table 2-24).

Table 2-24 Terrestrial wild vertebrates in the Bayinbuluke component

Class	Northern widely-distributed type (O)	Palaearctic type (U)	Holarctic type(C)	Central-Asia type (D)	Plateau type (P)	Northeast type (M)	Oriental type (W)
Amphibians	1	-	-	1	-	-	-
Birds	-	38	24	10	8	1	1
Mammals	1	9	4	4	-	1	-
Total	2	47	28	15	8	2	1

● Animal species

There are abundant species of birds in Bayinbuluke, in total 119 species of all kinds of birds, such as cranes, egrets, golden eagles, bar-headed geese,

grey geese, whooper swans, tundra swans and mute swans, amounting to tens of thousands of birds in the nominated property. Bayinbuluke is the best habitat for breeding and summer habitat for wild birds. It is the largest National Nature Reserve for swan in China. There are nearly 7,000 swans inhabiting the marsh and swamps of the basin, making it the largest breeding group of wild swans in the world. It is also the most southern limit for wild swans to breed in northern hemisphere.

There are 145 species of higher vertebrates in Bayinbuluke: five species of fish from two families, two species of amphibians from two families, 119 species of birds from 31 families and 19 species of beasts from 10 families (Table 2-25).

Table 2-25 Wild vertebrates discovered in the Bayinbuluke compoment

Class	Families	Species	Percentage (%)
Fishes	2	5	3.4
Amphibians	2	2	1.4
Birds	31	119	82.1
Mammals	10	19	13.1
Total	45	145	100

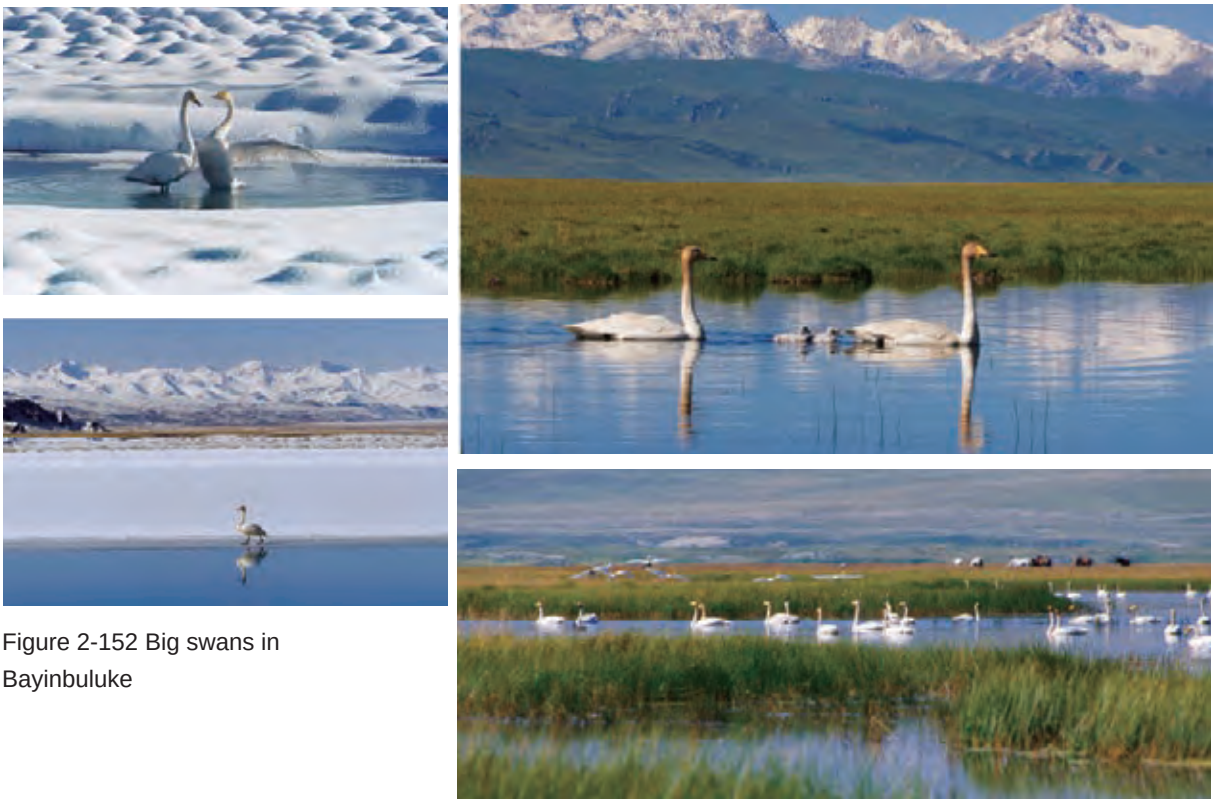


Figure 2-152 Big swans in Bayinbuluke

Figure 2-153 *Ovis ammon* of Bayinbuluke

● **Rare and endangered species**

There are 104 species of animals listed on the Red List of IUCN (2010), such as *Aythy anyroca, Limosa limosa* and *Falco cherrug*. One species is included in Appendix II of CITES (2010).

2.a-3-3-5 Natural landscape

The Youerdusi Basin where Bayinbuluke is surrounded by snow-capped mountains; it is China's second largest grassland next to the Ordos grassland. The melting snow and rain in the basin has induced a landscape composed of marshes, wetlands, rivers and lakes. The biodiversity is abundant and the natural landscape has been reserved and well protected.

(1) Bending rivers and marshes

The basin contains a highly scenic river, which twists and turns for 30km from east to west and 10km from north to south. Along this scenic river, there is marsh grass and numerous alpine lakes in series with each other. There are large quantities of aquatic plants in the crystal clear water of

Figure 2-154 River Meanders in Bayinbuluke

Figure 2-155 Bending rivers and marsh

Figure 2-156 Marsh of Bayinbuluke

Figure 2-157 Wetland of Bayinbuluke

the lakes. The carpet of green grass and the snow-capped mountains and peaks reflected in the lakes together form a fantastic and attractive natural landscape of marshes and bending rivers. The landscape in Bayinbuluke is the outstanding representative of the marsh and sinuous river landscape in the nominated property, and it is also famous as one of China's six most beautiful wetlands.

(2) Wild animals

The world-famous Swan Lake is located in the central part of the nominated property of Bayinbuluke. Springs, rivers and melting snow from the Tianshan Mountains flow into the Swan Lake, bringing an abundance of food supply and water. Thus, the cool and humid climate is very suitable for a variety of waterfowl, especially swans, to thrive. Every April, tens of thousands of rare birds such as whooper swans, tundra swans and mute swans, leave from India and south Africa and fly to Bayinbuluke to breed. They usually leave Bayinbuluke during October and November, after a residence period of 7-8 months. Swans, lakes, sky, clouds and mountain peaks blend into a very spectacular scene.

Figure 2-158 The Swan lake

Figure 2-159 The Swan lake

2.a-3-3-6 Summary of Values Which Contribute to the Serial Site of Xinjiang Tianshan

(1) Bayinbuluke is the best representative of the large inter-montane basins of the Tianshan Mountains.

(2) Bayinbuluke is the typical representative of an alpine wetland ecosystem in the arid temperate zone.

(3) Bayinbuluke is the best representative of a beautiful landscape of bending rivers and marshes of the Tianshan Mountains.

(4) Bayinbuluke is China's largest breeding ground for swans, as well as the northern hemisphere's most southern limit for the breeding of wild swans.

2.a-3-4 Bogda

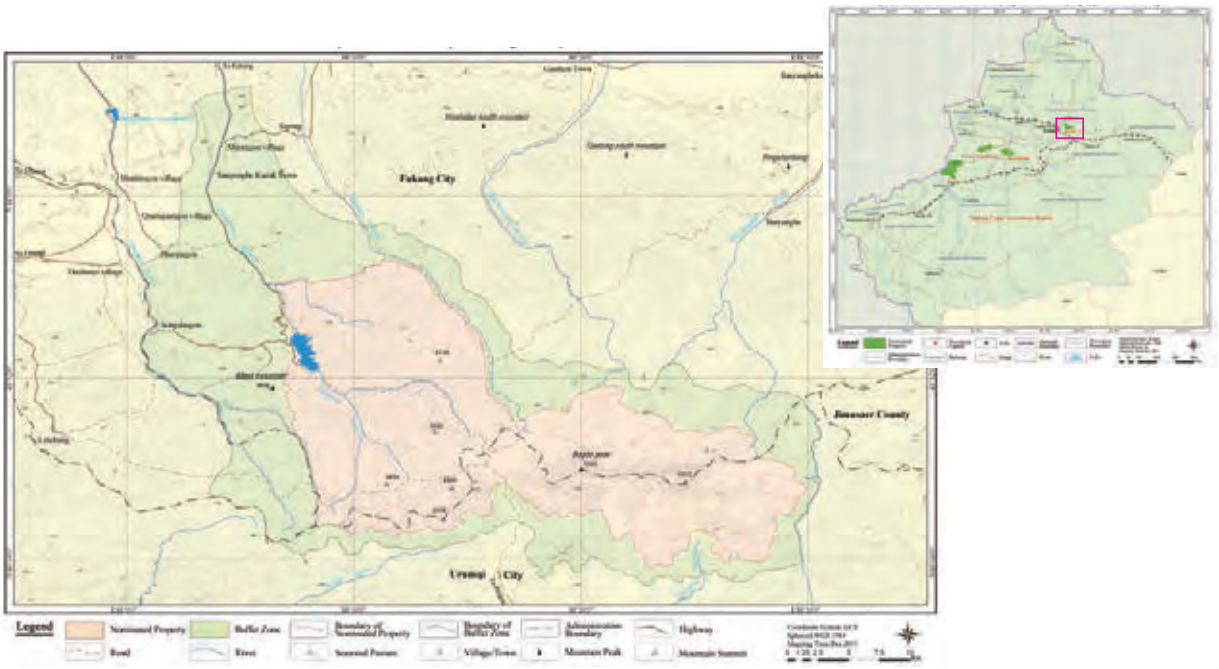


Figure 2-160 Location of Bogda component in Xinjiang Tianshan

Table 2-26 Main features of the Bogda component

Location	Fukang county and Urumqi city, Xinjiang Uygur Autonomous Region
Center coordinates	N43º50'00" E88º17'12"
Area of the nominated property	38,739 ha
Area of the buffer zone	41,547 ha

2.a-3-3-1 Physical Geographical Features

(1) Location and topography

The Bogda component is the eastern part of Xinjiang Tianshan, located in the North Tianshan Mountains. The topography gradually becomes higher from north to south. The elevation is between 1,380m and 5,445m, with the largest relative relief reaching 4,065m. The middle mountains between 1,600m and 2,600m in the northern part of this area have been eroded by river valleys, forming a complicated topography.

Figure 2-161 Topographies of Bogda

(2) Climate

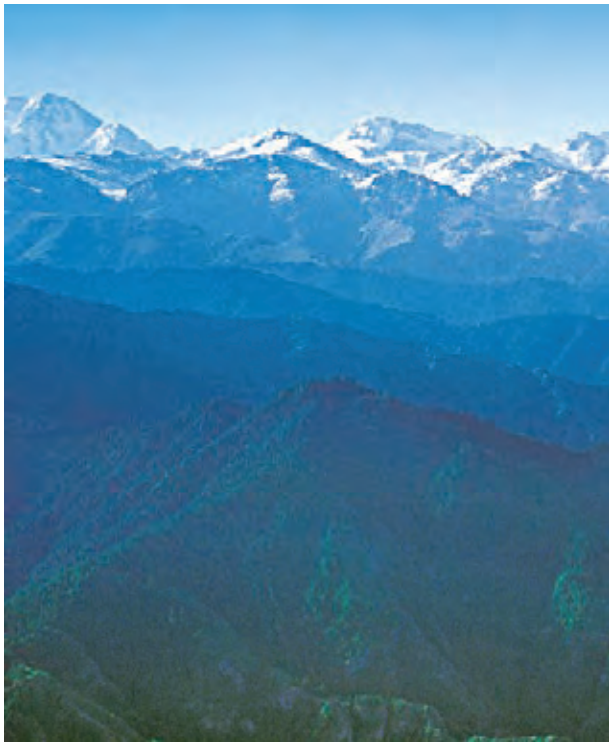
Bogda belongs to the continental temperate climate zone. It is a wet island in the center of the desert in the arid area. Most parts of the nominated Bogda are located on north slope of the Tianshan Mountains, and are sheltered by the windward slope intercepting currents from the Atlantic and Arctic. Because the mountain body is a barrier, the temperate continental climate is not that obvious in this area. In comparison with the other areas, it is warmer in winter and cooler in summer, with enough rainfall and relatively deep snow, and no strong wind nor evident spring and autumn. The annual average temperature is 2.5℃. The highest temperature is reached in July with a maximum of 28.4℃ and an average of 15.9℃, whereas the average lowest temperature is minus 12.4℃. The temperature however dips to minus 28.2℃. There is an annual average of 98.4 frost-free days and the relative humidity is 70-85%. The annual average precipitation is 444mm, concentrated in April to September, while the annual average evaporation is 1,439mm.

(3) Hydrology

Surface water of Bogda is mainly sourced from glaciers on Bogda Peak. There are 113modern glaciers in the Bogda Peak area, with an area of 101.4km² and ice volume of $18.4\times10^8 m^3$. It is a natural ice reservoir and the water source of many rivers. The main river system of Bogda is the Sangong River, with a length of 60km and a catchment area of $310km^2$. The rivers are mainly supplied by ice and snow melt water, rainfall and springs, with an annual average runoff of $4,969\times10^4 m^3$ and the highest monthly average runoff of $991\times10^4 m^3$ in August. In the headwaters of the Sangong River, there are three river branches, named Dadonggou, Jiangjungou and Malugou, all of which run through formerly glacier-filled valleys and flow into Tianchi Lake. There are 12 lakes in this area, of which, ten are small alpine glacial lakes. Tianchi Lake lies in the upper reaches of the Sangong River. The surface elevation of Tianchi Lake is 1,910m, and the largest depth is 102m. Its total area is $2.48km^2$, with a water volume of $1.6\times10^8 m^3$.

(4) Soils

From the top to the bottom of Bogda, there are original alpine soils (3,300-3,700m), alpine meadow soils (2,900-3,300m), sub-alpine meadow soils (2,700-2,900m), taupe forest soils (1,650-2,700m), mountain chestnut soils (1,400-1,650m) and mountain brown calcic soils (1,380-1,400m). The surface of three types is neutral to acid, and others are neutral to alkaline. The soils are high in organic matter, while the surface soils contain ample nitrogen, phosphorus and potassium.



2.a-3-3-2 Geological Features

(1) Geological tectonic features

The geological tectonic system of Bogda belongs to the Yinshan-Tianshan latitudinal tectonic belt, which is formed by the Bogda syncline of the North Tianshan Mountains fold belt. The main

tectonic line is nearly east-west.

(2) Lithology

The strata of this area are dominated by shallow marine carbonates, volcanic clastic rock and terrigenous clastic rock of the Carboniferous system in the Paleozoic erathem, with a depth of 6,300m. They are broadly distributed in the Bogda area, accounting for 60% of the total area. The rocks of this area are composed of limestone, sandstone, mudstone, dioritic porphyrite, tuff and volcanic breccia, which are hard and strongly resistant to weathering. The topography has been uplifted and large mountain junction zones and ridges formed. They are characterized by alpine areas covered with ice and snow and middle mountain zones composed of valleys and glacial relicts. The strata of the Mesozoic and Neozoic erathems are mainly distributed on the north and south slopes of the mountains, and are predominantly fluvial, lacustrine and marsh clastic rocks. The rocks are mainly composed of grey green and yellow green siltstone, sandstone, mudstone and coal seams, red sandy mudstone, red sandstone and siltstone with gypsum and so on, showing as low mountains and hills. In the plain area in front of the mountain, thick Quaternary siltstones and gravels have been deposited and pluvial and alluvial clinoplains and deserts have developed.

Figure 2-162 Topographies of Tianshan Tianchi

2.a-3-3-3 Landform Features

(1) There is a large altitudinal difference between the mountains and plains. Because of tectonic block-uplifting processes, the Bogda Mountain is much higher than the surrounding mountains. It is therefore a most attractive "geological symbol" in the eastern part of the main Tianshan Mountains and on the southeast of Junggar Basin. Bogda Peak is 5,445m high, and the Tianchi Lake is 1,900m high and so the relief can reach 3,545m.

(2) The step-layer landforms of the mountains are obvious. As a result of faulting, and various upheavals of blocks and subsequent erosion, three levels of planation surfaces have been formed, at elevations of 4,000m, 2,800-3,200m and 1,600-2,200m respectively.

(3) Under the influence of the vertical and horizontal zonality of the climate, the landforms are diverse: modern snow and ice alpine mountains, periglacial subalpine mountains, fluvial erosive middle mountains, subarid and arid denudation low mountains, alluvial and diluvial declining plains, alluvial plains and aeolian landforms.

(4) River systems have a radiation pattern from the central massif, determined by the fault pattern. Around Bogda Peak, there are four main rivers: Sigong River, Sangong River, Shuimogou River and Baiyanggou River.

2.a-3-3-4 Biology and Ecology

(1) Flora

● Flora features

Of the 15 types and 31 varieties of temperate zone spermatophyte in China, there are 12 types and 14 varieties in Bogda. There are 239 species of 50 genera that exist widely throughout the world and 22 genera of pantropical distribution. All the others are specific to the temperate zone. The exchange of plant species between this site and Central Asia, the Mediterranean and West Asia is relatively more than that with East Asia and North America.

● Vegetation types

According to the classification principles of *Vegetation of China*, the natural vegetation in the Bogda component can be divided into 8 vegetation types, 18 vegetation subtypes and 27 formations. The *Picea schrenkiana* formation, which belongs to mountain evergreen coniferous forests, is the main formation in this site. The main vegetation types include alpine cushion vegetation, alpine meadow, sub-alpine meadow, mountainous evergreen coniferous forests and mountain steppe (Figure 2-163).

The vegetation types in this region show the following distribution spectrum from high altitude to low:

Alpine cushion vegetation at an altitude of 3,200-3,700m (on sunny slops the upper limit is 3,750m), mainly composed of Form.*Thylacospermum caespitosum*, Form. *Potentilla chinensis Ser. biflora* and Form.*Sibbaldia tetrandra* Bge. Among the talus slopes, there is a montane rubble sparse

Figure 2-163 Vegetation type of the Bogda component

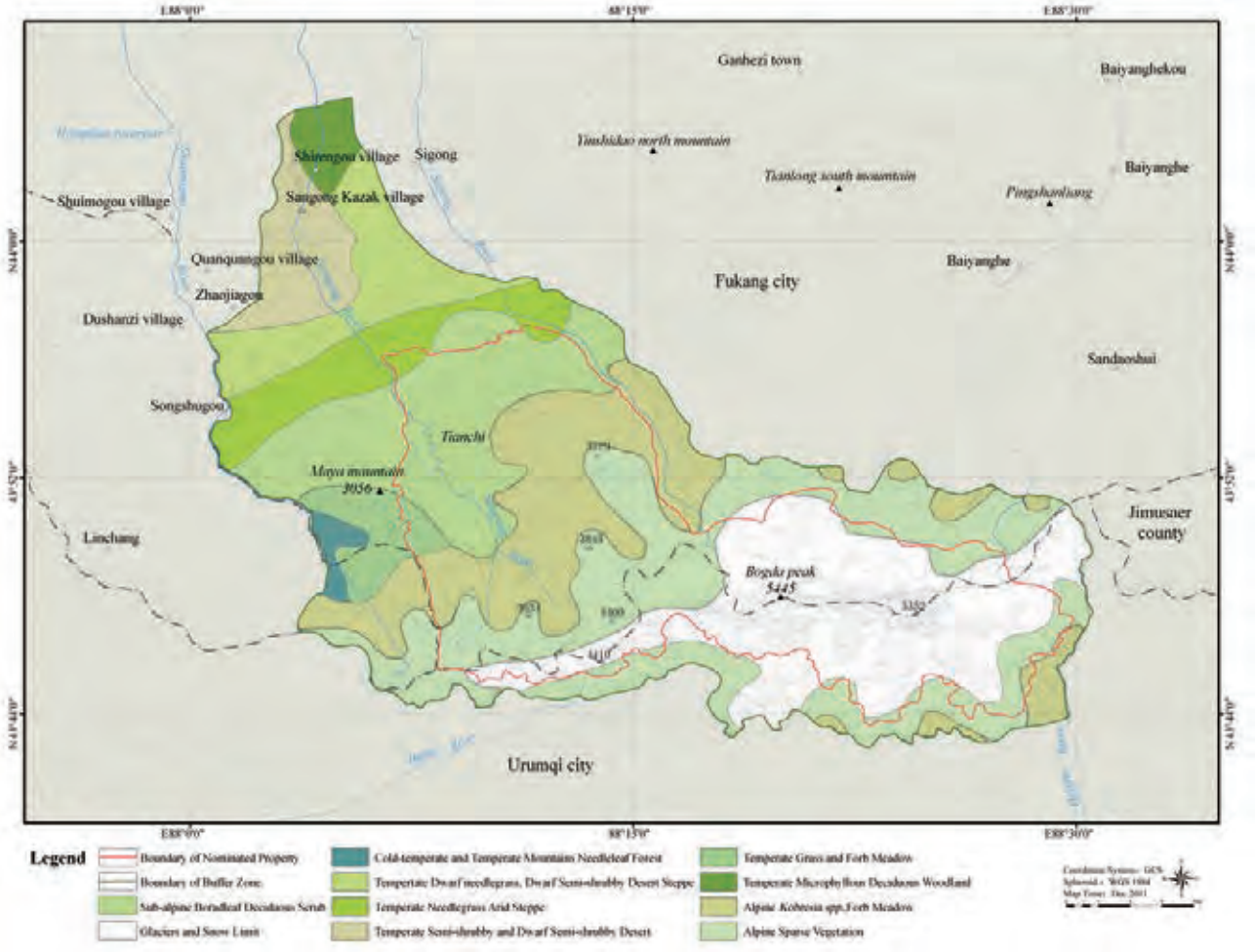


Figure 2-164 Sparse vegetation on alpine clitterc in Bogda

Figure 2-165 Alpine meadow of Bogda

Figure 2-166 Subalpine meadow of Baiyanggou

vegetation such as Form. snow lotus and Form. Saxifrage. This kind of vegetation is distributed on the gravel slopes around the snow line at the elevation of 3,000-3,600m, or intermixed with alpine meadow. The distribution area of this kind of vegetation accounts for over 50% of the total in Bogda.

Alpine meadow grows at an elevation of 2,900-3,200m, and is composed of Form. *Kobresia capillifolia*, Form. Carex spp., Varii herbae and Form. Festuca spp., Varii herbae. The area of distribution is relatively large. The community is mainly composed of *Carex humilis* and perennial forbs from families such as the Ranunculaceae, Polygonaceae, Compositae, Primulaceae, Gentianaceae and Scrophulariaceae, all of which produce small but bright-coloured flowers.

Sub-alpine meadow grows at an elevation of 2,700-2,900m, with a complicated floristic composition. The main components include Geranium, raincoat grass, nasturtium, Artemisia and Carex.

The mountain evergreen coniferous forest is dominated by Form. *Picea schrenkiana*, which is distributed at shady slopes of the mid mountains at elevation of 1,700-2,800m. The lower part of this kind of vegetation usually intercrosses with mountain meadow grassland.

Figure 2-168 Mountain steppe in Bogda

Figure 2-167 Snow spruce forest of Tianchi

Mountain steppe mainly occurs in the west of Bogda, growing between alpine meadow and evergreen coniferous forests or between mountain steppe and mountain meadow or sometimes connecting with temperate steppe. The main species are true xerophytic or mesoxerophytic Stipa grasses. The community is usually infiltrated with forbs.

● Altitudinal structure

Bogda is the best representative of the altitudinal vegetation zones on north slope of the Tianshan Mountains. It also well represents the altitudinal vegetation zones in the temperate arid zones globally. On the north slope of Bogda Peak, within a horizontal distance of 80km, the elevation rises from 700m to 5,445m, with seven vertical zones. From the highest to the lowest, they include: alpine snow zone (3,700-5,445m), alpine cushion vegetation (3,300-3,700m), alpine meadow (2,900-3,300m), sub-alpine meadow (2,700-2,900m), mountain coniferous

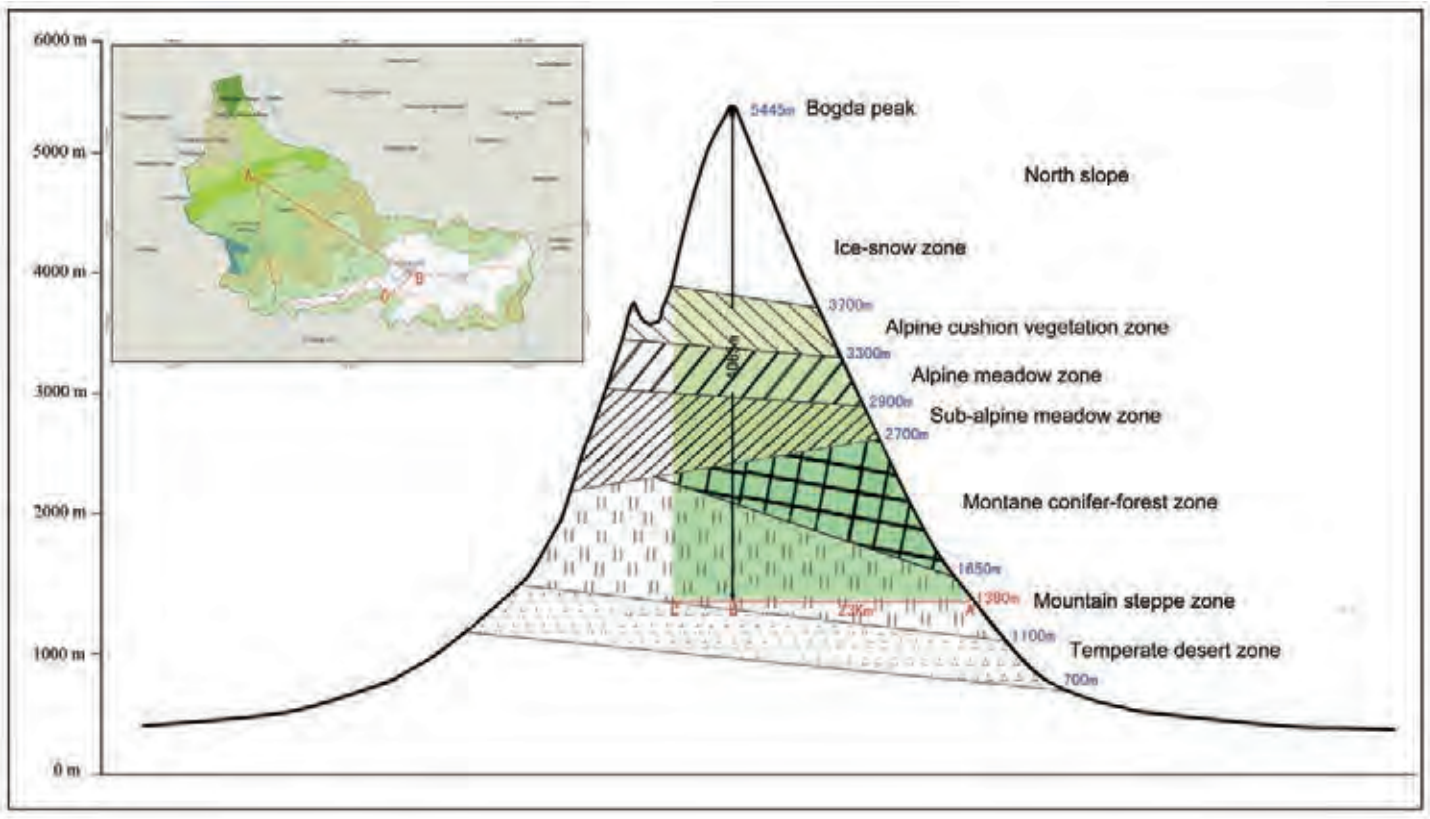


Figure 2-169 Altitudinal zones of vegetation in Bogda component

forests (1,650-2,700m), mountain steppe (1,100-1,650m) and temperate desert (700-1,100m). Especially as for the nominated Bogda, within a horizontal distance of 30km, the elevation rises from 1380m to 5,445m, with six altitudinal zones (Figure 2-169). It is rare that, within such a short horizontal distance, integrated altitudinal zone are so typical as well as representative, reinforcing the global significance of the site in the study of the succession of montane ecosystems.

There are 1,134 species of 432 genera from 76 families of higher vascular plants in the Bogda component (Table 2-27). Of them, angiosperms account for 97.45% of the total number.

Table 2-27 Higher vascular plants in the Bogda component

Class	Families	Genus	Species	Percentage (%)
Fern	6	8	18	1.59
Gymnosperm	3	3	10	0.88
Angiosperm	67	421	1,106	97.53
Total	76	432	1,134	100

Rare and endangered species, endemic species

Of the wild vascular plants, there are eight species included in the Red List of IUCN (2010), such as *Betula tianschanica, Myosotis alpestris, Juniperus pseudosabina and Larix sibirica.* There are six species included in Appendix I, II and III of CITES (2010) such as *Goodyera repens* and *Neottia camtschatea*, as well as 27 species endemic to the Tianshan Mountains such as *Oxytropis bogdoschanica, Ferula fukangensis, Seriphidium borotalense, Serratula rugosa* and *Saussurea involucrata*. There are also a large number of tertiary relic elements in the Bogda site, mostly important components of mountain evergreen coniferous forest, mountain broadleaved deciduous forests, desert riparian forest, deciduous broadleaved shrubs and deserts, such as *Picea schrenkiana, Glycyrrhiza glabra, Asparagus neglectus, Sorbus tianschanica and Ephedra przewalskii.*

Figure 2-170 *Larix sibirica*

Figure 2-171 *Juniperus pseudosabina*

Figure 2-172 *Asparagus neglectus*

Figure 2-173 *Glycyrrhiza glabra*

Figure 2-174 *Betula tianschanica*

Figure 2-175 *Myosotis alpestri*

Figure 2-176 *Goodyera repens*

Figure 2-177 *Neottia camtschatea*

Figure 2-178 *Oxytropis bogdoschanica*

Figure 2-179 *Ferula fukangensis*

Figure 2-180 *Seriphidium b*orotalense

Figure 2-181 *Serratula rugosa*

Figure 2-182 *Saussurea involucrata*

(2) Fauna

● Fauna features

Zoo-geographically, of the 179 species of terrestrial animals, pan-northern and northern types account for more than half of all species, followed by:, wide-spread species, Central Asian species and highland species (Table 2-28). From the analysis on animal distribution, there are 179 species of terrestial vertebrates, with Paleoarc ones and Holarctic ones accounting for 60%; also the Northern widely-distributed type, Central-Asia type and Plateau type are also important.

Table 2-28 Terrestrial wild vertebrate in the Bogda component

Type	Northern widely-distributed type (O)	Paleoarc type (U)	Holarctic type (C)	Central-Asia type (D)	Plateau type (P)	Northeast type (M)
Amphibians	–	–	–	1	–	–
Reptiles	–	–	–	2	–	–
Birds	21	41	45	23	13	1
Mammals	6	3	12	9	2	
Total	27	44	57	35	15	1

● Animal species

There are 181 species of 56 families from 25 orders of vertebrates in Bogda, including two species of fish, one species of amphibian, and two species of reptile. With respect to birds, there are 144 species of 16 orders from 38 families. There are 32 species of six orders from 13 families of large animals and 668 species of 414 genera and 18 orders from 121 families of insects (Table 2-29).

Table 2-29 Wild vertebrates in Bogda component

Class	Orders	Families	Species	Percentage (%)
Fishes	1	2	2	3.57
Amphibians	1	1	1	1.79
Reptiles	1	2	2	3.57

Birds	16	38	144	67.86
Mammals	6	13	32	23.21
Total	25	56	181	100.00

● Rare and endangered species

There are 127 species of rare and endangered animals from the area included in the Red List of IUCN (2010), such as *Lynx lynx, Capreolus capreolus, Netta rufina and Phoenicurus ochruros.* . Five species are included on the Appendix I, II and III of CITES (2010).

Figure 2-183 *Lynx lynx*

Figure 2-184 *Capreolus capreolus*

Figure 2-185 *Netta rufina*

Figure 2-186 *Phoenicurus ochruros*

Figure 2-187 *Cervus elaphus tianshanicus*

Figure 2-188 *Ursus arctos isabellinus*

2.a-3-3-5 Landscape Features

(1) Alpine lakes

There are ice lakes, Tianchi Lake, east small lake and west small lake and three rivers as well as other typical water landscape in the Bogda component. Among them, Tianchi Lake is a typical alpine lake, framed

Figure 2-189 View of Tianchi Lake

with snow peaks, forests, rivers, lakes and meadows. Tianchi Lake perfectly displays the water scenery of Xinjiang Tianshan.

(2) Landform views

The landform views in Bogda are especially abundant. In the alpine area above 3,500m, glacial landforms are well developed, with U-shaped valleys, horns, block fields, stone rivers and talus blending with the glaciers. A typical stone forest landscape, with rocks of many shapes, is formed on the east side of Mayashan.

Figure 2-190 Heigou glacier in Bogda compoment

Figure 2-191 Mayashan stone forest

Figure 2-192 Mayashan stone forest

Figure 2-193 Colorful forest

(3) Biological landscape

There are six mountain altitudinal landscape zones in Bogda that provide habitat for a variety of species of plants and animals.

2.a-3-3-6 Summary of Values that Contribute to the Serial Sites of Xinjiang Tianshan

(1) The main and highest peak of the north Tianshan Mountains, Bogda Peak, dominates the Bogda component of the Xinjiang Tianshan site. Within a very short horizontal distance, it shows intact vertical mountain natural belts on the north slope of the Tianshan Mountains. Bogda is the most typical representative of vertical mountain zones in the world's temperate arid zones. It has also been accepted by UNESCO as a Man and Biosphere Reserve.

(2) Bogda borders on the Turpan and Junggar basins, which are both extremely dry. Thus, it is a typical representative of mountain glacier close to an extremely dry climate in the mid-temperate zones. Its ecology and hydrology are probably the most sensitive indicator of climate change in the world's arid regions. Bogda is the perfect region to launch research on the response of wildlife and vegetation in temperate arid zones impacted by climate change.

(3) The Bogda component contains the most typical alpine lakes in Xinjiang Tianshan. It contains 12 glacial-dammed lakes, the most famous of which is Tianchi Lake.

2.a-4 Human Activities

2.a-4-1 Population and Nationality

The total area of Xinjiang Tianshan is 575,922ha, with no permanent residents. The area of buffer zone is 515,592ha with no permanent residents either. Every year from June to September, herdsmen enter the nominated property and buffer zone for grazing. The total number of herdsmen to the nominated property is around 4,500 and their population density is less than 1 person/km^2. The total number of herdsmen to the buffer zone averages around 12,700 and their population density is less than 3 person/km^2. They are predominatly ethnic minorities, including Kazakh, Mongol, Hui, Uygur, Kirgiz, Tajik, Uzbek, Russia, Tartar and other nationalities. Among them, Kazakh and Mongol account for the most.

2.a-4-2 Major Human Activities

(1) Pastoral activities

The subalpine meadows of the high and mid mountains, hilly grassland of low mountains and meadows on the plain or lowlands can be respectively utilized as pastures in summer, spring-autumn and winter. Successively, waves of Saka, Yuezhi, Wusun, Qiang, Huns, Xianbei, Rouran, Turk, Uighur, Kazakh, Uyghur, Uzbek, Tartar and other nomadic people have lived here at times for centuries throughout history. All these peoples lived a nomadic life dependent on the water resource and grassland and they all respected the natural resources. Their conservation efforts played a positive role in protecting today's natural resources and enables Xinjiang Tianshan to retain its original natural environment and ecosystems.

(2) Trade activities

Tianshan Mountains in Xinjiang is an important transportation line connecting the East and West throughout history. It was well-known as a 'green corridor' on the Silk Road. The north and middle lines of the middle section of the Silk Road are located along the oases at the foot of the north and south slopes of the Tianshan Mountains. A large quantity of glaciers have given rise to many oases which have always been the trade

hubs, such as Yiwu (nowadays Hami), Tingzhou (nowadays Jimusar) and Ili (nowadays Yining) on the north line and Jushi, Gaochang (nowadays Turpan), Yuli (nowadays Yanqi), Qiuci (nowadays Kuche), and Gumo (nowadays Aksu) on the south line. A road from Qiuci to Wusun, along the Tuoshigan River valley south of Tomur peak had been opened up during West Han Dynasty (202-9BC). In the Eastern Han Dynasty (25-220AD), a *Tianshan North Road* was opened up which started from Tekesi valley and extended along the north part of the Tomur area to Chugu city, which was located to the east of Issyk-Kul Lake,. In the Tang Dynasty, the *Gongyue Road* was opened up from Qiuci to Gongyue, and it cut through the Tomur area. Also in the Tang Dynasty, the eminent monk Xuezang went to Suiye city by crossing over the Muzhaerte Glaciers. Tianshan Mountain in Xinjiang has played an important role in trading activities between the West and East from 119 BC (when the emperor of the Han Dynasty, Liuche, sent ZhangQian to the west on diplomatic missions which makes the "Silk Road" open) to 1840 A.D. (when the Silk Road declined).

(3) Scientific researches

There are many precious ancient records on the Tianshan Mountains such as *Historical Records, History of Han Dynasty, Book on Ancient Chinese Geography, Commentary on the Waterways Classic, Atlas Annals of Western Region*, etc.. Many poets and famous people also described the Tianshan Mountains vividly with a lot of details.

In 119 BC, Zhang Qian went to Wusun City for the second time through the Tianshan Mountains and his experience was all recorded in *The Records of the Grand Historian* written by Sima Qian. In 629 B.C., Xuan Zang went to India to learn about Buddhism and he travelled through the Tomur area, describing the climate and glaciers in the book *Da Tang Xiyu Ji* (*Western Land History of the Tang Dynasty*).

From the middle of 19th century to early 20th century, Russia, Britain, Germany, France, Sweden, Japan, the United States and other countries organized expeditions (in the name of governments or individuals) to visit the Tianshan Mountains in Xinjiang. The Russian geologist, botanist and entomologist, P.P. Nikolay Nikolaevich Semenov, explored the Tianshan Mountains in Xinjiang as early as in 1856-1857. Following that, P.P. Semionov and H.H. Valikhanov from Russia, Carey from Britain and Sven Hedin (1927-1928, 1930-1935) from Sweden led expeditions to the Tianshan Mountains. Since the 20th century, some famous geologists

such as Professor Yuan Fuli (1929-1930), academician Huang Jiqing and Professor Li Chengsan (1943) and Mr. Ma Rongzhi (1944) have conducted thorough investigations of the topography, geology, natural environment, natural resources and ecosystems of the Tianshan Mountains in Xinjiang and published numerous papers and reports.

Since 1949, the Chinese Academy of Sciences (CAS) has organized many scientific expeditions to research the geology, geomorphology, climate and glaciers of the Tianshan Mountains in Xinjiang. The alpine ice-snow utilization research team from CAS systematically inspected the glacier resources of the Tianshan Mountains in Xinjiang four times, that is, in 1959-1962, 1973, 1977-1978 and 1989-1995. From 1977 to 1978, CAS carried out a comprehensive scientific expedition on the north and south slopes of the Tomur region. During this period, some scientific research organizations from Xinjiang also worked on the geology, geography, soil and biology of the Tianshan Mountains. *The Physical Geography of the Tianshan Mountains in China* published in 2004, which was organized by Hu Ruji, is the third synthesis of research results on the Tianshan Mountains.

So far, more than 400 articles and papers on the geology and geomorphology, physical geography, biology and ecology of the Tianshan Mountains in Xinjiang have been published by researchers home and abroad. Domestic experts as well as foreign scholars have also conducted in-depth investigations on the four nominated components of Xinjiang Tianshan. It has become an important base for teaching, research and field studies for many universities and research institutes home and abroad.

(4) Tourism activities

Throughout history, the Tianshan Mountains in Xinjiang have attracted and impressed many scholars of literature with their incomparable natural scenery. They include Li Bai, Li Shangyin, Cen Shen and other poets who left numerous poems and works. However, due to its isolated location as well as transportation difficulties and steep topography, tourism has only developed in recent years in some parts except for Tianchi. The main tourism activities are limited to the buffer zone. There are many regulations and ordinances on protecting the natural and ecological environment of Xinjiang Tianshan, so tourism has little effect on the natural and ecological environment.

2.b History and Development

2.b-1 Natural History

During the Mesoproterozoic era to early Neoproterozoic era (1000Ma) cracked along the edge of the of the paleo-continent and deep troughs were formed. Then the collision and stitching occurred and super-continent (Rodinia, 1000-800 Ma) was formed, leading to the uplift of central part of paleo-Tianshan, which was surrounded by ocean. In Tianshan area only stromatolite and layered aragonite can be found (both are formed of sediment of carbonate adsorbed by some low bacteria and algae as well as viscous algae). At the end of the Neoproterozoic era, Pangea again cracked, which brought up the Paleo-Asian Ocean between the Siberian and Tarim plates. The sedimentary environment of Tianshan area mainly features marine carbonate - clastic depositions.

In the early Paleozoic era (540-420 Ma), the Tianshan oceanic basin (a part of the Paleo-Asian Ocean) was formed. The south of the Tianshan area belonged to the South Tianshan Ocean and the north part belonged to the North Tianshan Ocean. The south part of Tianshan mainly featured shallow sea carbonate deposition. While the North Tianshan Ocean still kept the ocean enviroment. It finally disappeared after evolution of island arc in the Cambrian, Ordovician and Silurian periods. In the North Tianshan area, the deposition featured acidic volcanic rocks and clastic rocks. In the marine environment, the main organisms were trilobites, brachiopods, graptolites, corals, gastropods, etc.

In the late Paleozoic era (420-251 Ma), most of the Tianshan area was a marine environment and in the late Permian period this region changed into land. In the southern part of the Tianshan area, there was extensive distribution of marine clastic and carbonate rocks and, in the northern part, there was distribution of marine clastic, carbonate, volcanic and volcanic clastic rocks. The presence of these rocks indicated that the late-Paleozoic sediments featured a transition from shallow sea to coastal, then toparalic and finally to terrestrial. During the sea-land evolution, the main organisms included brachiopods, corals, ammonites, gastropods, fish, etc., and by the late Permian period there were many terrestrial biota, including

plants, vertebrates, bivalves, etc.

At the end of early Permian period of the late Paleozoic era, affected by the Variscan tectonics (Tianshan tectonics), the Junggar and Tarim blocks crashed into each other from the north and south direction. This caused the Tianshan fold and uplift, leading to the disappearance of residual the Tianshan Ocean, and the emergence of the mountain chains and basins. The Variscan tectonic movement is attributed to the ancient Tianshan Orogeny and the Tianshan fold belt caused by it consists of a series of anticlinorium and synclinorium. The ridge direction of the current North Tianshan, Middle Tianshan and South Tianshan of Xinjiang roughly represents the trend of the fold during that time. Because of the strong tectonic activity, Variscan magmatic activity was frequent and this reached its peak during the mid and late Variscan period. Acidic and intermediate-acidic rocks mainly composed of granite and granodiorite rocks accounted for 90% of the Tianshan intrusive rocks during this period.

During the Mesozoic era, the Indo-China and Yanshan tectonic movements exerted less impact on the Tianshan Mountains and, after the Triassic period, the Tianshan area became a relatively stable state. Especially since the Jurassic period, the geographical environment has been generally stable. Because of external pressures, the folding mountains underwent stages of erosion and planation, which brought deep deposite on piedmont depression and intermittent depression. Eventually, a gentle peneplain was formed. In the Mesozoic era, the climate was hot and moist, with distinctive characteristics of terrestrial communities, dominated by higher plants. During this period, the Tianshan area carried Ginkgo trees on its upper level and evergreen shrubs composed of cycad forests at the lower level, as well as a large number of ancient conifers. Important fauna types were represented by bivalves and ostracods, as well as reptiles and fishes among vertebrates.

From the Eocene to the Oligocene epoch of the Paleocene period (55-23 Ma), the Indian Plate moved north to join with the Eurasia Continent at its southern edge. The Indian Plate continued to wedge into the Eurasia Continent, resulting in the intercontinental subduction and strike-slip motions leading to the retreat of the ancient Mediterranean. As the climate became more arid, the warm and wet original flora were gradually replaced by modern xerophytic Mediterranean flora.

In the Neogene period, especially since the Pliocene epoch (5 Ma), the

Tianshan mountains, that had been eroded into peneplains underwent new tectonic movements, with strong fault block lifting under the control of an active fault zone. Stratified relief structures, featuring alternating huge mountains and inter-mountain basins (as well as a three-level planation surface) were formed. As the Tianshan mountains were uplifted, the Tarim and Junggar basins became more enclosed; at the same time the climate changed from humid to arid and deserts appeared in these two basins. During the Pliocene epoch to Pleistocene epoch, the climate changed from warm to cold and the vegetation changed from forests to steppe and deserts, establishing the basic geomorphology-climate pattern of modern Tianshan Moutains in Xinjiang.

In summary, the biological evolution of the Xinjiang Tianshan nominated property has a close relationship with the major geological events during the Earth's evolution since the late Mesozoic era. These major geological events caused profound changes in the process of biological evolution. Therefore, a large number of ancient relict species have been retained in the nominated property and many of them are remnants of the Paleogene and Cretaceous, descendants of the ancient hot and dry Mediterranean environment. The nominated property plays a significant role in the study of the world's biota, as well as in the study of how the environmental transition and climate change of arid zones have exerted an influence on biological evolution. Thus, the nominated property is of global scientific significance.

2.b-2 Human History

Tianshan Mountains in Xinjiang is vast and lush. Since ancient times, people of all Chinese nationalities have lived on this fertile land and have created a rich material culture and spiritual civilization. The Tianshan Mountains have become the carrier of culture and spirit for people of all nationalities in Xinjiang.

According to archaeological discoveries in Tianshan Mountains in Xinjiang, there were human activities in the region in the early Neolithic (7000 years ago). These people lived in caves and existed by hunting and gathering. In the Neolithic, from the Mazars dating back to 6,000 years ago to the Saka dating back to 4,000 years ago, Tianshan Mountains in Xinjiang had been a center for human activities in the vast arid Central Asia. The wild fruit forests in Tianshan Mountains in Xinjiang and the intermontane rivers nearby provided an excellent ecological environment

rich in biological species, which provided abudant resources for human activities. Before the Qin and Han dynasties (4000 BC-202 BC), the nationalities that lived in the region around Tianshan Mountains in Xinjiang mainly included the Saka, Yuezhi, Wusun, Qiang, and Huns. In the Han Dynasty (202 BC-220 AD), the Ili Basin was a territorial state of WuSun which was one of the states on the north branch of Silk Road. Xijun, a princess of the Han Dynasty, married the Wusun king, Kunmi, and lived a life described as *"No need to engage in farm production, and move with the animals to find a better place to live".*

In the Southern and Northern Dynasties (220AD-589AD), the Xianbei and Rouran people ruled the region. In the Sui and Tang dynasties (581AD-907AD), Turkic and Huihe people were the main ethnic groups living in the region. In 640AD and 702AD, the Tang Dynasty set up the Beiting (nowadays Jimsar) Military Viceroy's Office and Anxi (nowadays Kuqa) Military Viceroy's Office to govern SuiYe town, GongYue and Qiuci, which were military towns of the West Region in Tang dynasty as well as transportation centers on the Silk Road. In the Song Dynasty (960AD-1279AD), Tianshan Mountains in Xinjiang was the territory under the jurisdiction of West Liao Kingdom. In the Yuan Dynasty (1271AD -1368AD), a large number of Mongolians moved here and Tianshan Mountains in Xinjiang became the horse herding grounds of Mongolians. From the period of Emperor QianLong in the Qing Dynasty to the Republic of China (1757AD-1949AD), by constructing canals to bring in water and developing agriculture, the main human production activities changed from mountain grazing to oasis farming. So the intensity of human activity in Tianshan Mountains in Xinjiang gradually decreased. Since the 1990s, the grazing of mountain livestock has gradually increased.

For thousands of years, the nominated Xinjiang Tianshan site was seldom disturbed by humans. This is because the properties are located in the hinterland of the Tianshan Mountains, the terrain or topography is steep and they are difficult to access. Until recent times there were nomadic activities in the buffer zones of the nominated properties. A lifestyle that depends on annual migratiion for water and pasture has little longterm effect the on ecological environment of Xinjiang Tianshan. Consequently, the original geology, landforms and ecological systems have been kept well in the nominated properties.

2.b-3 History of the Protection of Tianshan

Because Xinjiang Tianshan is located in the arid centre of Eurasia, and was not widely known because of its precipitous landforms, primitive vegetation cover and difficult transportation. Consequently, the outstanding resource values of the Tianshan Mountains in Xinjiang were not recognized by scholars until the 1980s. Prior to that, Xinjiang Tianshan had been under the influence of external natural forces. Therefore, the resources and the environment of the nominated properties had been left intact.

(1) Government protection and management

State and local governments now pay great attention to the environment and resources protection in the nominated properties.

The Tomur component: the Tomur Peak Provincial Nature Reserve was approved by the government of Xinjiang Uygur Autonomous Region in 1980. Then approved by the State Council of the People's Republic of China, it was promoted to National Nature Reserve in 2003. In 2006, the Tomur National Nature Reserve applied to the Ministry of Land and Resources of PRC to be a National Geological Park. The Administrative Bureau of Tomur National Nature Reserve, established by the governments of Wensu County and Aksu Prefecture, has drawn up a master plan aiming to strengthen the management and protection.

The Kalajun-Kuerdening component: The West-Tianshan National Nature Reserve was approved by the State Council of the People's Republic of China in 2000. Kalajun Provincial Park was approved by the government of Xinjiang Uygur Autonomous Region in 2010. The governments of Ili Kazakh Autonomous Prefecture, Gongliu County and Tekesi County have issued a series of laws and regulations and have developed and implemented appropriate management regulations as well as a planning system to strengthen the protection.

The Bayinbuluke component: In June of 1980, Bayinbuluke Provincial Nature Reserve was approved by government of Xinjiang Uygur Autonomous Region; in 1986, it was improved to National Nature Reserve by the state council of the People's Republic of China; in 2001, the administrative bureau of Bayinbuluke National Nature Reserve made a master plan to effectively protect its ecological environment and biological diversity.

The Bogda component: the Tianshan Tianchi Provincial Nature Reserve was approved by the government of Xinjiang Uygur Autonomous Region in June, 1980. On 8th November, 1982, the State Council approved the establishment of Tianshan Tianchi National Park. On 27th November, 1990, it was listed as Northern Bogda Biosphere Reserve in the Temperate Desert of China, under the Man and Biosphere Plan by UNESCO. On 31st December, 1994, the National Forest Park of Bogda was approved by the Forestry Ministry of PRC. It was enrolled in the National Wetland Inventory of China in 2004. In January 2006, the Party Committees and State Government of Changji decided to integrate the Tianchi Administrative Commission and the Administrative Bureau of Tianchi Nature Reserve into Xinjiang Tianchi Administrative Commission, and formulated *Regulation on the Management of the Tianshan Tianchi Park* which enhances the protection and management of Tianshan Tianchi with more responsibility.

(2) Protection of local pledges

Based on the knowledge gained through their daily lives, nomadic groups have formed folk traditions on the protection of the environment and these have played an important role in conserving natural environment. Local rules or regulations have been created as follows: grass cannot be cut, flowers cannot be stepped on, grass cannot be pulled, hay cannot be burned, living trees cannot be cut down, tree branches cannot be cut to pick fruits, pregnant animals cannot be hunted, cubs cannot be killed, dirty water cannot be poured into the river and waste must be buried. Such agreements have become widely-acknowledged civil regulations and rules that are worked out and abided by residents jointly.

(3) Natural conservation tradition of local inhabitants

In the customs and religious beliefs of the local nomadic people, nature shall be respected. Mountain forests, grasslands, lakes and water resources shall all be protected. Nature cannot be offended. To ensure their survival, nature is treasured and the environment is protected. For example, the traditional nomadic life of transhumance aims at preventing overuse and degradation of the grasslands. During the transhumance, the temporarily-inhabited locations are cleared and restored to their original condition. Water is regarded as the source of all living things and it is considered that gods live in the water, so the water cannot be polluted. Activities, which may contaminate water, such as hand-washing and laundry in the rivers and lakes, were prohibited. All these indicate the environmental-protection awareness of the local nomadic people.

3. Justification for Inscription

3.a Criteria Under Which Inscription is Proposed

3.b Proposed Statement of Outstanding Universal Value

3.c Comparative Analysis

3.d Integrity

3. Justification for Inscription

3.a Criteria Under Which Inscription is Proposed

In terms of the Operational Guidelines, the Xinjiang Tianshan serial property is nominated under World Heritage criteria (vii) and (ix).

- Criterion (vii): contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.

- Criterion (ix): be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals.

3.a-1 Criterion (vii):Contain Superlative Natural Phenomena or Areas of Exceptional Natural Beauty and Aesthetic Importance

Located in the hinterland of Central Asia, far from any ocean and surrounded by vast deserts, Xinjiang Tianshan is the world's most representative natural mountain landscape in the temperate arid zone. It has outstanding landscape diversity and spectacular natural beauty. The east-west stretching Xinjiang Tianshan lies between the Junggar Desert in the north and the Tarim Desert in the south, to form a superlative scene, *two deserts flanking a mountain*. From western Tomur Peak (7,443m) to eastern Bogda Peak (5,445m), Xinjiang Tianshan forms a beautiful skyline over vast deserts in Central Asia.

The beauty of Xinjiang Tianshan lies not only in the spectacular snow-capped mountains and glacier-capped peaks, beautiful forests and meadows, clear rivers and lakes and grand red bed canyons, but also in the combination and contrast between the above-mentioned mountain elements and the vast desert, all superlative natural phenomena and natural beauty. In the Tomur component, white snow-capped mountains and glacier-capped peaks stand close by flaming red bed canyons to form

a sharp contrast. In the Karajun-Kuerdening component, green and luxuriant forests and meadows mingle with each other to form various patterns. In the Bayinbuluk component there are wide expanses of steppe and free rivers and lakes, where the meanders of the Kaidu River form a graceful scene. In the Bogda component, snow-capped mountains, glaciers, rivers, lakes, forests and meadows coexist with each other to present a superlative natural beauty of mountains in a desert area.

Xinjiang Tianshan has bare rocks on its south slope and luxuriant forest and meadow on north slope, giving a striking visual contrast of the hot and cold, the dry and wet, the desolate and luxuriant as well as the spectacular and exquisite.

The Tianshan is not only the *mountains of heaven* in China and Central Asia, but also a green corridor on the Silk Road. In history, it was eulogized in numerous fairy stories, legends, poems, songs and paintings. Today, Xinjiang Tianshan is still one of the most iconic symbols in China.

3.a-2 Criterion (ix): Be Outstanding Examples Representing Significant Ongoing Ecological and Biological Processes in the Evolution and Development of Terrestrial, Fresh Water, Coastal and Marine Ecosystems and Communities of Plants and Animals.

Xinjiang Tianshan is the most typical representative of mountain ecosystem in the temperate arid zone. Xinjiang Tianshan is a unique huge mountain ecosystem surrounded by two vast deserts. It is outstanding among the global mountain systems because of the pattern of two deserts flanking one mountain, the location deep in Asia's hinterland and the arid continent climate. Numerous glaciers and rivers in the huge mountains act like a water tower, which maintain the mountain-oasis-desert ecosystem in the arid zone. In climatic terms, there are five temperature zones (warm temperate, temperate, cold temperate, frigid and alpine permanent ice-snow) and four precipitation zones (humid, semi-humid, semi-arid, and arid). There are seven first level habitat types according to IUCN/SSC, including forest, shrubland, grassland, wetlands, etc. as well as 22 second level habitat types. As for the vegetation, there are nine types, 25 sub types and 82 formations.

Tianshan Mountains in Xinjiang belongs to the Global 200 Ecoregion 111 “Middle Asian Montane Steppe and Woodlands”. And the nominated property is the typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, and Tian Shan foothill arid steppe. In the Kalajun component, the montane steppe and meadow of Xinjiang Tianshan are most extensive. The Kuerdening component is where *Picea schrenkiana* is most concentrated in the Tianshan, and this is also the only reserve designated to conserve *Picea schrenkiana* and its environment. On south slope of the Tomur component, large areas of foothill arid steppe remain in their original state. The Bayinbuluke component is an outstanding example of steppe and wetland in a high intermountain basin in the Tianshan Mountains.

The Xinjiang Tianshan site has all the typical mountain altitudinal natural zones of a temperate arid zone. Their distribution reflects the water and heat variations at different altitudes, gradients and slopes. The nominated property is an outstanding example for the study of biological community succession in mountain ecosystems in an arid zone undergoing global climate change. In Tomur, there is a complete range of altitudinal natural zones on the south slope of Tianshan, from the ice-snow zone to warm temperate desert zone across an elevation drop from 7,443m to 1,450m. In Bogda, there is a range of altitudinal natural zones on the north slope of Tianshan, from the ice-snow zone to mountain steppe zone across an elevation drop from 5,445m to 1,380m.

Xinjiang Tianshan is the outstanding representative of biological and ecological evolution on the Pamir-Tian-Shan Highlands. Xinjiang Tianshan extends across the Eurasian forest floristic subregion and Asian desert floristic subregion. Its features of altitudinal vegetation distributions, significant differences between north and south slopes, and diversity of flora, all illustrate the biological and ecological evolution of the Pamir-Tian-Shan Highlands. Due to its special location and climate, the Kalajun-Kuerdening component became a refuge for relic species in Paleogene period. There are large areas of wild fruit forest with 52 species of wild fruit tree. It is the only place where the wild *Padus avium* originated. This area also exhibits evidence of biological evolution and succession under the influence of the global climate change.

Xinjiang Tianshan has outstanding biodiversity and it is important habitat for relic species, and numerous rare and endangered species, as well as endemic species. It is a significant representative of the process whereby the original warm and wet flora has gradually been replaced by

modern xeric Mediterranean flora. It is a component of the 'Mountains of Central Asia', one of Conservation International's 34 Global Biodiversity Hotspots, as well as lying within the 'Mountains of Middle Asia', one of the IUCN/WWF Centres of Plant Diversity. The site contains 2,622 species of vascular plants (from 635 genera and 106 families) and 550 species of vertebrate animals (from 276 genera and 90 families and 36 orders). There are 94 relic plant species before Quaternary Glaciation. There are 110 species of rare and endangered plants and 367 species of rare and endangered wild animals. There are 118 species of endemic plants and 22 species of endemic animals in the nominated property.

3.b Proposed Statement of Outstanding Universal Value

3.b-1 Summary

i. Brief synthesis

The serial properties of nominated Xinjiang Tianshan have four components with a total area of 575,922ha, and that of the buffer zones is 515,592ha. Tianshan is a huge mountain range in Central Asia, and the east-west length of Tianshan in Xinjiang is 1,760km, with Tomur as its highest peak. Xinjiang Tianshan is different from other mountains in many respects and it presents unique physical geographic features. It is an outstanding example of a mountain ecosystem in temperate arid zone, with a diversity of landform features and ecosystems, and it displays the natural beauty of mountains in temperate arid zone. Tomur-Khan Tengri area is one of the three largest mountain glacier distribution areas within Central Asia, and boasts the most complete altitudinal natural zones on south slope of Tianshan. The Kalajun-Kuerdening component is where the endemic *Picea schrenkiana* is concentrated in Tianshan, with large areas of wild fruit forest and montane steppe and meadow. The Bayinbuluke component is the outstanding representative of high intermountain basin in the Tianshan, with typical alpine meadows and alpine wetlands. The Bogda component presents the physical features in the eastern part of Tianshan, with the most typical altitudinal natural zones and snow-capped mountain, glacier, lake, river, forest, meadow, etc. features coexisting with each other over a short distance.

ii. Justification for criteria

Criterion (vii): Located in the hinterland of Central Asia, far from any ocean and surrounded by vast deserts, Xinjiang Tianshan is the world's most representative natural mountain landscape in the temperate arid zone. It has outstanding landscape diversity and spectacular natural beauty. The east-west stretching Xinjiang Tianshan lies between the Junggar Desert in the north and the Tarim Desert in the south, to form a superlative scene, *two deserts flanking a mountain*. From western Tomur

Peak to eastern Bogda Peak, Xinjiang Tianshan forms a beautiful skyline over vast deserts in Central Asia. The beauty of Xinjiang Tianshan lies not only in the spectacular snow-capped mountains and glacier-capped peaks, beautiful forests and meadows, clear rivers and lakes and grand red bed canyons, but also in the combination and contrast between the above-mentioned mountain elements and the vast desert, all superlative natural phenomena and natural beauty. Xinjiang Tianshan has bare rocks on its south slope and luxuriant forest and meadow on north slope, giving a striking visual contrast of the hot and cold, the dry and wet, the desolate and luxuriant as well as the spectacular and exquisite. Tianshan is not only the *mountains of heaven* in China and Central Asia, but also a green corridor on the Silk Road. In history, it was eulogized in numerous fairy stories, legends, poems, songs and paintings. Today, Xinjiang Tianshan is still one of the most iconic symbols in China.

Criterion (ix): Compared with the similar regions in the world, Xinjiang Tianshan is an outstanding example of the ongoing biological and ecological evolution process in temperate arid zone. At least after Pliocene epoch (5Ma), the landform, ecology, biology and landscape are preserved in a better way because of the pattern of two deserts flanking one mountain, the location deep in Asia's hinterland and the arid continent climate, which is unique among the global mountain ecosystems and the most typical representative of mountain ecosystem in the temperate arid zone. The ongoing development of vegetation under the influence of landform and climate can be obviously found in the nominated properties. It is the typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, Tian Shan foothill arid steppe, which belong to the Global 200 Ecoregions 111 "Middle Asian Montane Steppe and Woodlands". Xingjiang Tianshan boasts typical range of mountain altitudinal natural zones in temperate arid zone, it significantly presents the distribution feature and developing law of mountain ecosystem in temperate arid zone, and it is an outstanding example for the study of biological community succession in mountain ecosystems in an arid zone undergoing global climate change. Xinjiang Tianshan has obvious altitudinal vegetation distribution, significant differences between north and south slopes and diversity of flora component. Its features of altitudinal vegetation distributions, significant differences between north and south slopes, diversity of flora, large areas of wild fruit forest, and refuge of relic species in Neogene period, all illustrate the biological and ecological evolution of the Pamir-Tian-Shan Highlands. Xinjiang Tianshan has outstanding biodiversity and it is important habitat for relic species, and numerous rare and endangered species, as well as endemic

species. It is a significant representative of the process whereby the original warm and wet flora has gradually been replaced by modern xeric Mediterranean flora.

iii. Statement of integrity

The nominated serial site of Xinjiang Tianshan meets the requirements for integrity and protection and management in terms of the *Operational Guidelines for the Implementation of the World Heritage Convention*. The four components contain the most typical continuous distribution of snow-capped peaks, glaciers, lakes, wetlands, rivers, floral meadows, forests, steppe, red bed canyons, etc.; the most typical altitudinal natural zones; the best preserved biodiversity and habitats of rare and endangered species; and are large enough to encompass all the essential components to embody the unique esthetic, biological and ecological values of the Tianshan mountains in Xinjiang. The nominated property has been demarcated and the boundaries of the nominated property and corresponding buffer zone are all clearly marked on the site and map. The scope of the site is large enough to integrate the nominated aesthetic, biologic and ecologic values of the full range within Xinjiang.

iv. Requirements for protection and management

All the components are owned by the state, with a national or provincial protection status, such as National Nature Reserve, National Park, Provincial Nature Reserve and Provincial Park. They are under the long term protection of national or local laws, regulations and so on. The nominated property is strictly protected according to laws and regulations.

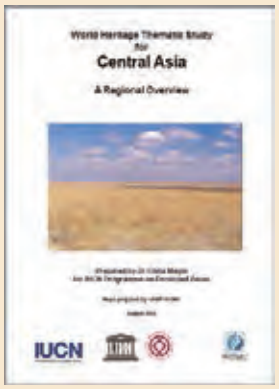
A multi-level management system from the national to the local level and a co-operative system involving various parts of government, technology institutions, research institutions and the local communities are established with sufficient finance and staff. Every component within Xinjiang Tianshan has a master plan. The *Management Plan of Nominated Xinjiang Tianshan* was made, *Regulations on the Protection of Nominated World Natural Heritage Property of Xinjiang Tianshan* was issued, administrative authorities were formed, and the status of Xinjiang Tianshan in law and its effective management are enhanced. The community knows of the declaration and all stakeholders support the declaration, which will benefit the long term management.

At present, there are problems such as seasonal grazing and an imperfect

monitoring system in the nominated property and the buffer zone. In five years, a complete grazing prohibition in the nominated property and grazing limitation in the buffer zone will be realized and a better monitoring system will be formed.

Insert

Background information



In order to implement the global strategy by the World Heritage committee, a regional workshop on Possibilities of Nominations on World Natural and Mixed Heritage in Central Asia, by World Heritage Centre of UNESCO, was held at Altay, Kazakhstan, in December, 2002. Subsequently, IUCN undertook a thematic study on World Heritage in Central Asia and published the World Heritage Thematic Study for Central Asia, A Regional Overview in 2005. The working file provides effective technical support for identifying the potential World Natural Heritages in Central Asia that boast outstanding universal value, as well as guiding relevant countries to apply for World Natural Heritage.

The study indicates that Central Asia is a vast, biodiverse and scenically rich region, currently unrepresented in the World Heritage List. According to Udvardy's system of bio-geographic provinces, Xinjiang Tianshan is located in the bio-geographic province of Pamir-Tian-Shan Highlands where there is no World Heritage yet, giving it priority for World Natural Heritage recognition. Within the WWF's Global 200 Ecoregions, there is currently no World Heritage in view of the Ecoregion of Middle Asian Montane Steppe and Woodlands which includes Tianshan montane conifer forests, Tianshan montane steppe and meadows and Tianshan foothill arid steppe. In terms of the plant diversity system of IUCN/WWF, there are currently no World Natural Heritage sites for 'Mountains of Central Asia' which contains the Tianshan Mountains.

In addition, in terms of the 34 global biodiversity hotspots of CI (Conservation International), there is currently no World Natural Heritage for Mountains of Central Asia which contains the Tianshan Mountains. In terms of the 218 EBAs (Endemic Bird Area) of BIC (Bird International Conservation), there is currently no World Natural Heritage for the Taklimakan Desert. IUCN working document *A Global Overview of Mountain Protected Areas on the World Heritage List* (2002) reports that there is still no World Heritage in Central Asia although it includes some of the world's highest and largest ranges of mountains. Therefore, whether from a regional or global perspective, the nominated Xinjiang Tianshan site, boasts a remarkable natural geography, representative ecosystems and ecological processes and unique natural landscape and beauty. It can make up for the blank and representative insufficiency in the World Heritage List in the vast and important region of Central Asia.

In particular, the global outstanding universal values of Xinjiang Tianshan are as follows:

3.b-2 The Nominated Property Is the Most Outstanding Representative of Mountains in the Temperate Arid Zone and Has Outstanding Landscape Diversity and Superlative Natural Beauty.

Xinjiang Tianshan presents the diversity of natural beauty in an integrated way and it is the most outstanding representative of mountain integrated natural landscape in temperate arid zone. Xinjiang Tianshan includes the highest peaks of the Tianshan Mountains, vast glaciers, mountain basins, forests, steppes, inland rivers, glacial lakes, wetlands and red bed canyons, forming extremely rich landform diversity. Altitudinal natural zones based on warm temperate desert and temperate desert are formed in Xinjiang Tianshan. Warm temperate zone, temperate zone, cold temperate zone, frigid zone and alpine permanent ice-snow zone have been formed in different heat environment at different elevation. Influenced by water conditions, humid climate zone, semi-humid climate zone, semi-arid climate and arid climate zone are all available. Because of different combinations of heat and water, a diversity of biological landscape which is rare in the world has been formed. Combination of biological landscape and geomorphic landscape, plus the significant seasonal change in temperate zone, enrich the diversity of natural beauty in Xinjiang Tianshan.

As for Xinjiang Tianshan's natural landscape, there is a complete altitudinal natural zonation on a large scale, including glacier, snow-capped peak, alpine meadow, sub-alpine meadow, cypress and shrub, spruce pure forest, needle-broad leafed mixed forest, wild fruit forest, valley forest, shrub forest and desert steppe, which, in combination, exhibit a grand and spectacular natural landscape.

The landscapes are obviously different on a medium scale. With snow-capped peak standing with canyon, forest interspersed with meadow, steppe intermixed with shrub, and shrubs dotting the desert, various monomers form the spectacular mosaic patterns, and plus the micro topography, the pattern will be more enriched. Many hues will make the landscape more fascinating with white snow-capped peaks and glaciers, colorful floral meadows, green forests and red bed canyons.

On a smaller scale, snow-capped peaks, glaciers, forest, grassland and canyon can individually form a wonderful scene. Only in the Tomur Canyon, there are hundreds of wonderful scenes which are vivid and delicate, changing irregularly. Such rich combination of nature landscape, plus the contrasting colors, constitutes a unique mountain natural landscape system in temperate arid zone.

Figure 3-1 Tomur

Figure 3-2 Kalajun

Figure 3-3 Kuerdening

Figure 3-4 Bayinbuluke

Figure 3-5 Bogda

3.b-3 The Nominated Property Is the Most Typical Representative of Mountain Ecosystem in the Temperate Arid Zone. It Has the Typical Altitudinal Biological Zones and It Is an Outstanding Example for the Study of Biological Community Succession in Mountain Ecosystems in an Arid Zone Undergoing Global Climate Change.

(1) The most typical representative of mountain ecosystem in temperate arid zone

According to Udvardy's biogeographic province system (1975), the nominated property is a mixed mountain ecosystem of the 14 biome types. The mixed mountain ecosystem, humid tropical forests and tropical dry forests are dominant in the existing World Heritage sites; however mountain ecosystem in temperate arid zone most typically represented by Xinjiang Tianshan is absent.

Xinjiang Tianshan is the most typical representative of mountain ecosystem in the temperate arid zone. Xinjiang Tianshan is a unique huge mountain ecosystem surrounded by two vast deserts. It is outstanding among the global mountain systems because of the pattern of two deserts flanking one mountain, the location deep in Asian hinterland and the arid continent climate. Numerous glaciers and rivers in the huge mountains act like a water tower, which maintain the mountain-oasis-desert ecosystem in the arid zone.

There are 481.913km^3 of glacial reserve in the nominated property that

Figure 3-6 Glaciers in Tomur peaks

accounts for 45.9% of the total amount of Tianshan Mountains. The glacial reserve supplies abundant water for the formation and evolution of mountain ecosystem. In climatic terms, there are five temperature zones (warm temperate, temperate, cold temperate, frigid and alpine permanent ice-snow) and four precipitation zones (humid, semi-humid, semi-arid, and arid). Different combinations between water and heat formulate various vegetation types, imaginable habitats for the wildlife, as well as mountain ecosystems in arid zone.

There are seven first level habitat types according to IUCN/SSC, including forest, shrubland, grassland, wetlands, etc. as well as 22 second level habitat types. As for the vegetation, there are nine types, 25 sub types and 82 formations, making it the most typical representative of mountain ecosystem in temperate arid zone.

(2) The typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, and Tian Shan foothill arid steppe

The nominated property belongs to the Global 200 Ecoregion 111 “Middle Asian Montane Steppe and Woodlands”. Based on its unique ecological system and good preservation condition, it is the typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, and Tian Shan foothill arid steppe.

The Kuerdening component is where *Picea schrenkiana* is most

Figure 3-7 Ecoegion of Middle Asian montane steppe and woodlands

Figure 3-8 Snow spruce forest in Kuerdening

concentrated in the Tianshan, and this is also the only reserve designated to conserve *Picea schrenkiana* and its environment.

Biyik Mountain, where the Kalajun component is located, is the most typical region representing the second level and third level planation surfaces of the Tianshan Mountains. The Kalajun grassland, where the nominated property lies, is just on the vast third level planation surface at the latitude of 2,200-2,400m, making it the most expansive mountain steppe and meadow in the whole Xinjiang Tianshan site. The Kalajun grassland is about 25km wide from north to south and 40km long from east to west, and its significance is recognized by the *Food and Agriculture Organization of United Nations*.

Figure 3-9 Meadow steppe in Kalajun

Figure 3-10 Foothill arid steppe in Tomur

The height difference of the nominated Tomur is about 6,000m. The humid current from west is hindered by high mountains and, in the south, Tomur is affected by extremely drought and hot Tarim Desert. Thus, on south slope of the Tomur component, large areas of foothill arid steppe remain in their original state, with a height difference of 1,200m.

(3) Typical mountain altitudinal natural zones of a temperate arid zone

Xinjiang Tianshan has the typical mountain altitudinal natural zones in arid temperate zone. Their distribution reflects the water and heat variations at different altitudes, gradients and slopes. The nominated property is an outstanding example for the study of biological community succession in mountain ecosystems in an arid zone undergoing global climate change.

The Tomur and Bogda components respectively represent the altitudinal natural zones of warm temperate zone and temperate zone in temperate arid zone. In Tomur, within a horizontal distance of 70km, across an elevation drop from 7,443m to 1,450m, there is a complete range of altitudinal natural zones on the south slope of Tianshan, from ice-snow zone, alpine cushion vegetation zone, alpine meadow zone, sub-alpine meadow zone, mountain steppe zone, warm temperate steppe zone to warm temperate desert zone. In Bogda, within a horizontal distance of nearly 30km, across an elevation drop from 5,445m to 1,380m, there is a

range of altitudinal natural zones on the north slope of Tianshan, from the ice-snow zone, alpine cushion vegetation zone, alpine meadow zone, sub-alpine meadow zone, mountain forest zone to mountain steppe zone.

3.b-4 The Nominated Property Is the Outstanding Representative of Biological and Ecological Evolution on the Pamir-Tian-Shan Highlands.

Undergoing climatic change from hot and humid, to warm and humid, to cold and dry, the vegetation in the nominated property evolved from tropical forest, through subtropical forest, to steppe. After the Mesozoic era, pollen studies indicate that a Ginkgo flora accompanied by lower evergreen shrub layer of Cycadales formed the forests in Xinjiang Tianshan; then a more lush tropical forest composed of *Pteridosperms* replaced the former vegetation. Since the Paleogene period, subtropical forest was widely distributed, containing angiosperms as well as gymnosperms (pine and cypress). From the Miocene epoch to the Pliocene epoch, the climate changed from humid to dry and, during the Pliocene-Pleistocene Period, the climate changed from warm to cold which caused the vegetation to gradually evolve from forest into steppe. After the Paleogene period, the ancient Mediterranean gradually retreated and, with mountain uplift and basin enclosure, the climate became drier and the original warm and humid tropical fern forest flora was gradually replaced by modern Mediterranean xeric flora. At the end of the Mesozoic era, creatures in the nominated property changed greatly because of major geological events, making the nominated property the refuge for numerous relic species.

Xinjiang Tianshan belongs to the holarctic floristic kingdom that extends across two sub-regions, that is, Eurasian forest floristic subregion and Asian desert floristic subregion. In view of the former sub-region, the nominated property belongs to the Tianshan region and, in view of the latter sub-region, the nominated property belongs to the western Central Asia and eastern Central Asia. The nominated property is rich in mountain flora within a desert area and has 2,622 species of plants which feature obvious altitudinal vegetation distribution, significant differences between north and south slopes, and diversity of floral components. The alpine zone is characterized by a Northern Hemisphere alpine component, and some cushion plants show the original relationship of this part of the Tianshan flora to the Himalayan region. The forest flora is spruce and

larch, and shrubs and meadow are mainly endemic species with a north component, north-temperate component or Europe and Asia temperate component. Mountain steppe and meadow are composed of Eurasian steppe, Central Asian and Siberian elements. Medium and small shrubs and semi-woody plants dominate the deserts, the *Chenopodiaceae, Composite, Tamaricaceae, Zygophyllaceae, Ephedraceae* and *Polygonaceae* families forming the main body; unigeneric and unispecific species are common and ancient and relic species are also common in the nominated property. *Malus sieversii (Lebed.) Roem* is endemic species and representative of Central-Asia. Many of the creatures in the nominated property are mainly relic species that can date back to the Paleogene or even the Cretaceous, remnants of the species that existed in the dry and hot ancient Mediterranean. The nominated property is an outstanding example of the biological evolution and succession of the bio-geographic province of Pamir-Tian-Shan Highlands.

The specific environment of Kalajun-Kuerdening kept it from being covered by Quaternary Glaciation. Because of the abundant rainfall, favorable winter temperature inversion layer, and the terrain which can keep the valley free from cold waves, it has become a refuge for numerous relic species in Paleocene period, as well as large areas of wild fruit forests (maritime deciduous broadleaved forest). There are 52 varieties of wild fruit trees, such as wild apple, wild apricot, wild walnut, etc. It is also the region where wild European palm originated. Consequently, the nominated Xinjiang Tianshan site contains significant gene pools and provides important evidence explaining how biological evolution and succession have been affected by global climatic change.

Figure 3-11 *Malus sieversii*

Figure 3-12 *Padus avium*

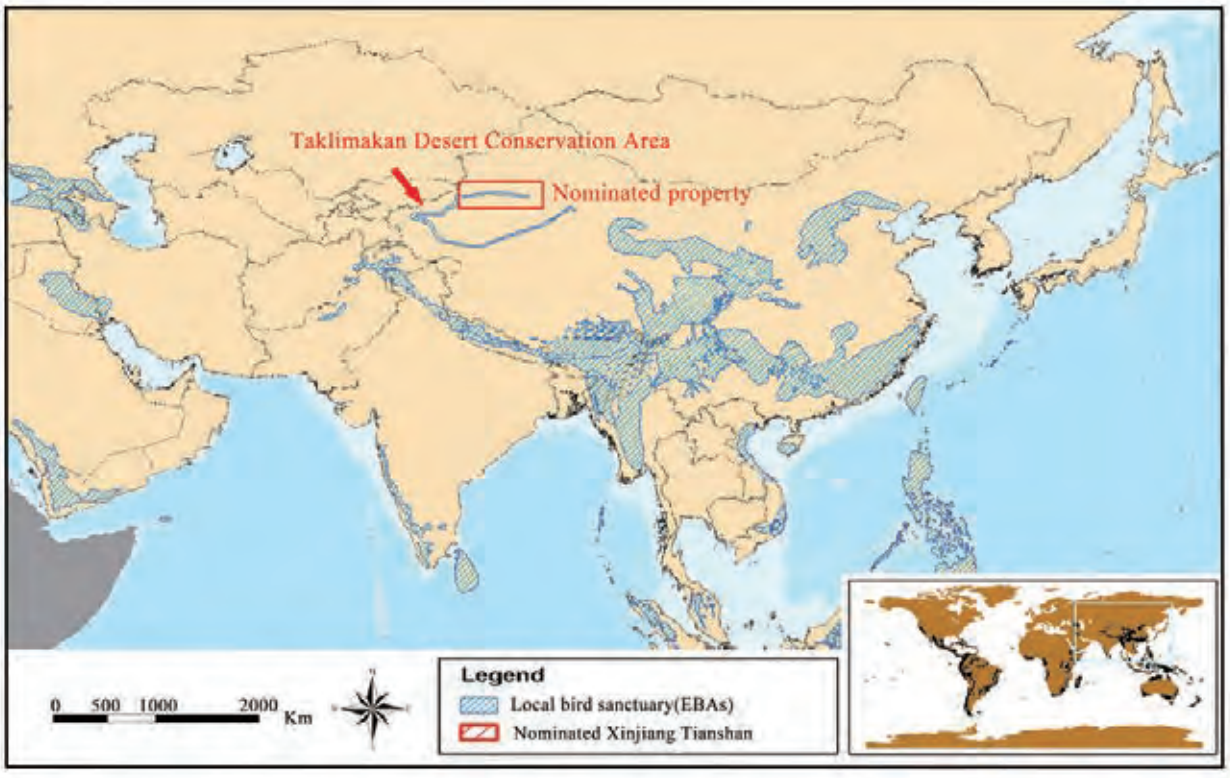
3.b-5 The Nominated Property Has Outstanding Biodiversity and It Is Important Habitat for Relic Species, and Numerous Rare and Endangered Species, as well as Endemic Species.

The nominated property is a component of the 'Mountains of Central Asia', one of Conservation International's 34 Global Biodiversity Hotspots, as well as lying within the 'Mountains of Middle Asia', one of the IUCN/WWF Centres of Plant Diversity. In addition, the nominated Tomur is a component of Taklimakan Desert Reserve, one of Bird International Conservation's 218 Endemic Bird Areas.

(1) Rich species diversity

The nominated property is rich in biodiversity in view of the biogeographic province of Pamir-Tian-Shan Highlands. There are 2 622 species of vascular plants (from 635 genera and 106 families) and 550 species of vertebrate animals (from 276 genera and 90 families and 36 orders), including 102 species of mammals, 370 species of birds, 32 species of reptiles, 6 species of amphibians and 40 species of fish.

Figure 3-13 Taklimakan Desert Reserve (EBAs)



(2) Relic species

The nominate property was the important biological refuge during the climatic fluctuations of Quaternary Glaciation in the hinterland of the Eurasian continent. There are 94 relic species of plants dating back before Quaternary Glaciation, which accounts for 3.59% of the total number of species of vascular plants in the nominated property.

(3) Rare and endangered species

There are 110 species of rare and endangered plants in the nominated property. Of them, there are 18 species listed on the Red List of IUCN (2010) and 16 species included in CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) (2010). There are 367 species of rare and endangered animals in the nominated property. Of them, there are 355 species listed on the Red List of IUCN (2010), 10 species are included on Appendix I of CITES (2010) and 47 species are included on Appendix II of CITES (2010).

Figure 3-14 *Cistanche deserticola*

(4) Endemic species

There are 118 species of plants endemic to Tianshan, which accounts for 4.5% of the total number of vascular plants in the nominated property. There are 22 species of wild animals endemic to Tianshan, which accounts for 4% of the total number of vertebrates in the nominated property.

Figure 3-15 *Saussurea involucrata*

3.c Comparative Analysis

According to *Operational Guidelines for the Implementation of the World Heritage Convention*, the nominated property should be compared with areas and heritage sites which meet the same criteria. According to the World Natural Heritage category of IUCN, the nominated property belongs to the mountain category and it should be compared with mountain heritage sites on the World Heritage List, other huge mountains in arid zone of Asia, Tianshan mountains abroad and protected areas in Tianshan Mountains on the Tentative List for World Natural Heritage to illustrate the Outstanding Universal Value of the ecological systems, ecological processes and landscape aesthetics of the nominated serial property of Xinjiang Tianshan.

3.c-1 Comparison with the Mountain World Heritage Sites in the World Heritage List

Up to July, 2011, there were 183 World Natural Heritage and 28 mixed World Heritage sites on the World Heritage List. According to the working paper of A Global Overview of Mountain Protected Areas on the World Heritage List (2002), World Heritage mountain should meet three criteria: (1) a minimum of 1,500m of relative height difference inside the protected area; (2) a minimum size of 10,000ha; (3) an IUCN protected area category I-IV. In this paper, 55 natural and mixed cultural and natural mountain sites that have been inscribed on the WH list were identified; together with another 10mountain sites that have been inscribed on the WH list in recent years, there is currently a total of 65 world heritage mountains. These properties exhibit superlative natural phenomena or exceptional natural beauty (criterion vii), geological processes (criterion viii), ecological and biological processes (criterion ix) and biodiversity (criterion x), and thus possess Outstanding Universal Values.

The Tianshan mountain range is one of the seven largest in the world. The total length of Tianshan Mountains in Xinjiang is 1,760km, and although located in the dry hinterland of Eurasia, it is extensively glaciated. Therefore, it is not comparable with the small mountain sites on the World Heritage List. Within the group of large mountain properties, since it is located in the temperate arid desert zone, its physical geographical features, biodiversity, ecosystems and natural landscapes are not comparable with large mountain properties in polar, subtropical or tropical regions. Xinjiang Tianshan is nominated under criteria (vii) and (ix), and therefore it will not be compared with mountain properties inscribed under other criteria. Consequently, this narrows the comparison down to 13 of the 65 listed mountain properties (Table 3-1).

Table 3-1 The 13 Mountain World Heritage sites which need to be compared with Xinjiang Tianshan*

No.	World Heritage Site	Criteria met	Area (ha)& altitude (m)	Biogeographical Province	Geological coordinates	Superlative natural phenomena of natural beauty and aesthetic importance	Ecological processes / ecosystems
1	Los Glaciares	(vii) (viii)	Area: 445,900 Altitude: 178-2,920	Chilean Nothofagus (8.11.2) / Southern Andean (8.37.12)	49°12'-50°52'S 72°40'-73°37'W	The Los Glaciares National Park is an area of exceptional natural beauty, with rugged, towering mountains and numerous glacial lakes, including Lake Argentino, which is 160km long. At its source, three glacier rivers meet, milky glacial water thundering down to the lake, massive round-shaped ice blocks hitting the lake with spectacular splashes	
2	Canadian Rocky Mountain Parks	(vii) (viii)	Area: 2,306,884 Altitude: 1,600-4,345	Rocky Mountains (1.19.12)	50°34'-53°28'N 115°10'-119° 32'W	The seven parks of the Canadian Rockies form a striking mountain landscape. With rugged mountain peaks, icefields and glaciers, alpine meadows, lakes, waterfalls, extensive karst cave systems and deeply incised canyons, the Canadian Rocky Mountain Parks possess exceptional natural beauty, attracting millions of visitors annually.	
3	Kluane/ Wrangell-St Elias/ Glacier Bay/ Tatshenshini-Alsek	(vii) (viii) (ix) (x)	Area: 9,839,121 Altitude: -500-5,959	Yukon Taiga (1.3.3) / Glacier Bay: Sitkan (1.1.2)	58°10'-59°15'N 135°15'-138°40'W	The joint properties encompass the breadth of active tectonic, volcanic, glacial and fluvial natural processes from the ocean to some of the highest peaks in North America. Coastal and marine environments, snow-capped mountains, calving glaciers, deep river canyons, fjord-like inlets and abundant wildlife abound. It is an area of exceptional natural beauty.	The influence of glaciation at a landscape level has led to a similarly broad range of stages in ecological succession related to the dynamic movements of glaciers. Subtly different glacial environments and landforms have been concentrated within the property by the sharp temperature and precipitation variation between the coast and interior basins. There is a rich variety of terrestrial and coastal/marine environments with complex and intricate mosaics of life at various successional stages from 500m below sea level to 5000m above.

4	Waterton Glacier International Peace Park	(vii) (ix)	Area: 457,614 Altitude: 962-3,178	Rocky Mountains (1.19.12)	48°15'-49°00'N 113°15'-114°30'W	Both national parks were originally designated by their respective nations because of their superlative mountain scenery, their high topographic relief, glacial landforms, and abundant diversity of wildlife and wildflowers.	The property occupies a pivotal position in the Western Cordillera of North America resulting in the evolution of plant communities and ecological complexes that occur nowhere else in the world. Maritime weather systems unimpeded by mountain ranges to the north and south allow plants and animals characteristic of the Pacific Northwest to extend to and across the continental divide in the park. To the east, prairie communities nestle against the mountains with no intervening foothills, producing an interface of prairie, montane and alpine communities. The international peace park includes the headwaters of three major watersheds draining through significantly different biomes to different oceans. The biogeographical significance of this tri-ocean divide is increased by the many vegetated connections between the headwaters. The net effect is to create a unique assemblage and high diversity of flora and fauna concentrated in a small area.
5	Nanda Devi National Park	(vii) (x)	Area: 71,783 Altitude: 3,000-7,817	Himalayan Highlands (2.38.12)	30°41'-30°48'N 79°33'-79°46'E	The Valley of Flowers is an outstandingly beautiful high-altitude Himalayan valley that has been acknowledged as such by renowned mountaineers and botanists in literature for over a century and in Hindu mythology for much longer. Its ‘gentle’ landscape, breath-takingly beautiful meadows of alpine flowers and ease of access complement the rugged, mountain wilderness for which the inner basin of Nanda Devi National Park is renowned.	

6	Sagarmatha National Park	(vii)	Area: 114,800 Altitude: 2,805-8,848	Himalayan Highlands (2.38.12)	27°57’55”N 86°54’47”E	Sagarmatha is an exceptional area with dramatic mountains, glaciers and deep valleys, dominated by Mount Everest, the highest peak in the world (8,848m). Several rare species, such as the snow leopard and the lesser panda, are found in the park. The presence of the Sherpas, with their unique culture, adds further interest to this site.	
7	Te Wahipounamu-South West New Zealand	(vii) (viii) (ix) (x)	Area: 2,600,000 Altitude: 0-3,764	Neozealandia (7.01.02)	166°26'-170°40'E 43°00'-46°30'S	The area contains New Zealand’s highest mountain, longest glaciers, tallest forests, wildest rivers and gorges, most rugged coastline and deepest fiords and lakes. The temperate rainforest and alpine plant communities are outstanding examples of these important ecosystems.	Notable example of on-going biological processes include large expanses of temperate rainforest, plant succession after glacial retreat, chronosequences on beach ridges, plant succession on alluvial plains, vegetation development in glacial lakes, ecotypic differentiation on ultramafic soils, extensive and little modified freshwater habitats, a diversity of alpine ecosystems, some generic alpine plant endemism, and on-going evolutionary processes such as the differentiation between the isolated kiwi populations.
8	Volcanoes of Kamchatka	(vii) (viii) (ix) (x)	Area: 3,830,208 Altitude: 0-4,688	Kamchatkan (2.7.5)	56°60'N 158° 30'E	The Kamchatka Volcanoes is a landscape of exceptional natural beauty with its large symmetrical volcanoes, lakes, wild rivers and spectacular coastline. It also contains superlative natural phenomena in the form of salmon spawning areas and major concentrations of wildlife (e.g. seabird colonies) along the coastal zone of the Bering Sea.	The expanded site is also biologically analogous to six islands and its geographic location between a large continental landmass and the Pacific Ocean has given it unique characteristics. Natural processes continue with on-going volcanic activity and colonisation.

9	Golden Mountains of Altay	(x)	Area: 1,611,457 Altitude: 109-4,506	Altay Highlands (2.35.12)	49°15'-51°00'N 86°15'-89°00'E		The Altai region represents an important and original centre of biodiversity of montane plant and animal species in northern Asia, a number of which are rare and endemic.
10	Swiss Alps Jungfrau-Aletsch	(vii) (viii) (ix)	Area: 82,388 Altitude: 809-4,274	Central European Highlands (2.32.12)	46°30'00"N 8°02'00"E	The impressive landscape within the property has played an important role in European art, literature, mountaineering and alpine tourism. The area is globally recognised as one of the most spectacular mountain regions to visit and its aesthetics have attracted an international following. The impressive north wall of the High Alps, centred on the Eiger, Mönch and Jungfrau peaks, is a superlative scenic feature, complemented on the southern side of the Alpine divide by spectacular peaks and a valley system which supports the two longest glaciers in western Eurasia.	Within its altitudinal range and its dry southern/wet northern exposures, the property provides a wide range of alpine and sub-alpine habitats. On the two main substrates of crystalline and carbonate rocks, a variety of ecosystems have evolved without significant human intervention. Superb examples of plant succession exist, including the distinctive upper and lower tree-line of the Aletsch forest. The global phenomenon of climatic change is particularly well-illustrated in the region, as reflected in the varying rates of retreat of the different glaciers, providing new substrates for plant colonization.
11	Yellowstone National Park	(vii) (viii) (ix) (x)	Area: 898,349 Altitude: 1,610-3,462	Rocky Mountains (1.19.12)	44°08'-45°07'N 109°10'-111°10'W	The extraordinary scenic treasures of Yellowstone include the world’s largest collection of geysers, the Grand Canyon of the Yellowstone River, numerous waterfalls, and great herds of wildlife.	The park is one of the few remaining intact large ecosystems in the northern temperate zone of the earth. All flora in the park are allowed to progress through natural succession with no direct management being practiced. The park’s bison are the only wild, continuously free-ranging bison remaining of herds that once covered the Great Plains and, along with other park wildlife, are one of the greatest attractions.

12	Three Parallel Rivers of Yunnan Protected Areas	(vii) (viii) (ix) (x)	Area: 939,441 Altitude: 760-6,740	Szechuan Highlands (2.39.12)	29º00'N-25º 30'N 98º15'E-100º20'E	The deep, parallel gorges of the Jinsha, Lancang and Nu Jiang are the outstanding natural feature of the property; while large sections of the three rivers lie just outside the property boundaries, the river gorges are nevertheless the dominant scenic element in the area. High mountains are everywhere, with the glaciated peaks of the Meili, Baima and Haba Snow Mountains providing a spectacular scenic skyline. The Mingyongqia Glacier is a notable natural phenomenon, descending to 2700m altitude from Mt Kawagebo (6740m), and is claimed to be the glacier descending to the lowest altitude for such a low latitude (28° N) in the northern hemisphere.	The dramatic expression of ecological processes in the Three Parallel Rivers property has resulted from a mix of geological, climatic and topographical effects. First, the location of the area within an active orographic belt has resulted in a wide range of rock substrates from igneous through to various sedimentary types. An exceptional range of topographical features is associated with the property being at a "collision point" of tectonic plates. Add the fact that the area was a Pleistocene refugium and is located at a biogeographical convergence zone and the physical foundations for evolution of its high biodiversity are all present. Along with the landscape diversity with a steep gradient of almost 6000m vertical, a monsoon climate affects most of the area and provides another favourable ecological stimulus that has allowed the full range of temperate Palearctic biomes to develop.

13	Uvs Nuur Basin	(ix) (x)	Area: 898,063 Altitude: 759-4,116	Altay Highlands (2.35.12)	49°46'-50°40'N 90°12-95°38E		The closed salt lake system of Uvs Nuur is of international scientific importance because of its climatic and hydrological regimes. Because of the unchanging nature of the nomadic pastoral use of the grasslands within the basin over thousands of years, current research programmes should be able to unravel the rate at which Uvs Nuur (and other smaller lakes within the basin) have become saline (and eutrophic). These processes are on-going and because of its unique geophysical and biological characteristics, the basin has been chosen as an IGBP site for monitoring global warming.

*Date source: http://whc.unesco.org/en/list

(1) Comparative analysis of the 13 mountain WH sites

Los Glaciares

- Physical Features. The park has rugged, towering mountains and numerous glacial lakes, including the great Lago Argentino. This vast alpine area includes the Patagonian ice field which occupies about half of the park. Extending over 14,000km^2, the ice field is the largest ice mantle outside Antarctica. It has a total of 47 glaciers and a further 200 smaller glaciers are independent of the main ice field.

- Vegetation. The park contains two distinct vegetation types: subantarctic Patagonian forest and Patagonian steppe. The principal species in the Andean-Patagonian forests include southern beech Nothofagus antarctica. Patagonian steppe occurs to the east with bare snow-covered mountains and glaciers to the west.

- Fauna. The most impressive wildlife in the park is the birds, including black-necked swans, a variety of ducks and geese, Chilean flamingos wade, Darwin's rhea. Mammals include an isolated population of southern Andean huemul, mountain viscacha, guanaco, Argentine grey fox and Austral hog-nosed skunk.

Canadian Rocky Mountain Parks

- Physical Features. The area is extremely rugged, largely unmodified by man and mountainous with many peaks above 4,000m and local relief up to 2,135m. Geological formations are composed of highly faulted, folded and uplifted sedimentary rocks. There are several icefields and hundreds of remnant valley glaciers. Glacial lakes, numerous waterfalls, extensive limestone cave systems, fossil beds, deeply incised canyons, hot springs, and underground rivers.

- Vegetation. The site has three vegetation zones: montane, subalpine and alpine. Montane forest is generally found between 1,200m and 1,800m and typical species include Douglas fir, white spruce, aspen and poplar. The subalpine ecoregion is the most extensive ecoregion in the Rockies and can be subdivided into lower and upper subalpine. The alpine ecoregion is characterized by diminutive and hardy vegetation such as low-growing willow and dwarf birch, heath, mountain avens and sedge.

- Fauna. A total of 56 mammalian species have been recorded. Characteristic species include Rocky Mountain goat, bighorn sheep, northern pika and hoary marmot. Forest mammals include moose, mule deer, white-tailed deer, caribou, red deer and red squirrel. Carnivores include grey wolf, grizzly bear, black bear, wolverine, lynx and puma. Some 280 avifaunal species have been noted, including northern three-toed woodpecker, white-tailed ptarmigan, grey jay, mountain bluebird, Clark's nutcracker, golden eagle, mountain chickadee and rock pipit.

Kluane / Wrangell-St Elias / Glacier Bay / Tatshenshini-Alsek

- Physical Features. The heritage site is a unique area with high mountain peaks, foothills, glacial systems, lakes, streams, valleys and coastal landscapes. The Wrangell-St Elias region represents the most extensive array of glaciers and ice fields outside the polar region. These features and the high mountains of the Wrangell-St Elias, Chugach and Kluane ranges have resulted in the region becoming known as the 'Mountain Kingdom' of North America. Geologically the mountains are included in the Pacific mountain system and include the 130km long Bagley ice field, the second-highest peak in the USA (Mount St Elias) and the largest piedmont glacier on the North American continent (Malaspina Glacier). Extensive lowlands are found only in the centre and along north-western fringes of the region. The Malaspina foreland coastal area comprises mainly long, straight piedmont glacial beaches cut through by numerous often sizeable glacial-melt drainage-ways.

- Vegetation. The wide ranges of climatic zones and elevations in the region have resulted in a great variety of ecosystems representing three major biomes or broad vegetational subdivisions: the coastal coniferous biome; the northern coniferous biome; and the alpine tundra biome. The coastal coniferous biome includes coastal spruce-hemlock forests, tall shrub thickets and bogs and marshes. The northern coniferous biome includes closed tall spruce and deciduous forests, open, low mixed evergreen and deciduous forests, tall shrub thickets and low shrub thickets. The alpine tundra biome includes moist sedge and grass alpine tundra and dry alpine tundra: moist sedge and grass alpine tundra composed of sedges and grasses interspersed with low shrubs such as blueberry and Labrador tea; and dry alpine tundra matted alpine plants dominated by mountain avens.

- Fauna. There is a great variety of fauna reflecting the habitat diversity. Carnivores include coyote, grey wolf, red fox, short-tailed weasel, mink, wolverine, river otter, lynx and the more easily visible brown bear and black bear. Other mammals include pica and snowshoe hare, arctic ground squirrel, beaver Castor, muskrat and porcupine. Rodents include the hoary marmot. Moose and caribou range in lower elevations and mountain goat and Dally sheep occupy high mountainous areas. The avifauna includes spruce grouse, ruffed grouse, willow ptarmigan, rock ptarmigan, white-tailed ptarmigan, trumpeter swan and many song birds.

Waterton Glacier International Peace Park

- Physical Features. The park is situated in the extreme south-west of the Province of Alberta, along the eastern slopes of the Continental Divide and at the western margin of the Canadian Great Plains region. Local relief is dominated by the 2,500m peaks of the Border and Clark Ranges. The most immediately obvious feature of the park is the sudden transition from prairie to mountain landscape. The dominant landforms of the park are of glacial origin; typical of both mountain and continental glaciations. The mountain valleys and rock basins were shaped by glacial erosion.

- Vegetation. Five large ecoregions are found within Waterton-Glacier National Parks; these are alpine tundra, subalpine forest, montane forest, aspen parkland and fescue grassland. Arctic-alpine tundra vegetation covers much of the terrain, typical species including drays tundra and dwarf alpine poppy. The subalpine forest ecoregion is the single-most vegetation cover in the park. A strong boreal element is typical of this ecoregion, characterized by such species as dwarf birch and fireweed. The montane forest occurs at low to mid elevations, but is largely restricted to the dry foothills and major river valleys of the eastern slopes. The aspen parkland serves as a transition belt between the prairie grasslands and the coniferous forest zone, with dominant tree species being trembling aspen and balsam poplar. The fescue grasslands ecoregion is typified by the festuca / danthonia grass association.

- Fauna. The park is noted for an abundance of wildlife and a wide diversity of habitats. Investigations have listed 61 species of mammals, 241 species of bird, and 20 species of fish. Carnivores include grey wolf, coyote, cougar, American black bear and mink. Carnivores

include grey wolf, coyote, cougar, American black bear, grizzly bear and mink. Ungulates include mule deer, white-tailed deer, moose, bison, mountain goat and bighorn sheep. Rodents include beaver and muskrat.

Nanda Devi and Valley of Flowers National Parks

- Physical Features. The Nanda Devi National Park is one of the most spectacular wilderness areas in the Himalayas. A dozen peaks above 6,400m, including Dunagiri (7,066m), Nanda Devi East (7,434m) and etc. The area is a vast glacial basin, divided by a series of parallel, north-south oriented ridges, with the lower Rishi Gorge which descends to 2,100m. The Valley of Flowers National Park is located in the Garhwal Himalaya of eastern Uttaranchal State, 340km northeast of Delhi and covers an area of 8,750ha. The altitude is from 3,350m to 6,708m.

- Vegetation. Forests are restricted largely to the Rishi Gorge and are dominated by fir, rhododendron and birch up to about 3,350m. Birch forest, with an understorey of rhododendron form a broad belt. Beyond Ramani, the vegetation switches from forest to dry alpine communities, with scrub juniper becoming the dominant cover within the 'Inner Sanctuary'. Juniper gives way altitudinally to grasses, prone mosses and lichens, and on riverine soils to annual herbs and dwarf willow. Woody vegetation extends along the sides of the main glaciers before changing gradually to squat alpines and lichens.

- Fauna. The basin is renowned for the abundance of its ungulate populations, notably Himalayan musk deer. Mainland serow and Himalayan tahr are also common. Large carnivores are common leopard, Himalayan black bear and brown bear. The only primate present is common langur. There are 114 bird species belonging to 30 families. Species abundant include crested black tit, yellow-bellied fantail flycatcher, orange-flanked bush robin, blue-fronted redstart, Indian tree pipit, vinaceous-breasted pipit, common rosefinch and nutcracker.

Sagarmatha National Park

- Physical Features. This is a dramatic area of high, geologically young mountains and glaciers. The deeply-incised valleys cut through sedimentary rocks and underlying granites to drain southwards into

the Dudh Kosi and its tributaries, which form part of the Ganges River system. The upper catchments of these rivers are fed by glaciers at the head of four main valleys, Chhukhung, Khumbu, Gokyo and Nangpa La. Lakes occur in the upper reaches, notably in the Gokyo Valley, where a number are impounded by the lateral moraine of the Ngozumpa Glacier (at 20km the longest glacier in the park). There are seven peaks over 7,000m.

- Vegetation. The Himalayan zone provides the barrier between the Palaearctic realm and the Indomalayan realm. Most of the park (69%) comprises barren land above 5,000m, 28% is grazing land and about 3% is forested. Six vegetation zones in the Nepal Himalaya are represented in the park, from oak forests at the lowest elevations to lichens and mosses at the highest elevations, including lower subalpine; upper subalpine; lower alpine; upper alpine; and subnival zone.

- Fauna. The area has a comparatively low number of mammalian species. Larger mammals include common langur, jackal, a small number of wolf, Himalayan black bear, red panda, yellow-throated marten, Himalayan weasel, masked palm civet, snow leopard, Himalayan musk deer, Indian muntjac, serow, Himalayan tahr and goral. There are 152 species of birds.

Te Wahipounamu–South West New Zealand

- Physical Features. Glaciers are an important feature, especially in the vicinity of Westland and Mount Cook national parks, which contain 28 of 29 New Zealand peaks above 3,000m. Erosion in the mountains remains very rapid, especially in the zone of high rainfall (and most rapid uplift) west of the Main Divide. Intense gullying, serrated ridges, and major and minor rockfalls are characteristic of this zone. Full exposure to Southern Ocean swells has produced a dramatic "iron-bound" coast on basement rocks, with irregular high cliffs and many offshore rocks and stacks.

- Vegetation. The vegetation is notable for its diversity and essentially pristine condition. A floristically rich alpine vegetation of shrubs, tussocks and herbs extends around the summits of the mountains, from about 1,000m to the permanent snowline. At warmer lower altitudes, the rainforest is dominated by dense stands of tall podocarps. The wetter, milder west is characterized by luxuriant rainforest and wetlands; the drier, more continental east has more open forest,

shrublands and tussock grasslands. The most extensive and least modified natural freshwater wetlands in New Zealand are found in this area.

- Fauna. The heritage is the core habitat for many indigenous animals, including a number of primitive taxa, and contains the largest and most significant populations of forest birds in the country, most of which are endemic to New Zealand.

Volcanoes of Kamchatka

- Physical Features. The site is located on the Kamchatka Peninsula, in the central mountainous spine of the peninsula facing east towards the Bering Sea. More than 300 volcanoes are found in Kamchatka, 29 being currently active, including caldera, strata-volcano, somma-volcano and mixed types, the largest included in the World Heritage site being Kronotskaya Sopka (3,528m).

- Vegetation. The vegetation is in largely pristine condition, and includes mountain valley taiga forest of birch, larch and spruce; extensive stone-birch forest; riparian forest on alluvial soil of poplars, aspen, alder and willow; peat wetland and extensive coastal wetlands up to 50km wide; and subalpine shrub and mountain tundra. The region also contains an especially diverse range of Palaearctic flora (including a number of nationally threatened species and at least 16 endemics.

- Fauna. The faunal complement is relatively low in diversity, with the Kamchatka Peninsula exhibiting some of the biogeographic qualities of an island. Nevertheless, a number of species are abundant, including bears, snow ram, northern deer, sable and wolverine, and there is a high level of endemism. Noteworthy birds include Stellar's sea eagle (50% of world population), white-tailed eagle, golden eagle, gyrfalcon and peregrine falcon. There are numerous seabird colonies and 50% of the global population of Aleutian tern nest on the peninsula.

Golden Mountains of Altay

- Physical Features. The site comprises the high mountainous areas of Altai, the headwaters of the Katun and Chulyshman rivers and Lake Teletskoye. The confluence of these two rivers, beyond the boundary of the nominated site, forms the River Ob at 5,410km, the fifth-longest

river in the world, which flows north into the Arctic Ocean. Typical relief features of mountain peaks include the 4,605m Mount Belukha, cirques and trough valleys with lake basins, morainal hills and ridges.

- Vegetation. The site is composed of a mountainous taiga, a glacial zone, mountain meadows, and high-altitude tundra and steppes. More than 1,400 vascular plants are found here and of these 17% are endemic species.

- Fauna. The area supports a diverse fauna, including 72 mammal species and 310 bird species. Snow leopard and argali mountain sheep are also found here. Lake Teletskoye is the largest body of freshwater.

Swiss Alps Jungfrau-Aletsch

- Physical Features. It is located in the south central Swiss Alps midway. Elevation ranges from 900m on the southern slopes to 4,274m on the summit of the Finsteraarhorn. Nine peaks in the site are higher than 4,000m. Classic examples of glacial phenomena occur in the site, such as U-shaped valleys, valley glaciers, cirques, horn peaks, and moraines. Of particular note is the Aletsch Glacier, the largest (128km^2), the longest (23km) and deepest (900m) in Europe.

- Vegetation. Vegetation is representative of the Alps and vary by slope, aspect and elevation. On the north side, forests at lower elevations consist of broadleaved species such as beech, ash, alder, elm and birch. The subalpine zone is dominated by Norway spruce with mountain ash, silver birch and stone pine. The south side is too dry for beech, which is replaced by Scots pine and more continental species such as European larch on young soils.

- Fauna. Fauna in the region is typical of the Alps, with a wide variety of species including ibex, lynx, red deer, roe deer, chamois and marmot as well as several reptiles and amphibians. A representative range of alpine birds also occurs, including golden eagle, kestrel, chough, ptarmigan, black grouse, snow finch, wallcreeper, lammergeier, pygmy owl and various woodpecker species.

Yellowstone National Park

- Physical Features. The park is part of the most seismically active region of the Rocky Mountains, a volcanic “hot spot”. It boasts an impressive array of geothermal phenomena, with more than 3,000

geysers, lava formations, fumaroles, hot springs and waterfalls, lakes and canyons. The forested area is 650,000ha with an average elevation of 2,000m.

- Vegetation. Forest is dominated by lodgepole pine Pinus contorta. The range of plant communities is from semi-arid steppe to alpine tundra. One grass Agrostis rossae is endemic.

- Fauna. Six species of ungulates are native to the park, e.g. elk Cervus elaphus and mule deer Odocoileus hemionus. Other species of interest are Grizzly bear Ursus arctos, bald eagle Haliaeetus leucocephalus and etc. Native fishes, e.g. Yellowstone cut-throat trout Oncorhyncus clarki bouvieri.

Three Parallel Rivers of Yunnan Protected Areas

- Physical Features. Extending 310km from north to south and 180km from east to west, the site encompasses large sections of three of the great rivers of Asia, the Yangtse (Jinsha), Mekong (Lacang) and Salween (Nu Jiang), which run parallel from north to south through the nominated area for over 300km. The world heritage area lies over four parallel north-south trending mountain ranges that reach a height in excess of 4,000m above sea level in altitude.

- Vegetation. The land area encompassed by Three Parallel Rivers of Yunnan Protected Areas is one of the world's least-disturbed temperate ecological areas, an epicentre of Chinese endemic species and a natural gene pool of great richness. Owing to its function as a refuge during the last Ice Age and its location near the boundaries of three major biogeographic realms, East Asia, South-East Asia and the Tibetan plateau, the park has 22 vegetation subtypes and 6,000 plant species.

- Fauna. The fauna is a complex mosaic of Palaearctic, oriental and local endemic species adapted to almost all the inland climates from southern subtropical to frigid, except for desert. The area is believed to support over 25% of the world's animal species, many being relict and endangered.

Uvs Nuur Basin

- Physical Features. Uvs Nuur is the northernmost of the enclosed basins of Central Asia. It is enclosed on the north (Tuva) by the Tannu Ola

Range and the Sangilen Mountains in the north-east. The main feeder to Uvs Nuur is the Tes-Khem River. Uvs is relatively shallow (10-20m depth) and very saline and alkaline. In all, the lakes display a range of hydrological characteristics, water quality and biomass productivity.

- Vegetation. The vegetation reflects the conjunction of the Siberian and Central Asian floras, with 19 species endemic to Tuva and Mongolia, 51 relict species and 94 plant species classified as rare.

- Fauna. Uvs Nuur Basin is important habitats for the endangered snow leopard and there are large herbivores such as the Asiatic ibex, argali mountain sheep, wild boar, red deer and musk deer and the Mongolian and black-tailed gazelle; predators include wolf, red fox, lynx, polecat and weasel, and many different kites, falcons, eagles and vultures

As stated already, 13 sites are located in different biogeographical provinces (Udvardy) with Xinjiang Tianshan. Different biogeographical provinces represent various ecological processes and biodiversity, which cannot be replaced with each other. The 13 sites developed different vegetation types, animal species and ecosystems. Thus, they are very different from Xinjiang Tianshan in terms of biota, biodiversity, ecological processes, altitudinal natural zones and natural landscapes.

The relative height difference of Xinjiang Tianshan is 6,063m with the highest peak of Tomur 7,443m and the lowest point 1,380m. Although the highest peak is lower than that of Sagarmatha National Park (8,848m) and Nanda Devi National Park (7,817m), the relative height difference is 60m higher than that of Sagarmatha National Park (6,003m), greater than any other world mountain heritage.

Compared to the 13 sites, Xinjiang Tianshan is located in temperate desert, which shows a complete altitudinal sequence of natural mountain landscapes. The nominated property richly displays the diverse landscapes of a large mountain system in the arid temperate zone, contrasting barren south slopes with beautiful north slopes, wet west and dry east, freezing alpine mountain and hot desert.

Ecological systems of Xinjiang Tianshan are dominated by Tianshan montane conifer forest, Tian Shan montane steppe and meadows and Tian Shan foothill arid steppe, which are totally different from that of the 13 sites. Tianshan montane conifer forest is dominated by *Picea schrenkiana*, endemic to Tianshan Mountains.

(2) Comparison conclusion

Compared with other mountain WH sites, Xinjiang Tianshan embraces the largest relative relief, and furthermore. In the Pamir-Tian-Shan Highlands where Xinjiang Tianshan is located, there is currently no World Natural Heritage. Mountain ecosystems in the nominated property are featured with endemic species and altitudinal natural zones, which cannot be replicated in other mountain world heritages.

3.c-2 Comparison with Other Large Mountains in Arid Zone of Asia

(1) Comparison with Pamir Mountains

The Pamir is a huge mountain junction, formed by the joining of the Himalaya, Tianshan, Kunlun, Karakorum and Hindu Kush Mountains. The Pamir is divided into West Pamir and East Pamir by the north-south Sarykol Range, showing different natural landscapes. The highest peak is Kongur, at the eastern extremity of the range in western Xinjiang; it has an elevation of 7,719m. The western Pamir, in Tajikistan, has many glaciers and the highest peaks are Ismail Somoni (7,495m) and Lenin Peak (7,134m). The lowest altitudinal natural zone is desert, covered by bare rock desert and moraines. Average elevation of East Pamir is 6,100m, and the landscape is dominated by erosion plains and ridge hillocks with a relative height difference from 1,000m to 1,800m. Alpine cold desert landscapes are very well developed, and forests are lacking. On the dry slopes, there are short shrubs of *Ceratoides*, and cushion vegetation belonging to *Oxytropis*. In the bottom of relatively humid valley, there are *Kobresia pygmaea* plants.

West Pamir is dominated by high mountains covered by permanent snow and glaciers and deep and narrow valleys, with glacial landforms widely developed. Tajik National Park, in this part of Tajikistan, is the largest alpine nature reserve in Central Asia and also Eurasia. High mountains and deep valleys with rapid rivers occur in the incised landforms with relative relief of 2,000-3,000m. Vegetation in West Pamir is more abundant than that of the East Pamir and the altitudinal natural zones are more typical. In the lower part of the Pamir of Sarykol Plateau and in the valleys, *Artemisia* desert predominates. The typical vegetation at an elevation of 3,200-3,600m, is thorny cushion groups, at 3,600-3,800m it

is steppe of *Festuca ovina* and *Stipa*, and at 3,800-4,300m it is alpine cold desert plants, and above 4,300m it is rock and permanent snow.

The Pamir is quite different from Xinjiang Tianshan in terms of biodiversity, biogeographical groups, altitudinal natural zones, natural landscapes and ecoregions.

- Less plant species. Because of the lower precipitation and the higher average elevation, Plant species of Pamir is near 300, obviously less than that of Xinjiang Tianshan.

- Biogeographical fauna and flora. The flora of Pamir is dominated by north temperate and old world temperate elements, with some Qinghai-Tibet ones such as *Oxytropis* sp., *Microula sikkimensis*, *Meconopsis* sp., which are different from Xinjiang Tianshan (with its north temperate, Mediterranean, western Asia and Central Asia components). The two regions belong to different fauna regions, as the Pamir lies in the Qinghai-Tibet region of the Central Asia sub-kingdom, while Xinjiang Tianshan lies in Kazakh region of the Central Asia sub-kingdom. Animal species in the Pamir show transitional features between Tianshan Mountains and Qinghai-Tibetan Plateau, such as Kiang, Blue Sheep, Ladak Pika, Tibetan Fox, Tibetan Snow Cock.

- Natural landscapes. Montane evergreen coniferous forest, alpine meadow and foothill arid steppe, which are the most significant

Figure 3-16 Pamir

Figure 3-17 Xinjiang Tianshan

landscape components of Central Asia, cannot be found in the Pamir. So the plateau landscapes of the Pamir are not comparable with the mountain altitudinal natural landscapes of Xinjiang Tianshan.

- Ecoregions. Xinjiang Tianshan is a typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, and Tian Shan foothill arid steppe of Middle Asian Montane Steppe and Woodlands of Global 200 Ecoregion, while the Pamir belongs to alpine desert and tundra ecoregion of Pamir. They belong to different ecoregions and thus have different biological communities and corresponding ecological processes, which cannot be replaced by each other.

(2) Comparison with Altay Mountains

The Altay Mountain range is one of the great mountain ranges in Central Asia, with an average altitude of 1,000-3,000m and the highest peak Mt. Belukha (Muztau huigi) of 4,506m. The Altay Mountains are very different from Xinjiang Tianshan in terms of biota, altitudinal natural zones, natural landscapes and biogeographical provinces.

- Biogeographical fauna and flora. The flora of the Altay Mountains is dominated by Siberian, Old World and Holarctic elements, and the forest ecosystem is Euro-Siberian Taiga mainly composed of conifers like *Larix sibirica, Pinus sibirica, Picea obovata* and *Abies sibirica*. The montane coniferous forests is at 1,200m-2,000m above sea level, of which, cold temperate deciduous coniferous forests account for much, and broadleaved deciduous forests are mainly composed of *Populus tremula, Betula pendula, Betula microphylla* are also important. The fauna of Altay Mountains is distinguished from that of Xinjiang Tianshan. Altay Mountains lie in Euro-Sibirica kingdom; and the representative animals are *Lygopus mutus, Bonasa bonasia, Martes zibellina, Alces alce, Lepus timidus*, etc. of Taiga component. While Xinjiang Tianshan lies in Central Asia sub-kingdom and the representative animals are red deer, Argali and ibex of the northern type.

- Altitudinal natural zones. In the Altay Mountains, xeric deserts and steppes are better developed, while the mesophytic forest and meadow zone is relative narrow. So altitudinal natural zones of the Altay Mountains are highly different from that of Xinjiang Tianshan, which is characterized by completely zonal evergreen coniferous forests mainly composed of snow spruce. In addition, the subalpine meadows, mountain steppes and meadows and foothill arid steppes of Xinjiang

Tianshan are much better developed.

- Natural landscapes. The natural landscapes of Altay Mountains extend from temperate desert grasslands to glaciers with altitude increasing. There are also lots of swamps, rivers and lakes in this region. The average elevation of the Altay Mountains is considerably lower than that of Tianshan Mountians in Xinjiang, and the topography is relatively gentler with fewer glaciers when compared with Tianshan Mountians in Xinjiang. So its natural landscapes are more spectacular than that of the Altay Mountains. On the south slope of the Altay Mountains, intact mountain altitudinal natural zones have been developed with a forest belt dominated by the mixed forests of *Picea obovata*, *Betula pendula*, *Larix sibirica* and *Juniperus sibirica*, very different from the snow spruce forest landscapes of Xinjiang Tianshan.

- Biogeographical provinces. According to *A Classification of the*

Figure 3-18 Altay Mountains

Figure 3-19 Xinjiang Tianshan

Biogeographical Provinces of the World by Udvardy(1975), the Altay Mountains lie in the Palaearctic Realm of the 8 biological realms, are located in the Altay Highlands of the 193 biological provinces, and belong to the mixed mountain system of the 14 biota. Among the WWF Global 200 Ecoregion, the Altay Mountains lie in the Altay-Sayan Montane Forests ecoregion (including Altay montane forest and forest steppe, Altay alpine meadow and tundra), while Tianshan in Xinjiang is located in the Middle Asian Montane Steppe and Woodlands ecoregion. The Altay Mountains and Tianshan in Xinjiang are located in different biological provinces and ecoregions of WWF's Global 200, and have completely different patterns of biodiversity and ecological processes, and thus are different from each other.

(3) Comparison with the Karakorum Mountains

The length of the Karakorum Range is 800km, the width 240km and the average elevation is more than 6,000m. There are 19 peaks above 7,260m, enclosing nearly 3,000 of the world's temperate mountain glaciers with Yinsugaiti glacier (42km) being the longest one in China. However, the Karakorum Range is very different from Xinjiang Tianshan in terms of biodiversity, altitudinal natural zones, natural landscapes and biogeographical provinces.

- Fewer plant species. Because of its dry climate, the plant species of the Karakorum Mountains are considerably less than those of Xinjiang Tianshan. Vascular species are less than 1,000, and most of which are located in the altitudinal band of 3,500-4,000m.

- Biogeographical fauna and flora. The flora of the Karakorum Mountains is also dominated by a Central Asian component, but there is also some Qinghai-Tibet Plateau component. Dominant woody species are quite different, as zonal snow spruce is dominant in Xinjiang Tianshan, while intra-zonal *Juniperus centrasiatica* is the main species in the Karakorum Mountains. Representative herbivore animals in the Karakorum Mountains include wild yak, Tibetan antelope, blue sheep and Tibetan wild ass of the plateau type, while that of T Xinjiang Tianshan include red deer, argali and ibex of the northern type. So fauna component of the two areas are quite different.

- Different altitudinal natural zones. Altitudinal zones of vegetation can only be found on the north and west slopes of the Karakorum Mountains. These slopes are, dominated by xeric vegetation, mainly

mountain steppes, with a lack of subalpine forest and meadow zones. From top to bottom, the zones are: permanent ice-snow, alpine shrub and meadow, subalpine steppe, mountain steppe and mountain desert.

- Different natural landscapes. The Karakorum Mountains are typical cold alpine desert landscapes, quite different from the diverse

Figure 3-20 Karakorum

Figure 3-21 Xinjiang Tianshan

mountain altitudinal landscapes of Xinjiang Tianshan.

- Different biogeographical provinces. According to *A Classification of the Biogeographical Provinces of the World* by Udvardy (1975), the Karakoram Range lies in the Palaearctic Realm of the 8 biogeographical realms, belongs to the Tibetan of the 193 biogeographical provinces, and the cold-winter deserts and semi-deserts of the 14 biological regions. The Karakorum Range and Xinjiang Tianshan are in different biogeographical provinces, which can't be replaced with each other.

(4) Comparison with the Kunlun Mountains

The Kunlun Mountains extend from east to west with a length of 2,500km, a width of 130-200km and an average elevation of 5,500-6,000m.

They separate the Tarim Basin and Taklimakan Desert in the north from the Tibetan Plateau in the south. The Kunlun Mountains are highly different from Xinjiang Tianshan in terms of biodiversity, biota, altitudinal natural zones, natural landscapes and biogeographical provinces.

- Fewer plant species. As they lie far away from the monsoonal influences of the Indian Ocean and Pacific Ocean, the Kunlun Mountains are not influenced by oceanic currents, and have a dry climate with very limited rainfall. There are only about 100 species of higher plants, most of which are dwarf shrubs. However, Xinjiang Tianshan has 2,600 species of higher plants.

- Biogeographical fauna and flora. The flora of the Kunlun Mountains is dominated by a Central Asian component, but there is also some Qinghai-Tibet Plateau component, and a lack of ancient relic species. The fauna of the Kunlun Mountains belongs to the Qinghai-Tibet region of the Central Asian sub-kingdom, while that of Tianshan in Xinjiang belongs to the Kazakh region of the Central Asia sub-kingdom. Representative animals in the Karakorum Mountains are dominant by large ungulates including wild yak, Tibetan antelope, blue sheep and Tibetan wild ass endemic to the Plateau, in addition, there are also a number of *Camelus bactrianus*. The two regions are obviously different from each other in fauna.

- Different altitudinal natural zones. Super xeric mountain altitudinal natural zones have been developed in the Kunlun Mountains. From top to bottom, there are cold alpine desert zone, alpine shrub and meadow zone, subalpine

Figure 3-22 Kunlun Mountains

Figure 3-23 Xinjiang Tianshan

steppe zone, mountain desert steppe zone and mountain desert zone.

- Different natural landscapes. The Kunlun Mountains are characterized by their desert steppe landscapes, which are quite different from the mountain altitudinal natural landscapes of Xinjiang Tianshan.

- Different biogeographical provinces. According to *A Classification of the Biogeographical Provinces of the World* by Udvardy (1975), the Kunlun Mountains lie in the Palaearctic Realm of the eight biogeographical realms, belong to Tibetan of the 193 biogeographical provinces, and the cold-winter deserts and semi-deserts of the 14 biological regions. The Kunlun Mountains and Xinjiang Tianshan are in different biogeographical provinces, which are different from each other.

(5) Comparison conclusions

Compared with the other huge mountains in arid zone of Asia, Xinjiang Tianshan is surrounded by two vast deserts, the barrier effect of which are obvious and consequently large differences in the landscapes of the north and south slopes have resulted. Because of its larger relative height difference and humidity differences, compared with other huge mountains, Xinjiang Tianshan exhibits the most abundant plants and intact altitudinal natural zones of Central Asian mountain ranges. Xinjiang Tianshan and these other large mountains are either in different biogeographical provinces, have very different fauna and flora, or lie in different ecoregions. In conclusion, Xinjiang Tianshan is quite distinct from the other large mountains discussed above, in terms of its abundant landscape biodiversity and the uniqueness of its natural beauty.

3.c-3 Comparison with Those Parts of the Tianshan Mountains Abroad

(1) North Tianshan Mountains in Kazakhstan

North Tianshan Mountains in Kazakhstan are located in the north of Ili River valley, next to Balkhash Lake in the west, which are 500km long with Talgar Mountain in Alma-Atinskiy (4,973m) as the highest peak.

Among all the protected areas in North Tianshan Mountains in Kazakhstan, Altyn-Emel National Nature Park, Ile-Alatau National Nature Park, and Alma-Atinskiy Zapovednik are stated to be with higher potential for meeting WH Criteria in the IUCN working paper *World Heritage Thematic Study for Central Asia-A Regional Overview* (2005).

Northern Tien Shan has complete mountain altitudinal natural zones from the alpine zone at 4,973m to the semi-desert zone at 1,000m. Altitudinal natural zones range through a temperate desert zone (1,000-1,300m), mountain forest-steppe zone (1,300-2,600m) composed of steppe, mixed forests and conifer forests, a subalpine meadow zone (2,600-3,000m), an alpine meadow zone (3,000-3,600m) and permanent ice-snow zone (3,600-4,973m). More than 300 glaciers with an area over 300km^2 have developed here, and the largest glacier has a length of six km.

(2) West Tianshan Mountains of Kazakhstan, Kyrgyzstan, and Uzbekistan

West Tianshan Mountains extend across Kazakhstan, Kyrgyzstan and Uzbekistan, from Kyzylkum Desert in Uzbekistan in the west to the China's border with Kyrgyzstan in the east. It is 1,100km long with Tomur (7,443m) as its highest peak.

Among all the protected areas in West Tianshan Mountains, Aksu-Dzhabagly National Nature Park in Kazakhstan, Sary-Chelek Zapovednik, Besh-Aral State Nature Park, Besh Aral State Nature Reserve, Chandalash Wildlife Refuge, Manass Wildlife Refuge in Kyrgyzstan, and Chatkal Zapovednik, Ugam Chatkal National Park in Uzbesistan are stated to be with higher potential for meeting WH Criteria in the IUCN working paper *World Heritage Thematic Study for Central Asia-A Regional Overview* (2005).

Western Tien Shan has three main vegetation zones: mountain Turanian-type semi-savanna, forest/shrub (mostly juniper and hardwood with the notable presence of wild fruit tree species) and alpine steppe, in an elevation drop from 4,247m to 1,110m.

(3) Comparative analysis of Tianshan Mountains in Xinjiang with North Tianshan Mountains in Kazakhstan, and West Tianshan Mountains in Kazakhstan, Kyrgyzstan, and Uzbekistan

- West Tianshan Mountains, North Tianshan Mountains and Tianshan Mountains in Xinjiang belong to the same mountain chain of Tianshan. Owing to the orientation of the mountains and prevailing winds, the Tianshan's climate is more humid in the west; while climate of Tianshan Mountains in Xinjiang is drier, for being at the east of the range and surrounded by two vast deserts (Figure 3-24, Table 3-2).

Figure 3-24 Location of Tianshan Mountains in Xinjiang, North Tianshan Mountains and West Tianshan Mountains

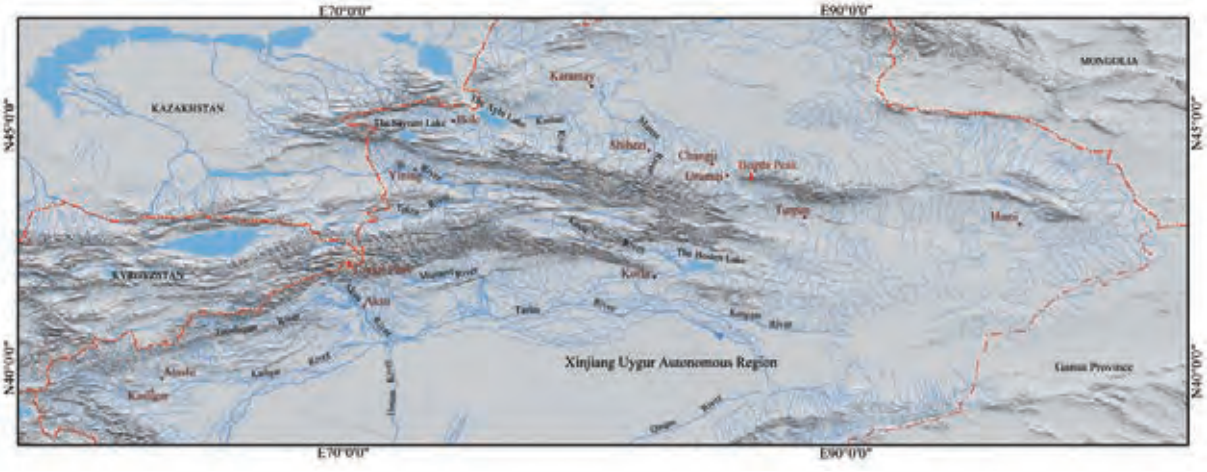


Table 3-2 Main Geographical features of Tianshan Mountains in Xinjiang, North Tianshan Mountains and West Tianshan Mountains *

Attributes	Tianshan Mountains in Xinjiang	North Tianshan Mountains	West Tianshan Mountains
Longitude	E79º-E89º	E77º-E82º	E69º-E72º
Latitude	N41º-N45º	N43º-N45º	N41º-N43º
Highest Point	7,443	4,973	7,443

*Date source: http://whc.unesco.org/en/tentativelists/; *World Heritage Thematic Study for Central Asia- A Regional Overview* (2005)

- Northern Tien Shan has high floral and faunal diversity and includes a relatively high number of threatened species such as snow leopard and kulan. It has high numbers of endemic plants, and around half of the proposed site is located in the 'Mountains of Middle Asia' CPD. It is situated within the currently un-represented Pamir-Tian-Shan Highlands Biogeographic Province. The whole site lies within the Global 200 Ecoregion "Middle Asian montane woodlands and steppe", but is also close to the border of the "Central Asian Deserts" Gobal 200 Ecoregion and contains many faunal and floral elements associated with it, such as desert reptiles and kulan (IUCN, 2005).

- Taken as a whole, the West Tien Shan is believed to be an area of spectacular montane scenery, meriting inscription as a montane site. And, it has large, viable populations of most of the larger fauna (many such as the snow leopard and Tien Shan argali globally threatened) characteristic of the currently un-represented Pamir-Tian-Shan Highlands Biogeographic Province. It has high numbers of endemic plants, and is located in the 'Mountains of Middle Asia' CPD. It also lies within the Global 200 Ecoregion "Middle Asian montane woodlands and steppe" (IUCN, 2005).

- Xinjiang Tianshan is the best representative of a major mountain ecosystem in the temperate arid zone. There are seven first level habitat types according to IUCN/SSC, including forest, shrubland, grassland, wetlands, etc. as well as 22 second level habitat types. As for the vegetation, there are nine types, 25 sub types, 82 formations, and 2,622 species (Table 3-3). In a larger range of elevation drop Xinjiang Tianshan has all the typical mountain altitudinal natural zones of a temperate arid zone. Xinjiang Tianshan better presents the biological and ecological evolution on the Pamir-Tian-Shan Highlands. Diverse landscape types and sharply contrasts between the north and south slope make the spectacular scene in Xinjiang Tianshan.

Table 3-3 Wild animals and plants species in Xinjiang Tianshan, Northern Tien Shan, and Western Tien Shan

Attributes		Higher plants	Wild vertebrate				
			Mammals	Birds	Reptiles	Amphibians	Fishes
Xinjiang Tianshan		2,622	102	370	32	6	40
Northern Tianshan in Kazakhstan*	Altun Emel	634	70	155	25	4	28
	Ele Alatau	1,200	47	148	10	2	8
	Alma-Atinskii	950	-	-	-	-	-
Western Tianshan in Kazakhstan, Kyrgyzstan, and Uzbekistan *		1,100	42	240	9	2	5

*Date source: *World Heritage Thematic Study For Central Asia- A Regional Overview (2005)*

(4) Comparison conclusion

West Tianshan Mountains, and North Tianshan Mountains are similar to Tianshan Mountains in Xinjiang in physical features, vegetation, fauna and landscape. Due to the influence of location and westerly circulation, they are different in values. West Tianshan Mountains are important for the biodiversity, threatened species and spectacular montane scenery. North Tianshan Mountains are important for the biodiversity and threatened species. However, Tianshan Mountains in Xinjiang better present more diverse mountain ecosystems, ongoing ecological processes and spectacular montane scenery on a larger scale in the temperate arid zone, which is featured with sharp contrast and diverse landscapes.

3.c-4 Comparison with Protected Areas in the Tianshan Mountains which are on the Tentative List of World Natural Heritage

At present, there is no World Natural Heritage site in the Tianshan Mountains, but five protected area groupings in neighboring countries, plus Xinjiang Tianshan, are on the Tentative List (Table 3-4).

(1) Xinjiang Tianshan is the best representative of mountain ecosystems in temperate arid zone

Compared with the other five protected areas mentioned above, more abundant wild animals and plants can be found in Xinjiang Tianshan (Table 3-5), making it a better representative of the mountain ecosystems in temperate arid zone.

Table 3-4 Protected area groupings in the Tianshan Mountains on the Tentative List of World Natural Heritage*

Name	Protected areas included	State	Criteria	Area (ha) Altitude (m)	Geographical coordinates	Main biological and ecological features	Landscape aesthetic features
Western Tianshan	Sary-Chelek State Biosphere Reserve; Besh-Aral State Reserve; Padysha-Ata State Reserve	Kyrgyzstan	(vii) (viii) (ix)(x)	Area: 146,584 Altitude: 1,000-4,247	41°34'-41°52'N 70°27'-71°56'E	There are 7 altitudinal natural zones in this site, including a typical forest belt, subalpine meadows, alpine meadows and so on. The forests are mainly composed of small leafed valley forests, deciduous broad leaved forest, wild fruit forest and coniferous forest.	The main landscapes include steppe, forest, meadow, snow peaks, waterfalls, valleys and streams and so on. The river valley landforms are well developed, with alternating cliffs and basins.
Western Tianshan	Karatau State Nature Reserve; Aksu-Zhabagly State Nature Reserve; Sayram-Ugam State National Nature Park	Kazakhstan	(vii) (viii) (ix)(x)	Area: 315,287 Altitude: 800-4,200	42°10'-42°30'N 75°15'-70°55'E	There are 5 altitudinal natural zones in this site, including a desert zone, true steppe zone, larch forest zone, alpine meadow zone and ice-snow zone.	The site shows typical desert landscape with mountain altitudinal natural zones
Northern Tianshan	Ile-Alatau State National Park	Kazakhstan	(x)	Area: 30,000 Altitude: 1,400-3,600	42°48'-43°19'N 76°30'-77°50'E	There are 4 altitudinal natural zones in this site, including a low mountain semi-desert zone, mountain grassland zone, subalpine meadow zone and alpine meadow zone.	The landscape of this site is mainly composed of mountain grassland, forest and plains in front of mountains.
“Altyn-Emel” National Park	State National Natural Park "Altyn-Emel"	Kazakhstan	(vii) (viii) (ix)	Altitude: 1,200-2,500	79°00'E 43°05'N	Forest is broadly distributed in this site.	The vegetation of this site has been obviously affected by the warm and wet current from the Atlantic.
Mountains of the Western Tianshan	Chatkal State Biosphere Reserve	Uzbekistan	(viii) (x)	Area: 35,700 Altitude: 1,100-4,000	42°32'N 70°14'E	There are 3 altitudinal natural zones in this site, including a mountain steppe zone, mixed forest zone of larch with mountain small-leaved forest and alpine meadow zone.	The main natural landscapes are composed of meadows and mixed forest of wild fruit.

* Date source: http://whc.unesco.org/en/tentativelists/

Table 3-5 Number of species of animals and plants in the protected areas of the Tianshan Mountains on the Tentative List of World Natural Heritage*

Protected areas	Higher plants	Wild vertebrates				
		Mammals	Birds	Reptiles	Amphibians	Fishes
Xinjiang Tianshan	2,622	102	370	32	6	40
Western Tianshan in Kyrgyzstan	676	35	157	7	2	3
Western Tianshan in Kazakhstan	2,000	42	238	9	2	2
Northern Tianshan in Kazakhstan	1,200	47	148	10	2	8
“Altyn- Emel” National Park in Kazakhstan	634	70	155	25	4	28
Mountains of the Western Tian shan in Uzbekistan	1,186	44	230	16	2	-

*Date source: http://whc.unesco.org/ , http://unep-wcmc.org/

(2) Xinjiang Tianshan has the best altitudinal sequence of mountainous natural zones within a short distance

Xinjiang Tianshan contains the best example of altitudinal natural zones on the north and south slopes of the Tianshan Mountains. Specifically, the Tomur component has a relative height difference of 6,000m in a horizontal distance of 70km, covering seven altitudinal natural zones. The Bogda component has a relative height difference near of 4,100m in a horizontal distance of 30km, extending across six altitudinal natural zones. It is unique for continents that so many mountain altitudinal natural zones are exhibited perfectly in such a short horizontal distance.

As for the five protected areas mentioned above, the "Altyn-Emel" State National Natural Park in Kazakhstan lies below 3,000m with a limited altitudinal height difference. Western Tianshan (800-4,200m) and Northern Tianshan (1,400-3,600m) in Kazakhstan and the Mountains of Western Tianshan (1,100-4,000m) in Uzbekistan have four altitudinal natural zones. Western Tianshan in Kyrgyzstan has developed seven altitudinal natural zones with a relative height difference of 3,000m.

Compared with the five protected areas, nominated Xinjiang Tianshan exhibits a larger altitudinal height difference, encompasses broader natural zones, and the altitudinal natural zones of Xinjiang Tianshan is more representative. Consequently, Xinjiang Tianshan represents the biological succession law for the biogeographical province of Pamir-Tian-Shan Highlands in a much better way.

3.c-5 Summary of the Comparisons

(1) According to the comparative analysis above, the unique characteristics of the nominated Xinjiang Tianshan from a global perspective are as follows:

(2) The Tianshan Mountains are the world's longest independent latitudinal mountain range. Globally, it is the only great mountain range surrounded by two vast deserts, showing a unique geographical pattern of "two desert flanking one mountain".

(3) The natural beauty of Xinjiang Tianshan in a temperate arid zone, with its physical geological characteristics providing great contrasts and an extremely large relative height difference of 6,063m, is unique worldwide.

(4) Xinjiang Tianshan is the best representative of the ecological and biological evolution processes in the biogeographical province of Pamir-Tian-Shan Highlands.

(5) Xinjiang Tianshan is the most typical representative of mountain ecosystems in temperate arid zone.

(6) Xinjiang Tianshan is an outstanding location for research on succession of biological communities of mountain ecosystems in the temperate arid zone undergoing global climate change.

(7) Xinjiang Tianshan is unique globally because of its numerous temperate arid zone mountain altitudinal natural zones in a short distance.

3.d Integrity

3.d-1 Protected Status

Land in the nominated properties belongs to the state and all parts are protected areas such as National Nature Reserve, National Park and Provincial Park. Therefore, the nominated properties are protected under laws and regulations, such as the *Constitution of the People's Republic of China, Regulations of the People's Republic of China Concerning Parks and Regulations of the People's Republic of China on Nature Reserves.*

- ***Constitution of the People's Republic of China***

All mineral resources, waters, forests, mountains, grasslands, unreclaimed land, beaches and other natural resources are owned by the State, that is, by the whole people, with the exception of the forests, mountains, grasslands, unreclaimed land and beaches that are owned by collectives as prescribed by law.

The State ensures the rational use of natural resources and protects rare animals and plants. Appropriation or damaging of natural resources by any organization or individual by whatever means is prohibited.

- ***Regulations of the People's Republic of China on Nature Reserves***

Article 26: In nature reserves, such activities as felling, grazing, hunting, fishing, gathering medicinal herbs, reclamation, burning, mining, stone quarrying and sand dredging etc., are prohibited unless it is otherwise provided for by relevant laws and regulations.

- ***Regulations of the People's Republic of China Concerning Parks***

Article 24: The landscapes and natural environments in parks should be strictly protected and should not be damaged or changed randomly, according to the principles of sustainable development. Administrative agencies of parks should establish and perfect management system

concerning the protection of scenic resources. The residents and visitors of parks should protect the landscapes, water, vegetation, wildlife and infrastructure.

3.d-2 Border and Scope

The nominated serial property of Xinjiang Tianshan is composed of four components (Tomur, Kalajun-Kuerdening, Bayinbuluke and Bogda), all of which have defined borders and buffer zones. Most of the borderlines have been defined according to the natural boundaries of mountains and rivers, elevation and vegetation zones, considering existing boundaries of existing protected areas, including Man and Biosphere Protected Area, National Nature Reserves, National Park, and so on. The boundaries of all components of Xinjiang Tianshan have been investigated and demarcated with consistent borderlines both for the nominated properties and the corresponding buffer zones. All of the nominated properties and buffer zones are under strict protection.

(1) Principles for boundary determination of the nominated properties

- Firstly, to ensure the integrity of aesthetic, biological and ecological values, areas which featured: the best continuous distribution of snow-capped peaks, glaciers, lakes, wetlands, rivers, floral meadows, forests, steppe, red bed canyon, etc.; the most typical altitudinal natural zones; and the best preserved biodiversity and habitats of and rare and endangered species, were selected for nomination.

- Secondly, to ensure the integrity of the natural geographical units, the boundary of the nominated property was made consistent with valleys, ridges, rivers, or contours as much as possible.

- Thirdly, borders of the nominated properties were made, as far as possible, consistent with the borders of existing protected areas.

(2) Principles for boundary determination of the buffer zones

- Each nominated property has a buffer zone, the boundary determination of which is as follows:
- Firstly, peripheral natural areas are to act as buffers for the nominated

properties.

- Secondly, buffer zones are to include the outstanding scenic areas set off the landscape in the nominated property.

- Thirdly, the area of the buffer zones should be large enough to protect the nominated sites.

(3) Border description of the nominated property of Tomur component and its buffer zone

Borders of the nominated property

The Tomur component covers the main glaciers and the most typical regions where altitudinal natural zones of the south slope of Tianshan Mountains are located.

- The eastern border goes south along the administrative borders of Wensu county and Baicheng county, passing the low edge of Ukur Glacier's tongue, the western mountain ridge of the valley of the Muzart River, the lower edge of the glacier tongue of Tugbliqi, and the outer edge of the glacier tongue of Qiongkzbayi, across Buriglek village, Bayilekata village and Bozdun Kirgiz autonomous village, and along the valley of the Kalayuergun River to its mouth.

- The southern border goes west from the mouth of Kalayuergun River, along the mountain foot of Tomur, across the Tailan River, along the snow line south of the Kqikarbasi Glacier and the Tomursu Glacier, and the outer edge of the glacier tongue and mountain ridge, to the border of China and Kyrgyzstan.

- The western border is the national border of China and Kazakhstan and the border of China and Kyrgyzstan.

- The northern border is the administrative border of Wensu county and Zhaosu county (the ridge line of Harktawu mountain).

Borders of the buffer zone

- The eastern border goes south along the snow line west of the Muzart River and the outer edge of the glacier, passing the valley of the branch of the Kalayuergun River, south and 2-3km east of the valley of the

Kalayuergun River, to the mouth of the Kalayuergun River.

- The southern border is 2-3km away from the south border of the nominated property, and is almost the same as the south border of nominated property, following the dividing line of vegetation and the mountain ridge line, to the national border of China and Kyrgyzstan.

- There is no buffer zone needed in the west because it is covered by snow and glaciers, located at high altitude along the national borders of China and Kazakhstan and of China and Kyrgyzstan.

- The northern buffer border is 5-10km away from that of the nominated property. It goes east along the mountain ridge line at the outer edge of main glaciers, across the Sayikale River, the Alemant River, the Dunduguole River, and the Shat River to the Shat meadow area.

- The eastern-northern border goes along the snow line in the north, south and east of the Muzart Glacier, along the outer edge of the glacier tongue and dividing line with the other glaciers (mountain ridge line), to the valley of Muzart River.

Figure 3-25 Border of the Tomur component and its buffer zone

(4) Border description of the nominated property of Kalajun-Kuerdening component and its buffer zone

Borders of the nominated property

The Kalajun-Kuerdening component includes two core regions, named Kuerdening in the east and Kalajun in the west. Kuerdening has the most preserved original habitat of *Picea schrenkiana*, and Kalajun has best preserved regions of grassland and meadow ecosystems.

- The eastern border of Kalajun goes south along the Jirgalang River and its branch to the point N42º51'30"，E82º29'11" where Tekesi county and Hejing county meet.
- The southern border goes east along the Kurdai River and mountain ridge line around the source of its branch to the low forest line of *Picea schrenkiana* on the east peaks of Qiongkushitai River.
- The western border goes north along Kerenbayisayi to join with the forest line of *Picea schrenkiana* on the north of Kalajun grassland, and goes south along Kekebulake valley and the *Picea schrenkiana* forest line to a mountain ridge in the water source area of Tasibulake River.
- The northern border goes east along the southern edge of *Picea schrenkiana* forest at the north of the Kalajun grassland, and to the west of the bank of the Jirgalang River flowing towards the Tarim Basin.

- The eastern border of Kuerdening goes south along the west bank of the Botu River, to the point N42º59'38"，E83º5'50" where Hejing county and Gongliu county meet.
- The southern border is the administrative boundary of Hejing county and Gongliu county (mountain ridge line of Nalaty).
- The western border goes north along the east bank of the Aktuyek River (branch of Kuerdening River) to the east bank of the river where it meets the Kuerdening River.
- The northern border goes east along the low forest line of *Picea schrenkiana* to the west of bank of the Botu River.

Borders of the buffer zone

The buffer zone surrounds the two core areas of Kuerdening and Kalajun.

- The eastern border goes south along the south bank of Jirgalang River which is the boundary of Xinyuan county and the Gongliu River, along

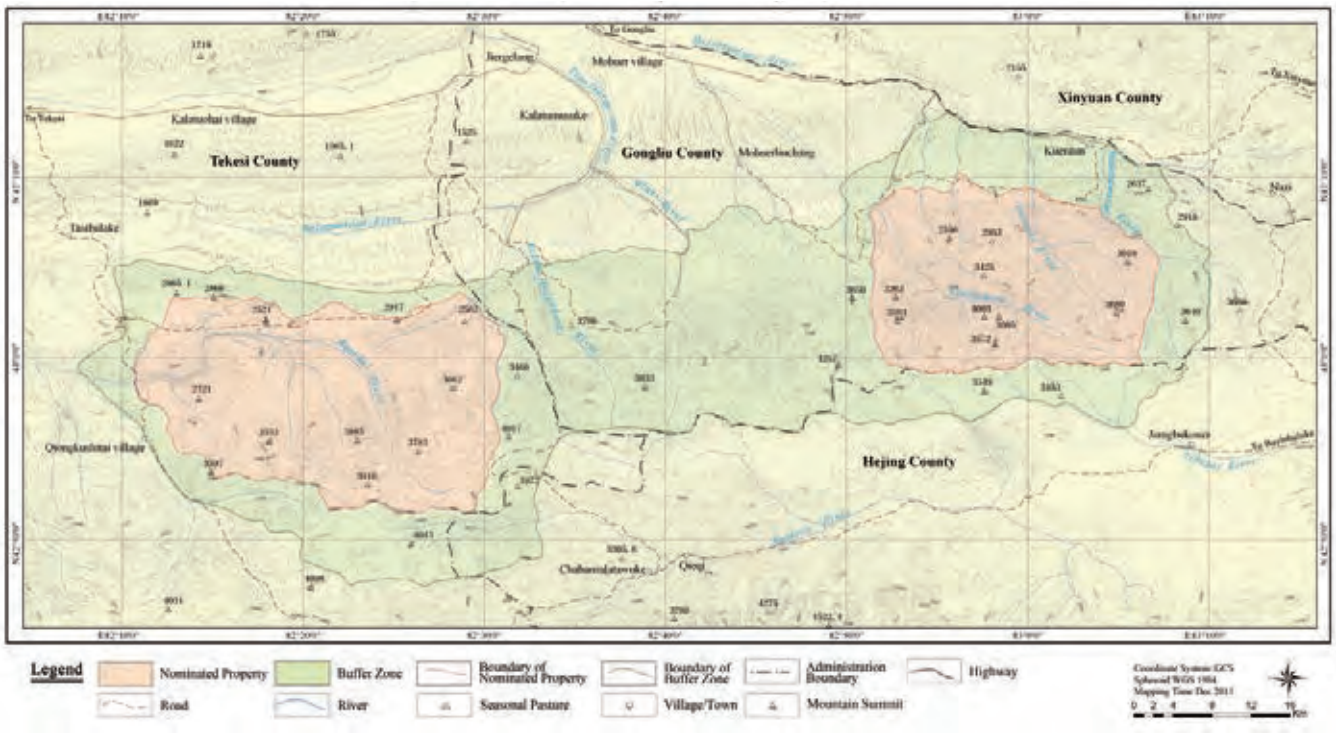
the west bank of the Aenba River which is a branch of the Jirgalang River, and the west of the bank of Botu River which is also a branch of Jirgalang River, across the point N43º0'7"，E83º8'46" where Gongliu County and Hejing county meet, and along the mountain ridge line to the valley of Yiksai River.

- The southern border goes west along the north bank of Yiksai River and a branch of Kuoksu River, the administrative border of Gongliu county, to the mountain ridge line south of the Jirgalang River valley in the catchment of the Tarim Basin to the mountain ridge line north of Kuoksu River, and to east of the bank of Qiongkushitai River.

- The western border goes north along the east of Qiongkushitai River, along the mountain ridge line, east of the bank of Kurdai River branch to the lower forest line of *Picea schrenkiana* north of Kalajun grassland.

- The northern border goes east along the lower forest line of *Picea schrenkiana*, across the Small Jirgalang River, Qiaxi River, Kshimohuruzan River and the Kurdun River to the west bank of Jirgalang River.

Figure 3-26 Border of the Kalajun-Kuerdening component and its buffer zone



(5) Border description of nominated property of Bayinbuluke component and its buffer zone

Borders of the nominated property

The Bayinbuluke component covers the best preserved alpine wetland ecosystem and the borders of it are the same as that of Bayinbuluke National Nature Reserve.

- Borders of the property of Bayinbuluke are in between point N42°39'29"-42°58'26" and point E83°43'5"-84°36'18", along the natural geological boundaries of Bayinbuluke National Nature Reserve.

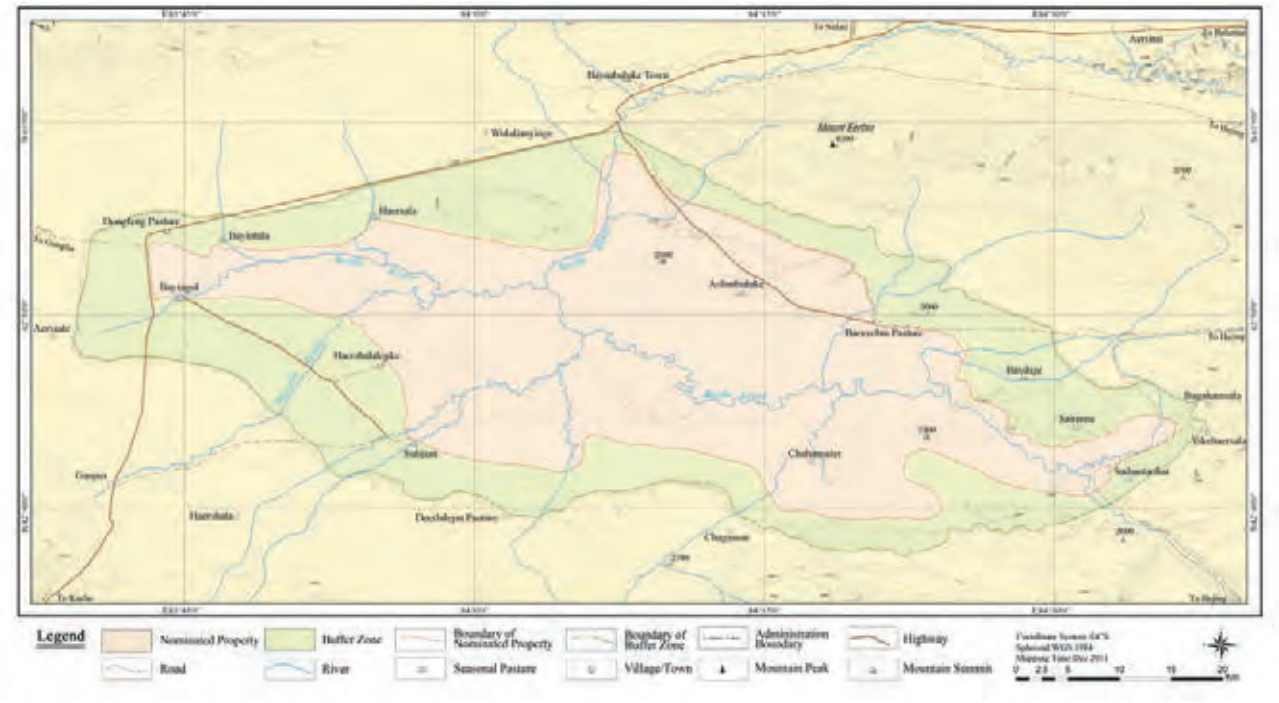
- The eastern border follows along the 2,400m contour line, Kaidu River and south edge of Bayinbuluke National Nature Reserve; the western border follows along highway 217, and the northern border along the north edge of Bayinbuluke National Nature Reserve (the 2,400m contour).

Borders of the buffer zone

- The borders of the buffer zone of Bayinbuluke are in between point N42°37'19"-42°59'31"and point E83°38'56"-84°38'2".

- The southeastern border goes along the mountain ridge along the 2,800m contour line, and the northeastern border goes along the 2,700m contour.

Figure 3-27 Border of Bayinbuluke and its buffer zone



(6) Border description of nominated property of Bogda component and its buffer zone

The Bogda component covers the main glaciers and the most typical region where altitudinal natural zones on the north slope of Tianshan Mountains are located.

Borders of the nominated property

- The eastern border goes south from the protection station on the west bank of Sigong River, along the west bank of Sigong River, then the outer snow line on the north of the Bogda glacier, the border of Tianshan Tianchi National Park and along the 3,800m contour line (the outer edge of the snow line on the east of Bogda glacier).

- The southern border goes east along the 3,800m contour line (the outer edge of the glacier and snow line) to the water source of the Shuimogou River at the point N43º45'30"，E88º28'8" where Urumqi city and Fukang county boundaries meet.

- The western border goes north along the valley of the eastern branch of Shuimogou River, the southern and eastern forest line *Picea schrenkiana* in the Maya Mountain, along the west bank of Tianchi Lake and east of highway 111 to the point N43º56'6"，E88º6'30" where the rivers converge.

- The northern border goes east along Sangong River to the protection station on the west bank of Sigong River.

Borders of the buffer zone

- The eastern border goes south along the east border of Tianshan Tianchi National Park, along the mountain ridge three kilometers away from the glaciers and Aksu River, to the point N43º44'1"，E88º29'47".

- The southern border goes west from the point N43º44'1"，E88º29'47", along the west of Aksu River and the 3,300m contour line (border of alpine sparse vegetation natural zone) to the border of Tianshan Tianchi National Park (43º44'49"，E88º6'40");

- The western border is the same as that of Tianshan Tianchi National Park, along the mountain ridge and around the junction of Urumqi city and Fukang County at N43º44'49¬", E88º06'40" to the eastern bank

Figure 3-28 Border of Bogda and its buffer zone

of Shuimogou River. It then goes north along the eastern bank of Shuimogou River to the point of N43º56'59¬", E88º00'41", and then turn to the northeast along the boundary of the park to the point of N44º04'02¬", E88º03'00".

- The northern border is the same as that of Tianshan Tianchi National Park , trending east along the latitudinal direction N44º to the point of N44º04'50"， E88º05'28".

3.d-3 Area of the Nominated Properties and Relevant Elements

The total area of the nominated properties is 575,922 ha, and that of the buffer zones is 515,592 ha, with the smallest nominated property over 38,000 ha. Most of the nominated properties are free of human activities and permanent occupation and, thus, retain a near pristine natural environment, permitting the natural evolution of the ecological system and the protection of modern glaciers and glacial relics, integrated natural landscapes, biological habitats and rare and endangered species. At the same time, all the nominated properties are under the protection of national or provincial regulations. The areas that have not been included in the nominated properties but are in the buffer zones are also protected.

In order to maintain the integrity of natural heritage values, strict protection and management measures can be carried out according to existing protection regulations.

All the necessary elements that display the unique aesthetic values and biological and ecological values of Xinjiang Tianshan have been included within the nominated properties.

- Firstly, all of the nominated properties exhibit unique integrated natural landscapes of mountains in the world's temperate arid regions, covering the most beautiful landforms, water and biological elements of snow peaks and glaciers, rivers and marshes, alpine lakes, meadows, forests and grasslands, red canyons and deserts, and so on.

- Secondly, the nominated properties are the most typical representatives of mountain altitudinal natural zones on the north and south slopes of the Tianshan Mountains and the most important refuges for relict species. They are the regions that can best illustrate the evolution of biodiversity and distributional changes in the world's temperate arid regions. The elements of biology and physiological processes of the nominated properties reflecting the evolution and development of the ecosystem and the floral and faunal communities have been well protected.

- Thirdly, the nominated properties of Xinjiang Tianshan are the best preserved areas of biodiversity and pristine biological habitats, and are significant zones for the distribution of main flora and fauna, and are essential habitats for many rare and endangered species in the world's temperate regions. Thus, the environment and biodiversity of the nominated properties deserve the strictest protection so that the natural evolution of their ecosystems can continue without detrimental influences.

3.d-4 Negative Effects

(1) Tomur

There are no permanent residents in the Tomur component and buffer zone. There is a seasonal herdsman population of 1,361 (a population density of less than one person/km²) in the nominated property, and seasonal herdsman population of 5,445 (a population density of less than two persons/km²) in buffer zone. Kirgiz, Kazakh and Uygur peoples constitute the majority who undertake seasonal herding in certain parts of the buffer zone between June

and September. The Tomur site is located in Tomur Peak National Nature Reserve, maintaining the originality and integrity of the natural environment.

(2) Kalajun-Kuerdening

There are no permanent residents in the Kalajun-Kuerdening site and its buffer zone, with 996 seasonal herdsmen (a population density of less than two persons/km²) in the nominated property and 3,313 seasonal herdsmen (a population density of less than four persons/km²) in the buffer zone. These herdsmen are predominantly Kazakh. Herdsmen enter the peripheral area of the nominated property and buffer zone from June to September to engage in grazing. Only small scale tour activities are allowed in a small area in the buffer zone with lower development intensity. Therefore, the natural properties and Outstanding Universal Values haven't been damaged by human activities.

(3) Bayinbuluke

There are no permanent residents in the nominated Bayinbuluke and its buffer zone. There is a seasonal herdsman population of 1,872 (a population density of less than two persons/km²) in the nominated property, and a seasonal herdsman population of 2,602 (a population density of less than four persons/km²) in the buffer zone. There are predominantly Mongolian herdsmen who enter the peripheral area of the nominated property and buffer zone from June to September to engage in grazing. There are tour activities in some parts of the nominated property and its buffer zone with small development intensity. So, the natural properties and Outstanding Universal Values of the nominated Bayinbuluke haven't been disturbed.

(4) Bogda

There are no permanent residents in the nominated Bogda and its buffer zone. There is a seasonal herdsman population of 217 (a population density of less than one person/km²) in the nominated property, and a seasonal herdsman population of 1,375 (a population density of less than four persons/km²) in the buffer zone. The herdsmen enter the peripheral area of the nominated property and buffer zone from June to September to engage in grazing. A few hiking and climbing expedition visitors enter the nominated property. Tour activities are mainly in the buffer zone, with an excessive concentration of tourists in some of hotspots during the peak season. The administrative agencies of the nominated property have alleviated the ecological and environmental pressure from the tourism industry through measures such as: zoning, tourists' guidance and separation, removal of buildings which spoil the environment and landscape integrity,

undertaking a series of ecological restoration projects, and formulating and implementing regulations and laws on protection and management.

The physical geographical environment of Xinjiang Tianshan is complicated. The original character and integrity of the natural environment of the nominated properties has been conserved through the harmonious coexistence between the traditional production style and life style and nature. There are no permanent residents in the nominated property and its buffer zone. The nomads engaging seasonal grazing in certain areas have not adversely affected the health of the grassland ecosystems. In five years, a complete grazing prohibition in the nominated property and grazing limitation in the buffer zone will be realized, which will be carried out by government of Xinjiang Uygur Autonomous Region. There are no mining industry and no deforestation in the nominated property and buffer zone. Poaching existed occasionally in history; however, it has been controlled effectively. At present there is essentially no poaching in the nominated property and buffer zone. In recent years, tourism has developed, which is generally limited to sightseeing in the buffer zones. In conclusion, the natural properties and outstanding universal values of the nominated properties have been best preserved with minimized negative effects of human activities.

3.d-5 Protection and Management

Since the 1980s, a series of laws and regulations have been approved by the state and on May 25th, 2011, *Regulations Concerning the Protection of Nominated Natural Heritage Property of Xinjiang Tianshan* was approved by the People's Government of Xinjiang Uygur Autonomous Region. The nominated properties are designated as Man and Biosphere Protected Area, National Nature Reserve, National Park and Provincial Park and so on. Corresponding management and protection teams and specific management regulations and measures have been formulated. The native nomads, with their traditional cultures and religious beliefs, all respect nature and seek to protect the mountain forests, grasslands, lakes and water. Their folklore and traditions agree on the protection of nature in their daily life, and their beliefs are integrated into strengthening the wider community's support for the heritage protection and management system. At the same time, heritage elements are effectively protected through projects such as national non-commercial forest conservation; water-source forest conservation, natural and ecological forest conservation, returning farmland into forest or grassland and voluntary resettlement of herdsmen outside the property (See Chapter 5. Protection and Management of the Property).

4. State of Conservation and Factors Affecting the Property

4.a Present State of Conservation

4. b Factors Affecting the Property

4. State of Conservation and Factors Affecting the Property

4. a Present State of Conservation

(1) The nominated properties are national or provincial protected areas under regulations and laws

The nominated properties have been successively granted various protective statuses, such as national nature reserve, national park and provincial park, etc. (see 5.b-1). Accordingly, they are protected by relevant laws and regulations, such as: *the Constitution of the People's Republic of China, the Forest Law of the People's Republic of China, the Environmental Protection Law of the People's Republic of China, Regulations of the People's Republic of China on Nature Reserves, Regulations of the People's Republic of China on Parks, Regulations on the Protection of Nominated World Natural Heritage Property of Xinjiang Tianshan,* etc. (see 5.b-2).

(2) Complete management system and administrative authorities have been established, providing sufficient staff and fund for protection of the nominated properties

A four-level management system, from the state to the province, the prefecture and the nominated property is in place and, accordingly, administrative bureaus of nature reserves and administrative commissions of parks have been established to undertake management activities on behalf of the government. Thus, staff, material resource and fund are guaranteed (see 5.c).

(3) A management plan has been worked out, boundaries have been defined, and monitoring system has been established

A *Master Plan of Xinjiang Bayinbuluke Natural Nature Reserve, a General Plan of the National Nature Reserve in the West Tianshan Mountains, a General Plan of the National Nature Reserve of Tomur Peak, Landscape Planning of Tianshan Tianchi* and other protective technical documents have been successively developed. In these documents, the scope of the nominated properties is defined with marked boundaries. To achieve strict protection and rational use of natural heritage resources, the *Management Plan of Nominated Xinjiang Tianshan* was drawn up. In this plan, the overall objectives of protection and management are stated, reasonable protection zonings are outlined, protection is classified based on the importance of the heritage values, and detailed protection and management measures are stipulated. In addition, monitoring system is established to carry on long-term dynamic monitoring on the geological relics, biological processes, biodiversity, environmental quality, natural disasters and tourist impacts (see 6.a), with all data recorded (see 6.a) for future reference.

Overall, the nominated properties are kept in their original natural state, mainly because of the steep terrain and difficult access. Most of the area is uninhabited, with no human activity in the core area. Furthermore, the sound legal system, scientific protection planning, and effective management will keep the heritage resources (such as the ecosystems, vertical natural zones, biodiversity, endangered species and habitats, geological relics and landforms) intact. Therefore, the integrity and the outstanding universal value of each nominated property will be kept in good condition.

4.b Factors Affecting the Property

Since the 1990s, tourism and animal husbandry have developed in the surrounding areas which bring potential pressures on the conservation of the natural environment and biodiversity. The administrative authorities of the nominated properties have adopted a series of forceful measures in recent years to reduce the effects of human activities. At present, factors adversely affecting the properties are as follows:

4.b-1 Development Pressures

No industrial and mining enterprises and water conservancy works can be found within the properties. Original vegetation and habitats of wild animals were once disturbed by the rapid development of animal husbandry on the edges and in the buffer zones of the nominated properties; however, migration, limitation of the amount of grazing, bans on grazing, and the introduction of subsidies and incentives for the protection of grasslands ecology have improved the situation. As early as in 2004, government of Xinjiang Uygur Autonomous prefecture has promulgated a ban on deforestation of the natural forest in Xinjiang Tianshan. Thus there is no deforestation in the nominated properties and their buffer zones. Numerous rare wild animals occur here and poaching exists occasionally in history; however, since the establishment of various protected areas such as natural reserves or parks, which are protected by corresponding laws and regulations, there is essentially no poaching at present. No other infrastructure exists except what necessary for site protection, such as management stations and monitoring facilities.

4.b-2 Environmental Pressures

As a result of global warming, the melting and shrinkage of modern glaciers in the nominated properties are being accelerating, as in other parts of the world. No invasive alien species have been found here so far. However, the vegetation and ecosystems have been affected in some places by harmful forest pest, which makes it necessary to strengthen quarantine work in the future. Since all the nominated properties are designated as national/provincial park or national/provincial nature reserve, some problems, such as grassland degradation, soil erosion and deforestation, have been effectively controlled.

With development of tourism industry, increase in tourist arrivals will bring more ecological pressures on the buffer zone of Bogda. To address this potential problem, the administrative authority has carried out a series of pre-emptive measures, such as: limiting the number of tourists and their length of stay; setting rules and regulations to restrict tourists' behavior, enhancing the promotion of, and education about, conservation; introducing an environment friendly shuttle bus and forbidding vehicles from entering the scenic areas; shipping collected garbage out of the scenic areas for disposal and improving sewage disposal systems to

control and eliminate pollution sources effectively. The nominated properties are currently free of air and water pollution.

4.b-3 Natural Disasters and Risk Preparedness

Countermeasures are taken by administrative authorities to protect the property from natural disasters such as forest fires, earthquakes, floods, blizzards, landslides, pests and diseases, etc.

A geological disaster warning system has been established which will reinforce the monitoring and prevention of disasters in key areas. Detailed and effective prevention measures are available. Organization system and responsiblity system have been established to monitor and prevent geological disaster.Besides, in the case of urgent geological disaster, leadership competence has been enhanced and reaction speed has been improved. Hence, the loss of personnel, possessions and damage to the environment will be minimized.

A forest fire warning system has been set up. Fire-fighting professional troops are based in the nominated properties. Protection stations and the community will carry out targeted responsibilities of forest protection and fire prevention together. Periodical training on forest protection and fire prevention will improve the personnel's knowledge and ability in fire prevention and suppression. There are warning boards of no smoking and no flammable material, and prevention infrastructure in dangerous parts of the sightseeing areas. Fire prevention and fire-fighting equipment has been improved. A hierarchical emergency scheme has been established allocating the responsibilities of management and personnel according to the scope and severity of forest fires.

Monitoring of forest pests and diseases and associated research has been strengthened. Skilled and professional staff will be responsible for the forecasting and monitoring of forestry pests and diseases. Biological means are the primary control and, together with chemical and physical techniques, comprise an appropriate strategy to manage forest pests and diseases. Inspection and quarantine of timber and seeds in the buffer zones have been strengthened to prevent the invasion of pests and diseases.

4.b-4 Visitor/tourism Pressures

The development of the tourism industry has brought certain pressures on natural resource and environment in the nominated properties and in the buffer zones. No tourism has been developed in the Tomur where only a little tourism occurs on the edge of its buffer zone. Only a few tourists can be found on the edge of the Kalajun-Kuerdening and Bayinbuluke and their buffer zones. A small amount of hiking and adventure tourism exists in the Bogda and mass tourism activities are mainly found in its buffer zone, leading to the extreme concentration of tourists and the overloading of environmental capacity in some hot spots in peak season. In buffer zones of the Bogda and Kalajun-Kuerdening, construction of tourism service facilities and infrastructure have led to varying degrees of environmental destruction and visual disturbance to the landscape. Tourism activities are to some extent a threat to the migration and habitat protection of wild animals there.

In recent years, administrative authorities in the nominated properties have used zoning and diversion of visitors to keep the tourists within the environmental capacity. Buildings affecting the environment and the integrity of the landscape have been demolished or renovated, and a series of ecological restoration projects have been implemented. Protection and management laws and regulations have been developed and implemented. By taking these measures, pressures on the environment from tourism are alleviated effectively. If the site is listed as World Heritage, the tourist service system in the nominated property and the buffer zone will be enhanced; and the likely visitors will be accommodated in the buffer zones, and especially in the periphery Wensu county, Tekesi county, Gongliu county, Bayinbuluke town in Hejing county, and Fukang county.

4.b-5 Number of Inhabitants Within the Property and the Buffer Zone

There are no permanent residents in Xinjiang Tianshan. Herders enter to engage in seasonal grazing activities from June to September every year. The total area of the nominated properties of Xinjiang Tianshan is 5,759.22km^2, and 4,446 seasonal herders entered the nominated properties in 2010 with a population density of less than 1 person per square kilometer. The area of the buffer zones is 5,155.92km^2 and 12,735 herders entered the buffer zones with a population density of less than three persons per square kilometer in 2010.

Table 4-1 Population Distribution

Property		Area of the nominated properties (km²)	Population	Population density in the nominated properties (person/km²)	Area of the buffer zones(km²)	Population in buffer zones	Population density (person/km²)	Average density (person/km²)
Tomur		344,828	1,361	0.4	280,120	5,445	1.9	1.1
Kalajun-Kuerden-ing	Kalajun	47,768	372	0.8	35,296	819	2.3	1.4
	Kuerdening	35,139	624	1.8	82,539	2,494	3.0	2.6
Bayinbuluke		109,448	1,872	1.7	80,090	2,602	3.2	2.4
Bogda		38,739	217	0.6	41,547	1,375	3.3	2.0
Total		575,922	4,446	0.8	515,592	12,735	2.5	1.6
Year		2010						

5. Protection and Management of the Property

5. a Ownership

5. b Protective Designation

5. c Means of Implementing Protective Measures

5. d Existing Plans Related to the Municipality and Region in Which the Proposed Property is Located

5. e Property Management Plan or Other Management System

5. f Sources and Levels of Finance

5. g Sources of Expertise and Training in Conservation and Management Techniques

5. h Visitor Facilities and Statistics

5. i Policies and Programs Related to the Presentation and Promotion of the Property

5. j Staffing Levels (Professional, Technical, and Maintenance)

5. Protection and Management of the Property

5. a Ownership

According to Article 9 of the Constitution of the People's Republic of China, all mineral resources, waters, forests, mountains, grassland, unreclaimed land, beaches and other natural resources are owned by the state, that is, by the whole people, with the exception of the forests, mountains, grasslands, unreclaimed land and beaches that are owned by collectives in accordance with the law. The state ensures the rational use of natural resources and protects rare animals and plants. Accordingly, the nominated properties of Xinjiang Tianshan are owned by the People's Republic of China.

Natural resources, tour facilities, public facilities and infrastructure in the nominated properties are owned by the state (and local governments will manage them on behalf of the state). State or collective units have the authority to use the forests (state forest) and grasslands (herders' contract), etc. Residential buildings and ancillary facilities are personal properties and service facilities all belong to enterprises.

5. b Protective Designation

5. b-1 Designation

At present, all the nominated properties have legal protective designations at national and provincial levels (Table 5-1), including national nature reserves, national parks, national geo-parks, provincial nature reserves and provincial parks, etc., to ensure their environmental protection and sustainable development. According to the IUCN Protected Area Categories, the nominated properties can be classified into protected area types I, II, III and IV (Table 5-2).

Table 5-1 Protective designation of the nominated properties of Xinjiang Tianshan for World Natural Heritage

Nominated property		Protective designation and approval time
Tomur		Tomur Peak National Nature Reserve, approved by the State Council of the People's Republic of China in 2003
Kalajun-Kuerdening	Kalajun	Kalajun Provincial Park of Xinjiang, approved by the Government of Xinjiang Uygur Autonomous Prefecture in 2009
	Kuerdening	Western Tianshan Mountains National Nature Reserve, approved by the State Council of the People's Republic of China in 2000
Bayinbuluke		Bayinbuluke National Nature Reserve, approved by the State Council of the People's Republic of China in 1986
Bogda		TianshanTianchi National Park, approved by the National People's Congress of China in 1982 Man and Biosphere Reserve, approved by UNESCO in 1990 TianshanTianchi National Forest Park, approved by the State Forestry Administration of China in 1994 Bogda Provincial Nature Reserve, approved by the Government of Xinjiang Uygur Autonomous Prefecture in 2008 TianshanTianchi National Geo-park, approved by the Ministry of Land and Resources of the People's Republic of China in 2009

Table 5-2 The protective attributes and their IUCN category

Protective attribute	Nominated property	IUCN protected area category
National Nature Reserve	Tomur	Ia (Strict Nature Reserve)
	Kuerdening*	
	Bayinbuluke*	
National Park	Bogda	II (National Park)
Provincial Nature Reserve		IV (Habitat/Special Management Area)
Provincial Park of Xinjiang	Kalajun	III (Natural Monument)

*By 2015, complete grazing prohibition in the nominated property and grazing limitation in the buffer zone will be realized.

5. b-2 The Legal Basis for Conservation

5.b-2-1 Laws and Regulations Concerning the Protection of the Nominated Properties

Table 5-3 Laws and regulations concerning the protection of the nominated property

Name	Revising time	Issued by
Amendment to the Constitution of the People's Republic of China	2004	National People's Congress
Forestry Law of the People's Republic of China	1998	The Standing Committee of the 6th National People's Congress
Grassland Law of the People's Republic of China	2002	The Standing Committee of the 6th National People's Congress
Water Law of the People's Republic of China	2002	The Standing Committee of the 6th National People's Congress
Law of the People's Republic of China on Wildlife Protection	2004	The Standing Committee of the 7th National People's Congress
Law of the People's Republic of China on Environmental Protection	1989	The Standing Committee of the 7th National People's Congress
Regulations of the People's Republic of China on Nature Reserves	1994	State Council of the People's Republic of China
Regulations of the People's Republic of China Concerning Parks	2006	State Council of the People's Republic of China
Regulations of the People's Republic of China on Wild Plants Protection	1996	State Council of the People's Republic of China
Regulations of Xinjiang on Nature Reserves	2008	Standing Committee of Xinjiang People's Congress
Regulations of Xinjiang on Wild Plants Protection	2006	Standing Committee of Xinjiang People's Congress
Measures of Xinjiang Concerning the Law of the People's Republic of China on the Protection of Wildlife	2004	Standing Committee of Xinjiang People's Congress
Regulations Concerning the Protection of Nominated Natural Heritage Property of Xinjiang Tianshan	2011	Standing Committee of Xinjiang People's Congress
Regulations on the Management of Tomur Peak Nature Reserve	1985	Government of Aksu Prefecture
Regulation on the Management of the Tianshan Tianchi Park	2010	Standing Committee of People's Congress Changji Hui Autonomous Prefecture

5.b-2-2 Concerning Articles of Major Laws and Regulations

Constitution of the People's Republic of China

Article 9: The state ensures the rational use of natural resources and protects rare animals and plants. Appropriation or damaging of natural resources by any organization or individual by whatever means is prohibited.

Article 22: The state protects scenic places and historical areas, valuable cultural monuments and relics and other important items of historical and cultural heritage in China.

Article 26: The state protects and improves the living environment and the ecological environment, and prevents and controls pollution and other public hazards. The state organizes and encourages afforestation and the protection of forests.

Forestry Law of the People's Republic of China

Article 19: The local people's government at various levels shall organize competent authorities to establish a forest protection organization to take charge of the work of forest protection; add forest protection facilities and enhance forest protection in light of actual needs; and urge grass-roots organizations with forests and in forest districts to conclude forest protection covenants, mobilize the masses to protect forests, delimit forest protection responsibility zones, and provide full-time or part-time forest protection personnel.

Article 20: The competent department of forestry under the State Council and the people's governments of provinces, autonomous regions and municipalities directly under the Central Government should delimit nature reserves and set up protection and administration in typical forest regions, forest regions where there are rare and precious animals and where rare plants grow, natural tropical rain forest regions and other natural forest regions with special protection value in different natural zones.

Article 21: The local people's government at various levels shall make earnest efforts to do well in the prevention and fighting of forest fires

Article 24: The competent forestry authorities under the State Council

and the people's government at the provincial, autonomous region or directly-administered municipality level shall delimit natural protection areas to strengthen protection and administration in typical forest ecology areas in different natural terrain, forest districts where precious animals and plants grow and breed, natural tropical rain forest districts and other natural forest districts with special protection value.

Grassland Law of the People's Republic of China

Article 42: Grasslands should be protected. Grasslands with the following attributes should be identified and under strict management: (4) Grasslands that have particular functions for climate moderation, protection of headwaters, conserving water and soil, solidifying sand and protecting it from wind erosion; (5) The steppe functions as the habitat and refuge of nationally protected wild animals and plants.

Article 43: The competent department responsible for grasslands under the State Council or the people's governments of provinces, autonomous regions and municipalities can set up grassland nature reserves in the following regions according to related regulations of reserve zone management: (1) typical grassland types; (2) areas with a natural concentrated distribution of rare and endangered wild animal or plant species; (3) grassland with important ecological functions and economic and research values.

Article 55: Except for rescue, salvage and the transhumance of herding people, motor vehicles are forbidden to drive on the grasslands and to destroy steppe vegetation; people who pursue geological exploration and scientific investigations should submit their plans for driving areas and routes to the competent department of the steppe under the people's county government. Such activities cannot be carried out without approval.

Law of the People's Republic of China on Wildlife Protection

Article 6: The governments at various levels shall strengthen the administration of wildlife resources and formulate plans and measures for the protection, development and rational utilization of wildlife resources.

Article 8: The State shall protect wildlife and the environment for its survival, and shall prohibit the illegal hunting, catching or destruction of wildlife by any unit or individual.

Article 9: The State shall give special protection to the species of wildlife which are rare or near extinction. The wildlife under special state protection shall consist of two classes: wildlife under first-class protection and wildlife under second-class protection. Lists or revised lists of wildlife under special state protection shall be drawn up by the department of wildlife administration under the State Council and announced after being submitted to and approved by the State Council.

Law of the People's Republic of China on Environmental Protection

Article 17: The people's governments at various levels shall take measures to protect regions representing various types of natural ecological systems, regions with a natural distribution of rare and endangered wild animals and plants, regions where major sources of water are conserved, geological structures of major scientific and cultural value, famous regions where karst caves and fossil deposits are distributed, traces of glaciers, volcanoes and hot springs, traces of human history, and ancient and precious trees. Damage to the above shall be strictly forbidden.

Article 19: Measures must be taken to protect the ecological environment while natural resources are being developed or utilized.

Article 23: In urban and rural construction, vegetation, waters and the natural landscape shall be protected and attention shall be paid to the construction of gardens, green land and historic sites and scenic spots in the cities in the light of the special features of the local natural environment.

Water Law of the People's Republic of China

Article 5: The state shall protect water resources and adopt effective measures to preserve natural flora, plant trees and grow grass, conserve water sources, prevent and control soil erosion and improve the ecological environment.

Regulations of the People's Republic of China on Nature Reserves

Article 4: The state shall practice economic and technological policies and measures favorable to the development of nature reserves, and

incorporate the development planning of nature reserves into the national economic and social development plans.

Article 18: Nature reserves may be divided into three parts: the core area, buffer zone and experimental zone.

The intact natural ecosystems and the areas where the rare and endangered animals or plants are concentrated within the nature reserve shall be included in the core area which no units or individuals are allowed to enter. Scientific research activities are generally prohibited in the core area except for those approved according to Article 27 of the Regulations.

A certain amount of area surrounding the core area may be designated as the buffer zone, where only scientific observations and other research activities are allowed.

The area surrounding the buffer zone may be designated as the experimental zone, which may be entered for various activities such as scientific experiment, educational practice, visit and investigation, tourism, and the domestication and breeding of rare and endangered wild animal or plant species.

If the people's government responsible for the approval of the establishment of the nature reserves thinks it necessary, a certain amount of area surrounding the nature reserve may be designated as the outer protection area.

Article 27: Nobody shall be allowed to enter the core area of nature reserves.

Where scientific observations and investigations are necessary for scientific research, the unit concerned shall submit applications and activity plans to the administrative agency of the nature reserves in advance, to be approved by the competent administrative department of nature reserves in the people's government at or above the provincial level. The entrance into the core area of national nature reserves shall be approved by the competent administrative department of nature reserves under the State Council.

For residents living in the core area of the nature reserve who are necessitated to move out, the local people's government shall see to the proper settlement for them.

Regulations of the People's Republic of China Concerning Parks

Article 24: The landscapes and natural environments in parks should be strictly protected and should not be damaged or changed randomly, according to the principles of sustainable development. Managing agencies of parks should establish and improve every management system concerning the protection of scenic resources. The residents and visitors inside parks should protect the landscapes, water, grass and forests, wildlife and infrastructure.

Article 25: Managing agencies of national parks should do investigations and identify important landscapes inside national parks and establish relevant protection measures.

Regulations of the People's Republic of China on Wild Plants Protection

Article 9: The state shall protect wild plants and the environment for their survival. All units and individuals shall be forbidden to collect wild plants illegally or damage the environment for their survival.

Article 11: Districts with natural concentrated distributions of species of wild plants under special state or local protection shall be designated as nature reserves in accordance with relevant laws and regulations.

Article 14: The department of wild plants administration and relevant units shall take measures to save the wild plants under special state and local protection when their growth is endangered, protect or restore the environment for their survival and, when necessary, build cultivation bases, seed banks or move the wild plants to other places for protection.

Regulations of Xinjiang on Nature Reserves

Article 6: Development planning of nature reserves should be incorporated into the national economic and social development plan, take protection as the main principle, and combine protection and use as the other principle. Protection of nature reserves should be strengthened to prevent the environment and natural resources from being damaged.

Article 12: Relevant administrative departments should divide the nature reserve into three parts: the core area, buffer zone and experimental

zone, and publish this. An unzoned nature reserve should be managed by drawing up pertinent regulations for a core area and buffer zone.

Regulations of Xinjiang on Protection of Wild Plants

Article 4: The government shall pursue a policy of strengthening the protection of wild plant resources, actively developing and rationally utilizing wild plant resources.

Article 12: Relevant departments of the people's governments at and above the county level shall determine the forbidden picking area and forbidden picking terms according to wild plants' biological features and the growing conditions. A region where wild plant resources are devastated should be enclosed for at least 3 years for conservation.

Article 14: In the natural distribution areas of State and Xinjiang key protected wild plant species and rare and endangered wild species, nature reserves should be established in accordance with relevant laws and regulations; in other areas, protection spots or protection marks for State and Xinjiang key protected wild plant species should be set according to the actual situation.

Measures of Xinjiang Concerning the Law of the People's Republic of China on Wildlife Protection

Article 11: The Government of Xinjiang should establish nature reserves in the habitat area or waters of State and Xinjiang key protected wild animal species.

Article 15: Governments at all levels should take timely measures to rescue the key protected wild animals which are threatened by natural disasters.

Article 17: The hunting, catching or killing of wild animals under special protection of Xinjiang shall be prohibited. Where the catching or fishing of wildlife under first-class state protection is necessary for scientific research, domestication and breeding, exhibition or other special purposes, the unit concerned must pass the inspection of the department of wildlife administration under the Xinjiang government and apply to the department of wildlife administration under the state council for a special license.

Regulations Concerning the Protection of the Nominated World Natural Heritage Property of Xinjiang Tianshan

Article 11: The range of nominated properties shall be set by the principle of fully reflecting the natural heritage values, and the effective protection and display of natural heritage. Ecological protected areas, natural landscape protection areas, natural relics protection areas, historical sites protection areas and other functional areas should be designated within representative areas of natural ecosystems, as well as areas of concentration of endangered species, areas of geological structure of great scientific and cultural value, fossil distribution areas, glacial sites and other natural heritage areas or historical sites. Within functional areas, parts where construction is prohibited, parts where construction is restricted and exhibition parts should be clearly defined.

Buffer zones should be designated in the important landscape heritage areas close to the edge of the nominated properties of the Tianshan Mountains, and the functional areas important to the nominated properties of the Tianshan Mountains and their protection. Management bodies of Tianshan nominated properties should set boundary markers around the nominated properties and buffer zones.

Article 19: In the construction prohibited part of the nominated properties in the Tianshan Mountains, no construction activities are permitted except for necessary research, monitoring and security facilities. In the construction restricted part, natural heritage protection facilities can be built. In the display part, public service facilities and management facilities relevant to sightseeing and recreation can be built.

Regulation on the Management of Tomur Peak Nature Reserve

Article 2: Logging, hunting, planting, mining, excavation, digging medicine, collecting and military exercises and other activities that may affect the growth and reproduction of the plants and animals are strictly forbidden in core protected areas.

Article 4: The core protected area should be strengthened by the control of hunting guns and equipment. Any unit or individual without the permission of the management department shall not be allowed taking hunting guns and equipment into the protected area. Managers have rights to confiscate offenders' hunting guns and equipment or their hunting products; otherwise, the offenders may be fined or processed by the Department of Justice in serious cases.

Regulation on the Management of the Tianshan Tianchi Park

Article 25: Acts that are prohibited in the Tianshan Tianchi Park are as follows:

(1) Excavating mountains, quarrying sand and earth cutting, mining, land reclamation, building tombs, tombstones and other acts that can cause damage to the landscape, infrastructure, vegetation and landforms;

(2) Constructing facilities that are used for storage of explosive, flammable, radioactive, toxic and corrosive materials;

(3) Discharging and pouring out pollutants such as waste water and sludge into the water, or washing vessels or vehicles in the water;

(4) Felling trees, hunting wild animals and excavating wild herbs;

(5) Carving, engraving or scribbling on the facilities or scenic resources;

(6) Littering;

(7) Making a fire, smoking or using fireworks in the park;

(8) Burning incense or candles outside the designated place;

(9) Selling goods or providing services to tourists in a forceful or deceptive way;

(10) Establishing snacks and vendor stalls or expanding businesses without authorization;

(11) Misuse of tickets;

(12) Causing damage to the landscape and facilities and other acts that cause public disorder.

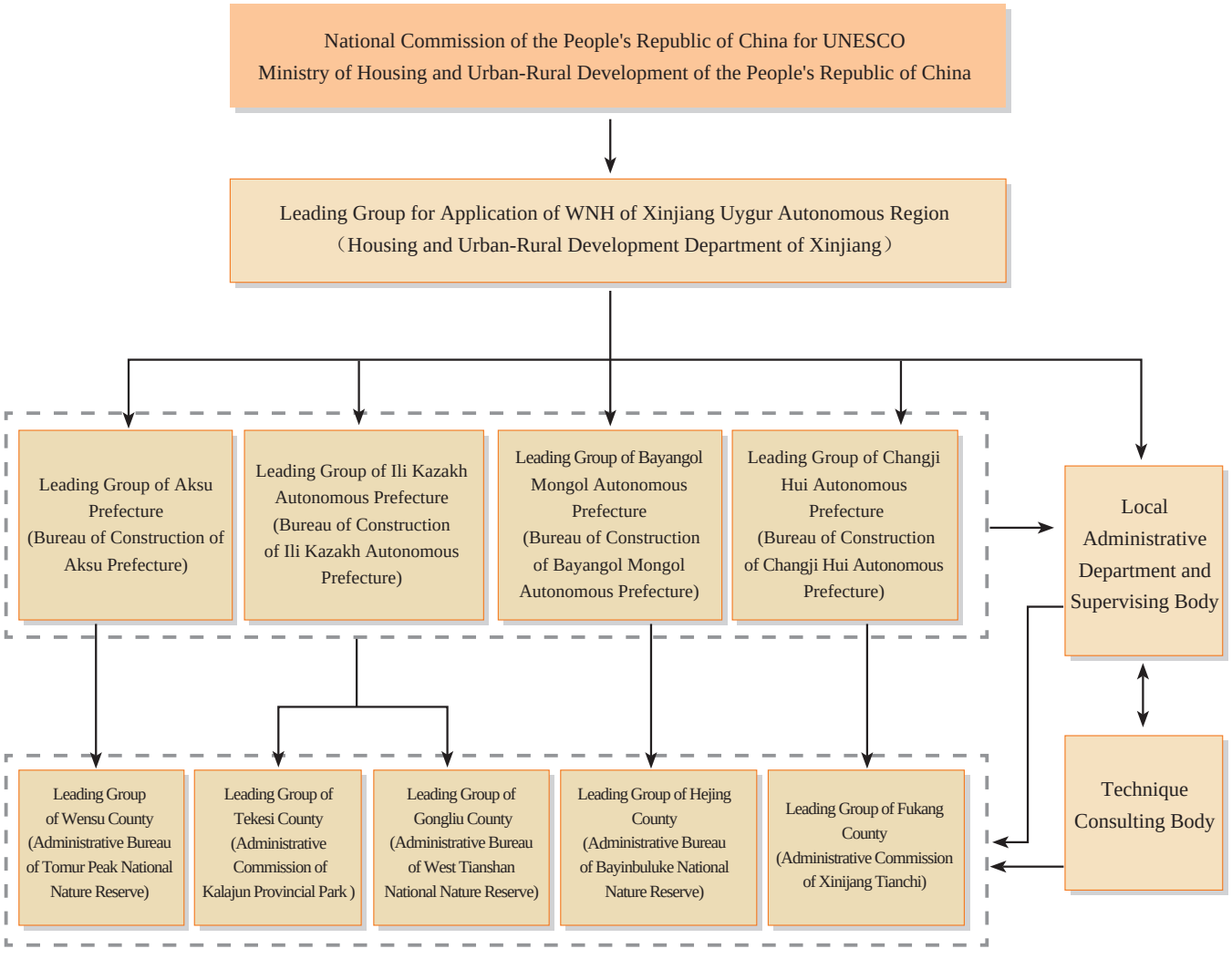
5. c Means of Implementing Protective Measures

5. c-1 Management System

A multi-level management system, from the national to the local level,

and a cooperative mechanism for governments, technological institutes, research institutes and communities have been constituted (Fig. 5-1). Under the leadership of the Ministry of Housing and Urban-Rural Development of China, and the People's Government of Xinjiang, a leading group has been set up with an office in the Housing and Urban-Rural Development Department of Xinjiang, and it will guide the application of the nominated properties of Xinjiang Tianshan for World Natural Heritage. At the same time, it will keep direct connection with the world heritage administrative department in the Ministry of Housing and Urban-Rural Development and coordinate exchange and cooperation among various nominated properties. The prefectural leading groups are commissioned by the governments of Aksu Prefecture, Ili Kazak Autonomous Prefecture, Bayangol Mongol Autonomous Prefecture, and Changji Hui Autonomous Prefecture and have direct jurisdiction over the nominated properties. The administrative authorities of protected areas of the nominated properties will be responsible for the implementation

Figure 5-1 Management system of the nominated Xinjiang Tianshan



of protective measures. Simultaneously, the monitoring body, scientific protection and sound management will be strengthened. Furthermore, with the folk customs and nature conservation traditions of local residents, a multi-level and multi-department system of cooperation are formed, keeping the protection and management system in order.

5. c-2 Management Agencies

Management agencies of the nominated Xinjiang Tianshan are comprised of four levels, including national, provincial, prefectural and the nominated properties' agencies. These departments form a good management system that operates smoothly through good cooperation among the Ministry of Housing and Urban-Rural Development, the Department of Housing and Urban-Rural Development of Xinjiang Uygur Autonomous Region (to which the office of the provincial leading group of Xinjiang is attached), the local management offices for the world natural heritage application where the nominated properties are located and the management bodies of the nominated properties (administrative bureau of nature reserve or administrative commission of the park, etc.).

(1) National level

The Ministry of Housing and Urban and Rural Development of China is mainly responsible for the application of the nominated properties for Natural World Heritage designation, supervision and administration of conservation and planning of the nominated properties, regular monitoring of the nominated properties, the overall plan assessment of the natural parks in the nominated properties, and approval of key projects and the examination of protection measures in the nominated properties.

(2) Provincial level

The leading group of Xinjiang Uygur Autonomous Region will be responsible for the editing, supervision, examination and permission of protection and management plans of parks in the nominated properties of Xinjiang Tianshan. It will execute the administrative authority of the application of Xinjiang Tianshan for World Natural Heritage and management of World Natural Heritage in the future if it is inscribed on the World Heritage List; if successful, it will manage uniformly, carry out and monitor the implementation of protective measures. Besides this, it will be responsible for the coordination, communication and cooperation among the four components.

(3) Prefectural Level

Leading groups of the prefectures where the nominated properties of Xinjiang Tianshan for World Natural Heritage are located will be responsible for the implementation of protection and management, scientific research and monitoring, as well as planning and development, construction and so on.

(4) Administrations of the nominated properties' level

This refers to the county leading groups of the nominated properties of Xinjiang Tianshan. The administrative commissions of parks and the administrative bureaus of nature reserves where the nominated properties are located will be in direct charge of the properties of Xinjiang Tianshan. They will be responsible for the monitoring of resources and environments, management of executive staff and the implementation of regulations and plans and so on. Besides, they are responsible for the construction of a digital monitoring centre and scientific centre, to enhance scientific conservation and management of the nominated property and implement protective and managing measures directly.

5. c-3 Protection Content

Plans for the nominated properties put forward detailed regulations and requirements for their protection and management in different aspects and levels. In terms of the elements of the heritage values of the nominated properties, the protection contents are composed of the following aspects:

- Geology, including geological profile, fossil beds, faults, folds, etc.
- Landforms, including glacial relics, modern glaciers, red bed canyons, erosion and planation surfaces, etc.
- Water, including natural rivers, lakes and swamps.
- Biodiversity and habitats, including rare and endangered species, endemic species, relic species and their original habitats.
- Natural beauty, including the comprehensive natural landscape in the temperate arid region composed of high mountains, snow peaks and

glaciers, valleys, forests, grasslands, rivers, lakes, swamps, wetlands, deserts and so on.

- Pollution, that is air quality and water quality, will be strictly controlled in the nominated properties and buffer zones to keep them from being polluted.

5. c-4 Partitioned Protection (zoning)

According to the sensitivity, extent of endangerment, distribution of of the protected objects and the necessities of heritage display, the nominated properties of Xinjiang Tianshan are divided into the construction-prohibited district, the construction-limited district and the exhibition district. Simultaneously, buffer zones are established in the area surrounding the nominated properties.

(1) Construction-prohibited district

It is the core area which possesses the outstanding universal values of the natural heritage, where modern glaciers, glacial relics, typical natural ecosystems and ecological processes of natural succession, endangered species and their habitats are strictly preserved. Ecosystems and landscapes must be maintained in their original state with only necessary facilities allowed for scientific research, monitoring and safeguarding security in the construction-prohibited district. People are forbidden to enter this district except for undertaking necessary protective, scientific or monitoring activities. All kinds of production and construction are prohibited.

(2) Construction-limited district

This is an area with high natural aesthetic values where sightseeing and a moderate level of traditional nomadic life are allowed. However, the size and scope of tourism activities should be strictly controlled. Only facilities related to sightseeing, such as necessary ecological restoration, security facilities, trails, signposting, sanitation facilities and recreational facilities and so on are allowed in this district. Further, the architectural style, scale, height, colour and site selection must be in harmony with the environment. No cars can enter this area except for the environmentally friendly shuttle buses and vehicles to carry out management tasks. Grazing activities of the original inhabitants that provide no threat to the heritage values are allowed while the human population should be strictly controlled.

(3) Exhibition district

This is the construction area to provide services to support protection and management. In this district, appropriate utilization and production activities of local residents are allowed, and necessary service facilities for tourism and basic infrastructure are permitted. Facilities related to the protection of natural heritage should be controlled. All these facilities should be in harmony with the natural landscape and environment of the nominated properties.

(4) Buffer zone

The buffer zones are transition zones which are essential to the maintenance of the integrity of the ecosystems and natural landscapes of the nominated properties. Motorized transport and the scale of resident population should be controlled and the amount of grazing should be limited. Ecological restoration should be implemented. Soil erosion should be controlled and environmental remediation should be enhanced. Construction projects and facilities which will disrupt the landscape, pollute the environment and destroy the environment should be prohibited.

5. c-5 Monitoring

Each nominated property has established a relatively complete monitoring system (see 6.a). Thus, the dynamic processes relating to geology and landforms, ecosystems, species of animals and plants, physical environment (containing air and water environments), geologic disasters, vegetation renewal, tourist numbers and community population and economic construction and so on will be observed regularly or irregularly. Data will be available for decision making and to guide research in the nominated properties and, consequently, the outstanding universal values of the nominated properties will be well maintained.

5. c-6 Local Traditional Conservation

The long history, traditional cultures, originalty and simplicity of the nomadic life in the nominated properties have formed unique cultural landscapes. The original residents in the nominated properties and surrounding areas live in harmony with nature. Over time, various local rules and regulations have been formulated that respect nature and protect the environment. Local traditional cultures which promote conservation will be protected as they can have a positive effect in promoting preservation of heritage resources.

5. d Existing Plans Related to the Municipality and Region in Which the Proposed Property is Located

5. d-1 Existing Plans Related to the Nominated Properties

Existing plans related to the nominated properties（Table 5-4）put forward specific provisions and requirements for protection and management from different angles and levels.

Table 5-4 Existing plans related to the nominated properties

Relevant plans	Compiled by	Approval time
Master Plan of Tomur Peak National Nature Reserve (2003-2008)	Administrative Bureau of Tomur Peak National Nature Reserve	2003
Master Plan of the National Nature Reserve of the West Tianshan Mountains (2003-2012)	Administrative Bureau of the National Nature Reserve of the West Tianshan Mountains	2002
Master Plan of Kalajun Park(2009-2020)	Government of Tekesi County	2009
Master Plan of Xinjiang Bayinbuluke National Nature Reserve(2002-2011)	Administrative Bureau of Bayinbuluke National Nature Reserve	2001
Landscape Planning of Tianshan Tianchi(2004-2020)	Administrative Commission of Xinjiang Tianchi	2005
Master Plan of Xinjiang Tianchi and Bogda Nature Reserve (2008-2015)	Administrative Commission of Xinjiang Tianchi	2008

5. d-2 Summary of the Main Contents in Relevant Plans

Master Plan of Tomur Peak National Nature Reserve (2003)

This plan was established in 2003, and is administered by the National Bureau of Forestry. The plan contains nine sections, as follows.

- Chapter one explains the background, basis and terms of the plan.
- Chapter two introduces the general state of the National Nature Reserve

of Tomur. The total area of the nature reserve is 237,600 ha, extending from Muzhaerte River in the east to the Keqikala Glacier, neighboring Kezilebulake, Baozidun grazing pasture, Jigedaibulake and Atuoyinake River on the south and the Tomur Peak, Tailan Peak and Qionkuzibayi Peak on the north. This chapter describes the geology and landforms, climate, soil, hydrology, social and economic state and historical and lawful status of the nature reserve, and evaluates the in-situ state of the natural ecological quality, management level and protection values of the nature reserve.

- Chapter three illustrates the protective properties and objects, goals, functional zones of the protected area and general pattern of the National Nature Reserve of Tomur. The National Nature Reserve of Tomur is a comprehensive alpine protected area to protect the high mountain glaciers, forests, wild plants and animals and their habitats. The main objects include high mountain glaciers, spruce forests, national protected animals Class I such as snow leopards, Capra ibexes, golden eagles and so on, various high plants, lichens, fungi and their habitats.

- Chapter four contains provisions of the plan, including protection and management, scientific research and monitoring, promotion and education, facility construction, community conditions, ecological tourism and multi-level management. Detailed protective measures are proposed for the protection of wild plants and animals, forest fireproofing, defense against harmful insects, special plans for protection and management etc.

- Chapter five to nine illustrate key construction projects, investment budget, organization and staff, and guarantee the implementation of the plan and evaluate the benefits of the national nature reserve.

Master Plan of the National Nature Reserve of the West Tianshan Mountains (2002)

This plan was established in 2002, and is administered by the National Bureau of Forestry. The plan contains nine sections, as follows.

- Chapter one explains the background, basis and terms of the Master Plan of the National Nature Reserve of the West Tianshan Mountains.

- Chapter two introduces the general state of the National Nature Reserve of the West Tianshan Mountains. The total area of the nature reserve

is 31,217 ha, extending from Dajiergelangying forest area in the east to the Damoheying forest area in the west of the Gongliu forest farm, neighboring Dajiergelang River on the north and the watershed of the Nalaty Mountains. This part describes the geology and landforms, climate, soil, hydrology, biological resources, social and economic state, the historical and lawful status, and evaluates the state of the natural ecological quality, management level and protective values of the nature reserve, indicating the main problems of the protected area.

- Chapter three describes the protected properties and objects, goals, functional zones of the protected area and general pattern of the National Nature Reserve of the West Tianshan Mountains. The National Nature Reserve of the West Tianshan Mountains is a comprehensive protected area with a montane forest ecosystem, established mainly to conserve the montane coniferous forest composed snow spruces and Tianshan spruces and the montane deciduous broadleaved wild fruit forests composed of wild apple trees and wild apricot trees, and the rare and endangered animals such as black storks, golden eagles, imperial eagles, snow leopards, Capra ibex, red deer, argali and so on, as well as the high mountain glaciers and the Kuerdening River etc.

- Chapter four presents the contents of the plan, including protection and management, scientific research and monitoring, promotion and education, facility construction, community conditions, ecological tourism and multi-level management. Detailed protective measures are proposed for the protection of wild plants and animals, forest fireproofing, actions against harmful insects, and special plans for protection and management.

- Chapter five to nine illustrate key construction project, investment budget, organization and staff, guarantees implementation of the plan and evaluation of the benefits of the National Nature Reserve of the West Tianshan Mountains.

Master Plan of Kalajun Park (2009)

This plan was constituted in 2009, and is administered by the Department of Housing and Urban-Rural Development of Xinjiang Uygur Autonomous Region. The plan contains 15 sections, as follows.

- Sections one and two introduce the general state, main problems, and

evaluation of Kalajun Park, including geographical location, natural environment, human environment, tourism development, landscape types and categories, landscape features, evaluation of the park and analysis of the evaluation results.

- Section three to six describes the basis, principles and scope of the plan, environmental capacity and control of tourist numbers, the nature of the tourist market and forecasts the magnitude of tourism. The park neighbours the Kapusalang Valley on the north and the snow mountain to the south of Qiongkushitai on the south, extending to the junction of the Kukesu River and Kuerdai River in the west. The total area reaches 220,000 ha.

- Section seven and eight present the property, orientation, planning goals, patterns and functional zones of Kalajun Park. Kalajun Park is mainly composed of alpine natural grasslands of high quality which are unusual globally. The purely natural landscapes are characterized by the combination of high mountains, forest valleys, grasslands and rivers.

- Section nine explains the protection and development aspects of the project. In order to maintain the sustainable development and utilization of the biological species and natural resources, it is necessary to conserve the biodiversity of the park to the largest extent, enhance the control and defense against natural disasters and reduce environmental deterioration and resource damage. Strict protection is needed to keep the original state of the natural landscapes.

- Section ten to fifteen provides the plans for tourist attractions, park tour routes, tourist service facility and infrastructure plan, social coordination plan for herders, plan to guide of economic development and development time-line.

Master Plan of Xinjiang Bayinbuluke National Nature Reserve (2001)

This plan was constituted in 2001, and administered by State Forestry Administration. The plan contains 10 chapters, as follows.

- Chapter one states the planning background, basis and term.

- Chapter two states the basic knowledge of Bayinbuluke Nature

Reserve. It is located in the wetland of the Yuerdusi basin with a total area of 136,894 ha, which includes the wetland in big Yuerdusi basin, the wetland in small Yuerdusi basin and a section of the Kadu River connecting the two. This chapter describes in detail aspects of the nature reserve such as geology, landforms, soil, hydrology, social economy, historical status and status in law.

- Chapter three evaluates the resources in the reserve, their ecological quality, management level, ecological benefits, social benefits and economic benefits as well as the protection value. It also states the problems of protection and management.

- Chapter four describes the protection state, the protected objects, planning targets, zoning and overall layout of Bayinbuluke reserve. It is a montane wetland and aquatic ecosystem mainly protecting the aquatic and terrestrial species and their habitats.

- Chapter five describes the protection and management plan, scientific research and monitoring plan, promotion and education plan, infrastructure plan, community co-management plan, ecotourism plan and various business plans. The protection and management plan includes detailed plans for wildlife conservation, forest fire prevention, and pest and disease prevention, and puts forward concrete protection measures.

- Chapter six to ten state the key construction projects, investment evaluation, organizational structure and personnel, measures to guarantee the implementation of the plan and benefit evaluation of the reserve.

Landscape planning of Tianshan Tianchi (2005)

This plan was constituted in 2004, and administered by the Department of Housing and Urban-Rural Development of Xinjiang Uygur Autonomous Region. The plan contains 15 sections, as follows.

- Section one and two show the planning tenets, basis, principles, guiding thought, scope and term and construction targets.

The Tianchi Park in the Tianshan Mountains extends from the Sigong River in the east to the Shuomogou valley in the west, to the south of the Dapingtan coal mine and on the north to the ridge line of the Tianshan Mountains, with a total area of about 54,800 ha.

- Section three to five illustrate the landscape features, property of the park, functional zones, structure and environmental capacity. It is a key national park that is characterized by its complete altitudinal natural landscapes and snow peaks, glaciers and alpine lakes.

- Section six describes the protection and development plans of Tianchi Park in the Tianshan Mountains, including classified protection, core area conservation, water quality and water source area protection, measurement plan for sediment accumulation in the Hainan area and the plan for water and soil conservation. Protection is dominant and a special protection plan has been made to strengthen the protection and management of the park. Tourists are forbidden to enter the ecological protected area and no construction is allowed there. The key protection objectives include water quality and water source area of the lake, forest vegetation dominated by snow spruces and biodiversity, and the main scenes and landforms around the historical relics. Besides, environmental monitoring stations will be established to observe the water and air quality, soil and water loss, sediments and biodiversity regularly and to take timely remedial actions and provide the basis for further protection, management and plans.

- Sections seven to fifteen examine the plans for scenic tours of typical landscapes, facilities, basic engineering, the social coordination of

local residents, guidance of economic development, coordination of land utilization and construction times and monitoring of these plans.

Master Plan of Xinjiang Tianchi and Bogda Nature Reserve (2008)

This plan was constituted in 2008, and administered by the Forestry Department of Xinjiang Uygur Autonomous Region. The plan contains 10 sections, as follows.

- Section one provides the background, basis, guideline and principles, investment budget and terms of the plan.

- Section two introduces the general state of the Nature Reserve of Bogda, including geographical location and scope, natural conditions, social and economic state, historical evolution and legal status. The nature reserve lies in the south of Fukang county of Xinjiang Uygur Autonomous Region and in the mountains on the north slope of Bogda Peak. The total area is 38,069 ha.

- Section three introduces and evaluates the present state of the Nature Reserve of Bogda, including evaluation of resources, natural ecological quality, management, the economy and protection values and possible problems. The external threats are mainly artificial damage and hunting, lack of staff to carry out protection and management, lack of technical personnel, outdated technology, incomplete infrastructures, lack of education and promotion.

- Section four and five illustrate the general pattern and planning content respectively, including the property of the protected area, protection objects, planning targets, functional zones and general pattern. The contents include plans for nature protection and ecological restoration, scientific research and monitoring, education and promotion, construction of infrastructure, community conditions and ecological tourism.

- Section six shows the key construction projects of the nature reserve, including projects of biodiversity protection, scientific equipment and monitoring, education and training, and ecological tourism facilities.

- Section seven to ten describe the investment budget, organization and staff arrangement, guarantee measures and benefit evaluation of the Nature Reserve of Bogda.

5. e Property Management Plan or Other Management System

5. e-1 Existing Protection and Management Plans for the Nominated Properties

To meet the requirement of protection and management of the serial nominated properties of Natural World Heritage, a comprehensive management plan has been made that encompasses the four nominated properties of Xinjiang Tianshan (Table5-5). A copy of the plan will be submitted as Appendix 3.

Table 5-5 Management plan of the nominated properties of Xinjiang Tianshan

Plan	Compiled by	Approved time
Management plan of nominated Xinjiang Tianshan	Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences	2011

5. e-2 Description of the Protection and Management Plan

Abstract: According to the requirements of protection and management of the serial nominated properties of Natural World Heritage, a comprehensive management plan encompassing all the sites of the property is included. The Protection and Management Plan of the Nominated properties of Xinjiang Tianshan was made by Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, and permitted by the People's Government of Xinjiang Uygur Autonomous Region. The plan includes 15 parts.

- Section one describes the general conditions, location and scope, boundary definition, outstanding universal values and the general state of buffer zones of the nominated properties.

- Section two evaluates the current state of protection and management of the nominated properties, including the history of protection and management, types of human activities and their effects, protection condition and factors influencing management and so on.

- Section three introduces the departments responsible for the implementation of the plan, and the planning terms, background, contents, guidelines and targets.

- Section four describes the management system and staff responsibilities, the functions of relevant departments and the arrangement of professional staff of the nominated properties of Tomur, Kalajun-Kuerdening, Bayinbuluke and Bogda.

- Section five provides the local financial guarantees for the nominated properties, including the source, expenditure and guarantee plan for local finance of the nominated properties.

- Section six shows the legal guarantees of the nominated properties, including existing laws and management regulations, and the contents of protection and management laws.

- Section seven describes the protection of the outstanding universal values of the nominated properties in terms of geological relics and geographical landscapes, biodiversity, habitats and natural landscapes.

- Section eight presents the zoning of the nominated properties, including the corresponding management measures, protection states and the protection and management of buffer zones.

- Section nine shows the special measures to observe, control and protect the water, air and sound environments and environmental sanitation.

- Section ten analyzes the management tourism of the nominated properties, including analysis of environmental capacity and tourism development, control tourist volume, tour service system and facilities and the management of tourists' safety.

- Section eleven describes the promotion, display and education about the natural heritage of the nominated properties.

- Section twelve explains the participation of local residents in the environmental protection and community development.

- Section thirteen introduces scientific research about the nominated

properties, including achievements of scientific research, scientific research plan, symposia and scientific education, and so on.

- Section fourteen shows the monitoring state of the nominated properties, including observation contents and indices for evaluating the protected conditions, the present monitoring system and measures required to complete the monitoring system.

- Section fifteen calculates the protection funds and investment in construction.

5.e-3 Guarantee of Effectively Implementing Management Plans or Other Management Systems

(1) Laws and regulations

The laws and regulations of the People's Republic of China and Xinjiang provide a legal basis for conservation and management planning of the nominated properties (see5.b-2). The laws must be followed when implementing conservation measures. At the same time, special regulations considering the conservation of the nominated properties have been constituted, providing institutional guarantees for the implementation of the protection and management plans.

(2) Management system

There are special management arrangements imposed by the Ministry of Housing and Urban-Rural Development of the People's Republic of China (MOHURD) on the Department of Housing and Urban-Rural Development, the Department of Forests, Department of Land Resources, etc. An administrative commission is established in each nominated property, namely, the Administrative Bureau of the Tomur Peak National Nature Reserve, the Administrative Bureau of the National Nature Reserve of West Tianshan, the Administrative Commission of Kalajun Park, the Administrative Bureau of Bayinbuluke National Nature Reserve and the Administrative Commission of Tianchi in Xinjiang. All the institutions work with an appropriate division of labor to implement the management plans effectively, which are the organizational guarantee for the execution of the protection and management plans of the nominated properties.

(3) Community participation

Local herders are an important part of the nominated properties' buffer zones. Herders' lives are closely linked to the natural environment, especially to the conservation of the nominated property. With the implementation of various protection plans and the establishment of different kinds of protected areas, such as national nature reserves, national parks and national geological parks, the participation and management ability of herders has increased, so as their awareness of environmental protection. With respect to resource management, passive participation in conservation had been transformed into active involvement, which provides a guarantee for implementation of the protection and management plans of the nominated properties.

5. f Sources and Levels of Finance

Over the years, state and local governments, and administrations of the nominated properties have attached great importance to their protection. From 2006 to 2010, more than 20 billion Yuan has been invested on a field survey of biological resources, geological resources and scenic resources, scientific research, environmental remediation and infrastructure construction (Table5-6). The nominated properties are located in the economically underdeveloped regions of western China and more than 30% of the funding was from the Central Government and the People's Government of Xinjiang Uygur Autonomous Region.

Table 5-6 Sources and levels of finance

(Unit: 10,000 yuan)

Property	Item	Year					Total
		2006	2007	2008	2009	2010	
Tomur	Financial revenue	15	15	11	15	18	73
	Special subsidy	80	101	101	203	219	703
	Amount	95	116	112	218	236	776

Kalajun-Kuerdening	Kalajun	Financial revenue	-	22	33	85	9	149
		Special subsidy	-	-	-	-	600	600
		Total Investment of Fixed Assets	-	80	650	420	-	1,150
		Amount	-	102	683	505	609	1,899
	Kuerdening	Financial revenue	54	65	622	88	163	993
		Special subsidy	-	-	-	-	-	-
		Amount	54	65	622	88	163	993
Bayinbuluke		Financial revenue	5	10	10	20	20	65
		Special subsidy	2	2	4	5	5	18
		Amount	7	12	14	25	25	83
Bogda		Financial revenue	4,647	8,725	5,232	3,844	8,907	31,355
		Special subsidy	0	0	35	0	20	55
		Total Investment of Fixed Assets	3,273	6,160	11,862	12,000	23,880	57,175
		Amount	7,920	14,885	17,129	15,844	32,807	88,585
Total (2006-2010)								92,336

Note: Financial revenue includes income from the sale of tickets

5. g Sources of Expertise and Training in Conservation and Management Techniques

Foreign experts and scholars are invited to carry out long-term research on the glacial landforms, ecosystems, altitudinal natural zones, biodiversity, and rare and endangered species of the nominated properties, and also provide technical guidance on conservation and management. The Ministry of Housing and Urban and Rural Development of the People's Republic of China, the State Forestry Bureau, the Ministry of Land and Resources, the Chinese Academy of Sciences and other research institutions will provide support and guidance too. The Department of Housing and Urban-Rural Development, the Department of Land and Resources, the Forestry Department, the Tourism Bureau and other departments of the Xinjiang Uygur Autonomous Region offer various types of regular or irregular

training to improve the professionalism of protection and management staff. Training contents cover laws and regulations, resource protection, planning and management, natural disaster prevention and management, ecotourism, sustainable development, community development and so on. Presently, managers and staff in the nominated properties have a deep understanding of heritage values of the nominated properties, heritage protection, environmental protection, etc.

5. h Visitor Facilities and Statistics

5. h-1 Statistics on Tourists in Recent Years in the Nominated Properties

Table 5-7 Statistics on tourists in recent years in Xinjiang Tianshan

(Unit: 10, 000 persons/time)

Year / Property		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Tomur		11.7	10.5	12.4	13.3	17.8	18.1	21.2	23.6	11.5	28.9
Kalajun-Kue-rdening	-	-	-	-	-	-	2.5	2.9	3.3	3.5	3.5
	3.1	3.45	3.85	4.75	5.72	5.88	5.7	5.35	6	6.5	6.5
Bayinbuluke		5.46	6.54	7.07	7.12	8.23	8.56	8.92	8.96	9.20	9.50
Bogda		42.9	43.33	44.86	64.59	64.75	84.46	85.22	76.5	90.8	108.2

5. h-2 Tourism Facilities

Table 5-8 Visitor facilities in the Tomur component

Visitor facilities		Number	Description
Remark	Walkway	18	Walkways form a circle.
	Tour guides	6	Tour guides are trained and qualified with official certificates.
	Signs and Notices	50	Such as various guiding boards, indicator boards and map boards.
	Publications	4	Such as various books, albums of paintings, electronic videos, etc.
Museum			In building
Service Center		1	

Overnight Accommodation	3	At the periphery of the nominated Tomur
Restaurant and Rest Facility	7	At the periphery of the nominated Tomur
Shop	1	At the entrance of the Tomur National Nature Reserve
Parking Lot	2	
Washroom	4	
Search and Rescue Centre	1	

Table 5-9 Visitor facilities in the Kalajun-Kuerdening component

Visitor facilities		Number		Description
		Kuerdening	Kalajun	
Remark	Walkway	30	15	Walkways form a circle.
	Tour guides	5	2	Tour guides are trained and qualified with official certificates.
	Signs and Notices	95	30	Such as various guiding boards, indicator boards and map boards.
	Publications	5	2	Such as various books, albums of paintings, electronic videos, etc.
Museum		-	-	In building
Service Center		1	1	260m^2 for nominated Kuerdening 400m^2 for nominated Kalajun
Overnight Accommodation		7	5	At the periphery of the nominated Kalajun-Kuerdening
Restaurant and Rest Facility		7	5	At the periphery of the nominated Kalajun-Kuerdening
Shop		20	4	At the entrances of the parks or reserves in the nominated property of Kalajun-Kuerdening
Parking Lot		4	1	11,000m^2 for nominated Kuerdening 3,000m^2 for nominated Kalajun
Washroom		8	10	50 sets for nominated Kuerdening 8 sets for nominated Kalajun
Search and Rescue Center		1	1	At the periphery of nominated Kuerdening The animal husbandry health-centre for Kalajun

Table 5-10 Visitor facilities in the Bayinbuluke component

Visitor facilities		Number	Description
Remark	Walkway	5	Walkways form a circle.
	Tour guides	3	Tour guides are trained and qualified with official certificates.
	Signs and Notices	60	Such as various guiding boards, indicator boards and map boards
	Publications	3	Such as various books, albums of paintings, electronic videos, etc.
Museum		1	800m^2
Service Center		1	3,800m^2
Overnight Accommodation		30	At the periphery area of the nominated Bayinbuluke
Restaurant and Rest Facility		40	At the periphery area of the nominated Bayinbuluke
Shop		75	At the entrance of the parks or reserves in nominated Bayinbuluke
Parking Lot		3	200,000m^2
Washroom		22	
Search and Rescue Center		1	

Table 5-11 Visitor facilities in the Bogda component

Visitor facilities		Number	Description
Remark	Walkway	13	Walkways form a circle.
	Tour guides	60	Tour guides are trained and qualified with official certificates.
	Signs and Notices	1,237	Such as various guiding boards, indicator boards and map boards
	Publications	20	Such as various books, albums of paintings, electronic videos, etc.
Museum		1	800m^2
Service Center		1	3,800m^2
Overnight Accommodation		2	At the periphery of the nominated Bogda
Restaurant and Rest Facility		14	At the periphery area of the nominated Bogda
Shop		13	At the entrance of the parks or reserves in the nominated Bogda
Parking Lot		5	200,000m^2
Washroom		32	170 sets
Search and Rescue Center		1	At Beihai of Tianchi Lake

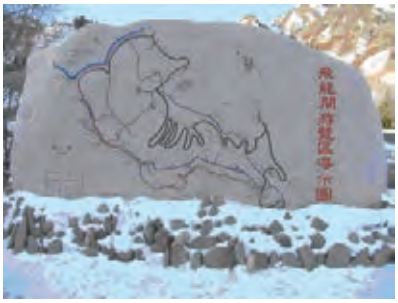


Figure 5-2 Map in Bogda component

Figure 5-3 Washroom in Bogda component

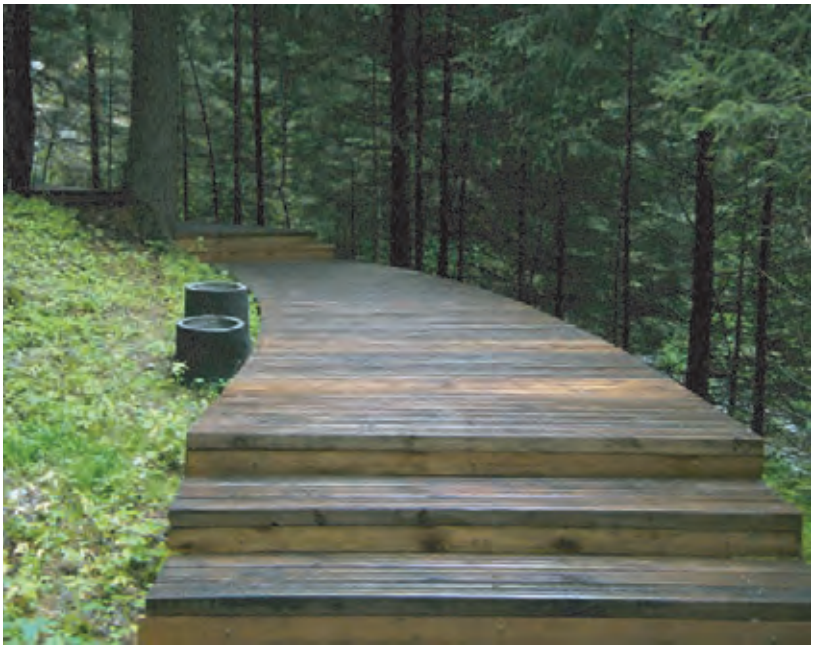


Figure 5-4 Walkway in Bogda component

5. i Policies and Programs Related to the Presentation and Promotion of the Property

Each nominated property has been brought into the local social and economic development plan and other relevant plans. This has established its scientific planning, lawful management, strict protection and sustainable utilization status of being under continuous protection and the role it should play in local social and economic development. Many programs have been carried out to promote the properties.

5. i-1 Scientific Research

(1) Achievements of scientific research

Before the 19th century, there are many precious records on Tianshan in ancient China, such as “Historical Records”, “History of Han Dynasty”, “Book on Ancient Chinese Geography”, “Commentary on the Waterways

Classic", "Atlas Annals of Western Region" etc.

From the middle of the Nineteenth Century to the beginning of the Twentieth Century, the government or individuals from Russia, Britain, Germany, Sweden, Japan, the United States, and other countries organized "expeditions" to undertake investigation activities in Xinjiang Tianshan. For example, the Russian geologist, botanist, and entomologist P.P. Semionov, and H.H. Valikhanov, Carey from Britain and Sven Hedin from Sweden made contributions to the study of Xinjiang Tianshan' geological, geographical, climate, flora and fauna.

In the Twentieth Century, some well-known Chinese geologists and geographers, such as Professor Yuan Fuli, national academician Huang Jiqing, Professor Li Chengsan, Mr. Ma Rongzhi, etc. made comprehensive studies of Xinjiang Tianshan's topography, geomorphology, geological foundations, natural environment, natural resources and ecosystems and published a number of papers and reports.

Since 1949, the Chinese Academy of Sciences has organized a variety of scientific expeditions and has carried out researches on Xinjiang Tianshan's geology, topography, climate, glaciers and other natural resources. Xinjiang Institute of Ecology and Geography of the Chinese Academy of Sciences has undertaken extensive field investigations and has established sites for long-term observation and experiment, and has published a series of monographs. One of them is on the physical geography of the Tianshan Mountains in China, which was compiled by Mr. Hu Ruji on behalf of the organization and published in 2004. It is the third compendium of research results on Xinjiang Tianshan.

So far, domestic and foreign scholars have published more than 400 research works on Xinjiang Tianshan's geological features, physical geography, biology and ecology (Table 5-12). Xinjiang Tianshan has become an important teaching practice base, research base and popular science education base for many domestic and foreign universities and research institutions.

Table 5-12 Significant scientific achievements on Xinjiang Tianshan

Work	Content	Author	Published by/ Stored in
Inventory of modern glaciers of Xinjiang Tianshan	Details of the resources of modern glaciers and their distribution in Xinjiang Tianshan	Hu Ruji	Urumqi: Xinjiang Scientific and Technological Commission 1975
Form of Tianshan Mountains	Describes the natural geography, geological history, the new tectonic movement, glaciation, fluvial processes, terrain, loess accumulation, altitudinal mountain landscape and the evolution of the Tianshan mountains in a systematic way.	Xinjiang Institute of Ecology and Geography of Chinese Academy of Sciences	Beijing：Science Press，1986
Control of avalanches of Xinjiang Tianshan	Conclusion of long-term experimental observations on the snow avalanches and their control.	Hu Ruji & Jiang Fengqing	Beijing：China Communications Press,1989
An introduction to the hydro-ecology in central Asia	This book states the basic principles and research methods of hydro-ecology of lakes in the arid region and analyses typical cases.	Mahpir, Tursunov	Urumqi：Xinjing Science and Technology and Health Press，1996
Study on the Planation Surfaces in the Central Asia Mountains: A Sample of Planation Surfaces in the Tianshan Mountains	Describes the distribution and characteristics of modern planation surfaces of the Tianshan Mountains, the formation and evolution mechanisms of planation surfaces, analysis of the characteristics of sediments on planation surfaces and environmental conditions revealed by them, ascertains the number and levels of the planation surfaces and their formation age, and restoration and reconstruction of ancient planation surfaces of the Tianshan Mountains.	Wang Shuji	Beijing：Science Press，1998
The permafrost cycle landform process and sedimentary characteristics in the Tianshan Mountains	Research on the evolution and sedimentary facies features of periglacial and glacier landforms of the Tianshan Mountains; dynamics of glacial landforms; macro- and micro- features of moraine deposition.	Cui Zhijiu	Hebei Science Press，1998
Glacial action of the Tianshan Mountains	Systematic study of the amount of glaciers of the Tianshan Mountains, their changes, distribution and characteristics; climate and heat balance in glaciation area, glacier mass balance process, characteristics and regional differences; ice formation zone and its distribution; glacial runoff and water balance; glacial debris flow formation and distribution; utilization of snow, ice and water resources and so on.	Liu Chaohai, Xie Zichu et al.	Beijing：Science Press，1998
Wild fruit forests resources in the Tianshan mountains / Comprehensive research on wild fruit forests in Ili, Xinjiang, China	Details of the natural environment, origin and evolution, distribution, and plant resources of Tianshan wild fruit forests.	Lin Peijun	Beijing：China Forestry Publishing House，2000

Physical Geography of the Tianshan Mountains in China	A comprehensive and systematic dissertation on the Tianshan Mountains in China	Hu Ruji	China Environmental Science Press. 2004
Study on Wild Fruit Trees of Xinjiang	Focus on Xinjiang Ili mountainous region, distribution of wild fruit trees in Xinjiang and their relationship with climate and the geographical environment are analyzed systematically.	Yan Guorong & Xu Zheng	China Forestry Publishing House, 2010

(2) Scientific research plan

The scientific research plan includes works to strengthen cooperation with domestic and international universities and research institutes, establishment of a special research fund, development of a series of scientific research programs, increase of scientific research on ecosystems, biological diversity, mountain landscapes, ecotourism and other aspects of the nominated properties, further development of the scientific and conservation values of the nominated properties, publishing of relevant scientific monographs, proceedings and papers to increase the academic and international influence of the nominated properties. Focus of the research are as follows:

● Conventional basic research

Conventional basic research includes investigation of basic information on the resources and comprehensive scientific investigation, such as natural conditions, natural landscape, flora and fauna, species, resources, phenological observations, geography, history and other basic social surveys.

● Technical monographic study

This mainly includes studies of the protection and utilization of biological resources, ecological effects and environmental monitoring, ecology and ecosystem succession of rare wildlife, techniques to restore and optimize damaged natural ecology, and harmonious development between regional economic development and construction of the nominated properties to protect ecology.

● Long-term monitoring

Long-term observation on representative ecosystems of the nominated properties are carried out, such as gradients, structure, function and

Figure 5-5 Snow Leopard monitoring and protection training in Tomur Peak Nature Reserve

productivity of various ecosystems, dynamics, regeneration ability of ecosystems and the relationships between different ecosystems. In addition, studies on areas which have never been investigated, and where we having little knowledge about the biological groups, will be progressively undertaken. And studies on the restoration of habitats of wild animals and plants and corridors are also important and will be progressively carried out.

- **Application of protection and management**

Applied studies of protection and management mainly aiming at sustainable development of the nominated properties, will be encouraged, including the construction of scientific education experimental base, presentation system of scientific education, construction of geographical information system construction, a dynamic management of landscape and ecology network, influences of human activities on the nominated properties, control and observation of geological disasters, economic and social development of the nominated properties and tourism management and activities in the nominated properties.

(3) Scientific research symposia

High level symposia will held on report on scientific research, and combined with protection and management policies for the nominated properties, and consider the need for research on their forests, grasslands and water resources, and tourism development. Scientific research departments, such as the Protection Centre for Snow Leopards in the Tomur area (Fig. 5-5), shall be encouraged, in order to make the nominated properties a scientific base of international importance for montane ecosystems, biodiversity and montane natural altitudinal zones in the arid areas.

5. i-2 Heritage Presentation

The nominated property is promoted by traditional and modern media, publication and presentation (Table5-13). The main means are as follows:

（1）Interpretation centres will be built in the nominated properties

to publicize scientific knowledge about heritage values, heritage resources protection, environment protection and so on, by means of texts, albums, multi-media, etc.

（2）Snow peaks, glaciers, rivers and lakes, snow spruces, wild fruit forests, meadows, wild animals, spectacular atmospheric phenomena and other landscape features can be compiled as albums, publication brochures, poetry works and anthologies of essays and videos, etc. to be published officially and sold, or handed out free, to display the heritage values.

（3）The excellent quality of nature and the important scientific and aesthetic values of the nominated properties will be extensively publicized through TV, radio and the Internet, press conferences and international photo exhibitions, etc. This will strengthen public awareness of the need to protect the outstanding universal values of the nominated properties, many of which have already been reported in various media (see Table 5-13).

Table 5-13 Media reports on the nominated properties

Time	Media	Program
2000	CCTV	*China's Environmental Protection, Ecological Development of the Western Region of China*
2001	XJTV	*Bogda Peak-god in Snow and Glacier*
2002	XJTV	*Enter Xinjiang, Xinjiang - a Fantastic Place*
2003	CCTV-1,CCTV-2,CCTV-4	*Easy tour in China, China tour, Wind vane of tour, Discovery*
2004	CCTV、XJTV	*Splendid China, Exploration in western China*
2005	CCTV-1,CCTV-4,CCTV-7,CCTV-12	*News 30', Discovery, China Tour, Eyes Wide Shut, Beautiful Homeland Charming Xinjiang*
2006	CCTV-2,CCTV-7,CCTV-10	*Service for You, Green Time & Space, Approaching Science, Discovery*
2007	CCTV-1,CCTV-3,CCTV-7,CCTV-10, Yun Nan TV, Beijing TV-3	*China Science and Technology Review, Explore,Green Time & Space*
2008	CCTV-1,CCTV-4,CCTV-9,CCTV-10,Xin Jiang TV, Aksu TV	*Discovery, Vastman, New Discovery of Silk Road, Enjoy time: Beautiful Natural Scenery of Tomur Peak*

5. j Staffing Levels (Professional, Technical, and Maintenance)

There are 652 full-time personnel in the nominated properties at present. Among them, 334 people are administrative and professional technical staff, responsible for the administration of the property, investigation of resources, supervision of information, scientific research, environmental protection, fire safety, awareness raising and education, law enforcement and so on. Of the full-time personnel, 309 have college education or above, accounting for 47.40 % of the total. Also, 115 people are researchers and technicians with vocational training or above, accounting for 17.64% of the total (Table5-14).

The staff range from physical geography, geology, environmental protection engineering, administration, botany, zoology, planning, national park and garden management, geographical information systems, tourism management, forestry, water conservation and hydrological engineering, finance and accounting, etc.

Administrative authorites of the nominated properties pay special attention to the improvement of the quality of the personnel and training of professional knowledge. Training has been carried out through short-term seminars, training at high levels, position education, and expatriate posting to various World Natural Heritage sites.

Table 5-14 Current staffing level (professional, technical, and maintenance) of each property

Property		Professional management personnel and technique personnel			Other formal personnel	Invited external experts	Total
		Total	Personnel with college educational background or above	Personnel with vocational training or above			
Tomur		54	51	24	14	15	83
Kalajun-Kuerdening	35	29	13	10	5	50	50
	42	38	19	13	10	65	65
Bayinbuluke		52	40	21	20	5	77
Bogda		151	151	38	208	18	377
Total		334	309	115	265	53	652

6. Monitoring

6. a Key Indicators for Measuring State of Conservation

6. b Administrative Arrangements for Monitoring Property

6. c Results of Previous Reporting Exercises

6. Monitoring

6.a Key Indicators for Measuring State of Conservation

The nominated serial property of Xinjiang Tianshan will be proposed under World Heritage criteria vii and ix. According to the type and protection status of the nominated properties, an indicator system has been set up to meet the needs of heritage management.

(i) Monitoring of geological and geomorphic relics

The changes to relics and the surrounding environments will be under permanent monitoring, including general features and development conditions of snow peaks and glaciers, the accumulation and melting of glaciers and their physical processes, the relationship between glacial fluctuations and climatic change, recession and advancing of glacial tongues, red canyons, rivers and lakes, and so on.

(ii) Monitoring of ecological processes and biodiversity

This mainly includes the comprehensive monitoring of the integrity of ecosystems, ecological state of biodiversity, rare and endangered species, forests and grasslands, wetlands, as well as alien invasive species.

(iii) Environmental quality monitoring

Comprehensive monitoring of climate change, air quality, water quality, noise, solid waste pollution and environmental sanitation.

(iv) Tourism monitoring

Comprehensively monitoring of the number of visitors, tour forms, tourism service facilities and physical and biological impacts of visitors.

(v) Monitoring of natural disasters

This will involve the observation, control and response to emergency incidents. Key monitoring of avalanches, landslides, debris flows, structural failures, fires and pests shall be carried out.

(vi) Key indicators of monitoring

Table 6-1 Monitoring indicators of the Tomur component

Monitoring indicators	Period	Data store department
Integrity (type, boundary)	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Tomur Peak National Nature Reserve
Climate and glacier changes	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Tomur Peak National Nature Reserve
Glacial geomorphology and its dynamics	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Tomur Peak National Nature Reserve
Forest ecosystems and dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, , Administrative Bureau of Tomur Peak National Nature Reserve
Grassland ecosystems and dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Tomur Peak National Nature Reserve
Plant species and their number	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Animal species and their number	5 year	Administrative Bureau of Tomur Peak National Nature Reserve
Exotic species and their threats	Long term	Administrative Bureau of Tomur Peak National Nature Reserve
Hydrological dynamics and water quality	1 month	Administrative Bureau of Tomur Peak National Nature Reserve
Soil properties	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Weather and climate	1 day	Administrative Bureau of Tomur Peak National Nature Reserve、Meteorology Bureau of Wensu County
Tourism and recreation in touristic areas	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Number of visitors and tourism projects	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Natural disasters	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Forest fires	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Villages and population, resident status within the heritage site	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Ambient Air quality	1 month	Environment Protection Bureau of Aksu Prefecture
Water quality	1 month	Environment Protection Bureau of Aksu Prefecture
Noise	1 month	Environment Protection Bureau of Aksu Prefecture
Solid waste	1 month	Environment Protection Bureau of Aksu Prefecture

Table 6-2 Monitoring indicators of the Kalajun-Kuerdening component

Monitoring indicators	Period	Data store department
Integrity (type, boundary)	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Construction Bureau of Ili Kazakh Autonomous Prefecture
Forest ecosystem and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Construction Bureau of Ili Kazakh Autonomous Prefecture
Grassland ecosystem and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Construction Bureau of Ili Kazakh Autonomous Prefecture
Plant species and their number	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Animal species and their number	5 years	Construction Bureau of Ili Kazakh Autonomous Prefecture
Exotic species and the threats	Long term	Construction Bureau of Ili Kazakh Autonomous Prefecture
Hydrological dynamics and water quality	1 month	Construction Bureau of Ili Kazakh Autonomous Prefecture
Soil properties	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Weather and climate	1 day	Construction Bureau of Ili Kazakh Autonomous Prefecture
Tourism and recreation in touristic areas	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Number of visitors and tourism projects	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Natural disasters	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Forest fires	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Villages and population, resident status within the heritage site	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Ambient Air quality	1 month	Environmental Protection Bureau of Ili Kazakh Autonomous Prefecture
Water quality	1 month	Environmental Protection Bureau of Ili Kazakh Autonomous Prefecture
Noise	1 month	Environmental Protection Bureau of Ili Kazakh Autonomous Prefecture
Solid waste	1 month	Environmental Protection Bureau of Ili Kazakh Autonomous Prefecture

Table 6-3 Monitoring indicators of the Bayinbuluke component

Monitoring indicators	Period	Data store department
Integrity (type, boundary)	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Bayinbuluke National Nature Reserve
Wetland ecosystem and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Bayinbuluke National Nature Reserve
Wetland ecosystem and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Bayinbuluke National Nature Reserve
Plant species and their number	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Forestry Bureau of Hejing County
Animal species and their number	5 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Forestry Bureau of Hejing County
Exotic species and the threats	Long term	Administrative Bureau of Bayinbuluke National Nature Reserve, Forestry Bureau of Hejing County
Hydrological dynamics and water quality	1 month	Administrative Bureau of Bayinbuluke National Nature Reserve, Environmental Protection Bureau of Hejing County
Soil properties	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Environmental Protection Bureau of Hejing County
Weather and climate	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Meteorological Bureau of Hejing County
Tourism and recreation in touristic areas	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Tourism Bureau of Hejing County
Number of visitors and tourism projects	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Tourism Bureau of Hejing County
Natural disasters	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Land and Resources Bureau of Hejing County
Ambient Air quality	1 year	Environment Protection Bureau of Bayangol Mongol Autonomous Prefecture
Water quality	1 month	Environment Protection Bureau of Bayangol Mongol Autonomous Prefecture
Noise	1 month	Environment Protection Bureau of Bayangol Mongol Autonomous Prefecture
Solid waste	1 month	Environment Protection Bureau of Bayangol Mongol Autonomous Prefecture

Table 6-4 Monitoring indicators of the Bogda component

Monitoring indicators	Period	Data store department
Integrity (type, boundary)	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Commission of Xinjiang Tianchi
Climate and glacier changes	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Commission of Xinjiang Tianchi
Glacial geomorphology and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Commission of Xinjiang Tianchi
Forest ecosystems and dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Commission of Xinjiang Tianchi
Plant species and their number	1 year	Administrative Commission of Tianchi Lake of Tianshan Mountain, Xinjiang, China, Forestry Bureau of Fukang county
Animal species and their number	5 years	Administrative Commission of Xinjiang Tianchi, Forestry Bureau of Fukang county
Exotic species and the threats	Long term	Administrative Commission of Xinjiang Tianchi, Forestry Bureau of Fukang county
Hydrological dynamics and water quality	1 month	Administrative Commission of Xinjiang Tianchi, Environmental Protection Bureau of Fukang county
Soil properties	1 year	Administrative Commission of Xinjiang Tianchi, Environmental Protection Bureau of Fukang county
Weather and climate	Daily	Administrative Commission of Xinjiang Tianchi, Meteorology Bureau of Fukang county
Tourism and recreation in touristic areas	1 year	Administrative Commission of Xinjiang Tianchi, Tourism Bureau of Fukang county
Number of visitors and tourism projects	1 year	Administrative Commission of Xinjiang Tianchi, Tourism Bureau of Fukang county
Natural disasters	1 year	Administrative Commission of Xinjiang Tianchi, Land and Resources Bureau of Fukang county
Forest fires	1 year	Administrative Commission of Xinjiang Tianchi, Forestry Bureau of Fukang county
Villages and population, resident status within the heritage	1 year	Administrative Commission of Xinjiang Tianchi
Ambient Air quality	1 month	Environment Protection Bureau of Changji Hui Autonomous Prefecture
Water quality	1 month	Environment Protection Bureau of Changji Hui Autonomous Prefecture
Noise	1 month	Environment Protection Bureau of Changji Hui Autonomous Prefecture
Solid waste	1 month	Environment Protection Bureau of Changji Hui Autonomous Prefecture

6.b Administrative Arrangements for Monitoring Property

6.b-1 Management and Monitoring System

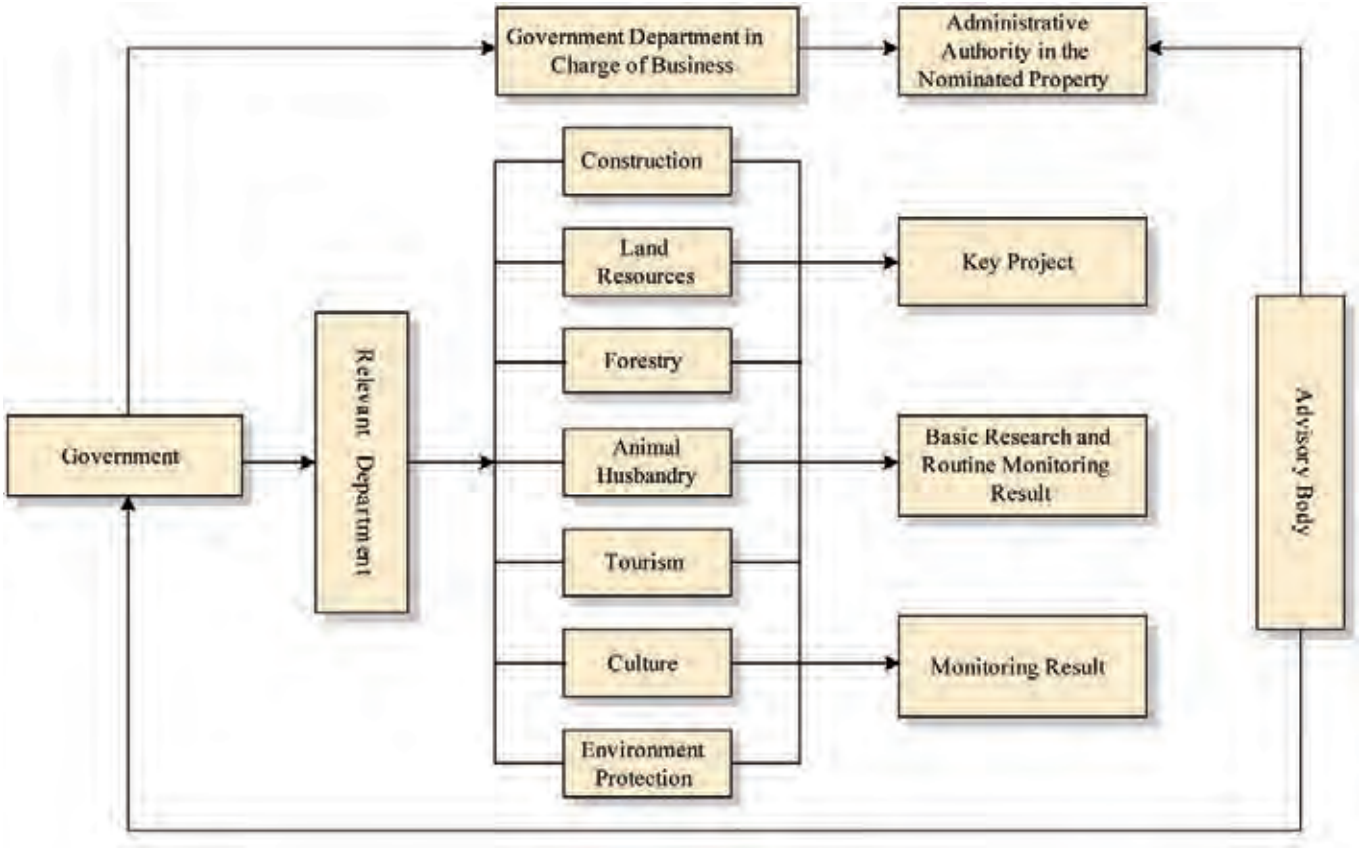


Figure 6-1 Management and monitoring system of Xinjiang Tianshan

6. b-2 Science and Technology Monitoring System

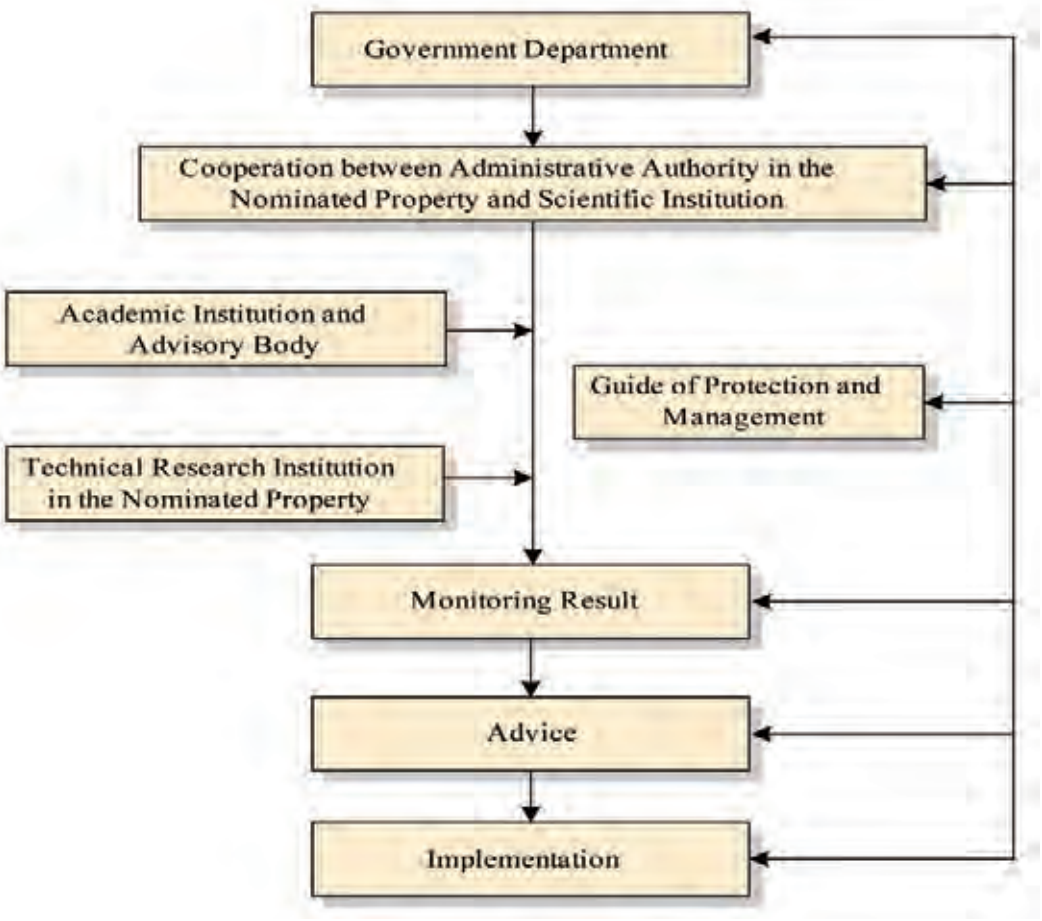


Figure 6-2 Science and technology monitoring system of Xinjiang Tianshan

6.b-3 Departments Responsible for Monitoring

Table 6-5 Departments responsible for monitoring in the Tomur component

Monitoring departments	Contact tel.	Address	Zip code
Administrative Bureau of Tomur Peak National Nature Reserve	+86-0997-2617358	60#, Tuohula Road, Aksu city, Xinjiang , P.R. China	843000
Environment Protection Bureau of Aksu Prefecture	+86-997-2123715	19#, the Aksu West Street, Aksu city, Xinjiang , P.R. China	843000
Construction Bureau of Wensu County	+86-0997-4533384	43#, Wuka Road, Aksu city, Xinjiang , P.R. China	843100
Environment Protection Bureau of Wensu County	+86-0997-4536577	the West Avenue of Wensu County, Aksu region	843100
Water Conservancy Bureau of Wensu County	+86- 0997-4531774	East Avenue of Wensu County, Aksu region	843100
Land and Resource Bureau of Wensu-County	+86-0997-4532801	the East Avenue of Wensu County, Aksu region	843100
Forestry Bureau of Wensu County	+86-0997-4533015	Tuohula Road, the West Avenue of Wensu County, Aksu region	843100
Animal Husbandry Bureau of Wensu County	+86- 0997-4534966	29#, the East Avenue of Wensu County, Aksu region	843100
Tourism Bureau of Wensu County	+86-0997-4538995	2#, Cultural Road of Wensu County, Aksu region	843100

Table 6-6 Departments responsible for monitoring in the Kalajun-Kuerdening component

Monitoring departments	Contact tel.	Address	Zip code
Administrative Bureau of Western Tianshan National Nature Reserve	+86-999-8322670	Xueling Yard, Yining city	835500
Environmental Protection Bureau of Ili Kazakh Autonomous Prefecture	+86-999-8024352	3#15 Stalin Street, Yining city	835000
Construction Bureau of Gongliu county	+86-999-5622373	East Xinhua Rd., Gongliu town, Gongliu county	835400
Environment Protection Bureau of Gongliu county	+86-999-5625135	West Xinhua Rd., Gongliu town, Gongliu county	835400
Water Conservancy Bureau of Gongliu county	+86-999-5622481	East Xinhua Rd., Gongliu town, Gongliu county	835400
Land and Resources Bureau of Gongliu county	+86-999-5622627	West Xinhua Rd., Gongliu town, Gongliu county	835400
Forestry Bureau of Gongliu county	+86-999-5622751	South Xingfu Rd., Gongliu town, Gongliu county	835400

Animal Husbandry Bureau of Gongliu county	+86-999-5622752	Dongmaili Rd., Gongliu town, Gongliu county	835400
Tourism Bureau of Gongliu county	+86-999-5620790	Tuanjie Rd., Gongliu town, Gongliu county	835400
Administrative Commission of Provincial Park of Kalajun	+86-999-6855979	Kalajun Park	835500
Construction bureau of Tekesi county	+86-999- 6624083	62#Azhati Street, Tekesi county	835500
Environment Protection Bureau of Tekesi county	+86-999-7760302	Kuobu Street, Tekesi county	835500
Water Conservancy Bureau of Tekesi county	+86-999-6623341	Azhati Street, Tekesi county	835500
Land and Resources Bureau of Tekesi county	+86-999-6623185	Azhati Street, Tekesi county	835500
Forestry Bureau of Tekesi coutny	+86-999-6623627	Azhati Street, Tekesi county	835500
Animal Husbandry Bureau of Tekesi county	+86-999-6628305	Azhati Street, Tekesi county	835500
Tourism Bureau of Tekesi county	+86-999-6624888	Azhati Street, Tekesi county	835500

Table 6-7 Departments responsible for monitoring in the Bayinbuluke component

Monitoring departments	Contact tel.	Address	Zip code
Administrative Bureau of Bayinbuluke National Natural Reserve	+86-996-2026504	West Bayin Road, Korla city	841000
Environment Protection Bureau of Bayangol Mongol Autonomous Prefecture	+86-996-2108826	64# Shihua Road, Korla city	841000
Construction Bureau of Hejing County	+86-996-5013273	North Road of Chahantonggu, Hejing county	841300
Environment Protection Bureau of Hejing County	+86-996-5027905	North Road of Chahantonggu, Hejing county	841300
Water Conservancy Bureau of Hejing County	+86- 996-5012607	7#West Tuanjie Road, Hejing county	841300
Land and Resources Bureau of Hejing County	+86-996-5022122	Aerxiate Road, Hejing town, Hejing county	841300
Forestry Bureau of Hejing County	+86-996-5022527	West Kaize Road, Hejing county	841300
Animal Husbandry of Hejing County	+86- 996-5022299	East Aerxiate Road, Hejing town, Hejing county	841300
Tourism Bureau of Hejing County	+86-996-5016440	East Aerxiate Road, Hejing town, Hejing county	841300

Table 6-8 Departments responsible for monitoring in the Bogda component

Monitoring departments	Contact tel.	Address	Zip code
Administrative Commission of Xinjiang Tianchi	+86-0994-6525567	501#, Junggar Road of Fukang county	831500
Environment Protection Bureau of Changji Hui Autonomous Prefecture	+86-994-2342132	3#, Hongxing West Road of Changji City	831100
Construction Bureau of Fukang county	+86-0994-3222418	32#, Fuxin Avenue of Fukang county	831500
Environmental Protection Bureau of Fukang county	+86-0994-3222167	46#, Bofeng Road of Fukang county	831500
Water Conservancy Bureau of Fukang county	+86-0994-3222425	265#, Junggar Road of Fukang county	831500
Land and Resource Bureau of Fukang county	+86-0994-3222221	34#, Fuxin Avenue of Fukang county	831500
Forestry Bureau of Fukang county	+86-0994-3222119	284#, Junggar Road of Fukang county	831500
Animal Husbandry Bureau of Fukang county	+86-0994-3222194	01#, Tianshan Avenue of Fukang county	831500
Meteorology Bureau of Fukang county	+86-0994-3222129	Bofeng Avenue of Fukang county	831500
Tourism Bureau of Fukang county	+86-0994-3222422	100#, Bofeng Road of Fukang county	831500

6.c Results of Previous Reporting Exercises

Table 6-9 Results of previous reporting exercises on Tomur component

Title	Content	Author	Information can be found from
Geology and paleontology of the Tomur Peak region in Tianshan Mountains	Systematic review of the geological structure, formation, granite, metamorphic rocks, geological age, the geological history, the Quaternary loess and paleontology around Tomur Peak region.	Mountain Scientific Expedition of CAS	Urumqi Xinjiang People's Publishing House, 1985
Glaciers and Meteorology of the Tomur Peak region of the Tianshan Mountains	Glacial relics of Quaternary, glaciation ages, glaciers and hydrological characteristics, radiation and heat balance, water vapour transportation, weather and climate in the Tomur Peak region are analyzed systematically in the book.	Mountain Scientific Expedition of CAS	Urumqi Xinjiang People's Publishing House, 1985
Physical geography of the Tomur Peak region of the Tianshan Mountains	Historical geography, geomorphological features, vegetation, soil types and their vertical distribution, water chemistry characteristics, geographical features and vertical natural zones in the Tomur Peak region are illustrated in the book, .	Mountain Scientific Expedition of CAS	Urumqi Xinjiang People's Publishing House, 1985
Scientific investigation of the Tomur Peak	This book covers the investigation of flora, distribution and resource situation of the animals, birds, insects, higher plants, fungi, lichens and other species around Tomur Peak.	Mountain Scientific Expedition of CAS	Urumqi Xinjiang People's Publishing House, 1985
Scientific investigation of the Tomur Peak	This is a picture album that displays geology, paleontology, glaciers, meteorology, physical geography, biology, etc. around Tomur Peak	Mountain Scientific Expedition of CAS	Urumqi Xinjiang People's Publishing House, 1985
Natural landscape resources investigation and assessment of the nominated Tomur	Comprehensively survey on the resources, including glacier peaks, valleys , Gobi desert and red canyons and so on in the nominated Tomur, and a comprehensive evaluation of the landscape resources and aesthetics	Yang Zhaoping	Xinjiang Institute of Ecology and Geography, CAS, 2010
Wildlife resource and inventory of the nominated Tomur	This book contains a comprehensive survey and evaluation of the mammals, birds, reptiles, amphibians and fishes in the nominated Tomur.	Ablimiti Abudukadier	Xinjiang Institute of Ecology and Geography, CAS, 2010
Vegetation and plant resources of the nominated Tomur	This book contains a comprehensive survey and evaluation on the flora, vegetation, plant resources and their distribution in the nominated Tomur.	Hai Ying	Xinjiang Institute of Ecology and Geography, CAS, 2010

Annual Report on environmental impact assessment of Tomur Nature Reserve	These reports examine the surface water, air, soil, acoustic environment and so on (2006 -2010).	Xinjiang Environmental Protection Technology Consulting Centre	Administrative Bureau of Tomur Peak National Nature Reserve

Table 6-10 Results of previous reporting exercises on the Kalajun-Kuerdening component

Title	Content	Author	Information can be found from
Study of wild fruit trees in Xinjiang	The book focuses on the mountain area in Ili Prefecture, and describes the distribution of wild fruit trees in Xinjiang and its relationship with the climate and geographical environment.	Yan Guorong, Xu Zheng	Beijing: China Forestry Press, 2010
Tianshan wild fruit forest resources - comprehensive study of the wild fruit forest	This book describes the natural environment, origin and evolution, distribution and plant resources of wild fruit forests in the Tianshan Mountains in detail.	Lin Peijun	Beijing: China Forestry Publishing House, 2000
Geomorphic process and sediment characteristics of the ice circle in the Mid-Tianshan Mountains	This book examines the peri-glacial and glacial development process and sedimentary facies of the Tianshan Mountains, dynamic mechanism of glacial landforms and macroscopic and microscopic characteristics of moraine deposition in this area.	Cui Zhijiu	Hebei Science Press, 1998
Natural landscape resources investigation and assessment of the Kalajun-Kuerdening nominated property	This book first surveys the landscape resources in the nominated Kalajun-Kuerdening, including forests, steppe, meadow and wild fruit forests and so on, then carries out a comprehensive evaluation of the landscape and aesthetic resources.	Yang Zhaoping	Xinjiang Institute of Ecology and Geography, CAS, 2010
Vegetation and plant resources of the nominated Kalajun-Kuerdening	This book examines the flora, vegetation, plant resources and their distribution in the nominated Kalajun-Kuerdening.	Hai Ying	Xinjiang Institute of Ecology and Geography, CAS, 2010
Wildlife in the nominated Kalajun-Kuerdening	This book introduces and evaluates the mammals, birds, reptiles, amphibians and fishes in the nominated Kalajun-Kuerdening.	Ablimiti Abudukadier	Xinjiang Institute of Ecology and Geography, CAS, 2010

Annual Report on environmental impact assessment of West Tianshan Mountain Nature Reserve	The reports examine the surface water, air, soil and acoustic environment in the Nature Reserve of West Tianshan Mountains (2006-2010).	Xinjiang Environmental Protection Technology Consulting Centre	Administrative Bureau of Tomur Peak National Nature Reserve, (2006-2010)
Annual Report on environment impact assessment of Kalajun Park	The report examines the surface water, air, soil and , acoustic environment in Kalajun Park (2010).	Xinjiang Environmental Protection Technology Consulting Centre	Administrative Commission of Kalajun Park

Table 6-11 Results of previous reporting exercises of the Bayinbuluke component

Title	Content	Author	Information can be found from
Investigation and assessment of natural landscape resources in the nominated Bayinbuluke	The book ievaluates the natural landscape resources in the nominated Bayinbuluke, including river bends, wetlands, natural landscape, etc.	Yang Zhaoping	Xinjiang Institute of Ecology and Geography, CAS, 2011
Wildlife in the nominated Bayinbuluke and the list	This book introduces and evaluates mammals, birds, reptiles, amphibians and fishes in the nominated Bayinbuluke.	Yang Weikang	Xinjiang Institute of Ecology and Geography, CAS, 2011
Vegetation and plant resources of the nominated Bayinbuluke	This book studies the flora, vegetation, plant resources and their distribution in the nominated Bayinbuluke.	Hai Ying	Xinjiang Normal University, 2011
Annual report on environmental impact assessment of Bayinbuluke Natural Nature Reserve	The report assesses the surface water, air, soil and acoustic environment in Bayinbuluke Natural Nature Reserve (2006-2010).	Xinjiang Environmental Protection Technology Consulting Centre	Administrative Bureau of Bayinbuluke Natural Nature Reserve, (2006-2010).

Table 6-12 Results of previous reporting exercises of Bogda component

Title	Content	Author	Information can be found from
Geological disaster monitoring of Tianshan Tianchi	Monitoring and control of the geological disasters in Tianchi Lake area (2008).	Institute of Mountain Hazards and Environment, CAS	Administrative Commission of Xinjiang Tianchi
Debris Flow Control of Xinjiang Tianshan Tianchi	Monitoring on debris flows and sediment deposition of Tianchi Lake (2007).	Institute of Mountain Hazards and Environment, CAS	Administrative Commission of Xinjiang Tianchi
Report on soil erosion monitoring in the Tianchi Lake area	Soil erosion monitoring (2004).	Department of Urban and Resources Sciences of Nanjing University	Administrative Commission of Xinjiang Tianchi
Annual Report on environmental impact assessment of Tianshan Tianchi Lake	The reports examine the surface water, air, soil and acoustic environment in the Tianshan Tianchi Lake area (2006-2010).	Xinjiang Environmental Protection Technology Consulting Centre	Administrative Commission of Tomur Peak National Nature Reserve
Observation report on water samples collected from Tianshan Tianchi Lake	Water quality monitoring in Tianchi Lake and Sangong River (2006-2010).	Fukang Observatory of Ecological System of Deserts of CAS	Administrative Commission of Xinjiang Tianchi, (2006-2010).
Comprehensive scientific survey report on Tianchi - Bogda Natural Reserve	The report examines the geological tectonic background, geological relic features and the distribution of rare and endangered species of this area (2006).	Xinjiang Institute of Ecology and Geography, CAS	Administrative Commission of Xinjiang Tianchi, 2006
China-Japan Joint Study on Tianchi-Bogda Peak region	The report mainly focuses on the glaciers in the area of Bogda Peak.	Shiyafeng, Wuguanghe, Wangyinsheng, Dubianxingya, Shangtianfeng, etc.	Journal of Glaciology and Geocryology, September, 1983
Investigation and assessment of natural landscape resources in the nominated Bogda	The book examines and evaluates the natural landscape resources in the nominated Bogda, including glaciers, alpine lakes, , mountain vertical landscapes and so on.	Yang Zhaoping	Xinjiang Institute of Ecology and Geography, CAS, 2010
Wildlife in the nominated Bogda and the list	This book introduces and evaluates mammals, birds, reptiles, amphibians and fishes in the nominated Bogda .	Ablimiti Abudukadier	Xinjiang Institute of Ecology and Geography, CAS, 2010
Vegetation and plant resources of the nominated Bogda	This book examines the flora, vegetation, plant resources and their distribution in the nominated Bogda.	Hai Ying	Xinjiang Institute of Ecology and Geo0graphy, CAS, 2010

7. Documentation

7.a Photographs, Slides, Image Inventory and Authorization Table and Other Audiovisual Materials

7.b Texts Relating to Protective Designation, Copies of Property Management Plans or Documented Management Systems and Extracts of Other Plans Relevant to the Property

7.c Form and Date of Most Recent Records or Inventory of Property

7.d Address Where Inventory, Records and Archives Are Held

7.e Bibliography

7. Documentation

7.a Photographs, Slides, Image Inventory and Authorization Table and Other Audiovisual Materials

(i) Picture album

One picture album (see appendix 6)

(ii) 35mm slides

50 pieces (see appendix 7)

(iii) Video disc

1 CD，25 minutes (see appendix 8)

(iv) Electronic picture album

Includes more than 50 pictures of the nominated properties which can be shown in the website in jpg format at a minimum of 300 dpi resolution.

(v) Image inventory

Image inventory of the nominated properties of Xinjiang Tianshan (see appendix 5)

(vi) Photographs, audio-visual materials and use authorization form

Table 7-1 Image inventory, photographs and audio-visual authorization Form

Id. No	Format (slide/ print/ video)	Caption	Date of Photo (mo/yr)	Photographer/ Director of the video	Copyright owner (if different than photographer/ director of video)	Contact details of copyright owner (Name, address, tel/fax, and e-mail)	Non exclusive cession of rights
1	35mm slides	Xinjiang Tianshan	2008—2011	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region xjjstcjc@sina.com	Authorized

2	25 minutes video disc	Xinjiang Tianshan	2011	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region xjjstcjc@sina.com	Authorized
3	One piece of picture album	Xinjiang Tianshan	2008—2011	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region xjjstcjc@sina.com	Authorized
4	Electronic format photo album, 300 dpi, jpg format	Xinjiang Tianshan	2008—2011	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region xjjstcjc@sina.com	Authorized

7.b Texts Relating to Protective Designation, Copies of Property Management Plans or Documented Management Systems and Extracts of Other Plans Relevant to the Property

7.b-1 Texts Relating to Protective Designation

- **Nature Reserve**

The nature reserve is the area of concentration of representative natural ecosystems, rare and endangered wildlife species, and the land and water for the natural relics with special significance. It is a region set aside with special protection and management according to law.

- **National Nature Reserve**

Nature reserves of international significance in science or special scientific

research, which are typical both at home and abroad, are selected as a National Nature Reserve.

- **Park**

A park is an area, which possesses visual, cultural and scientific value with natural and human landscapes, where the environment is beautiful. It provides good conditions for people to visit, for leisure and is a place where some scientific and cultural activities can be carried out

- **National Park**

Natural landscapes and cultural landscapes in national parks reflect important natural processes or important historical and cultural changes. They are still in their natural or historical state and are nationally representative. An application can be made to become a National Parks after gaining approval from the State Council of the People's Republic of China. It is a kind of Park at national level. It possesses all the values of Park, which accords with the international definition of a national park (IUCN's PA category II).

- **International Man and Biosphere Protected Area**

This protected area, which has been brought into UNESCO-MBA, is a representative area of lands, coastal areas and oceanic ecosystems under protection (and usually suitable for a wide range of research on the interaction of human communities with their natural environment).

- **National Forest Parks**

National Forest Parks are areas with spectacular forest scenes and cultural landscapes, with high recreational, scientific and cultural values, located in special geographical positions, regionally representative, with well-established tourism facilities, and well-known for sightseeing, relaxation or for scientific, cultural and educational activities.

- **Provincial Park of Xinjiang**

It is approved by the Department of Housing and Urban-Rural Development of Xinjiang Uygur Autonomous Region. It is a kind of Park mentioned above, which possesses all the values of parks at provincial level. It accords with the international definition of a Natural Monument (IUCN's PA category III).

7.b-2 Copy of Protection and Management Plan of the Nominated properties

Management Plan of the Nominated Xinjiang Tianshan (see appendix 3) has been completed and approved by the People's Government of Xinjiang Uygur Autonomous Region in 2011.

7.b-3 Extracts of Other Plans Relevant to the Nominated properties

(1) Tomur

Maste Plan of Tomur Peak National Nature Reserve (2003-2008)

Chapter 4: To focus on the protection of glacier, forest and wildlife resources, keep the integrity of the original ecological system, carry out wildlife rescue work, protect wildlife habitats, expand the rare and endangered wild animal populations, facilitate afforestation, increase the forest coverage, and improve the forest environment.

Maste Plan of Wensu Grand Canyon, Aksu, Xinjiang Uygur Autonomous Region (2008-2020)

Chapter 12: According to geological and geomorphic features, the tourism region can be divided into a core protection zone, controlled construction zone and peripheral activity zone. In the core protection zone, no construction or building of facilities are allowed, mining and quarrying are banned, visitors are not allowed entry to the area except for the roads. The plan is also to strengthen the protection of wildlife, to establish wildlife monitoring stations, and to observe and keep control of the quality of the habitat.

(2) Kalajun-Kuerdening

Maste Plan of the Picea Schrenkiana National Nature Reserve of Gongliu County, Xinjiang (1997)

Article 5: The forest fire defense facilities will be improved and the control, observation and warning of biological pests should be strengthened. Further, hunting of wildlife is prohibited.

Article 6: Build up a base for scientific research, carry out long-term observation and monitoring of vegetation and animal resources in the reserve, strengthen

cooperation on scientific investigation, scientific research and teaching practice with the research institutions and universities at home and abroad.

Maste Plan of National Nature Reserve of the Western Tianshan Mountains (2003-2012)

Chapter 4: The key protected objectives are to maintain the integrity of virgin ecosystems; to protect the mountain forest ecosystems dominated by montane conifer forest composed of snow spruces and montane deciduous forest of wild fruits. The aim is to enlarge the population of wild animals and plants, and focus on the protection of rare and endangered species.

Maste Plan of Kalajun Park (2009-2020)

Chapter 9: Make the greatest efforts to conserve species biodiversity, strengthen control and defense against natural disasters, prevent environmental deterioration and resource damage, maintain sustainable development and utilization of biological species and natural resources. The natural landscapes need to be kept in their original state and be strictly protected; no damage or change will be allowed.

(3) Bayinbuluke

Maste Plan of Bayinbuluke National Nature Reserve（2002-2011）

Chapter 4: Protect and improve the ecological environment in the reserve, especially the plants and animals in the wetland and their native habitat in a proper way, and focus on the protection of wetlands, the aquatic ecosystem and their key species: *Cygnus columbianus, Aquila chrysaetos, Haliaeetus leucoryphus*, etc.

(4) Bogda

Landscape planning of Tianshan Tianchi (2004-2020)

Chapter 6: Protection dominates and a special protection plan has been made to strengthen the protection and management of the park. The core area is highly protected and no tourists can enter and no construction is allowed. The key objectives include protection of the water quality and water source area of the lake, forest vegetation dominated by snow spruces, biodiversity, main scenery and the landforms around the historical relics. Monitoring stations will be established to monitor water and air quality, soil and water loss, sand

sediments and biodiversity, and to provide the basis for further protection, management and plans.

Master Plan of Xinjiang Tianchi and Bogda Nature Reserve (2008-2015)

Chapter 5: Maintain the integrity and original state of the natural landscape and ecological system, enlarge the population and amount of rare and endangered species, and protect the habitat of wildlife. The sediment deposition in Tianchi Lake needs to be well controlled, and modern glaciers and wetlands and other water sources should be conserved effectively. Research on the protection and utilization of biological resources in the protected area will be enhanced, and long-term monitoring on the environment and ecological effects shall be carried out. Typical ecosystems should be observed regularly.

7.c Form and Date of Most Recent Records or Inventory of Property

7.c-1 Most Recent Records

Table 7-2 Latest records of the nominated properties of Xinjiang Tianshan

Most recent records of property	Time
High vascular plants inventory of the nominated Xinjiang Tianshan	2010
Vertebrates inventory of the nominated Xinjiang Tianshan	2010
Glacier inventory of nominated Tomur	1980
Rare and endangered wild plants in the nominated Tomur	2010
Rare and endangered wild animals in the nominated Tomur	2010
Endemic plants in the nominated Tomur	2010
Endemic animals in the nominated Tomur	2010
Glacier inventory of nominated Nominated Kalajun-Kuerdening	1980
Rare and endangered wild plants in the Nominated Kalajun-Kuerdening	2010
Rare and endangered wild animals in the Nominated Kalajun-Kuerdening	2010
Endemic plants in the Nominated Kalajun-Kuerdening	2010
Endemic animals in the Nominated Kalajun-Kuerdening	2010
Rare and endangered wild plants in the Nominated Bayinbuluke	2010
Rare and endangered wild animals in the Nominated Bayinbuluke	2010

Endemic plants in the Nominated Bayinbuluke	2010
Endemic animals in the nominated Nominated Bayinbuluke	2010
Basic Scientific Research on Bogda for World Natural Heritage	2009
Glacier Inventory of Nominated Bogda	1980
Rare and endangered wild plants in the Nominated Bogda	2010
Rare and endangered wild animals in the Nominated Bogda	2010
Endemic plants in the Nominated Bogda	2010
Endemic animals in the Nominated Bogda	2010
Investigation Report on Gongliu Schrenk Spruce Natural Reserve of Xinjiang	1997
Study Report on the Feasibility of Environmental Ecological Restoration Project of Xinjiang Tianchi	2007
Investigation Report on Xinjiang Tianshan Tianchi National Geology Park	2007
Resources Evaluation Report on Kalajun Park of Tekesi County, Xinjiang	2011

7.c-2 Property Inventory

Table 7-3 Property inventory of the nominated Xinjiang Tianshan

Property inventory	Time
Natural landscape in the Nominated Xinjiang Tianshan	2010
Rare and endangered wild plants in the Nominated Xinjiang Tianshan	2010
Rare and endangered wildlife in the Nominated Xinjiang Tianshan	2010
Endemic plants in the Nominated Xinjiang Tianshan	2010
Endemic animals in the Nominated Xinjiang Tianshan	2010
Relic plants in the Nominated Xinjiang Tianshan	2010

7.d Address Where Inventory, Records and Archives Are Held

Table 7-4 Address where inventory, records and archives are held

Name	Address	Zip code
Xinjiang Institute of Ecology and Geography, CAS	818#, Beijing South Road of Urumqi, Xinjiang Uygur Autonomous Region	830011
Cold and Arid Regions Environmental and Engineering Research Institute, CAS	Donggang West Road 320, Lanzhou, Gansu, China	730000
Housing and Urban Construction Department of Xinjiang Uygur Autonomous Region	462#, Zhongshan Road, Block A,UnitedBuilding, People's Squire, Urumqi, Xinjiang Uygur Autonomous Region	830002

Administrative bureau of National Nature Reserve of TomurPeak	60#, Wuka Road, Aksu	843000
Administrative bureau of National Nature Reserve of WesternTianshanMountains	Xueling Yard, YiningCity	835500
Administrative Commission of TianchiLake of TianshanMountains, Xinjiang	510#, Junggar Road of Fukang county, Xinjiang Uygur Autonomous Region	831500
Forestry Prospect and Design Institute of Xinjiang	Shengli Road 146, Urumqi, Xinjiang Uygur Autonomous Region	830001
Institute of Mountain Hazards and Environment, CAS	9#, the fourth block of the People South Road, Chengdu, SichuanProvince	610041
Sichuan Bureau of Geology and Mineral Exploration and Development	146#, Tongji Bridge Down Avenue of Huyang town, Shuangliucounty of Chengdu City, SichuanProvince.	610213
XinjiangJialianAcademy of Urban Planning and Design Research Centre	26#, Guangming Road, Urumqi City, Xinjiang Uygur Autonomous Region	830001

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8.c Other Local Institutions

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8.b Official Local Institution/ Agency

8.b-1 Official Local Institution/Agency of the State and Province

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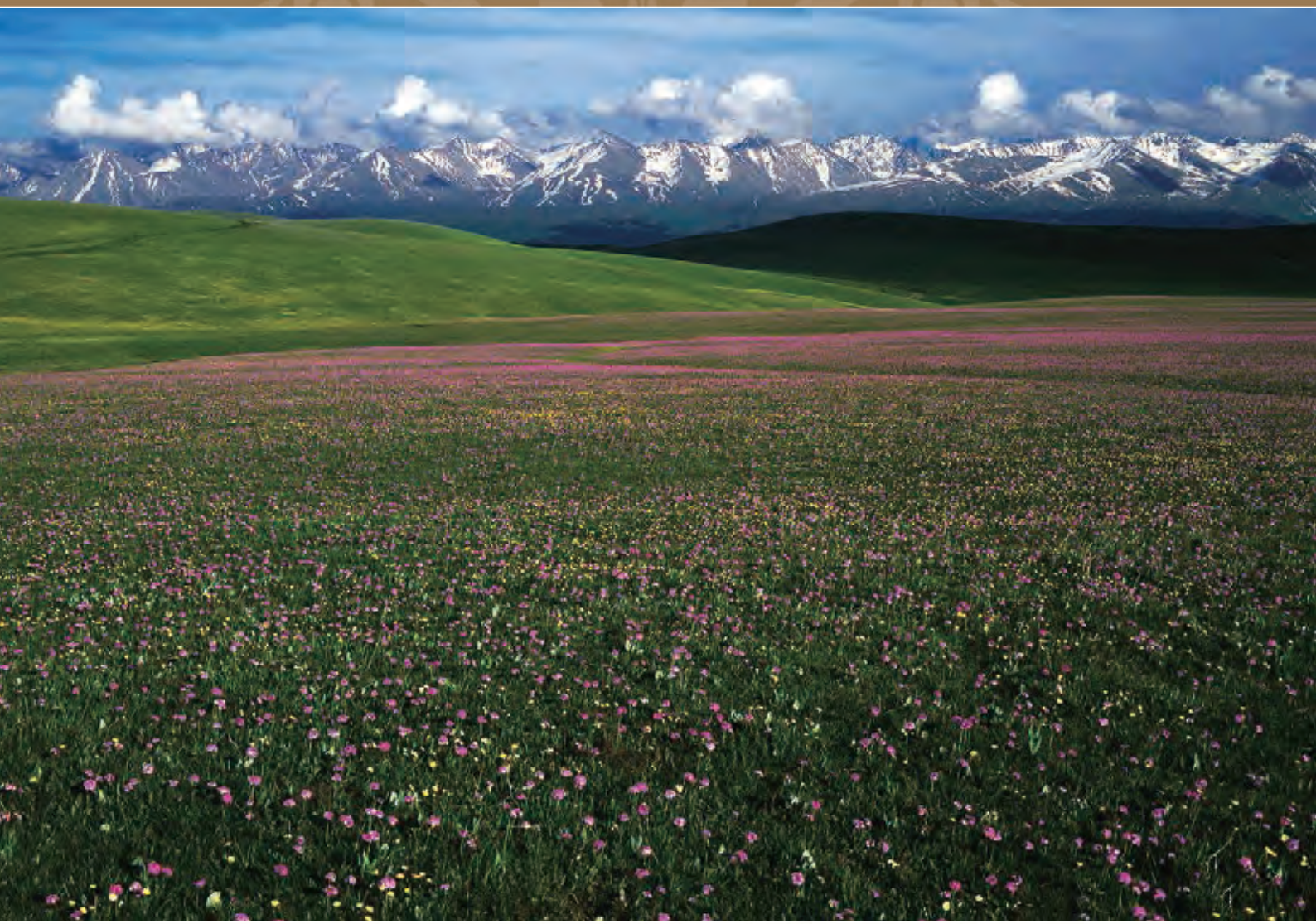

9. Signature on behalf of the State Party

Minister of Housing and Urban-Rural
Development of the People's Republic of China

World Heritage Nomination

Natural Heritage·China

Xinjiang Tianshan

Appendix 3

Management Plan

Ministry of Housing and Urban-Rural
Development of the People's Republic of China
2012.1

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1. Introduction

1.1 The Selection of Composition Properties

The Tianshan Mountains in Xinjiang are a large mountain system composed of a series of mountain ranges and there are significant differences in physical geography and biological features in different parts. No single component can completely represent its outstanding universal values. It took three years of research and consultation for the selection processes. Selection criteria depend on the representativeness of natural features such as geological features, ecological features and natural landscapes, as well as the integrity of the natural environment, the level of negative impact from human activities, and the current protection and management status.

Tianshan Mountains in Xinjiang are a huge mountain range extending in an west-east direction. The nominated serial property of Xinjiang Tianshan (here after it is also called Xinjiang Tianshan) has the four components (Tomur, Kalajun-Kuerdening, Bayinbuluke and Bogda) respectively located in the west, middle and east of the Tianshan Mountains in Xinjiang. The four parts reflect the natural characteristics in different sections of the Tianshan Mountains in a latitudinal direction. Overall, the four component properties contain the peaks and alpine areas of the South Tianshan Mountains and the North Tianshan Mountains, as well as the valleys of the Middle Tianshan Mountains that boast rich biodiversity. They are rich in geological, biological and scenic diversity. From the south to the north and from the west to the east, the four nominated properties are the most representative areas of Tianshan Mountains in Xinjiang. They complement each other and together constitute the complete picture of the serial properties of Xinjiang Tianshan.

The Xinjiang Tianshan are described as follows:

(1) The Tomur component is where the main peaks of the Tianshan Mountains are located and it is the largest center of glaciation. It is the representative of the South Tianshan Mountains and possesses the most typical altitudinal natural zones on the south slope of the Tianshan Mountains. This is also the site with the natural beauty of the red canyons of Tianshan Mountains in Xinjiang. It is also the best representative of foothill arid steppe, within the Global 200 Ecoregion 111 “Middle Asian montane woodlands and steppe”. It is also a major center of distribution of snow leopards in Central Asia.

(2) The Kalajun-Kuerdening component is located on the south side of the Ili River valley and it is the representative of the middle Tianshan Mountains with the richest biodiversity in the serial properties. The Kalajun-Kuerdening component is the best habitat for snow spruce and it is also one of the world’s most important localities where the Central Asian wild fruit

forests originated. It is the most outstanding representative of the integrated natural scenic beauty of arid temperate mountains. It is also the best representative of Tian Shan montane conifer forests and Tian Shan montane steppe and meadows, within the Global 200 Ecoregion 111 “Middle Asian montane woodlands and steppe”.

(3) The Bayinbuluke component is the best representative in the Tianshan Mountains of an intermountain basin, an alpine wetland ecosystem in the temperate arid zone and a beautiful water landscape.

(4) The Bogda component is where the main peak of the north Tianshan Mountains is located and it is the representative of the north Tianshan Mountains. It has the best altitudinal zone on the north slope of the Tianshan Mountains. It is the most typical representative of montane altitudinal zone in temperate arid zones in the world, and it also represents the alpine lake landscapes of Tianshan Mountains in Xinjiang.

1.2 Location and Scope

1.2.1 State, Province or Region

The nominated serial property of Xinjiang Tianshan is located in Xinjiang Uygur Autonomous Region, details below:

- Tomur: Wensu County in Aksu Prefecture
- Kalajun-Kuerdening: Tekesi County and Gongliu County, in Ili Kazakh Autonomous Prefecture
- Bayinbuluke: Hejing County in Bayangol Mongolian Autonomous Prefecture
- Bogda: Fukang County in Changji Hui Autonomous Prefecture and Urumqi City

1.2.2 Geographic Cordinates

General Coordinates: N41º30'00"—44º00'00", E79º30'00"—88º30'00"

Table 1-1 Coordinate of Xinjiang Tianshan

No.	Nominated property	Section	Center coordinates
1	Tomur	Wensu County	N41º58'06" E80º21'15"
2	Kalajun-Kuerdening	Tekesi County	N43º04'15" E82º58'44"
		Gongliu County	N42º57'30" E82º22'35"
3	Bayinbuluke	Hejing County	N42º47'53" E84º09'50"
4	Bogda	Fukang County, Urumqi City	N43º50'00" E88º17'12"

1.2.3 Area of Nominated Property and Proposed Buffer Zone

The total area of Xinjiang Tianshan is 575,922 ha, and that of the buffer zone is 519,592 ha.

Table 1-2 Area of Xinjiang Tianshan

Name		Area of the nominated property (ha)	Area of the buffer zone (ha)
Tomur		344,828	280,120
Kalajun-Kuerdening	Kalajun	47,768	35,296
	Kuerdening	35,139	82,539
Bayinbuluke		109,448	80,090
Bogda		38,739	41,547
Total		575,922	519,592

1.2.4 Description of the Borders of the Nominated Property and Buffer Zone

The nominated serial property of Xinjiang Tianshan concludes four components — Tomur, Kalajun-Kuerdening, Bayinbuluke and Bogda — all of which have defined borders and buffer zones. Most of the borderlines have been defined according to the natural boundaries of mountains and rivers, elevation and vegetation zones, considering existing boundaries of existing protected areas, including Man in the Biosphere Reserves, National Nature Reserves, National Parks, and so on. The boundaries of all components of Xinjiang Tianshan have been investigated and demarcated with consistent borderlines both for the nominated properties and the corresponding buffer zones. All of the nominated properties and buffer zones are under strict protection.

(1) Border description of the Tomur component and its buffer zone

■ Borders of the nominated property of Tomur

The nominated property of Tomur covers main glaciers and the most typical regions where altitudinal natural zones of the south slope of Tianshan Mountains are located.

- In accordance with the outer edge of glaciers, the eastern border goes south along the administrative border of Wunsu county and Baicheng county, pass the low edge of Ukur glacier tongue, western mountain ridge of the valley of Muzart river, low edge of glacier tongue of Tugbliqi, and the outer edge of glacier tongue of Qiongkzbayi, cross Buriglek

village, Bayilekata village and Bozdun Kirgiz autonomous village, and along the valley of Kalayulegun river to its mouth.

- The southern border goes west from the mouth of Kalayulegun river, along the mountain foot of Tomur, across the Tailan River, then along the snow line, the outer edge of the glacier tongue and mountain ridge which at the south of the Kqikarbasi glacier and the Tomursu glacier, to the border of China and Kyrgyzstan.

- The western border is the national border of China and Kazakhstan and the border of China and Kyrgyzstan.

- The northern border is the administrative border of Wunsu county and Zhaosu county (ridge line of Harktawu mountain).

■ Borders of the buffer zone of nominated Tomur

- The eastern border goes south along the snow line and the outer edge of the glacier which are at west of the Muzart river, passing the valley of the branch of the Kalayulegun river, along 2-3 km east of the valley of the Kalayulegun river, to the mouth of the Kalayulegun river.

- The southern border is 2-3 km away from the south border of the nominated property, and is almost the same as south border of nominated property, following the dividing line of vegetation and the mountain ridge line, to the national border of China and Kyrgyzstan.

- There is no buffer zone in the west because it is covered by snow and glaciers, located at high latitude and the national borders of China and Kazakhstan and of China and Kyrgyzstan.

- The northern border is 5-10 km away from that of the nominated property. It goes east along the mountain ridge line at the outer edge of main glaciers, across the Sayikale river, the Alemant river, the Dunduguole river, and the Shat river to the Shat meadow area.

- The eastern-northern border goes along the snow line in the north, south and east of the Muzart glacier, and the outer edge of the Muzart glacier tongue, as well as dividing line of the other glaciers, to the valley of Muzart river.

(2) Border description of the Kalajun-Kuerdening component and its buffer zone

■ Borders of the nominated property of Kalajun-Kuerdening

The Kalajun-Kuerdening component includes two core regions, named Kuerdening in the east

and Kalajun in the west. Kuerdening has the most preserved original habitat of *Picea schrenkiana*, and Kalajun has best preserved regions of grassland and meadow ecosystems.

- The eastern border of Kalajun goes south along the Jirgalang River and its branch to the point N42º51'30", E82º29'11" where Tekesi county and Hejing county meet.
- The southern border goes east along the Kurdai River and mountain ridge line around the source of its branch to the low forest line of *Picea schrenkiana* on the east peaks of Qiongkushitai River.
- The western border goes north along Kerenbayisayi to join with the forest line of *Picea schrenkiana* on the north of Kalajun grassland, and goes south along Kekebulake valley and the *Picea schrenkiana* forest line to a mountain ridge in the water source area of Tasibulake River.
- The northern border goes east along the southern edge of *Picea schrenkiana* forest at the north of the Kalajun grassland, and to the west of the bank of the Jirgalang River flowing towards the Tarim Basin.

- The eastern border of Kuerdening goes south along the west bank of the Botu River, to the point N42º59'38", E83º5'50" where Hejing county and Gongliu county meet.
- The southern border is the administrative boundary of Hejing county and Gongliu county (mountain ridge line of Nalaty).
- The western border goes north along the east bank of the Aktuyek River (branch of Kuerdening River) to the east bank of the river where it meets the Kuerdening River.
- The northern border goes east along the low forest line of *Picea schrenkiana* to the west of bank of the Botu River.

■ Borders of the buffer zone of nominated Kalajun-Kuerdening

The buffer zone surrounds the two core areas of Kuerdening and Kalajun.

- The eastern border goes south along the south bank of Jirgalang River which is the boundary of Xinyuan county and the Gongliu River, along the west bank of the Aenba River which is a branch of the Jirgalang River, and the west of the bank of Botu River which is also a branch of Jirgalang River, across the point N43º0'7", E83º8'46" where Gongliu County and Hejing county meet, and along the mountain ridge line to the valley of Yiksai River.

- The southern border goes west along the north bank of Yiksai River and a branch of Kuoksu River, the administrative border of Gongliu county, to the mountain ridge line south of the Jirgalang River valley in the catchment of the Tarim Basin to the mountain ridge line north of Kuoksu River, and to east of the bank of Qiongkushitai River.

- The western border goes north along the east of Qiongkushitai River, along the mountain ridge

line, east of the bank of Kurdai River branch to the lower forest line of *Picea schrenkiana* north of Kalajun grassland.

- The northern border goes east along the lower forest line of *Picea schrenkiana*, across the Small Jirgalang River, Qiaxi River, Kshimohuruzan River and the Kurdun River to the west bank of Jirgalang River.

(3) Border description of Bayinbuluke component and its buffer zone

■ **Borders of the nominated property of Bayinbuluke**

The Bayinbuluke component covers the best preserved alpine wetland ecosystem and the borders of it are the same as that of Bayinbuluke National Nature Reserve.

- Borders of the property of Bayinbuluke are in between point N42º39'29"-42º58'26" and point E83º43'5"-84º36'18", along the natural geological boundaries of Bayinbuluke National Nature Reserve. The eastern border follows along the 2,400 m contour line, Kaidu River and south edge of Bayinbuluke National Nature Reserve; the western border follows along highway 217, and the northern border along the north edge of Bayinbuluke National Nature Reserve (the 2,400 m contour).

■ **Borders of the buffer zone of the Bayinbuluke component**

- The borders of the buffer zone of Bayinbuluke are in between point N42º37'19"-42º59'31"and point E83º38'56"-84º38'2". The southeastern border goes along the mountain ridge along the 2,800 m contour line, and the northeastern border goes along the 2,700 m contour.

(4) Border desciption of Bogda and its buffer zone

The Bogda component covers the main glaciers and the most typical region where altitudinal natural zones on the north slope of Tianshan Mountains are located.

■ **Borders of the nominated property of Bogda**

- The eastern border goes south from the protection station on the west bank of Sigong River, along the west bank of Sigong River, then the outer snow line on the north of the Bogda Glacier, the border of Tianshan Tianchi National Park and along the 3,800 m contour line (the outer edge of the snow line on the east of Bogda Glacier).

- The southern border goes east along the 3,800 m contour line (the outer edge of the glacier

and snow line) to the water source of the Shuimogou River at the point N43º45'30",E88º28'8" where Urumqi city and Fukang county boundaries meet.

- The western border goes north along the valley of the eastern branch of Shuimogou River, the southern and eastern forest line *Picea schrenkiana* in the Maya Mountain, along the west bank of Tianchi Lake and east of highway 111 to the point N43º56'6",E88º6'30" where the rivers converge.

- The northern border goes east along Sangong River to the protection station on the west bank of Sigong River.

■ Borders of the buffer zone of the the Bogda component

- The eastern border goes south along the east border of Tianshan Tianchi National Park, along the mountain ridge three kilometers away from the glaciers and Aksu River, to the point N43º44'1"—E88º29'47".

- The southern border goes west from the point N43º44'1", E88º29'47", along the west of Aksu River and the 3,300 m contour line (border of alpine sparse vegetation natural zone) to the border of Tianshan Tianchi National Park (43º44'49" E88º6'40").

- The western border is the same as that of Tianshan Tianchi National Park, along the mountain ridge and around the junction of Urumqi city and Fukang county at N43º44'49", E88º06'40" to the eastern bank of Shuimogou River. It then goes north along the eastern bank of Shuimogou River to the point of N43º56'59", E88º00'41", and then turn to the northeast along the boundary of the park to the point of N44º04'02", E88º03'00".

- The northern border is the same as that of Tianshan Tianchi National Park , trending east along the latitudinal direction N44º to the point of N44º04'50", E88º05'28".

1.3 Description of the Nominated Property

1.3.1 Physical Geographical Features

(1) Location

Tianshan Mountain in Xinjiang is located in the central part of the Xinjiang Uygur Autonomous Region. In the west, it is adjacent to Kyrgyzstan, and in the east it reaches the Xingxingxia Gobi in Hami of the Xinjiang Autonomous Region. It extends from E74º to E95º longitudinally, with a length within Xinjiang of 1,760 km. The south most part is occupied by the Bashensuogong

Mountain and the north most is the Alatao Mountain. The average width can reach 300 km, from N40º to N45º latitude.

Tianshan Mountains in Xinjiang stretches from west to east in Xinjiang and is the natural boundary of Tarim Desert in the south and Junggar Desert on the north, covering nine prefectures, including the Kashgar Prefecture, Aksu Prefecture, Ili Kazakh Autonomous Prefecture, Boertala Mongol Autonomous Prefecture, Bayangol Mongol Autonomous Prefecture, Changji Hui Autonomous Prefecture, Urumqi City, Turpan Prefecture and Hami Prefecture.

(2) Topography

The length of the Tianshan Mountains in Xinjiang is about 1,760 km, which accounts for two thirds of the whole mountain range. There are three sections, more than 20 subsidiary mountain ranges and 10 inter-mountain basins or valleys. Latitudinally, they can be grouped into three huge mountain ranges, here termed the North Tianshan Mountains, the Middle Tianshan Mountains and the South Tianshan Mountains.

The North Tianshan Mountains can be separated into the west and east parts, with a total length of 1,300 km. The highest peak of the east part is the Bogda Peak with an elevation of 5,445 m; the highest peaks in the western part lie in the Ilianhabierga mountain conjunction area, where 21 peaks are over 5,000 m (with the highest one being 5,289 m). This is the most concentrated area of modern glaciers in the North Tianshan Mountains.

The total length of the Middle Tianshan Mountains is about 800 km, with an average elevation of 3,000 m. The highest peak in this area is Aierbin Mountain, with an elevation of 4,835 m. The topography of this area is relatively gentle, with the mountain planations most prominent in the western part.

The total length of the South Tianshan Mountains is about 1,100 km, and its average elevation is about 4,000m. The Tomur-Khan Tengri conjunction area is the highest region of the South Tianshan Mountains, where 15 peaks exceed 6,000 m.

The overall average elevation of the mountain ridge line is 4,000m, which exceeds Junggar Basin in the north by 3,500 m and the Tarim Basin in the south by 3,000 m. The highest peak is Tomur Peak with an elevation of 7,443 m.

(3) Climate

Tianshan Mountains in Xinjiang extends across a large area and shows great differences in elevation, resulting in complicated and varied local climates. Located amidst deserts, the huge

mountain range is an obvious natural boundary that modifies the regional airflow, resulting in large differences in physical geography between the northern and southern slopes. Most of the Tianshan Mountains in Xinjiang lie in the semi-arid area with a typical temperate climate. The piedmont area on the south slope belongs to the warm-temperate arid zone with altitudinal climate zones, including frigid, sub-frigid, cold temperate, temperate and warm temperate belts from top to bottom. Temperature differences between different areas are high and so is the annual temperature range. Generally, the average temperature of the south slope is higher than that of the north, and that of the east is higher than that of the west. The annual average temperature of the southern slope is 7.5-10.0 degrees Celsius and that of the northern is 2.5-5.0 degrees Celsius. The annual average temperature of the Turpan Basin is 12.5 degrees Celsius, and that of the Ili Valley in the west is 7.5 degrees Celsius. The lowest temperature could be below minus 50.0 degrees Celsius on Tomur Peak, while the highest temperature that has been observed is 49.7 degrees Celsius (August 3rd, 2008) in the Turpan Basin.

The climate of Tianshan Mountains in Xinjiang is evidently wetter than the adjacent areas of Central Asian deserts and the Tarim Basin and Junggar Basin, and so it is a huge 'wet island' in a 'desert sea'. It is mainly affected by western air currents, with most of the precipitation coming from the Atlantic Ocean; further moisture comes from the Arctic air currents leading to higher rainfall in the western parts and nothern slopes. For example, the annual rainfall in the Gongnaisi River in the upper reaches of the Ili River is 1,500-1,800 mm, in the southern slope of Tomur peak it is less than 100 mm and that in the Turpan Basin is 16.4 mm.

(4) Hydrology

The huge mountains of Tianshan Mountains in Xinjiang block off a mass of water vapor, forming a large water tower in the arid area, especially in the headstreams of many inland rivers. There are 373 rivers and 160 streams with a total runoff of 474×108 m^3, accounting for 53.6% of the total runoff of rivers in Xinjiang Uygur Autonomous Region. These rivers support oasis ecosystems which are essential to the survival of human beings. Of them, eight rivers have a runoff over 10×108 m^3; they include the Kash River, Gongnaisi River, Tekesi River, Manasi River and Kaidu River in the drainage area of the Ili River, the Muzhaerte River in the drainage area of the Weigan River, and the Kunmalike River and Tuoshigan River in the drainage area of the Aksu River. The water system of Tianshan Mountains in Xinjiang is like a feather, with most veins transverse to the mountain ridges and flowing from south to north. Several rivers in the western part, e.g. the Ili River, are controlled by the land tectonics; they are parallel to the ridges and flow east-west. The average elevation of the river drainage areas in Tianshan Mountains in Xinjiang is above 2,000 m, while some larger rivers that originate from the high mountains could reach 3,500 m. The main streams of these rivers are relatively short, for example most rivers in the middle of the north slope of Tianshan Mountains in Xinjiang are less than 100 km in length. Most river beds have steep gradients and the density of the river network on the north slope is larger than that on

the south slope.

Rainfall and seasonal snow melt-water, underground water and ice melt-water are the main sources of the runoff in the nominated properties, accounting for 37%, 33%, and 30% of the total runoff, respectively. In spring and summer, the groundwater is plentiful, while autumn and winter are dry seasons. The north slope of the Tomur component is in the drainage area of the Ili River, and the south slope is in the drainage area of the Tarim River. The Kalajun-Kuerdening component lies in the drainage area of the Ili River. The Bayinbuluke component lies in the drainage area of the Kaidu River. The Bogda component lies in the drainage area of the Sangong River, Sigong River, and Shuimo River.

(5) Soils

The serial sites of nominated Xinjiang Tianshan lie in different biological-climatic zones. The southern part of the Junggar Basin is temperate desert, while the Tarim Basin is warm temperate desert. Because of the differences of water storage capacity and evapotranspiration in various climatic zones, the changes in soil composition with altitude on the north and south slope are very different. The altitudinal zones of soil on the north slope is rather complete, from the lower to extremely high elevation, there are mountain grey brown desert soil, mountain brown desert soil, mountain chestnut soil, mountain chernozem, mountain grey cinnamonic soil, subalpine meadow soil, alpine meadow soil and alpine primitive soil. In the south slope, the mountain chernozem is lacking, and most of the places have no forest soil and subalpine meadow soil, except for the watershed of the Tailan River on the south slope of the Tomur Peak. In the Tomur Peak area, the altitudinal soil zones (from lower to higher elevation) include mountain brown desert soil, mountain brown desert soil, mountain chestnut soil and grey brown soil on shady slope, alpine meadow soil and the alpine primitive soil.

1.3.2 Landforms

The formation and development of the geology and landforms of Tianshan Mountains in Xinjiang are the outcome of the interaction of internal and external processes. Three stages of development were experienced, including a folding and upheaval stage, an erosion stage and a block uplifting stage. Landforms of the modern Tianshan Mountains are based on fault blocks. Under the effects of various exogenous forces since the Quaternary period, such as glaciation and fluviation, as well as drying and erosion, many kinds of landforms have been formed in Tianshan Mountains in Xinjiang, including fault blocks and basins, the grand mountainous plains and terrace landforms, as well as typical modern glacial landforms, ancient glacial landforms, canyons and the red terrains and so on.

1.3.3 Ecosystems

Tianshan Mountains in Xinjiang is located in the arid zone in Eurasia hinterland, surrounded by deserts. The huge mountains stand against the background of vast deserts, in a drop of 4000-6000 m. This geographical condition formed various water and heat types such as humid, semi-humid, arid and semi-arid ones. Distinct climate zones composed of warm temperate zone, mid-temperate zone, cold temperate zone, cold zones and alpine permanent ice-snow zone have been formed, and altitudinal natural zones including deserts, mountain steppe, deserts, mountain steppe, mountain forests, sub-alpine meadow, alpine meadow, alpine cushion vegetation and snow-ice zone has been formed, which provides good habitats and various living condition for wildlife, resulting in unique vegetation types and abundant species. Thus, complicated ecosystems have developed in Tianshan Mountains in Xinjiang.

1.4 Outstanding Universal Values

1.4.1 Criteria Met

According to the *Operational Guidelines for the Implementation of the World Heritage Convention*, the nominated serial property of Xinjiang Tianshan is proposed under World Heritage criteria (vii) and (ix).

Criterion (vii): contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance.

Criterion (ix): be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals.

1.4.2 Justification of Outstanding Universal Values

(1) Superlative natural phenomena or natural beauty

Located in the hinterland of Central Asia, far from any ocean and surrounded by vast deserts, Xinjiang Tianshan is the world's most representative natural mountain landscape in the temperate arid zone. It has outstanding landscape diversity and spectacular natural beauty. The east-west stretching Xinjiang Tianshan lies between the Junggar Desert in the north and the Tarim Desert in the south, to form a superlative scene, *two deserts flanking a mountain*. From western Tomur Peak (elevated at 7,443m) to eastern Bogda Peak (elevated at 5,445m), Xinjiang Tianshan forms a beautiful skyline over vast deserts in Central Asia. The beauty of Xinjiang Tianshan lies not only in the spectacular snow-capped mountains and glacier-capped peaks, beautiful forests and

meadows, clear rivers and lakes and grand red bed canyons, but also in the combination and contrast between the above-mentioned mountain elements and the vast desert, all superlative natural phenomena and of natural beauty. Xinjiang Tianshan has bare rocks on its south slope and luxuriant forest and meadow on north, giving a striking visual contrast of the hot and cold, the dry and wet, the desolate and luxuriant as well as the spectacular and exquisite. Tianshan is not only the *mountains of heaven* in China and Central Asia, but also a green corridor on the Silk Road. In history, it was eulogized in numerous fairy stories, legends, poems, songs and paintings. Today, Xinjiang Tianshan is still one of the most iconic symbols in China.

(2) Ongoing biological and ecological processes

Compared with the similar regions in the world, Xinjiang Tianshan is an outstanding example of the ongoing biological and ecological evolution process in temperate arid zone. At least after Pliocene Epoch (5Ma), the landform, ecology, biology and landscape are preserved in a better way because of the pattern of two deserts flanking one mountain, the location deep in Asia's hinterland and the arid continent climate, which is unique among the global mountain ecosystems and the most typical representative of mountain ecosystem in the temperate arid zone. The ongoing development of vegetation under the influence of landform and climate can be clearly found in the nominated properties. It is the typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, Tian Shan foothill arid steppe, within Global 200 Ecoregions 111 "Middle Asian Montane Steppe and Woodlands". Xingjiang Tianshan boasts typical range of mountain altitudinal natural zones in temperate arid zone, it significantly presents the distribution feature and developing law of mountain ecosystem in temperate arid zone, and it is an outstanding example for the study of biological community succession in mountain ecosystems in an arid zone undergoing global climate change. Xinjiang Tianshan boasts obvious altitudinal vegetation distribution, significant differences between north and south slopes and diversity of flora component. Its features of altitudinal vegetation distributions, significant differences between north and south slopes, diversity of flora, large areas of wild fruit forest, and refuge of relic species in Neogene Period, all illustrate the biological and ecological evolution of the Pamir-Tian-Shan Highlands. Xinjiang Tianshan has outstanding biodiversity and it is important habitat for relic species, and numerous rare and endangered species, as well as endemic species. It is a significant representative of the process whereby the original warm and wet flora has gradually been replaced by modern xeric Mediterranean flora.

2. Evaluation of the Current Protection and Management Situation

2.1 Protection and Management History of the Nominated Properties

Xinjiang Tianshan is located in the arid centre of Eurasia, and was not widely known because of its precipitous landforms, primitive vegetation cover and difficult transportation. Consequently, the outstanding resource values of the Tianshan Mountains in Xinjiang were not recognized by scholars until the 1980s. Prior to that, Xinjiang Tianshan had been under the influence of external natural forces. Therefore, the resources and the environment of the nominated properties had been left intact.

(1) Government protection and management

State and local governments now pay great attention to the environment and resources protection in the nominated properties.

The Tomur component: the Tomur Peak Provincial Nature Reserve was approved by the government of Xinjiang Uygur Autonomous Region in 1980. Then approved by the State Council of the People's Republic of China, it was promoted to National Nature Reserve in 2003. In 2006, the Tomur National Nature Reserve applied to the Ministry of Land and Resources of PRC to be a National Geological Park. The Administrative Bureau of Tomur National Nature Reserve, established by the governments of Wensu County and Aksu Prefecture, has drawn up a master plan aiming to strengthen the management and protection.

The Kalajun-Kuerdening component: The West-Tianshan National Nature Reserve was approved by the State Council of the People's Republic of China in 2000. In 2010, Kalajun Provincial Park was approved by the government of Xinjiang Uygur Autonomous Region. The governments of Ili Kazakh Autonomous Prefecture, Gongliu County and Tekesi County have issued a series of laws and regulations and have developed and implemented appropriate management regulations as well as a planning system to strengthen management and protection.

The Bayinbuluke component: In June of 1980, Bayinbuluke Provincial Nature Reserve was approved by government of Xinjiang Uygur Autonomous Region; in 1986, it was improved to National Nature Reserve by the state council of the People's Republic of China; in 2001, the administrative bureau of Bayinbuluke National Nature Reserve made a master plan to effectively

protect its ecological environment and biological diversity.

The Bogda component: the Tianshan Tianchi Provincial Nature Reserve was approved by the government of Xinjiang Uygur Autonomous Region in June, 1980. On 8th November, 1982, the State Council approved the establishment of Tianshan Tianchi National Park. On 27th November, 1990, it was listed as Northern Bogda Biosphere Reserve in the Temperate Desert of China, under the Man in the Biosphere Plan by UNESCO. On 31st December, 1994, the National Forest Park of Bogda was approved by the Forestry Ministry of PRC. It was enrolled in the National Wetland Inventory of China in 2004. In January 2006, the Party Committees and State Government of Changji decided to integrate the Tianchi Administrative Commission and the Administrative Bureau of Tianchi Nature Reserve into Xinjiang Tianchi Administrative Commission, and formulated *Regulation on the Management of the Tianshan Tianchi Park* which enhances the protection and management of Tianshan Tianchi with more responsibility.

(2) Protection of local pledges

Based on the knowledge gained through their daily lives, nomadic groups have formed folk traditions on the protection of the environment and these have played an important role in conserving natural environment. Local rules or regulations have been created as follows: grass cannot be cut, flowers cannot be stepped on, grass cannot be pulled, hay cannot be burned, living trees cannot be cut down, tree branches cannot be cut to pick fruits, pregnant animals cannot be hunted, cubs cannot be killed, dirty water cannot be poured into the river and waste must be buried. Such agreements have become widely-acknowledged civil regulations and rules that are worked out and abided by residents jointly.

(3) Natural conservation tradition of local inhabitants

In the customs and religious beliefs of the local nomadic people, nature shall be respected. Mountain forests, grasslands, lakes and water resources shall all be protected. Nature cannot be offended. To ensure their survival, nature is treasured and the environment is protected. For example, the traditional nomadic life of transhumance aims at preventing overuse and degradation of the grasslands. During the transhumance, the temporarily-inhabited locations are cleared and restored to their original condition. Water is regarded as the source of all living things and it is considered that gods live in the water, so the water cannot be polluted. Activities, which may contaminate water, such as hand-washing and laundry in the rivers and lakes, were prohibited. All these indicate the environmental-protection awareness of the local nomadic people.

2.2 Human Activities

2.2.1 Population and Nationality

The total area of Xinjiang Tianshan is 575,922ha, with no permanent residents. Every year from June to September, herdsmen enter into the edge of nominated properties for grazing. The total number of herdsmen is 4,446 and population density is less than 1 person/ km^2. They are predominantly ethnic minorities, including Kazakh, Mongol, Hui, Uygur, Kirgiz, Tajik, Uzbek, Russia, Tartar, etc. Among them, Kazakh and Mongol account for the most.

Table 2-1 Population of Xinjiang Tianshan

Property		Area (ha)	Population	Population description	Population density (Person/km^2)
Tomur		344,828	1,361	Seasonal herdsman	0.4
Kalajun-Kuerdening	Kalajun	47,768	372	Seasonal herdsman	0.8
	Kuerdening	35,139	624	Seasonal herdsman	1.8
Bayinbuluke		109,448	1,872	Seasonal herdsman	1.7
Bogda		38,739	217	Seasonal herdsman	0.6
Total		575,922	4,446	Seasonal herdsman	0.8

2.2.2 Major Human Activities

(1) Pastoral activities

The subalpine meadows of the high and mid mountains, hilly grassland of low mountains and meadows on the plain or lowlands can be respectively utilized as pastures in summer, spring-autumn and winter. Successively, waves of Saka, Yuezhi, Wusun, Qiang, Huns, Xianbei, Rouran, Turk, Uighur, Kazakh, Uyghur, Uzbek, Tartar and other nomadic people have lived here at times for centuries throughout history. All these peoples lived a nomadic life dependent on the water resource and grassland and they all respected the natural resources. Their conservation efforts played a positive role in protecting today's natural resources and enables Xinjiang Tianshan to retain its original natural environment and ecosystems.

(2) Tourism activities

Throughout history, the Tianshan Mountains in Xinjiang have attracted and impressed many

scholars of literature with their incomparable natural scenery. They include Li Bai, Li Shangyin, Cen Shen and other poets who left numerous poems and works. However, due to its isolated location as well as transportation difficulties and steep topography, tourism has only developed in recent years in some parts except for Tianchi. The main tourism activities are limited to the buffer zone. There are many regulations and ordinances on protecting the natural and ecological environment of Xinjiang Tianshan, so tourism has little effect on the natural and ecological environment.

2.3 Present State of Conservation

2.3.1 The Nominated Properties are National or Provincial Protected Areas by Regulations and Laws

The nominated properties have been successively granted various protective statuses, such as national nature reserve, national park and provincial park, etc.. Accordingly, they are protected by relevant laws and regulations, such as: *the Constitution of the People's Republic of China, the Forest Law of the People's Republic of China, the Environmental Protection Law of the People's Republic of China, Regulations of the People's Republic of China on Nature Reserves, Regulations of the People's Republic of China on Parks, Regulations on the Protection of Nominated World Natural Heritage Property of Xinjiang Tianshan,* etc..

2.3.2 Complete Management System and Administrative Authorities have been Established, Providing Sufficient Staff and Fund for Protection of the Nominated Properties.

A four-level management system, from the state to the province, the prefecture and the nominated property is in place and, accordingly, administrative bureau of nature reserves and administrative commissions of parks have been established to undertake management activities on behalf of the government. Thus, staff, material resource and fund are guaranteed.

2.3.3 A management Plan has been Worked out, Boundaries have been Defined, and Monitoring System has been Established.

A *Master Plan of Xinjiang Bayinbuluke Natural Nature Reserve, a General Plan of the National Nature Reserve of West Tianshan Mountains, a Master Plan of the Tomur Peak National Nature Reserve, Landscape Planning of Tianshan Tianchi* and other protective technical documents have been successively developed. In these documents, the scope of the nominated properties is defined with marked boundaries. To achieve strict protection and rational use of natural heritage resources, the *Management Plan of Nominated Xinjiang Tianshan* was drawn up. In this plan, the overall objectives of protection and management are stated, reasonable protection zonings

are outlined, protection is classified based on the importance of the heritage values, and detailed protection and management measures are stipulated. In addition, monitoring system is established to carry on long-term dynamic monitoring on the geological relics, biological processes, biodiversity, environmental quality, natural disasters and tourist impacts, with all data recorded for future reference.

Overall, the nominated properties are kept in their original natural state, mainly because of the steep terrain and difficult access. Most of the area is uninhabited, with no human activity in the core area. Furthermore, the sound legal system, scientific protection planning, and effective management will keep the heritage resources (such as the ecosystems, vertical natural zones, biodiversity, endangered species and habitats, geological relics and landforms) intact. Therefore, the integrity and the outstanding universal value of each nominated property will be kept in good condition.

2.4 Factors Affecting the Nominated Properties

Since the 1990s, tourism and animal husbandry have developed in the surrounding areas which bring potential pressures on the conservation of the natural environment and biodiversity. The administrative authorities of the nominated properties have adopted a series of forceful measures in recent years to reduce the effects of human activities. At present, factors adversely affecting the properties are as follows.

2.4.1 Main Threats and Countermeasures of Protection and Management

Main threats and countermeasures in the nominated property are natural disaster and human activity:

(1) Natural disasters

Countermeasures are taken by administrative authorities to protect the property from natural disasters such as forest fires, earthquakes, floods, blizzards, landslides, pests and diseases, etc.

- A geological disaster warning system has been established which reinforces the monitoring and prevention of disasters in key areas. Detailed effective prevention measures define the organizations that preside over geological disaster monitoring and make responsibilities clear and the system more operable. Besides, in the case of urgent geological disaster, leadership competence has been enhanced and reaction speed has been improved. Hence, the loss of personnel, possessions and damage to the environment should be minimized.

- A forest fire warning system has been set up. Fire-fighting professional troops are based

in the nominated properties. Protection stations and the community will carry out targeted responsibilities of forest protection and fire prevention together. Periodical training of full-time and part-time forest protection and fire prevention personnel will improve their knowledge and ability in fire prevention and suppression. There are warning boards of no smoking and no flammable material, and prevention infrastructure in dangerous parts of the sightseeing areas. Fire prevention and fire-fighting equipment has been improved. A hierarchical emergency scheme has been established allocating the responsibilities of management and personnel according to the scope and severity of forest fires.

- Monitoring of forest pests and diseases and associated research are being strengthened. Skilled professional staffs are responsible for the forecasting and monitoring of forestry pests and diseases. Biological means are the primary control and, together with chemical and physical techniques, comprise an appropriate strategy to manage forest pests and diseases. Inspection and quarantine of timber and seeds in the buffer zones are being strengthened to prevent the invasion of pests and diseases.

- Natural forest protection should be strengthened to increase resilience to ice storms, vegetation's anti-icing capacity. In addition, disaster emergency work for ice storms should be efficient and orderly, and management and emergency response capabilities to address ice storms should be improved to minimize or avoid the losses caused by disasters.

(2) Human activity

Human activities threatening the outstanding universal values are mainly economic development, environment pressure and tourism etc.

■ **Development pressures**

No industrial and mining enterprises and water conservancy works can be found within the properties. Original vegetation and habitats of wild animals were once disturbed by the rapid development of animal husbandry on the edges and in the buffer zones of the nominated properties; however, migration, limitation of the sizes of grazing, bans on grazing, and the introduction of subsidies and incentives for the protection of grasslands ecology have improved the situation. As early as in 2004, government of Xinjiang Uygur Autonomous prefecture has promulgated a ban on deforestation of the natural forest in Xinjiang. Thus there is no deforestation in the nominated properties and their buffer zones. Numerous rare wild animals occur here and poaching exists occasionally in history; however, since the establishment of various protected areas such as natural reserves or parks, which are protected by corresponding laws and regulations, there is essentially no poaching at present. No other infrastructure exists except what necessary for site protection, such as management stations and monitoring facilities.

■ Environmental pressures

As a result of global warming, the melting and shrinkage of modern glaciers in the nominated properties are being accelerating, as in other parts of the world. No invasive alien species have been found here so far. However, the vegetation and ecosystems have been affected in some places by harmful forest pest, which makes it necessary to strengthen quarantine work in the future. Since all the nominated properties are designated as national/provincial park or national/provincial nature reserve, some problems, such as grassland degradation, soil erosion and deforestation, have been effectively controlled.

With development of tourism industry, increase in tourist arrivals will bring more ecological pressures on the buffer zone of the nominated property of Bogda. To address this potential problem, the administrative authority of the nominated property has carried out a series of pre-emptive measures, such as: limiting the number of tourists and their length of stay; setting rules and regulations to restrict tourists' behavior, enhancing the promotion of, and education about, conservation; introducing an environment friendly shuttle bus and forbidding vehicles from entering the scenic areas; shipping collected garbage out of the scenic areas for disposal and improving sewage disposal systems to control and eliminate pollution sources effectively. The nominated properties are currently free of air and water pollution.

■ Tourism pressures

The development of the tourism industry has brought certain pressures on natural resource and environment in the nominated properties and in the buffer zones. No tourism has been developed in the nominated property of Tomur where only a little tourism occurs on the edge of its buffer zone. Only a few tourists can be found on the edge of the nominated properties of Kalajun-Kuerdening and Bayinbuluke and their buffer zones. A small amount of hiking and adventure tourism exists in the Bogda nominated property and mass tourism activities are mainly found in its buffer zone, leading to the extreme concentration of tourists and the overloading of environmental capacity in some hot spots in peak season. In buffer zones of the nominated properties of Bogda and Kalajun-Kuerdening, construction of tourism service facilities and infrastructure have led to varying degrees of environmental destruction and visual disturbance to the landscape. Tourism activities are to some extent a threat to the migration and habitat protection of wild animals there.

In recent years, administrative authorities in the nominated properties have used zoning and diversion of visitors to keep the tourists within the environmental capacity. Buildings affecting the environment and the integrity of the landscape have been demolished or renovated, and a series of ecological restoration projects have been implemented. Protection and management laws

and regulations have been developed and implemented. By taking these measures, pressures on the environment from tourism are alleviated effectively. If the site is listed as World Heritage, the tourist service system in the nominated property and the buffer zone will be enhanced; and the likely visitors will be accommodated in the buffer zones, and especially in the periphery Wensu county, Tekesi county, Gongliu county, Bayinbuluke town in Hejing county, and Fukang county.

2.4.2 Problems and Countermeasures in Management

(1) Finance

The availability of protection and management funds from local government will be influenced by the economic conditions, with resource conservation, scientific research, construction of protection facilities, and monitoring systems needing large amounts of capital. Although management organs of the nominated property strive to gain financial support, there is a great lack of funds for resource protection. A long-term plan to guarantee the protection and management funds can be made in each nominated property, and a combination of investment from government, civil donations and tourism income should be encouraged.

(2) Technology

Investment should be increased in training and equipment for field monitoring and patrolling.

(3) The balance of interests

Stakeholder's claims should be handled seriously. Resource protection has priority.

(4) Management policy

Protection and management mechanism should be enhanced. Based on the international conventions and national relevant laws, unified management standards should be established and specialized professional teams should be formed.

3. General Rules of Protection and Management

3.1 Authorities to Establish and Implement the Plan

According to *Operational Guidelines for the Implementation of the World Heritage Convention, Regulations of the People's Republic of China on Nature Reserves and Regulations of the People's Republic of China on Parks,* the leading group of Xinjiang Uygur Autonomous Region established this plan and will guide the protection and management of each nominated property based on this plan. Various stakeholders took part in the planning, including Housing and Urban-Rural Department of Xinjiang Uygur Autonomous Region, Department of Forestry of Xinjiang Uygur Autonomous Region, Xinjiang Animal Husbandry Department, Department of Land and Resources of Xinjiang Uygur Autonomous Region, Administration of Environmental Protection of Xinjiang Uygur Autonomous Region, Development and Reform Commission of Xinjiang Uygur Autonomous Region, and Tourism Bureau of Xinjiang Uygur Autonomous Region, as well as the government of where the nominated property is located. The administrative authority of each nominated property is to implement the plan.

Specific management bodies such as the Ministry of Housing and Urban-Rural Development, People's Government of Xinjiang Uygur Autonomous Region, Housing and Urban-Rural Development Department of Xinjiang Uygur Autonomous Region, the construction bureaus in relevant prefectures take part in the implementation of the plan. Specific administrative commission and administrative bureau are set up in the nominated properties with heritage management office, conservation and law branch, planning and construction branch, landscape management branch, comprehensive development branch, research center, promotion and external connection branch, etc. Office of the leading group of Xinjiang is set up under the administration of the Housing and Urban-Rural Development Department of Xinjiang Uygur Autonomous Region which carries out systematic coordination of management plan. Various agencies are responsible for their own work and cooperate with each other, providing a strong organizational guarantee for the implementation of the plan.

3.2 Time-limit of the Plan

Time limit of the plan is 2011-2015.

3.3 Basis of the Plan

3.3.1 Major Laws and Regulations

Table 3-1 Supportive laws and regulations

Name	Revision time	Issued by
Amendment to the Constitution of the People's Republic of China	2004	National People's Congress
Forestry Law of the People's Republic of China	1998	The Standing Committee of the 6th National People's Congress
Grassland Law of the People's Republic of China	2002	The Standing Committee of the 6th National People's Congress
Water Law of the People's Republic of China	2002	The Standing Committee of the 6th National People's Congress
Law of the People's Republic of China on Wildlife Protection	2004	The Standing Committee of the 7th National People's Congress
Law of the People's Republic of China on Environmental Protection	1989	The Standing Committee of the 7th National People's Congress
Regulations of the People's Republic of China on Nature Reserves	1994	State Council of the People's Republic of China
Regulations of the People's Republic of China Concerning Parks	2006	State Council of the People's Republic of China
Regulations of the People's Republic of China on Wild Plants Protection	1996	State Council of the People's Republic of China
Regulations of Xinjiang on Nature Reserves	2008	Standing Committee of Xinjiang People's Congress
Regulations of Xinjiang on Wild Plants Protection	2006	Standing Committee of Xinjiang People's Congress
Measures of Xinjiang concerning the Law of the People's Republic of China on the Protection of Wildlife	2004	Standing Committee of Xinjiang People's Congress
Regulations Concerning the Protection of Nominated World Natural Heritage Property Xinjiang Tianshan	2011	Standing Committee of Xinjiang People's Congress
Rules of implementation of the grassland law of Xinjiang	1997	Standing Committee of Xinjiang People's Congress
Regulations on management of Tianshan Tianchi National Park	2010	standing committee of people's congress of Changji Hui Autonomous Prefecture
Convention Concerning the Protection of the World Cultural and Natural Heritage	1972	UNESCO
Convention on Biological Diversity	1992	UNCED
Operational Guideline for the implementation of the World Heritage Convention	2008	UNESCO

3.3.2 Existing Plans Related to the Nominated Properties

Table 3-2 Supportive Plans

Name	Prepared by	Approved time
Master plan of Tomur Peak National Nature Reserve of (2001-2010)	Administrative Bureau of the Tomur Peak National Nature Reserve	2003
Master plan of Kalajun Park(2009-2020)	Government of Tekesi County	2009
Master plan of the National Nature Reserve of the West Tianshan Mountains (2003-2012)	Administrative Bureau of the National Nature Reserve of the West Tianshan Mountains	2002
Master Plan of Xinjiang Bayinbuluke National Nature Reserve(2002-2011)	Administrative Bureau of the Bayinbuluke National Nature Reserve	2001
Landscape Planning of Tianchi Lake(2004-2020)	Administrative Commission of Xinjiang Tianchi	2005
Master Plan of Xinjiang Tianchi and Bogda Nature Reserve (2008-2015)	Administrative Commission of Xinjiang Tianchi	2008
Master plan of Tianchi Geopark	Administrative Commission of Xinjiang Tianchi	2010

3.4 Content in the Plan

The plan defines the location and area of the nominated property, elaborates its outstanding universal value, analyzes its protection status, states some defects in the overall good protection, and puts forward a protection and management plan, so as to protect the nominated property effectively.

The contents are:

(1) to commit to and perform obligations according to the *convention concerning the protection of the world cultural and natural heritage* through overall planning and management of a series of nominated properties;

(2) to state objectively the location, scope, purpose of nomination, criteria met, reasons for being listed as nominated property, outstanding universal value and the present situation of protection and management of the nominated properties;

(3) to analyze objectively the challenges and problems of each of the nominated properties;

(4) to propose the overall protection and management objectives;

(5) to establish a series of specific protection and management plans for geo-relics, water, biology, ecology, landscape, etc.;

(6) to carry on protection partition and management partition of the nominated properties and formulate long-term protection and management policies and mechanisms;

(7) to formulate a series of integrated monitoring and evaluation mechanisms to ensure that the plan can be implemented effectively;

(8) to develop a series of integrated conservation and management schemes to guide operations in each nominated property.

3.5 Guiding Ideas of the Plan

Based on the spirit of *convention concerning the protection of the world cultural and natural heritage*, and the principle of "scientific planning, unified management, strict protection, sustainable use", we will strengthen the system of integrated effective protection and coordinated management, to establish a pattern of united protection and management, restore and strengthen ecosystem's function, and improve the internal development ability of the system; we will coordinate relations between tourism development and protection of resources and environment, and manage each nominated property to promote substantive protection through reasonable utilization, so that the whole series of heritage sites can develop in a benign fashion to ensure that the landforms, forest and water system are strictly protected, and scenic resource can be permanently used. Through capital investment, technical support and making laws and regulations, the government can manage the nominated properties effectively.

3.6 Goals of the Plan

According to *convention concerning the protection of the world cultural and natural heritage*, *convention on biological diversity* and China's relevant laws and regulations, the general aims of protection and management of the nominated properties are: to clarify the overall protection and management framework of Xinjiang Tianshan, to guide the protection and management of the heritage values of the nominated properties according to uniform standards to form a harmonious and smooth management mechanism in each property, to make the ecosystems such as glacier water sources, geological and landform relics, natural scenery, desert, grassland, forest, meadow and so on, and biodiversity, endangered species and their habitats effectively protected according to uniform standards and modes, to make the public aware of the improved protection, and to maintain and strengthen the outstanding universal value of the heritage.

The short-term goals are to establish and improve the management system and management

mechanisms for the nominated properties, to strengthen the legal system, to establish a professional protective law enforcement team for each nominated property, to improve resource conservation, to direct infrastructure construction in the scenic spots, to build heritage presentation and community residential systems and establish a scientific monitoring system.

The long-term goals are to gradually establish a legalized, standardized and internationalized heritage management system to effectively protect the geo relics, the complete environment, the diversity of species, the ecosystem's development in Xinjiang Tianshan, to make the serially nominated Xinjiang Tianshan into a world level scientific research and science education base, and famous world natural heritage, to achieve sustainable development and coordination of world heritage protection and exhibition.

4. Management Authorities and Personnel

4.1 Management Structure and Personnel Structure

4.1.1 Tomur

(1) Management framework: the office, division of resource and forest affairs, division of scientific research, publicity and training division, division of tourism and other business and the police station are established under the Administrative Bureau of Tomur Peak National Nature Reserve.

(2) Personnel structure: in the Administrative Bureau of Tomur Peak National Nature Reserve, there are 83 staff, of which 54 are professional managerial and technical staff; 51 have a college education or above; 24 have intermediate technical titles or above, 14 are other formal staff members and 15 are external experts.

4.1.2 Kalajun-Kuerdening

■ Kalajun

(1) Management framework: the office, division of planning and finance, division of marketing, division of reception, division of human resources and division of environmental protection are established under the Administrative Commissions of Kalajun Park.

(2) Personnel structure: in the Administrative Commissions of Kalajun Park, there are 50 staffs, of which 35 are professional managerial and technical staff; 29 have a college education or above; 13 have intermediate technical titles or above, 10 are other formal staff members and 5 are external experts.

■ Kuerdening

(1) Management framework: the office, division of resource and forest affairs, division of scientific research, division of tourism and other business and the police station are established under the Administrative Bureau of the West TianshanNational Nature Reserve.

(2) Personnel structure: in the Administrative Bureau of West TianshanNational Nature Reserve, there are 65 staffs, of which 42 are professional managerial and technical staff; 38 have

college education or above; 19 have intermediate technical titles or above, 13 are other formal staff members and 10 are external experts.

4.1.3 Bayinbuluke

(1) Management framework: the office, division of financial, division of protection, division of scientific research, division of various business and public security sub bureau are established under the Administrative Bureau of Bayinbuluke National Nature Reserve.

(2) Personnel structure: in the Administrative Bureau of Bayinbuluke National Nature Reserve, there are 77 staffs, of which 52 are professional managerial and technical staffs; 40 have a college education or above; 21 have intermediate technical titles or above, 20 are other formal staff members and five are external experts.

4.1.4 Bogda

(1) Management framework: ten divisions are established under the Administrative Commissions of Tianchi. These include the office, division of organization and human resources, division of publicity, education and law, division of planning and finance, division of reception, division of project planning and construction, division of resource conservation, division of operation and management, division of law enforcement and division of discipline inspection and supervision. There are also six institutions such as Tianchi National Forest Park, Bogda Environmental Monitoring Station, Ticket Managing Center, Property Management Center, Tianchi Information Center, Tianchi Tourist Service Center, and 1 agency of Tianchi Forest Public Security Sub bureau.

(2) Personnel structure: in the Administrative Commissions of Tianchi in the Tianshan Mountains, there are 337 staffs, of which 151 are professional managerial and technical staff; 151 have college education or above; 38 have intermediate technical titles or above, 208 are other formal staff members and 18 are external experts.

4.2 Plan of Management Authorities and Personnel Structure

4.2.1 Management Authorities

A multi-level management system, from the national to the local level, and a cooperative mechanism for governments, technological institutes, research institutes and communities have been constituted (Figure 4-1). Under the leadership of the Ministry of Housing and Urban-Rural Development of China, and the People's Government of Xinjiang, a leading group has been set up with an office in the Housing and Urban-Rural Development Department of

Xinjiang, and it will guide the application of the nominated properties of Xinjiang Tianshan for World Natural Heritage. At the same time, it will keep direct connection with world heritage administrative bodies in the Ministry of Housing and Urban-Rural Development and coordinate exchange and cooperation among various nominated properties. The leading groups in charge of the application for the nomination are commissioned by the governments of Aksu Prefecture, Ili Kazak Autonomous Prefecture, Bayangol Mongol Autonomous Prefecture, and Changji Hui Autonomous Prefecture and have direct jurisdiction over the nominated properties. The administrative authorities of nature reserve or park in the nominated properties will be responsible for the implementation of protective measures. Simultaneously, by relying on local governments, monitoring and scientific institutes and colleges, the monitoring, scientific protection and sound management should be strengthened. Furthermore, with the folk customs and nature conservation traditions of local residents, a multi-level and multi-department system of cooperation will be formed, ensuring that the protection and management system is in order.

Management agencies of the nominated World Natural Heritage properties of Xinjiang Tianshan are comprised of four levels, including national, provincial, prefectural and the nominated properties' agencies.

(1) National level

The Ministry of Housing and Urban and Rural Development of China is mainly responsible for the application of the nominated properties for Natural World Heritage designation, supervision and administration of conservation and planning of the nominated properties, regular monitoring of the nominated properties, the overall plan assessment of the natural parks in the nominated properties, and approval of key projects and the examination of protection measures in the nominated properties.

(2) Provincial level

The leading group of Xinjiang Uygur Autonomous Region will be responsible for the editing, supervision, examination and permission of protection and management plans of parks in the nominated properties of Xinjiang Tianshan. If successful, it will manage uniformly, carry out and monitor the implementation of protective measures. Besides, the department will be responsible for the coordination, communication and cooperation among the nominated properties.

(3) Prefectural level

Leading groups of the prefectures where the nominated properties of Xinjiang Tianshan for World Natural Heritage are located will be responsible for the implementation of protection and management, scientific research, monitoring, planning and development, construction and so on.

(4) Administrations of the nominated properties' level

This refers to the county leading groups of the nominated properties of Xinjiang Tianshan for World Natural Heritage. The administrative commission of parks and the administrative bureau of nature reserves where the nominated properties are located will be in direct charge of the administrative bureau of parks or administrative commissions of nature reserves in Xinjiang Tianshan. They will be responsible for the monitoring of resources and environments, management of executive staff and the implementation of regulations and plans and so on. Besides, they are responsible for the construction of a digital monitoring centre and scientific centre, to enhance scientific conservation and management of the nominated property and implement protective and managing measures directly.

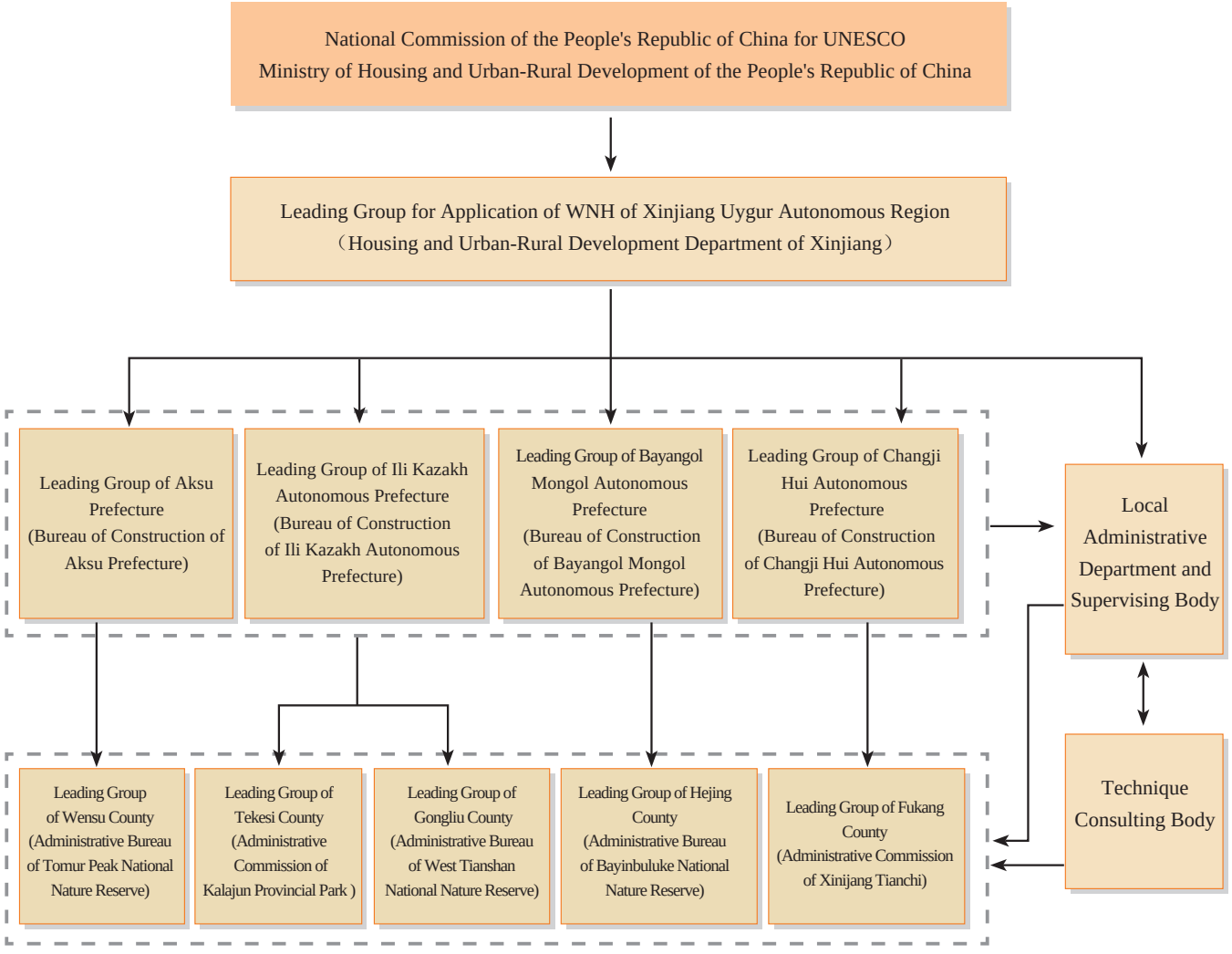

Figure 4-1 Management system of Xinjiang Tianshan

4.2.2 Equipment of Specific Personnel

Technical personnel include individuals with backgrounds in physical geography, geology, environmental engineering, botany, zoology, planning and design, management of parks, GIS, tourism management, and financial accounting, etc.

Table 4-1 Personnel structure in Tomur component

Major	By 2010	2011	2012	2013	2014	2015	Total
Physical geography	-	-	-	1	1	1	3
Geology	-	-	4	1	1	1	7
Ecology	-	-	2	1	1	-	4
Botany	-	-	2	1	1	-	4
Zoology	-	-	2	1	1	1	5
Forestry	-	-	1	-	1	1	3
Glacier monitor	-	-	1	1	1	1	4
Forest conservation	-	-	1	1	1	1	4
GIS	1	-	2	1	1	-	5
Environment engineering	-	-	-	2	1	1	4
Management of parks	3	-	-	-	1	-	4
Resource managing of natural reserve	1	-	1	1	1	1	5
Planning and design	-	-	2	1	1	1	5
Medicine	-	-	-	2	1	1	4
Law, English	-	-	2	1	1	1	5
Chinese language and literature	-	-	3	2	1	1	7
Tourism management	-	-	4	2	3	3	12
Economy management	-	-	3	2	2	1	8
Financial accounting	4	-	1	1	1	1	8
News and communication	-	-	2	2	1	1	6
Public management	-	-	2	1	2	1	6
Computer science and technology	-	-	2	2	2	1	7
Total	9	-	37	27	27	20	120

Table 4-2 Personnel structure in Kalajun component

Major	By 2010	2011	2012	2013	2014	2015	Total
Physical geography	-	-	1	1	1	1	4
Geology	-	-	1	1	-	1	3
Ecology	-	-	1	1	1	1	4
Botany	-	-	3	1	1	1	6
Zoology	-	-	1	1	1	1	4
Forestry	-	-	1	1	1	1	4
Forest conservation	-	-	1	1	1	1	4
GIS	-	-	-	1	1	1	3
Environment engineering	-	-	2	3	2	2	9
Management of parks	-	-	2	2	2	2	8
Resource managing of natural reserve	-	-	1	1	1	-	3
Planning and design	-	-	2	1	1	1	5
Medicine	-	-	-	1	1	1	3
Law, English	-	-	2	1	1	1	5
Chinese language and literature	2	-	2	1	1	1	7
Tourism management	-	-	3	3	3	3	12
Economy management	-	-	2	1	1	1	5
Financial accounting	2	-	2	1	1	1	7
News and communication	-	-	2	2	1	1	6
Public management	-	-	1	1	2	1	5
Computer science and technology	-	-	2	1	1	1	5
Total	4	0	32	27	25	24	112

Table 4-3 Personnel structure in Kuerdening component

Major	By 2010	2011	2012	2013	2014	2015	Total
Physical geography	-	-	1	-	1	-	2
Geology	-	-	-	1	-	1	2
Ecology	-	-	1	1	-	-	2
Botany	-	-	1	-	1	-	2
Zoology	-	-	-	1	-	1	2
Forestry	-	-	2	2	1	1	6
Forest conservation	1	-	1	-	1	-	3
GIS	-	-	1	1	2	2	6
Environment engineering	-	-	-	-	1	1	2
Management of parks	-	-	2	1	1	-	4
Resource managing of natural reserve	-	-	1	-	1	-	2
Planning and design	-	-	2	1	1	-	4
Medicine	-	-	-	1	1	1	3
Law, English	-	-	1	1	-	1	3
Chinese language and literature	-	-	2	2	1	1	6
Tourism management	-	-	3	3	2	2	10
Industrial and commercial management	-	-	2	1	1	-	4
Economy management	-	-	3	3	2	2	10
Financial accounting	-	-	3	3	1	1	8
News and communication	-	-	2	2	1	1	6
Arts	-	-	3	3	2	2	10
Public management	-	-	2	1	1	-	4
Computer science and technology	-	-	2	1	1	1	5
Total	1	0	35	29	23	18	106

Table 4-4 Personnel structure in the Bayinbuluke component

Major	By 2010	2011	2012	2013	2014	2015	Total
Physical geography	5	3	2	2	1	1	14
Geology	5	1	2	1	1	1	11
Ecology	4	1	2	1	1	1	10
Botany	3	1	2	2	2	2	12
Zoology	2	1	2	1	1	1	8
GIS	3	1	2	2	1	1	10
Environment engineering	5	1	2	2	1	1	12
Management of parks	1	1	2	2	1	1	8
Resource managing of natural reserve	5	1	2	1	1	1	11
Medicine	0	1	2	2	1	1	7
Law, English	1	1	2	2	1	1	8
Chinese language and literature	1	1	2	2	1	1	8
Tourism management	8	2	2	2	2	2	18
Economy management	1	1	2	1	1	1	7
Financial accounting	1	1	2	2	1	1	8
Public management	0	1	2	2	1	1	7
Computer science and technology	0	2	2	2	1	1	8
Total	45	21	34	29	19	19	167

Table 4-5 Personnel structure in the Bogda component

Major	By 2010	2011	2012	2013	2014	2015	Total
Physical geography	-	-	-	1	-	-	1
Geology	1	-	-	-	1	-	2
Ecology	-	-	-	-	1	-	1
Botany	16	-	-	-	-	-	16
Zoology	3	-	-	-	-	-	3
Forestry	-	-	2	2	1	1	6
Glacier monitor	-	-		1	1	1	3
Forest conservation	-	-	2	2	1	1	6
GIS	1	-	1	-	-	-	2
Environment engineering	2	-	1	-	-	-	3
Management of parks	5	-	1	1	1	-	8
Resource managing of natural reserve	-	-	1	1	1	1	4
Medicine	3	-	-	-	-	-	3
Law, English	10	-	1	-	-	-	11
Chinese language and literature	9	-	-	1	1	-	11
Tourism management	11	-	1	1	1	1	15
Economy management	31	-	-	-	1	-	32
Financial accounting	24	-	1	-	-	-	25
Public management	4	-	-	-	-	-	4
Computer science and technology	9	-	-	1	-	-	10
Total	129	-	11	11	10	5	166

5. Finance Guarantee

5.1 Sources and Levels of Finance

Over years, state and local governments, and administrations of the nominated properties have attached great importance to their protection. From 2006 to 2010, more than 0.9 billion yuan has been invested on a field survey of biological resources, geological resources and scenic resources, scientific research, environmental remediation and infrastructure construction (Table 5-1). Nominated properties are located in the economically underdeveloped regions of western China and more than 30% of the funding was from the Central Government and the People's Government of Xinjiang Uygur Autonomous Region.

Table 5-1 Sources and levels of finance

(Unit: 10,000 yuan)

Property		Item	Year					Total
			2006	2007	2008	2009	2010	
Tomur		Financial revenue	15	15	11	15	18	74
		Special subsidy	80	101	101	203	219	704
		Amount	95	116	112	218	237	778
Kalajun-Kuerdening	Kalajun	Financial revenue	-	22	33	85	9	149
		Special subsidy	-	-	-	-	600	600
		Total Investment of Fixed Assets	-	80	650	420	-	1,150
	Kuerdening	Amount	-	102	683	505	609	1,899
		Financial revenue	54	65	622	88	163	992
		Special subsidy	-	-	-	-	-	-
		Amount	54	65	622	88	163	992
Bayinbuluke		Financial revenue	5	10	10	20	20	65
		Special subsidy	2	2	4	5	5	18
		Amount	7	12	14	25	25	83
Bogda		Financial revenue	4,647	8,725	5,232	3,844	8,907	31,355
		Special subsidy	0	0	35	0	20	55
		Total Investment of Fixed Assets	3,273	6,160	11,862	12,000	23,880	57,175
		Amount	7,920	14,885	17,129	15,844	32,807	88,585
Total (2006-2010)								92,337

5.2 Financial Expenditure

Table 5-2 Expenditures of Xinjiang Tianshan in recent years

(Unit: 10, 000 yuan)

Investment	2006	2007	2008	2009	2010	Total
Environmental protection and remediation	7	2,154	3,679	1,589	3,519	10,948
Social security and employment	119	159	194	207	183	862
Agriculture, forestry and water affairs	54	65	80	88	163	450
Tourism industry affairs	1,855	2,387	2,969	2,254	3,263	12,728
Ecological restoration	-	96	307	164	188	755
Infrastructure	4,366	2,542	5,292	5,273	3,715	21,188
Special protection project	-	-	-	-	800	800
Interest on debt	-	469	1,145	2,618	1,182	5,414
Tax	186	289	134	114	275	998
Total	6,587	8,161	13,800	12,307	13,288	54,143

Table 5-3 Expenditure of Tomur component in recent years

(Unit: 10, 000 yuan)

Investment	2006	2007	2008	2009	2010	Total
Infrastructure	658	-	-	-	678	1,336
Total	658	-	-	-	678	1,336

Table 5-4 Expenditure of the Kalajun component in recent years

(Unit: 10, 000 yuan)

Investment	2006	2007	2008	2009	2010	Total
Tourism industry affairs	-	2	3	5	9	19
Special protection project	-	80	550	80	600	1,310
Infrastructure	-	20	130	420	-	570
Total	-	102	683	505	609	1,899

Table 5-5 Expenditure of the Kuerdening component in recent years

(Unit: 10, 000 yuan)

Investment	2006	2007	2008	2009	2010	Total
Agriculture, forestry and water affairs	54	65	80	88	163	450
Infrastructure	-	-	542	-	-	542
Total	54	65	622	88	163	992

Table 5-6 Expenditure of the Bayinbuluke component in recent years

(Unit: 10, 000 yuan)

Investment	2006	2007	2008	2009	2010	Total
Environmental protection and remediation	7	12	24	25	25	93
Total	7	12	24	25	25	93

Table 5-7 Expenditure of the Bogda component in recent years

(Unit: 10, 000 yuan)

Investment	2006	2007	2008	2009	2010	Total
Environmental protection and remediation	-	2,142	3,655	1,564	3,494	10,855
Social security and employment	119	159	194	207	183	862
Tourism industry affairs	1,855	2,384	2,966	2,249	3,254	12,708
Ecological restoration	-	96	307	164	188	755
Fix assets	3,273	6,160	11,862	12,000	23,880	57,175
Protection and management of infrastructure	3,708	2,542	4,750	5,273	3,037	19,310
Special protection project	-	-	-	-	800	800
Interest of debt	-	469	1,145	2,618	1,182	5,414
Tax	186	289	134	114	275	998
Total	9,141	14,241	25,013	24,189	36,293	108,877

5.3 Financial Guarantee Plan for the Nominated Property

5.3.1 Financial Guarantee of the Managing Authorities

According to the management needs and implementation of the protection plan and infrastructure construction plans of the nominated properties, the state, the People's Government of Xinjiang Uygur Autonomous Region and the relevant authorities allocate special funds for infrastructure construction, environmental protection, forest protection, grassland protection and other projects, to ensure the necessary funds are available for planning and design, scientific research and daily management of the nominated properties.

The people's governments of the city/county where the nominated property is located, according to the local annual budget and national and autonomous region's construction project plan, allocate local matching funds for infrastructure construction, tourism development subsidy, ecological resettlement funds to ensure the necessary funds are available for conservation of the nominated properties.

The nominated properties will get normal maintenance and operating costs through the development of tourism, increase of tourism ticket revenues, management income, which will be a supplementary means of raising maintenance and operating funds.

5.3.2 Special Funds

In order to ensure long-term, stable and adequate funding sources for the protection of resources and tourist management, the nominated properties have established a special funds, including a special fund for environmental and resources protection, a special fund for visitor management and special fund for capability construction.

The special fund for environmental and resources protection focuses on supporting resources and environment research and monitoring in the nominated properties, including the landform protection and research, protection and utilization of natural resources, protection and research of ecological systems, dynamic environmental monitoring, personnel training on protection of resources and so on.

The special fund for visitor management focuses on supporting research and management of tourists' safety, tourists' experiences and so on, including interpretation and education personnel training, tourism market research etc.

The special fund for capability construction focuses on supporting scientific research and management personnel training in the nominated properties, including basic and applied research, participation in various training programs, cooperation and exchange programs and meetings, visit and inspection projects and so on.

6. Guarantee of Law

6.1 Existing Laws and Regulations

Over the past twenty years, China has promulgated a series of laws and regulations related to natural resources and environmental protection, including conservation of various natural resources, ownership, utilities, benefit, planning, developing and so on in the nominated properties. These laws, regulations and international conventions constitute the basis for the nominated properties to be protected and managed in accordance with the law. Nominated properties are strictly protected by the following laws and government regulations, which any individual, group and government agency should obey.

(1) International conventions

- *Convention Concerning the Protection of the World Cultural and Natural Heritage (1972);*
- *Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975);*
- *Convention on Biological Diversity (1992);*
- *Guideline for Category of Reserve Conservation (1994);*
- *Operational Guideline for the Implementation of the World Heritage Convention (2010).*

(2) Laws

- *Constitution of the People's Republic of China (2004);*
- *Mineral Resources Law of the People's Republic of China (1996);*
- *Forestry Law of the People's Republic of China (1998);*
- *Grassland Law of the People's Republic of China (2002);*
- *Law of the People's Republic of China on the Protection of Wildlife (2004);*
- *Water Law of the People's Republic of China (2002);*
- *Law of the People's Republic of China on Environmental Protection (1989);*
- *Law of the People's Republic of China on Water and Soil Conservation (2010);*
- *Law of the People's Republic of China on Protection of Cultural Relics (2002);*
- *Urban and Rural Planning Law of the People's Republic of China (2007);*
- *Land Administration Law of the People's Republic of China (2004);*
- *Law of the People's Republic of China on Prevention and Control of Water Pollution (2008);*
- *Law of the People's Republic of China on Prevention and Control of Atmospheric Pollution (2000);*
- *Law of the People's Republic of China on Prevention and Control of Pollution From*

Environmental Noise (1996);

- *Law of the People's Republic of China on the Prevention and Control of Environmental Pollution by Solid Waste (1995).*

(3) Regulations

- *Regulations of the People's Republic of China on Nature Reserves (1994);*
- *Regulations of environment protection management of construction project (1998);*
- *Regulations of plan environment impact evaluation (2009);*
- *Regulations of the People's Republic of China Concerning Parks (2006);*
- *Regulations for the Implementation of Forestry Law of the People's Republic of China (2000);*
- *Regulations for the Implementation of the People's Republic of China on the Protection of Terrestrial Wildlife (1992);*
- *Regulations of the People's Republic of China on Wild Plants Protection (1996);*
- *Regulations of Construction Management of Parks (2006);*
- *Regulations of Conservation and Management of Geological Relics (1995).*

Besides the above mentioned ones, Xinjiang Uygur Autonomous Region established and enacted corresponding rules and local laws based on relevant laws of China in light of the local conditions.

Table 6-1 Local laws and regulations concerning the protection of the nominated property

Name	Issue Time	Issued by
Regulations on Protection of Nominated World Natural Heritage Property of Xinjiang Tianshan	2011	Standing Committee of People's Congress of Xinjiang Uygur Autonomous Region
Regulations of Xinjiang on Nature Reserves	1997	Standing Committee of People's Congress of Xinjiang Uygur Autonomous Region
Rules for Grassland Law of Xinjiang	1997	Standing Committee of People's Congress of Xinjiang Uygur Autonomous Region
Measures of Xinjiang Concerning the Law of the People's Republic of China on the Protection of Wildlife (Second Draft)	2004	Standing Committee of People's Congress of Xinjiang Uygur Autonomous Region
Regulations of Xinjiang on Wild Plants Protection	2006	Standing Committee of People's Congress of Xinjiang Uygur Autonomous Region
Regulations on Management of Tomur Peak National Naure Reserve	1985	Standing Committee of People's Congress of Aksu Prefecture
Regulations on Management of Tianshan Tianchi National Park	2010	Standing Committee of People's Congress of Changji Hui Autonomous Prefecture

6.2 Establishment of Protection and Management Laws

According to legislative requirements of protection of national nature reserve and natural heritage site, the Standing Committee of People's Congress of Xinjiang Uygur Autonomous Region issued *Convention Concerning the Protection of Nature Reserves of Xinjiang* in 1997. It states National Nature Reserves are managed by authorities concerning nature reserve of the government of Xinjiang Uygur Autonomous Region or of the State Council; provincial nature reserves are managed by authorities concerning nature reserve of Xinjiang Uygur Autonomous Region or of the government above the county-level; prefectural nature reserve or that of county level will be managed by authorities concerning nature reserve of the government which set the reserve or of the government of the county level. *Regulations on Protection of Nominated World Natural Heritage Property of Xinjiang Tianshan* was issued in 2011, and it states government of Xinjiang Uygur Autonomous Region will lead the overall work of the conservation of Xinjiang Tianshan with Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region in charge of the organization and implementation of specific work. Under the inspection and guide of Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, governments in prefectures and counties where the nominated properties are located will establish administrative authorities to be in charge of the protection and management in their own scopes. Relevant departments of housing and urban-rural development, forestry, environment protection, planning, agriculture, land and resource, animal husbandry, culture and tourism will be in charge of the protection and management of nominated properties in their limits of authority. When Xinjiang Tianshan is inscribed on the World Heritage List, a series of specific conservation measures will be available according to *Operational Guidelines for the Implementation of the World Heritage Convention* and the situation of the nominated properties.

7. Protection of Outstanding Universal Values

7.1 Protection on Biology and Ecology

7.1.1 Biological and Ecological Value

According to Udvardy's system of biogeographic provinces, Xinjiang Tianshan is located in the biogeographic province of Pamir-Tian-Shan Highlands; it belongs to Mountains of Central Asia (CI22) in 34 global biodiversity hotspots of CI (Conservation International); it is the representitave of Mountains of Middle Asia in the plant diversity system of IUCN/WWF; it is important in Middle Asian Montane Steppe and Woodlands of the WWF's Global 200 Ecoregions and it is the typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows and Tian Shan foothill arid steppe; it is an important bird breeding base in Taklimakan Desert of 218 EBAs (Endemic Bird Area) of BIC (Bird International Conservation).

Xinjiang Tianshan is the most typical representative of mountain ecosystem in the temperate arid zone. Xinjiang Tianshan is a unique huge mountain ecosystem surrounded by two vast deserts. It is outstanding among the global mountain systems because of the pattern of two deserts flanking one mountain, the location deep in Asia's hinterland and the arid continent climate. Numerous glaciers and rivers in the huge mountains act like a water tower, which maintain the mountain-oasis-desert ecosystem in the arid zone. In climatic terms, there are five temperature zones (warm temperate, temperate, cold temperate, frigid and alpine permanent ice-snow) and four precipitation zones (humid, semi-humid, semi-arid, and arid). There are seven first level habitat types according to IUCN/SSC, including forest, steppe, shrub, steppe, wetland, etc. as well as 22 second level habitat types. As for the vegetation, there are nine types, 25 sub types and 82 formations.

Tianshan in Xinjiang belongs to the Global 200 Ecoregion 111 "Middle Asian Montane Steppe and Woodlands". And the nominated property is the typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, and Tian Shan foothill arid steppe. In the Kalajun component, the montane steppe and meadow of Xinjiang Tianshan are most extensive. The Kuerdening component is where *Picea schrenkiana* is most concentrated in the Tianshan, and this is also the only reserve designated to conserve *Picea schrenkiana* and its environment. On south slope of the Tomur component, large areas of foothill arid steppe remain in their original state. The Bayinbuluke component is an outstanding example of steppe and wetland in a high intermountain basin in the Tianshan Mountains.

The Xinjiang Tianshan site has all the typical mountain altitudinal natural zones of a temperate

arid zone. Their distribution reflects the water and heat variations at different altitudes, gradients and slopes. The nominated property is an outstanding example for the study of biological community succession in mountain ecosystems in an arid zone undergoing global climate change. In Tomur, there is a complete range of altitudinal natural zones on the south slope of Tianshan, from the ice-snow zone to warm temperate desert zone across an elevation drop from 7,443 m to 1,450 m. In Bogda, there is a range of altitudinal natural zones on the north slope of Tianshan, from the ice-snow zone to mountain steppe zone across an elevation drop from 5,445 m to 1,380 m.

Xinjiang Tianshan is the outstanding representative of biological and ecological evolution on the Pamir-Tian-Shan Highlands. The Xinjiang Tianshan nomination extends across the Eurasian forest floristic subregion and Asian desert floristic subregion. Its features of altitudinal vegetation distributions, significant differences between north and south slopes, and diversity of flora, all illustrate the biological and ecological evolution of the Pamir-Tian-Shan Highlands. Due to its special location and climate, the Kalajun-Kuerdening component became a refuge for relic species in Paleogene Period. There are large areas of wild fruit forest with 52 species of wild fruit tree. It is the only place where the wild *Padus avium* originated. This area also exhibits evidence of biological evolution and succession under the influence of the global climate change.

Xinjiang Tianshan has outstanding biodiversity and it is important habitat for relic species, and numerous rare and endangered species, as well as endemic species. It is a significant representative of the process whereby the original warm and wet flora has gradually been replaced by modern xeric Mediterranean flora. It is a component of the *Mountains of Central Asia*, one of Conservation International's 34 Global Biodiversity Hotspots, as well as lying within the *Mountains of Middle Asia*, one of the IUCN/WWF Centres of Plant Diversity. The site contains 2 622 species of vascular plants (from 635 genera and 106 families) and 550 species of vertebrate animals (from 276 genera and 90 families and 36 orders). There are 94 relic plant species before Quaternary Glaciation. There are 110 species of rare and endangered plants and 367 species of rare and endangered wild animals. There are 118 species of endemic plants and 22 species of endemic animals in the nominated property.

7.1.2 Existing Problems and Threats

(1) There is insufficient research on the biological resources and their habitats, and it is difficult to determine the extensive scope of habitats;

(2) Basic research on various plant species is insufficient;

(3) Tourism activities will cause some interference with biological resources and their habitats;

(4) Global climate change is an unpredictable threat on biological resources and their habitats;

(5) Climate warming and human activities accelerate the glacier shrink.

7.1.3 Protection Measures

(1) Strengthen exchanges and cooperation with relevant international and domestic units, invite colleges and biological research institutions to establish a species diversity research base, develop a local biological research team and carry out long-term fundamental biological and ecological research and monitoring;

(2) Markers have been erected in the nominated properties and on the boundaries of buffer zones. Management authorities will further define areas for touring and seasonal grazing;

(3) Establish a professional management team and a patrol team; improve the training and knowledge of means to protect biological resources; conservation management authorities should work hard to control pests, prevent invasion of harmful alien species and reduce the impacts of forest fires;

(4) Improve the investigation and monitoring of biodiversity and wildlife; arrange a fixed monitoring sample area of 1 x 1 km and a new monitoring line to monitor the animals and plants in the property;

(5) Grazing will be prohibited to protect the alpine meadows in the nominated property and the buffer zone to maintain the biodiversity;

(6) Mountain patrols will be carried out regularly to protect the forest. They will be based on the protection station and monitoring area. More funds and more equipments should be made available;

(7) Depopulated areas should be defined and grazing and all tour activities should be prohibited in these areas to leave passages for wildlife and to protect their habitat;

(8) Enhance wildlife rescue, carry out treatment for individual injured, infected, old and weak animals, and build a rare and endangered wild animal rescue center;

(9) Carry on early rehabilitation for rescued wild animals before they are released to enhance their survival ability.

7.1.4 Plan of Protective Action

(1) Establish and improve biological and ecological research, and protection and management

institutions in the nominated property, and establish a research base in cooperation with colleges and universities;

(2) Strengthen management of natural forest in the nominated property with the key being to improve and guarantee the long-term implementation of government compensation mechanisms;

(3) Establish a multi-dimensional monitoring and inspection system composed of a protection station, monitoring sites and so on to prevent the invasion of harmful alien species;

(4) Establish an ecological and species conservation base to strengthen the conservation and breeding of endangered species and ecological restoration projects;

(5) Establish a multi-dimensional forest fire prevention team; improve the forest fire prevention system and strengthen forest fire protection;

(6) Strengthen domestic and international exchanges and cooperation, and engage in discussion and research on protection measures to counter global climate change and maintain biodiversity;

(7) The protection stations set up in the nominated properties will carry out strict inspections to prohibit expeditions and tourists from entering glacier areas, and to limit the tourist arrivals and their distribution in the buffer zones;

(8) Societal awareness of glacier conservation should be raised through publicizing information about glaciers knowledge and inviting people to learn about relevant laws and regulations.

7.2 Protection on Natural Landscape

7.2.1 Esthetic Value of the Natural Landscape

Located in the hinterland of Central Asia, far from any ocean and surrounded by vast deserts, Xinjiang Tianshan is the world's most representative natural mountain landscape in the temperate arid zone. It has outstanding landscape diversity and spectacular natural beauty. The east-west stretching Xinjiang Tianshan lies between the Junggar Desert in the north and the Tarim Desert in the south, to form a superlative scene, *two deserts flanking a mountain.* From western Tomur Peak (elevated at 7,443 m above sea level) to eastern Bogda Peak (elevated at 5,445 m above sea level), Xinjiang Tianshan forms a beautiful skyline over vast deserts in Central Asia.

The beauty of Xinjiang Tianshan lies not only in the spectacular snow-capped mountains and

glacier-capped peaks, beautiful forests and meadows, clear rivers and lakes and grand red bed canyons, but also in the combination and contrast between the above-mentioned mountain elements and the vast desert, all superlative natural phenomena and of natural beauty. In the Tomur component, white snow-capped mountains and glacier-capped peaks stand close by flaming red bed canyons to form a sharp contrast. In the Karajun-Kuerdening component, green and luxuriant forests and meadows mingle with each other to form various patterns. In the Bayinbuluk component there are wide expanse of steppe and free rivers and lakes, where the meanders of the Kaidu River form a graceful scene. In the nominated property of Bogda, snow capped mountains, glaciers, rivers, lakes, forests and meadows coexist with each other to present a superlative natural beauty of mountains in a desert area.

Xinjiang Tianshan has bare rocks on its south slope and luxuriant forest and meadow on north, giving a striking visual contrast of the hot and cold, the dry and wet, the desolate and luxuriant as well as the spectacular and exquisite..

The Tianshan is not only the *mountains of heaven* in China and Central Asia, but also a green corridor on the Silk Road. In history, it was eulogized in numerous fairy stories, legends, poems, songs and paintings. Today, Xinjiang Tianshan is still one of the most iconic symbols in China.

7.2.2 Existing Problems and Threats

(1) Seasonal nomadic activity has interfered with the original vegetation and wildlife habitat to varying degrees at the edge of some nominated properties;

(2) Potential natural disasters include earthquakes, fires, floods, mudslides, blizzards and forest pests and diseases;

(3) The development of tourism brings certain pressures on natural resources and environment protection in the nominated properties.

7.2.3 Conservation Measures

(1) All levels of government in the nominated properties are strengthening environmental protection, alert to alien species, limiting animal husbandry to the approved carrying capacity, completely banning of herd, etc.

(2) Construction projects are strictly controlled in the nominated properties and the buffer zones, especially infrastructure, service facilities and the construction of residences. The location, size, color and architectural style are strictly controlled to ensure the coordination between artificial projects and the natural landscape.

(3) All construction projects in the nominated properties, the buffer zones and the peripheral service area are required by law to carry out environmental impact assessments, and put forward schemes for comprehensive pollution control facilities and environmental protection.

(4) According to the vulnerability of protected objects and resource characteristics, the management organs in the nominated properties should further clarify accessibility to tourists, control tourist activities in reasonable way, and reduce the influence of tour activities on the environment.

(5) An overall protection scheme for the natural landscape and a management mechanism should be established, zoning systems should be proposed, and the relationship between protection and sight-seeing should be coordinated.

(6) Landscapes in the nominated property and buffer zone should be registered, their types should be distinguished and protection grades should be established.

7.2.4 Action Plan

(1) Plan of landscape conservation and regulations concerning construction and management will be formulated. Geographic information system of the nominated property and the buffer zone should be established. An approval system should be established for construction projects in the nominated property and the buffer zone. Construction management should be strengthened through specialized protective law enforcement and inappropriate construction projects should be nipped in the bud. Multi-level, real-time monitoring should be undertaken.

(2) Construction that is not harmonious with the environment will be removed.

(3) Lumbering is prohibited inside the nominated properties and buffer zones; protection stations and checkpoints are to be established at main intersections in the buffer zone of each nominated property to prevent timber from being transported outside.

(4) The unique natural landscapes and their distribution in the nominated properties, their significance and the protection measures should be publicized.

8. Protection Partition and Management Partition

At present, the nominated properties are protected and managed by means of partition and classification stated in *Master plan of Tomur Peak National Nature Reserve (2003-2008), Master plan of Kalajun Park(2009-2020), Master plan of the National Nature Reserve of the West Tianshan Mountains (2003-2012), Master Plan of Xinjiang Bayinbuluke National Nature Reserve(2002～2011), Landscape planning of Tianshan Tianchi (2004-2020), and Master Plan of Xinjiang Tianchi and Bogda Nature Reserve (2008-2015).*

On the basis of the *Convention Concerning the Protection of the World Cultural and Natural Heritage* and *Convention on Biological Diversity*, the plan clarifies the protection partition and management partition based on the sensitivity and endangerment of protection objectives, as well as the requirement of heritage exhibition. The plan focuses on protection of the major geo relics, the representative species, ecosystems and the environment of biological evolution, reduce of the disturbance of human activities and the conservation of natural features of the nominated properties. Moderate utilization or reasonable management activities are permitted so as to enhance the integrated value of the properties.

8.1 Protection Partition in the Nominated Properties

Protection partition is based on the protected objects' situation, their distribution characters and the possible degree of disturbance on them, so as to coordinate relationships between protection and utilization in different parts. There are three protection districts in Xinjiang Tianshan: construction prohibited district, construction limited district and exhibition district.

(1) Construction prohibited district

It is the core area that possesses outstanding universal values. It is highly valuable in ecology, aesthetics, science and teaching. It is where modern glaciers, ancient glacial relics, representative ecosystems and evolutionary processes, and endangered species and their habitats are strictly preserved. Ecosystems and landscapes must be maintained in their original state with only necessary facilities allowed for scientific research and monitoring and for security. Irrelevant personnel are forbidden to enter the restriction and limited utilization zones except to undertake necessary activities. All production and construction activities are prohibited.

Key points of protection in this district: There is strict prohibition on the construction having nothing to do with the resources and environmental protection such as buildings and motor vehicle roads. Only scientific exploration route, monitoring points, and conservation station(sentry) can be allowed in this district.

(2) Construction limited district

This is an area with high natural aesthetic values where sightseeing, scientific education and scientific tourism presentation are allowed.

Key points of protection in this district: It is prohibited to build any structures not compatible with the environment in this district. Tour facilities are limited to footpath, signboard, sanitation facility, awareness raising spot, recreational facility, and simple service point near conservation station (sentry); large-scale service facilities, such as resort, hotel, training center and sanatorium, are strictly prohibited. Except the motor vehicle roads and horse roads, no other roads can be built at random. Various buildings and roads not prohibited in the plan, not approved or irrelevant to resource protection, should be relocated or removed in a limited time. Tourism and environment monitor should be strengthened in this district, so as to ensure sustainable use of resources. No car can enter this district except the environment friendly shuttle buses and vehicles to carry out management tasks.

(3) Exhibition district

In this district, necessary service facilities for tourism and infrastructure are permitted. It is the major area where service for tourists is available in a short distance. Projects irrelevant to sightseeing are prohibited.

Key points of protection: motor vehicle road and horse road necessary for sightseeing can be built. Facilities such as footpath, restrooms, awareness raising facilities and small-scale service spots are allowed. Various construction projects should be compatible with the environment and landscape of the nominated properties. In conclusion, all the construction must be compatible with the original landscape and no large scale ones are permitted in the exhibition district.

Table 8-1 Protection partition of Xinjiang Tianshan

No.	Partition	Area(ha)	Percentage(%)
1	Construction prohibited district	518,714	90.07
2	Construction limited district	50,887	8.84
3	Exhibition district	6,321	1.09
Total		575,922	100

Table 8-2 Protection partition of the Tomur component

No.	Partition	Area(ha)	Percentage (%)
1	Construction prohibited district	321,463	93.22
2	Construction limited district	21,593	6.26
3	Exhibition district	1,772	0.52
Total		344,828	100

Table 8-3 Protection partition of the Kalajun component

No.	Partition	Area(ha)	Percentage (%)
1	Construction prohibited district	36,358	76.11
2	Construction limited district	10,361	21.69
3	Exhibition district	1,049	2.20
Total		477,68	100

Table 8-4 Protection partition of the Kuerdening component

No.	Partition	Area(ha)	Percentage (%)
1	Construction prohibited district	29,641	84.35
2	Construction limited district	4,997	14.22
3	Exhibition district	501	1.43
Total		35,139	100

Table 8-5 Protection partition of the Bayinbuluke component

No.	Partition	Area(ha)	Percentage (%)
1	Construction prohibited district	96,683	88.34
2	Construction limited district	10,871	9.93
3	Exhibition district	1,894	1.73
Total		109,448	100

Table 8-6 Protection partition of the Bogda component

No.	Partition	Area(ha)	Percentage (%)
1	construction prohibited district	34,569	89.24
2	construction limited district	3,065	7.91
3	exhibition district	1,105	2.85
Total		38,739	100

8.2 Managing Partition in the Nominated Properties

In order to have an orderly management system of the nominated properties, taking into account the requirements of the protection partition, the conservation stations are established in each nominated property with a sentry under its administration. The conservation stations (sentries) must control all of the area and exits, especially the trails, valleys and streams accessible to construction prohibited district.

The construction of conservation stations (sentries) in the nominated properties should be built according to the managing partition, land-use conditions, traffic, as well as location of tourism service facilities.

A conservation station is to protect the integrity of the resources and environment, to monitor, patrol and maintain of protected objects, and fulfill various protective measures constituted by the management authorities of the nominated properties.

Conservation sentries are the spots dispersed throughout the nominated properties for fire control and unlawful hunting, as well as environmental monitor and observation. Patrol staffs can get replenished and aided here.

Table 8-7 Number of conservation station (sentry)

Property		Conservation station	Conservation sentry
Tomur		5	14
Kalajun-Kuerdening	Kalajun	2	9
	Kuerdening	3	7
Bayinbuluke		3	12
Bogda		4	18

Table 8-8 Conservation stations (sentries) and their functions

Property	Conservation station	Conservation sentry	Major function
Tomur	Kekeqi	Kekeqi	Glacier, water quality and boundary of the nominated property in Kekeqi
		Uker	Glacier, and boundary of the nominated property in Uker
		Tugebieliqi	Glacier, and boundary of the nominated property in Tugebieliqi
	Qiongsubeixi	Qiongsubeixi	Glacier and water quality in Qiongsubeixi
		Kalegatilekewongkerkuotan	Glacier, and boundary of the nominated property in Kalegatilekewongkerkuotan
		Qiongkezibayi	Glacier and boundary of the nominated property in Qiongsubeixi
	Xiaotailan	Xiaotailan	The vegetation, environment and tourists' safety in Xiaotailan
		Bayili	Environment, tourists' safety and boundary of the nominated property in Bayili
		Pingtaizi	Vegetation, environment, tourists' safety and boundary of the nominated property in Pingtaizi
		Camp of animal husbandry company of the fifth regiment	Water quality, vegetation and boundary of the nominated property in the camp of the animal husbandry company of the fifth regiment
	Great cayon of Tomur	Grand canyon of Tomur	Environment, geology and tourism in the Grand Canyon of Tomur
		The third team	Geology in the Grand Canyon of Tomur
	Ateaoyinak	Ateaoyinak	Glacier and boundary of the nominated property in Ateaoyinak
		Tomur glacier	Glacier and boundary of the nominated property in Tomur

Kalajun-Kuerdening	Kalajun	Kuer grand canyon	Kuer Grand Canyon	Environment, vegetation of grassland and tourist safety in Kuer Grand Canyon
			Kaisikentuobie	Environment, grassland vegetation and tourists' safety in Kaisikentuobie
			Qiongkushitai	Environment, grassland vegetation and tourists' safety in Qiongkushitai
			Xukongtuhule	Environment, grassland vegetation and tourists' safety in Xukongtuhule
			Qiongmiergen	Environment, grassland vegetation and tourists' safety in Qiongmiergen
		Habudale	Habudale	Environment, grassland vegetation and tourists' safety in Habudale
			Kalazhuen	Environment and grassland vegetation in Kalazhuen
			Kuerdaihe river	Environment and grassland vegetation in Kuerdaihe river
			Kezilesi yerkungeyi	Environment and grassland vegetation in Kezilesi yerkungeyi
	Kuerdening	Botu	Botu	Forest vegetation, harmful forestry and harmful biology in Botu
			Erbotu	Forest vegetation, harmful forestry and harmful biology in Erbotu
		Kuerdening	Kuerdening	Environment and vegetation in Kuerdening
			Jingyishi bulake	Forest vegetation, harmful forestry and harmful biology in Jingyishi bulake
			Shate bulak	Forest vegetation, harmful forestry and harmful biology in Shate bulak
		Aktuyek	Aktuyek	Forest vegetation, harmful forestry and harmful biology in Aktuyek
			Kuerdening river	Environment and vegetation in Kuerdening river

Bayinbuluke	Bayinwulu	Bayinwulu	Environment and wildlife in Bayinwulu
		Upper reaches of Kaidu River	Environment and wildlife in Upper reaches of Kaidu River
		Baoereerbin	Monitor the border of the nominated property and vegetation of the steppe
		No 1 watching tower	Monitor environment and wildlife in No 1 watching tower area
		Rescuing center of wildlife	Monitor wildlife in Bayinwulu
	Hongqimuchang	Hongqimuchang	Monitor the vegetation of steppe in Hongqimuchang
		No 2 watching tower	Monitor environment and wildlife in No 2 watching tower area
		Lower reaches of Kaidu river	Monitor the environment and vegetation in lower reaches of Kaidu river
		Chahanersai	Monitor the water and vegetation in Chahanersai
	Bayangol	Bayangol	Monitor the environment and wildlife of nominated property in Bayangol
		Haersala	Monitor the border of nominated property in Bayangol
		Haersalaleteke	Monitor the border of nominated property in Bayangol
Bogda	Baiyanggou	Baiyanggou	Monitor the environment, vegetation and tourists' safety in Baiyanggou
		Sigonghe river	Monitor the environment, vegetation, tourists' safety and boundary of the nominated property in Sigonghe river
		Sigongliang	Monitor the environment, vegetation, and boundary of the nominated property in Sigongliang
		Nantaizi, Sigong	Monitor the environment, vegetation and tourists' safety in Nantaizi, Sigong
		Shuiquangou	Monitor the vegetation and animal habitat in Shuiquangou
		Banzigou	Monitor the vegetation and animal habitat in Banzigou

Bogda	Haibei	Haibei	Monitor the environment, tourists'safety and boundary of the nominated property in Haibei region
		Outlet of Tianchi	Monitor water quality in the outlet of Tianchi
		Center of Tianchi	Monitor water quality in the center of Tianchi
		Inlet of Tianchi	Monitor water quality in the inflow of Tianchi
	Hainan	Hainan	Monitor the environment, vegetation and tourists' safety in Hainan
		Dadonggou	Monitor the environment and vegetation in Dadonggou
		Haxionggou	Monitor the environment and vegetation in Haxionggou
		Malugou	Monitor the environment and vegetation in Malugou
		Bogda	Monitor the environment and glacier in Bogda
		Jiyanjiangou	Monitor the environment and vegetation in Jiyanjiangou region
	No. 1 camp of Bogda	No. 1 camp of Bogda	Monitor environment and glacier in No. 1 camp of Bogda region
		Sangecha	Monitor environment and glacier in Sangecha region

8.3 Protection and Management of Buffer Zone

8.3.1 Function and Scope of Buffer Zone

A buffer zone is the peripheral area which is designated to protect the outstanding universal value of the nominated property. It isolates the core area from external disturbances and is designed to keep the environment in the nominated property from unreasonable human activities or malicious intrusion. It also provides additional space for the growth and breeding of life in the nominated property. In addition, it is a transitional area or area of separation between natural reserves in the nominated property and the surrounding area. Protection and moderate development are combined in the buffer zone, and different resources and environment are protected differently.

There is buffer zone neighboring each nominated property, and its size is established according to the following principles: first, it must be adjacent to the core area; second, it must be a protected area which makes the landscape in the nominated property more valuable; and third, it must be wide enough to protect the core area.

8.3.2 Present Situation of Buffer Zone

Total area of buffer zone of Xinjiang Tianshan is 519,592 ha, and there is no permanent habitant in the buffer zone. In history, grassland in the buffer zone is usually the pastureland of the herdsman and from June to September every year, the herdsman will enter the buffer zone. In the other time, there is essentially no human activity here except the touring in some special areas.

Buffer zone of each nominated property is also the protective area of natural nature reserve or parks, where corresponding protective measures are taken and governments will give financial compensation to them.

Table 8-9 Population in buffer zones of the nominated properties

Property		Area(ha)	Buffer zone	Population description	Population density (person/km^2)
Tomur		280,120	5,445	Seasonal herdsman	1.9
Kalajun-Kuerdening	Kalajun	35,296	819	Seasonal herdsman	2.3
	Kuerdening	82,539	2,494	Seasonal herdsman	3.0
Bayinbuluke		80,090	2,602	Seasonal herdsman	3.2
Bogda		41,547	1,375	Seasonal herdsman	3.3
Total		519,592	12,735	Seasonal herdsman	2.5

8.3.3 Goals of Protection and Management

As for the buffer zone, the goals of protection and management are as follows: Generally speaking, the buffer zone will be managed according to the corresponding rules of the exhibition district. Natural resources management in buffer zone should be strengthened to meet local people's need for natural resource and alleviate the pressure on the nominated property. Ecological environment should be controlled and optimized and enough habitat space should be available for the wild life.

8.3.4 Resources and Environment Protection and Management

Protection and management of buffer zone are featured with joint defense, such as joint defense of various departments and defense of various areas, forestry affair authorities, public security authorities, towns and villages in the buffer zone are all included in the jointly defense mold.

Jointly defense authority should be set to expand functions of inspection station such as animal and plant quarantine, pest control, forest fire control, wood inspection to the whole area of buffer zone, and make it the carrier for joint defense of various departments and defense of various areas.

Jointly defense should be carried on regularly, the unsafe factors will be eliminated in the buffer zone in time and cooperation between various department and areas will be strengthened to form a long term and effective mechanism.

Community participation will be encouraged. Awareness of conservation will be raised through television, newspapers, leaflets, etc. Habitants will be organized to take part in conservation of public welfare forest and patrolling team will be set by volunteers in villages to strengthen the effective protection of forest in buffer zone.

In the buffer zone, forest tending and water conservancy shall be enhanced, and the projects of return grazing land to pasture and ecological restoration shall be carried out to renew natural landforms. Local herdsmen are encouraged to change the way of their income dominated by stockbreeding through education and guidance, and are encouraged to take part in the protection of heritage values and tourism development, to reduce the damage of human activities to natural environment, improve the environmental quality in buffer zones and realize the harmonious development of human and environment.

8.3.5 Buffer Zone Management

Heritage administrative authorities in the nominated property will be in charge of the plan of the buffer zone on behalf of the local governments and coordinate benefits of stakeholders. Utilization of the buffer zone will be strictly controlled as follows:

(1) Construction in buffer zone should be approved by people's government where it is located and plans in buffer zone must conform to protection and management plan.

(2) Appropriate production, business and managing facilities can be arranged in buffer zone, however, the scale should be strictly controlled. Utilization of land in buffer zone should conform to that of the nominated property and no forest can be adversely affected.

(3) Herdsman's income should be improved, industry structure should be improved, tourism industry is to be developed and the land use should fit in with the conservation requirements in the buffer zone.

(4) A friendly negotiation system of 1+X will be formed. Under the leadership of the

administrative authorities, and according to the protection and management plan, stakeholders' questions will be discussed and where there is disagreement they will be answered by the government. The leading group of Xinjiang Uygur Autonomous Region will check the conservation of the buffer zone irregularly.

(5) Biological conservation should be strengthened through joint protection that should be carried out regularly. Joint protection authorities should be established and protection should be extended to the whole of the buffer zone. Local herdsmen will be organized to take part in conservation of the grassland and forest.

(6) Subsidy and rewarding system will be implemented according to grazing forbidden policy.

(7) In buffer zone, moderate grazing is permitted. Herdsmen are encouraged to take part in the conservation.

(8) Conservation of forest should be strengthened, animal breeding grounds should be returned to pasture and ecology should be restored in the buffer zone.

9. Environmental Protection and Control

9.1 Monitoring and Protection of the Water Environment

(1) Current state of the water environment

The Tomur component belongs to the Ili river basin and Tarim river basin, the Kalajun-Kuerdening component belongs to the Ili river basin and the Bogda component belongs to the Sangonghe river basin, Sigonghe river basin and the Shuimohe river basin. Due to the sparse population in the nominated properties and lack of large-scale industrial and mining pollution, the water quality here is good.

(2) Control standard

The standard of the surface water quality within the nominated properties should meet that of I or II type in *GB3838-2002*; Sewage treatment should meet that of the first class of national standards.

(3) Control measure

- To protect the glacier in the nominated property in first level, human beings are prohibited from entering the glacier area except scientific research, monitoring and so on.
- According to the principles of ecology, it is necessary to protect, restore and build ecological environment to ensure the evolution of species.
- Based on the water system in the nominated properties, water power condition will be improved and the self-purification ability of the water network will be enhanced.
- Control the emission of domestic sewage of various facilities in the nominated properties, and dispose the sewage by septic tank, filtering tank, purifying tank and so on.
- Aqua Environment controlling system will be established. With the help of dynamic data process, countermeasures to protect the aqua environment shall be available in time.

9.2 Control of the Atmospheric Environment

(1) Current state of the atmospheric environment

There is no industrial pollution in the nominated properties and the atmospheric environment is essentially in its original and relatively good condition, and meets the first class standard of *Ambient Air Quality Standard (GB3095-1996).*

(2) Control standard

In accordance with the *Ambient Air Quality Standard*, the ambient air quality of the core and buffer zones within the nominated properties are classified as first-class areas, and the peripheral areas are not less than second class.

Planning objectives: In the nominated properties and their buffer zones, the number of days, with the ambient air quality meeting the first-class standard, should reach to 99% or more in a year. In peripheral area of the nominated property and its buffer zone, the number of days with the ambient air quality meeting the second-class standard should reach 95% or more in a year.

(3) Protection measure

- To ban polluting motor vehicles from entering the nominated property for the purpose of environmental protection. To establish checkpoints to stop the tourist vehicles. To set transferring station to transfer tourists to environment friendly shuttle bus.

- To control the number of horses in the nominated properties and the buffer zones to avoid dust pollution.

9.3 Control of the Sound Environment

(1) Current state of the sound environment

The continuous A sound level equivalent of the ambient noise in each nominated property is 40.1-46.1dB(A) in the day and 30.3-37.7dB(A) at night, which are both below the standard in Environmental quality standards for noise*(GB 3096-2008)*. The sound environment is good.

(2) Control standard

According to the environmental impact assessment index system for mountain scenery resources development *(HJ/T6-94)* made by the State Bureau of Environmental Protection, noise control

follows the 0 class standard stipulated in Environmental quality standards for noise *(GB 3096-2008)*, with the noise being below 50dB(A) in the day and below 40dB (A)at night.

(3) Control measure

- Sound source control: horns are prohibited; motor vehicles are prohibited to honk arbitrarily and noisy vehicles must enter the properties in limited time and place; severe punishment on violation of rules is strictly implemented.

- Reconstruction of supporting facilities: improve road-side vegetation and protective belt, buildings along the road will be sound insulated; restrict internal traffic flows in the nominated properties.

- Noise control of commercial activities: prohibit the use of amplifiers for selling products, and control the volume and the broadcasting time of audio equipment; strengthen management of markets; prevent traffic congestion; separate footpaths from roads for motor vehicle in commercial areas.

- Noise control of culture and entertainment activities: restrict the volume of audio equipment, as well as the location, number and time of their operation.

- Except for environment friendly shuttle bus and protection vehicles, other ones cannot enter the construction prohibited district. Vehicles are prohibited from using loudspeakers.

- Irregularly monitor footpaths and tourists hotspots in the exhibition district.

9.4 Control of the Soil Environment

(1) Current state of the soil environment

As few human activities have affected the nominated properties, ecosystems and vegetation are in their natural state, and the quality of soil is fine.

(2) Control standard

The control standard is type I in Soil Environmental Quality *(GB15618-1995)*.

(3) Protection measures

- Measures shall be adopted to prevent the soil from being damaged by fluvial and aeolian

erosion and other natural processes.

- Enhance the control of soil salinization, and restore vegetation by planting trees and grasses in a timely fashion in the area of soil and water loss.

- Make reasonable use of soil, to balance the investment, productivity and holding capacity, and to improve the environment and increase soil fertility and productivity.

- The protection of soil is based on biological measures as well as proper engineering.

9.5 Control of the Environment Sanitation

(1) Current state of sanitation

Complicated mountain environment in the nominated property is not suitable for industry, agriculture, transportation or urban construction. Historically, few human occurred in the nominated properties so that the original environment is retained. Although tourism industry in the nominated properties has been growing in recent years, it is in a limited part of the buffer zone with low intensity so that the environment and sanitation are sound.

(2) Planning objective

Environment and sanitation management system and production and service system should be established, to dispose rubbish in the decontamination, reduction and recycle ways; establish perfect environmental and sanitation management system.

(3) Control measures

- Garbage disposal: Classified dustbins compatible with the surrounding environment should be set at the service spots, sightseeing spots, footpaths and roads. Rubbish collection and disposal system should be established to regularly collect the rubbish and sent it to a transfer station or disposal station out of the nominated property.

- Restrooms: restrooms should be built in busy areas, such as service spots, parking area, entrances, footpaths and near sightseeing spots; more mobile toilets during holidays should be available; excrements must be deposed in decontamination.

- Sanitation staff and equipment: sanitation management authorities in each nominated property should be formed; number of sanitation workers should be in accordance with that of the habitants, service staff and tourists; special sanitation vehicles, parking area, and sanitation vehicle washing stations should be available to reduce the impact on environment.

10. Tourist Management

10.1 Analysis of Tourism in Each Nominated Properties

10.1.1 Problems Caused by Tourism

(1) Gradual annual increase of tourists

In 2001, 117,000 tourists visited the Tomur nominated property, rising to 289,000 in 2010, for a 11% average annual growth rate. In the nominated Kalajun, the tourist arrivals were 25,000 in 2007 and 35,000 in 2010 with an average annual growth rate of 9%. In the nominated Kuerdening, the tourist arrivals were 31,000 in 2001 and 65,000 in 2010 with an average annual growth rate of 8%. In the Bayinbuluke component, the tourist arrivals were 55,000 in 2001 and 95,000 in 2010 with an average annual growth rate of 6.4%.The nominated property of Bogda is the most visited with 429,000 tourist arrivals in 2001 and 1,082,000 in 2010 for an average annual growth rate of 10%. The above data shows that the tourist arrivals are increasing but the total is within the capacity of the nominated properties. The management institutions will keep monitoring the tourist arrivals to prevent excessive growth.

Table 10-1 Tourist arrivals in the nominated property in recent years

Unit (10,000persons/time)

Property \ Year		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Tomur		11.7	10.5	12.4	13.3	17.8	18.1	21.2	23.6	11.5	28.9
Kalajun- Kuerdening	Kalajun	-	-	-	-	-	-	2.5	2.9	3.3	3.5
	Kuerdening	3.1	3.45	3.85	4.75	5.72	5.88	5.7	5.35	6	6.5
Bayinbuluke		5.5	6.5	7.1	7.1	8.2	8.6	8.9	9.0	9.2	9.5
Bogda*		42.9	43.33	44.86	64.59	64.75	84.46	85.22	76.5	90.8	108.2

*Data includes that in the property and buffer zone.

(2) Increase of visitor facilities

At present, in each nominated property, the basic tourism facilities are signs, service centers, restaurants, shops, parking lots, restrooms, garbage bins, garbage processing stations, etc.

Accommodation facilities: accommodation facilities and a comprehensive reception base for each nominated property are generally located in an urban area or town. At present, in the Tomur component and the Kalajun-Kuerdening component, the tourism industry is still in the initial stage of development and tourism facilities are not in a large scale. In the Bogda component, due to the large amount of tourist arrivals, the reception capacity is larger. In the future, major reception facilities will be located in the buffer zone and outside of the buffer zone, backed by a city, county or town to form the service base.

Transport facilities: the construction of new transportation facilities will be strictly controlled in the nominated properties, and the areas that have been damaged by transport projects will be restored. Study of the environmental impacts of transport project will be strengthened and environmental impact assessment report will be required for large projects. Basically, no roads will be added in the nominated properties.

Other facilities: one heritage exhibition center should be built in each nominated property; a service center should be established at entrance to the main scenic spot in each nominated property; sightseeing spot and search and rescue center should be set up in each scenic spot; and each resting point or sightseeing spot should have rescue functions.

Table 10-2 Visitor facilities in the nominated property

Facility \ Property	Tomur	Kalajun-Kuerdening		Bayinbuluke	Bogda	Total
		Kalajun	Kuerdening			
Footpath	18	15	30	5	30	98
Tourguide	6	2	5	3	60	76
Signs and Notices	50	30	95	60	1,237	1,472
Publications	4	2	5	3	20	34
Service Center	1	1	2	1	1	6
Heritage exhibition center	1	1	1	1	1	5
Overnight Accommodation	3	5	7	30	2	47
Restaurant and Resting Facility	7	5	7	40	14	73
Shop	1	4	20	75	13	113
Parking Lot	2	1	4	3	5	15
Restroom	4	10	8	22	32	76
Garbage processing station	2	5	2	1	1	11
Dustbin	60	28	120	70	234	512
Search and Rescue Center	1	1	1	1	1	5

(3) Bring more environmental pollution and disruption

A large number of tourists and cars and construction of visitor facilities will pollute the air, water and sound environments.

10.1.2 Favorable Factors Regarding the Tourism Industry

(1) It helps to reinforce the management functions of management authorities in the nominated properties

With the development of tourism, tourism revenue will gradually increase and this can enhance the financial security of each nominated property. Management authorities can effectively control the number of tourists and provide a full range of tourist services to meet the tourists' demands and realize maximum value of tourism.

(2) It helps to publicize the heritage value of Xinjiang Tianshan

Each nominated property will invest human resource, fund and material to publicize the nominated properties to make them widely recognized at home and abroad.

10.2 Control of the Number of Tourist Arrivals

Tourist arrivals in each of the nominated property can be predicted according to the ecological standard of the nominated properties, visitor expectations, visiting characters and levels of tourism development (Table 10-3).

Table 10-3 Tourist arrivals in each property

Item \ Property	Tomur	Kalajun- Kuerdening		Bayinbuluke	Bogda
		Kalajun	Kuerdening		
Tourist arrivals in 2010 (10,000person/time)	28.9	3.5	6.5	9.5	108.2
Daily capacity (person/time)	10,000	6,000	8,000	6,000	9,300
Yearly capacity (person/time)	250	150	120	120	310
Tourist arrivals predicted in 2015 (10,000person/time)	60	40	30	50	150
Controlled number of tourist arrivals in a year (10,000person/time)	200	130	100	110	300

(1) Existing methods to control the number of tourist arrivals

- Tourist arrivals will be limited through enlarge of the touring space and passages in hotspots, and tourists will enter the hotspots one group after another and rotation system should be adopted to conserve the hotspots.

- Tourist arrivals will be limited through increase of ticket prices difference between the low and peak season.

- Tourist arrivals will be limited through tourism information forecasting system.

- Tourist arrivals will be limited through ticket selling box.

(2) Planning for the long-term control of numbers of tourist arrivals in each of the nominated properties

Once the nominated properties are successfully inscribed on the world natural heritage list, more tourists will come. In order to control the scale of tourism effectively, further measures need to be taken:

- With planning permission, more tourist spaces and projects will be developed, and the number of entrances and exits will be increased to scatter tourists.

- Online booking system will be created and the daily number of arrivals will be forecasted in time.

- The tourist service system in the nominated property and the buffer zone will be enhanced, and tourists will be asked to live in hotels in the periphery area of the nominated property. The tour transportation system will be enhanced to make visits more convenient and safe.

- Tour monitoring and evaluation system will be available to divert tourists from the hot spots. It is necessary to limit the visiting time and visitor number, as well as adopt the rotation system to conserve the environment.

- Warning scheme will be set to evacuate excessive tourists.

10.3 Service System for Visitors and Visitor Facilities

The service system for tourists and visitor facilities in the nominated properties should provide regular services specifically for visitors, such as transportation, communications, shopping,

health, safety, sanitation and so on.

(1) Visitor service center

Visitor service centers in the nominated properties of Tomur and Kuerdening are located in the buffer zones. Visitor service centers in the nominated properties of Kalajun and Bogda are built outside of buffer zones. The visitor server centre in each nominated property combines heritages protection and management, heritage exhibition, visitor reception and has good traffic conditions, so as to provide a comprehensive travel service.

(2) Visitor service spots

Visitor service spots are intermediate links of the visitor service system, distributed in reasonable positions and they supply services for sightseeing, with their construction scale and volume compatible to the surrounding natural landscape. Visitor service spots provide fast food, drinks, rest facilities, sanitation, security and other services.

10.4 Tourist Safety Education

Tourist safety education consists tourist personnel safety education and education about the protection of the nomination property. It can be implemented as follows:

- Carry out the fire prevention education by handing out free pamphlets, broadcasting, publishing bulletin, and a kindling deposit system.
- Put up notice boards to raise safety awareness mainly on steep slopes, by old trees, and in the key fire prevention area.
- Publicize the emergency phone number in conspicuous position in the nominated property.
- Provide free travel tips and tourist maps etc. mainly in service centers, hotels and restaurants.

10.5 Tourist Safety Management

Management authorities in the nominated properties should strengthen tourist safety management in the following ways:

- Carry out classification management on tourist behavior and control the tourist scale.
- Improve the touring safety facilities and put up safety warnings and guides in hazardous spots

and vehicles.

- Establish safety monitoring and inspection system, and implement an all-weather safety supervisor, and improve the emergency aid system.

10.6 Tourist Safety Guarantee

To prevent accidents and ensure the safety of the tourists, an aid system must be established in the nominated properties and gradually improved.

Strengthen the security administration in the nominated properties, set up a public security sub-bureau, police station, security sentry, and security patrolling team to ensure the public safety.

10.7 Medical Security Guarantee

Set up a multi-level medical security system which relies on the medical institutions in the city, county and town as well as the widely distributed medical assistance spots and facilities in the nominated properties.

Table 10-4 Major medical institutions and their functions in the nominated properties

Medical institution	Function
Medical Emergency Centre in the Service Base	Equip with professional ambulance men and vehicles to provide conventional medicine care.
Medical Assistance Station in the Service Center	Provide emergency medicine and better medical treatment for urgent patients and those switched from the lower medical institution, and then send them to hospitals.
Automatic Rescue Spots in the Service Spot	Provide the urgent patients with basic first aid, and then switch them to the higher level infirmaries or hospitals.

In addition, since the medical institutions in the nominated properties cooperate with the hospitals in the surrounding cities and counties, they can receive further assistance, share personnel, beds and advanced medical equipment to deal with the local problem.

11. Publicity and Exhibition of the Heritage

11.1 Heritage Exhibition

The best way to carry out protective education to the public is to display the geomorphic features, biodiversity and the universal outstanding values.

(1) Service centers

A service center will be set up in each property where exhibition hall, multi-media room, monitor room, service hall, etc. should be available and text, material objects and three-dimensional images will show the resource features of the nominated properties.

Table 11-1 Service center and heritage exhibition center

Property		Location	Coordinates	Construction area	
				Service center	Heritage exhibition center
Tomur		Entrance of Wunsu Grand Canyon in the buffer zone	N41°33′48″ E80°39′29″	1,000 m^2	1,000 m^2
Kalajun- Kuerdening	Kalajun	Near horse-breeding farm	N42°22′43″ E82°06′04″	1,000 m^2	1,000 m^2
	Kuerdening	Near the Pasturing Area Hospital in the buffer zone	N43°10′20″ E82°52′52″	1,000 m^2	1,000 m^2
Bayinbuluke		Ticket selling office out of the buffer zone	N43°00′48″ E84°07′56″	1,000 m^2	1,000 m^2
Bogda		Ticket selling office of Tianchi National Park in the buffer zone	N44°06′03″ E88°03′57″	3,800 m^2	800 m^2

(2) Heritage exhibition center

A heritage exhibition center is built in each nominated property will be free for tourists. It collects numerous samples and objects to display the topography, biodiversity, ecological system and natural landscape through pictures, text, three-dimensioned images, stereoscopic models, multi-media and so on.

The heritage exhibition center will display the following ones:

- natural history and regional landforms
- landforms of Xinjiang Tianshan and their significance
- biodiversity and biological and ecological processes
- natural landscapes
- protection measures
- comparisons with the other world mountain heritage
- long-term developing plan of each nominated property

(3) Signs and notice system

With the development of popular science tours, most of the nominated properties have already set up their own signs and notice systems to meet the needs of visitors, heritage protection and management. But there is still a long way to go. The existing signs are as follows:

- Sign of identity: National Nature Reserve, National Park, Scenic Spot of Xinjiang Uygur Autonomous Region, National Forest Park, Man and Biosphere Reserve of Bogda, etc.
- Regional signs and notice system: general introduction of nominated properties and scenic spots.
- Boundary sign and notice system: precise boundary of the nominated properties or buffer zone.
- Sign and notice system of scenic spots and relics spots: signs of natural landscape, geological relics and rare and endangered wildlife.
- Business signs: signs of commercial brands, attire of the staff, patrols, corporate identity, and business outlets.
- Guiding and security signs: signs of different segment (e.g. the entrance), touring line (types or time), environmental sanitation, tourist services, security and traffic.
- Sign system of quality of service: signs of tour guides, catering, accommodation, quality of goods etc.
- Promotion signs: signs of publicity on the Internet and development; improvement of supervisory signs of publicity and selling, and of an electronic information network.
- Public media promotion: advertising on TV and in public spaces, and displays in information windows.

11.2 Heritage Education

11.2.1 Education of the Administrative Personnel

For the purpose of improving the quality of the professionalism and services, and meeting new requirements of development, education and training for the administrative personnel will be carried out in the following ways:

- Strengthen training and assessment of guides especially the foreign language guides.
- Invite experts in give lectures on the heritage value, its threats and so on.
- Desk clerk in the management authorities should get more knowledge of science and the heritage and contest should be organized to promote this process.
- Invite experts from IUCN to teach on spot.
- Compile one or two briefs every month to introduce the nominated properties.
- Once Xinjiang Tianshan is successfully inscribed on the List of World Natural Heritage, further work should be done in the following ways:
- Send staffs to research institutions of world heritage in universities to receive further training.
- Send staffs to attend courses by the WHC and to study at other world properties at home and abroad.
- Invite experts at home and abroad, as part-time consultants to give lectures.

11.2.2 Residents' Education

In order to improve the sense of identity of the nominated properties, and the active consciousness to protect the heritage, management may carry out promotional activities in relevant communities, including the following:

(1) Hand out books, manuals and leaflets to schools, business units, tour guides, and so on.

(2) Carry on contests to encourage inhabitants to learn about the nominated properties.

(3) Focus on education of law in communities.

(4) Establish information columns in communities to publicize the basic knowledge of Xinjiang Tianshan.

11.2.3 School Education

(1) Offer courses about world natural heritage in the primary and high schools in the nominated properties.

(2) Field education: Organize students to visit the properties each term to know more about the rare and endangered animals and plants to enhance their awareness about environmental protection. Organize students to visit the heritage exhibition center and offer practical education to them.

(3) Set up practice bases, organize all kinds of cultural activities, and develop science tours.

11.3 Publicity of the Nominated Property

11.3.1 Domestic Publicity

Traditional and modern media are to be used to publicize and display the nominated properties (Table 11-2) as follows:

(1) An exhibition center is to be established in each nominated property to introduce heritage values, protection of heritage resources, protection of the environment and so on to the public through text, images, multi-media, objects and so on.

(2) Album of paintings, promotional brochures, poems, essays, images and so on will be compiled to introduce the snow peaks, glaciers, rivers, lakes and Picea schrenkiana, which will be officially published for sale, or be given free to visitors to display the heritage value.

(3) Make good use of television, radio, Internet, news, international photography exhibitions and so on to publicize the excellent natural quality and the important scientific and aesthetic values of the nominated properties and enhance the consciousness of the public to protect them.

(4) Make good use of outdoor advertising. Put up boards along the highway and main traffic lines in the nominated properties, set up special advertisements in the urban areas, villages, towns and corporations, in the core area of the property and the buffer zone for the publicity of the nomination. Also make good use of neon lights, trucks, road signs, light boxes, balloons and similar things to publicize and create a supportive atmosphere for the nomination.

(5) Hold a variety of social activities, cultural exchanges, academic activities and popular science activities to make more people participate in the nomination.

(6) Set up an exclusive website for the heritage of Xinjiang Tianshan to follow and report the nomination process.

Table11-2 Media reports on the nominated properties

Time	Media	Program
2000	CCTV	*China's Environmental Protection, Ecological Development of the Western Region of China*
2001	XJTV	*Bogda Peak-god in Snow and Glacier*
2002	XJTV	*Enter Xinjiang, Xinjiang - a Fantastic Place*
2003	CCTV-1,CCTV-2,CCTV-4	*Easy tour in China, China tour* *Wind vane of tour, Discovery*
2004	CCTV, XJTV	*Splendid China, Exploration in western China*
2005	CCTV-1,CCTV-4,CCTV-7,CCTV-12	*News 30', Discovery, China Tour, Eyes Wide Shut, Beautiful Homeland Charming Xinjiang*
2006	CCTV-2,CCTV-7,CCTV-10	*Service for You, Green Time & Space, Approaching Science, Discovery*
2007	CCTV-1,CCTV-3,CCTV-7,CCTV-10, Yun Nan TV, Beijing TV-3	*China science and technology review,* *Explore, Green Time & Space*
2008	CCTV-1,CCTV-4,CCTV-9,CCTV-10,Xin Jiang TV, Aksu TV	*Discovery, Vastman,* *New discovery of Silk Road,* *Enjoy time: Beautiful Natural Scenery of Tomur Peak*

11.3.2 International Publicity

(1) Publicity objective

Strengthen the publicity of the value of the nominated property in a global scale and promote international scientific research on the nominated property to push Xinjiang Tianshan, China to take its place in the world and upgrade the protection and management level of the property.

(2) Publicity ways and means

Intensify the scientific communication between the nominated property and existing World Heritage Properties by holding international symposiums. Participate actively in the academic exchanges and activities held by UNESCO and other international organizations. Choose Taiwan, Hong Kong, Shanghai, Beijing, Guangzhou, Fuzhou, Xiamen and other cities with a large foreign population as the bases to publicize the nominated property to the world. Publicize the value of the property and published more academic theses on the Internet. Choose some particular international destinations for direct delivery of international publicity.

(3) Specific ways

- Hold an annual international symposium about the landforms and biodiversity of Xinjiang Tianshan, China.
- Publish brochures about the landforms in various foreign languages, which are available at the entrances of the properties for free.
- Promote the nominated properties in Taiwan, Hong Kong, South Korea and Japan.
- Promote the nominated properties on CCTV-4, CCTV-9, and other channels.
- Strengthen the cooperation with UNESCO and other international organizations, and actively participate in international academic activities.

12. Participation of Herdsmen and Community Development

12.1 Participation of Herdsmen

(1) Hearings system

Before a development policy or decisions by administrative authorities of the nominated properties are made, a hearing shall be held which herdsmen attend.

(2) Feedback system

Herdsmen will be organized to evaluate the effectiveness of relevant policies and regulations which have been implemented. The development orientation of the nominated properties will be refined based on the suggestions of herdsmen,

(3) Participation system

Herdsmen will be employed to take part in the protection of the nominated properties, as staff engaged in basic management, cleaning, patrols, guards, interpreters and so on. This is also a solution to the problem of employment of local herdsmen, and a means of combining the development of the nominated properties and existence of local herdsmen.

(4) Guidance system

Full-time or professional staff will be arranged to guide the development and protection of the environment where they live.

(5) Training system

Herdsmen can be hired as staff of the nominated properties, and shall be provided with more than two training sessions every year.

(6) Support system

The financial budget plans of relevant administrative authorities will support the industrial development and construction of public facilities in areas where the nominated properties are

located.

12.2 Ecological Migration (Resettlement for Environmental Protection)

Policies of restoring land used for pasture, transhumance and ecological restoration have been carried out gradually in the nominated properties and buffer zones. In the planning term, grazing will be forbidden in the nominated properties, and will be limited in buffer zones.

(1) Resettle migrants appropriately

Migrants will be resettled outside of the nominated properties. For farmers and herdsmen who want to engage in agriculture, lands and production subsidies shall be provided, and for famers and herdsmen who want to be settle down, funds will be invested in the construction of houses that are resistant to earthquakes. Besides, water, electricity, roads, afforestation and agricultural water conservancy and other facilities in the settlements will be properly addressed.

(2) Approval of the stock-carrying capacity of pastures

Administrative departments of local government above the county level that are responsible for grasslands will define the stock-carrying capacity of pastures and, based on actual state of the nominated properties and buffer zones, check the stock-carrying capacity regularly, define and regulate stock numbers according to the productivity of pastures, implement grazing rotations and limit grazing, and arrange transfer between seasonal pastures appropriately.

(3) Pasture improvement

Most residents in the nominated properties and buffer zones are herdsmen and, after the implementation of ecological migration, the pasture area of the herdsmen is reduced. So, there is a demand to popularize advanced techniques to help herdsmen to fence, restore and improve pastures, and to use sprinkler systems. *Alfalfa, Siberian wild rye, Lyme grass, Festuca sinensis* and other forage plants will be planted in pastures in need of improvement. Also, pasture composition will be improved to increase the productivity and stock-carrying capacity.

(4) Construction of a feedstuff base

When the pasture begins to turn green in spring, natural grasslands will be closed to grazing. A supplementary feedstuff base will be built to supply supplementary feedstuff, so as to store more natural feed for livestock throughout the winter.

12.3 Adjustment of Production Methods

Implement of the plan will essentially prevent stockbreeding from occurring in the nominated properties and buffer zones. So, administrative departments of the nominated properties shall actively work together with local governments to initiate local development projects introducing new technologies and improved varieties, to adjustment production methods to better support the herdsmen.

(1) Developing high quality stockbreeding

Develop effective and high quality stockbreeding by taking advantage of technology, introducing fine breeding sheep and improved sheep varieties, and accelerating the construction of a breeding base. In these ways, the productivity and increased income of the stocking breeding economy can be assured.

(2) Developing heritage tourism

Herdsmen will be encouraged to engage in employment and developments relating to tourism as an important approach to increase incomes. Opportunities might include catering, transportation, guiding services, production and sale of goods for tourism, and amusement and leisure activities and so on.

12.4 Community Enhancement

Enhance publications and education opportunities to improve herdsmen'educational level and awareness of the importance of heritage protection, and coordinate the relationship between heritage protection and management and community enhancement.

(1) Population control

In order to control the birth rate to the level specified in national policy, it is necessary to carry out a policy of birth control by assisting local governments with family planning programs. Also, local employment should be made available to solve herdsmen'employment problems and reduce migration for work.

(2) Developing education

Most local residents in the nominated property are minority people. Their educational level is

generally low, so improved education is a key to community development. Compulsory education will be promoted; for example, measures will be carried out to ensure the enrollment of all the school-age children. Taking the advantage of existing schoolhouses, teachers will be chosen to open remediation classes and deliver junior or senior courses to improve the educational level of herdsmen, as a way to increase cultural equality.

(3) Construction of a model settlement

A model settlement village should be planned and constructed. Prominence should be given to environmentally appropriate construction. Buildings, roads, afforestation and various pipeline projects and other construction and facilities shall be planned and arranged comprehensively. Inappropriate constructions will be rebuilt, and trees and flowers will be planted to clean and prettify the environment.

13. Scientific Research

13.1 Achievements of Scientific Research

So far, domestic and foreign scholars have published more than 400 research works on Xinjiang Tianshan's geological features, physical geography, biology and ecology (Table 13-1). Xinjiang Tianshan has become an important teaching practice base, research base and popular science education base for many domestic and foreign universities and research institutions.

Table 13-1 Major achievements of scientific research on Xinjiang Tianshan

Work	Content	Author	Published by/ Stored by
Inventory of Modern Glaciers of Xinjiang Tianshan	Details of the resources of modern glaciers and their distribution in Xinjiang Tianshan	Ruji	Urumqi:Xinjiang Scientific and Technological Commission, 1975
Form of Tianshan Mountains	It describes the natural geography, geological history, the new tectonic movement, glaciation, fluvial process, terrain, loess accumulation, altitudinal mountain landscape and the evolution of the Tianshan mountains in a systematic way.	Xinjiang Institute of Ecology and Geography of Chinese Academy of Sciences	Beijing:Science Press, 1986
Control of Avalanches of Xinjiang Tianshan	Conclusion of long-term experimental observations on the accumulated snow, avalanches and their control.	Hu Ruji & Jiang Fengqing	Beijing: China Communications Press.1989
An Introduction to the Hydro-ecology in the Central Asia	This book states the basic principles and research methods of hydro-ecology of lakes in arid region, and analyses typical cases.	Mahpir, Tursunov	Urumqi:Xinjing Science and Technology and Health press, 1996
Study on the Planation Surface in the Central Asia Mountains: A Sample of Planation Surfaces in the Tianshan Mountains	This book describes the distribution and characteristics of modern planation surfaces of the Tianshan Mountains, the formation and evolution mechanisms of planation surfaces, analysis of the characteristics of sediments on planation surfaces and environmental conditions revealed by them, ascertains the number and levels of the planation surfaces and their formation age, and restoration and reconstruction of ancient planation surfaces of the Tianshan Mountains.	Wang Shuji	Beijing:Science Press, 1998

The Permafrost Cycle Landform Process and Sedimentary Characteristics in Tianshan Mountains	Research on the evolution and sedimentary facies of periglacial and glacier landforms of the Tianshan Mountains; dynamic mechanisms of glacial landforms; macro- and micro-features of moraine deposition.	Cui Zhijiu	Hebei Science Press, 1998
Glacial Action of Tianshan Mountains	Systematic study on the amount of glaciers of Tianshan Mountains, their changes, distribution and characteristics; climate and heat balance in glaciation areas, glacier mass balance process, characteristics and regional differences; ice formation zone and its distribution; glacial runoff and water balance; glacial debris flow formation and distribution; utilization of snow, ice and water resources and so on.	Liu Chaohai, Xie Zichu and so on	Beijing:Science Press, 1998
Wild Fruit Forests Resources in Tianshan Mountains/ Comprehensive Research on Wild Fruit Forests in ILi, Xinjiang, China	Details of the natural environment, origin and evolution, distribution, and plant resources of Tianshan wild fruit forests.	Lin Peijun	Beijing:China Forestry Publishing House, 2000
Physical Geography of the Tianshan Mountains in China	A comprehensive and systematic dissertation on the Tianshan Mountains in China	Hu Ruji	China Environmental Science Press. 2004
Study on Wild Fruit Trees of Xinjiang	Focus on Xinjiang Ili mountainous region, distribution of wild fruit trees in Xinjiang and their relationship with climate and the geographical environment are analyzed systematically.	Yan Guorong, & Xu Zheng	China Forestry Publishing House, 2010

13.2 Plan of Scientific Research

13.2.1 Research Direction and Content

The scientific research plan includes works to strengthen cooperation with domestic and international universities and research institutes, the setting up of a special research fund, development of series of scientific research programs, increasing the scientific research on ecosystems, biological diversity, mountain landscapes, ecotourism and other aspects of the nominated properties; further developing the scientific value and conservation value of the nominated properties, publishing relevant scientific monographs and proceedings, and publishing papers, to improve the academic and international influence of the nominated properties. Foci of the research are as follows:

■ **Conventional basic research**

Conventional basic research includes investigation of basic information on the resources and comprehensive scientific investigations on such topics as natural conditions, natural landscape, flora and fauna, species, resources, phenological observations, geography, history and basic social surveys.

■ **Studies for technical monographs**

It includes studies on biological resources' protection and utilization, ecological effects and environmental monitoring, ecology and ecosystem succession of rare wildlife, techniques to restore and optimize the damaged natural ecology, and coordinated and orderly development of the regional economic development to protect effectively the natural ecology of the nominated properties.

■ **Long-term monitoring**

It includes long-term monitoring studies on the representative ecosystems in the nominated properties, such as ecosystems' composition, structure, function and productivity, ecosystems' dynamics, their ability to regenerate and the relationship between them; continuous studies on areas not investigated before and biological groups poorly understood, and research on restoration of wildlife habitat and corridors.

■ **Applied research for protection and management**

It mainly includes applied research for protection and management for the sustainable development of the nominated properties, such as research on construction of experimental bases of science and education, research on science and education display systems and forms, research on geographic information system construction, research on dynamic management of landscape ecological networks, research on the influence of human activities, research on prevention and control of geological disasters, research on social and economic development and community development, and research on tourism activities and tourism management.

13.2.2 Organization and Management of Scientific Research

Based on Xinjiang Tianshan's application for World Natural Heritage, each nominated property will construct some research bases. Under the guidance of government departments, combined with universities and scientific research units, full use should be made of the personnel of colleges and scientific research units. Hire a number of multi-disciplinary research experts and consultants of multi-disciplinary science and technology in the long term. Combine research projects on heritage with applications by experts to fund their own research topics, organize regular or periodic scientific explorations and seminars in accordance with heritage protection, as well as

production and construction of experimental projects.

All research units of the nominated properities should organize and publish a journal of Xinjiang Tianshan, keep relationships with relevant academic associations at home and abroad, organize academic exchange activities to promote the research on heritage and bring the research results of Xinjiang Tianshan to the world.

13.3 Scientific Research Symposium

With adequate scientific research, and based on the protection and management of the nominated properties, the exploitation and utilization of resources such as forests, meadow grasslands, rivers and lakes, and tourism development research, management departments of the nominated properties will organize high-level symposiums in the future, and establish a science and research monitoring body, such as Tomur snow leopard conservation center, to make mountain ecosystems of the nominated properties in temperate arid area known internationally, and to make the nominated properties the research base for biodiversity and mountain altitudinal zones.

13.4 The Management of Popular Science Education

(1) Insist on the promotion and education about protection regulations and scientific knowledge to the staffs and villagers in long term.

Mainly use the form of notices, brochures, public service advertisements and publicity columns, and also do some regular publicity through the media of the local party and government, such as television, newspapers, documents, etc. The managers and staff in the nominated properties should also be promoting guides of Xinjiang Tianshan natural heritage. At the same time, information should be spread through government-organized meetings at all levels, especially to farmers.

(2) Strengthen the environmental protection education of tourism.

Establish at least one heritage exhibition center in each nomination, so as to spread scientific knowledge of Xinjiang Tianshan and ecology through popular science tourism. Also, establish signboards of Xinjiang Tianshan bioecology and environment at various junctions and squares, so as to strengthen the promotion of science and conservation.

(3) Edit and publish popular readings and publicity pictures relevant to popular science tourism of Xinjiang Tianshan.

Distribute these readings and publicity pictures on the properties in and the around villages and schools, in particularly, promoting the learning of parents through students.

14. Monitoring in the Nominated Properties

14.1 Monitored Objects

(1) Monitoring of heritage values

This is monitoring of the constituent elements of the nominated properties' outstanding universal value, including the monitoring of landscapes, vegetation, animals, animal habitats, changes in animal species, and the integrity of the borders of the nominated properties and buffer zones.

(2) Monitoring of ecological processes and biodiversity

This mainly includes the comprehensive monitoring of the integrity of ecosystems, ecological state of biodiversity, rare and endangered species, forests and grasslands, wetlands, as well as alien invasive species.

(3) Environmental quality monitoring

Comprehensive monitoring of climate change, air quality, water quality, noise, solid waste pollution and environmental health.

(4) Monitoring of glaciers

Movement of glaciers, relationships between climate and glaciers, and so on, will be studied through monitoring the positions of glaciers. Remote sensing can be used to monitor the movement of glaciers regularly.

(5) Monitoring of heritage tourism

This is the monitoring of tourist numbers, tourist characteristics and types, tourism projects, tour area, and the facilities for and quality of tourism services.

(6) Monitoring of natural disasters

This will involve the observation, control and response to emergency incidents. Key monitoring of avalanches, landslides, debris flows, structural failures, fires and pests shall be carried out.

14.2 Key Indicators to Measure Protection Status

Xinjiang Tianshan will be nominated under criteria vii and ix for World Natural Heritage status. According to the type and protection state of the heritage, a system of heritage management and monitoring should be established.

Table14-1 Monitoring indicators of the Tomur component

Monitoring Indicators	Period	Data Store department
Integrity (type, boundary)	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Tomur Peak National Nature Reserve
Climate and glacier changes	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Tomur Peak National Nature Reserve
Glacial geomorphology and its dynamics	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Tomur Peak National Nature Reserve
Forest ecosystems and dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region,, Administrative Bureau of Tomur Peak National Nature Reserve
Grassland ecosystems and dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Tomur Peak National Nature Reserve
Plant species and their number	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Animal species and their number	5 year	Administrative Bureau of Tomur Peak National Nature Reserve
Exotic species and their threats	Long term	Administrative Bureau of Tomur Peak National Nature Reserve
Hydrological dynamics and water quality	1 month	Administrative Bureau of Tomur Peak National Nature Reserve
Soil properties	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Weather and climate	1 day	Administrative Bureau of Tomur Peak National Nature Reserve, Meteorology Bureau of Wensu County
Tourism and recreation in touristic areas	1 year	Administrative Bureau of Tomur Peak National Nature Reserve

Number of visitors and tourism projects	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Natural disasters	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Forest fires	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Villages and population, resident status within the heritage site	1 year	Administrative Bureau of Tomur Peak National Nature Reserve
Ambient Air quality	1 month	Environment Protection Bureau of Aksu Prefecture
Water quality	1 month	Environment Protection Bureau of Aksu Prefecture
Noise	1 month	Environment Protection Bureau of Aksu Prefecture
Solid waste	1 month	Environment Protection Bureau of Aksu Prefecture

Table 14-2 Monitoring indicators of the Kalajun-Kuerdening component

Monitoring Indicators	Period	Data store department
Integrity (type, boundary)	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Construction Bureau of Ili Kazakh Autonomous Prefecture
Forest ecosystem and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Construction Bureau of Ili Kazakh Autonomous Prefecture
Grassland ecosystem and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Construction Bureau of Ili Kazakh Autonomous Prefecture
Plant species and their number	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Animal species and their number	5 years	Construction Bureau of Ili Kazakh Autonomous Prefecture
Exotic species and the threats	Long term	Construction Bureau of Ili Kazakh Autonomous Prefecture
Hydrological dynamics and water quality	1 month	Construction Bureau of Ili Kazakh Autonomous Prefecture
Soil properties	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Weather and climate	1 day	Construction Bureau of Ili Kazakh Autonomous Prefecture

Tourism and recreation in touristic areas	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Number of visitors and tourism projects	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Natural disasters	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Forest fires	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Villages and population, resident status within the heritage site	1 year	Construction Bureau of Ili Kazakh Autonomous Prefecture
Ambient Air quality	1 month	Environment Protection Bureau of Ili Kazakh Autonomous Prefecture
Water quality	1 month	Environment Protection Bureau of Ili Kazakh Autonomous Prefecture
Noise	1 month	Environment Protection Bureau of Ili Kazakh Autonomous Prefecture
Solid waste	1 month	Environment Protection Bureau of Ili Kazakh Autonomous Prefecture

Table 14-3 Monitoring indicators of the Bayinbuluke component

Monitoring Indicators	Period	Data store department
Integrity (type, boundary)	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Bayinbuluke National Nature Reserve
Wetland ecosystem and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Bayinbuluke National Nature Reserve
Wetland ecosystem and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Bureau of Bayinbuluke National Nature Reserve
Plant species and their number	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Forestry Bureau of Hejing County
Animal species and their number	5 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Forestry Bureau of Hejing County
Exotic species and the threats	Long term	Administrative Bureau of Bayinbuluke National Nature Reserve, Forestry Bureau of Hejing County

Hydrological dynamics and water quality	1 month	Administrative Bureau of Bayinbuluke National Nature Reserve, Environment Protection Bureau of Hejing County
Soil properties	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Environment Protection Bureau of Hejing County
Weather and climate	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Meteorological Bureau of Hejing County
Tourism and recreation in touristic areas	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Tourism Bureau of Hejing County
Number of visitors and tourism projects	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Tourism Bureau of Hejing County
Natural disasters	1 year	Administrative Bureau of Bayinbuluke National Nature Reserve, Land and Resources Bureau of Hejing County
Ambient Air quality	1 year	Environment Protection Bureau of Bayangol Mongol Autonomous Prefecture
Water quality	1 month	Environment Protection Bureau of Bayangol Mongol Autonomous Prefecture
Noise	1 month	Environment Protection Bureau of Bayangol Mongol Autonomous Prefecture
Solid waste	1 month	Environment Protection Bureau of Bayangol Mongol Autonomous Prefecture

Table 14-4 Monitoring indicators of the Bogda component

Monitoring Indicators	Period	Data store department
Integrity (type, boundary)	1 year	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Commission of Xinjiang Tianchi , Xinjiang, China
Climate and glacier changes	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Commission of Xinjiang Tianchi , Xinjiang, China
Glacial geomorphology and its dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Commission of Xinjiang Tianchi , Xinjiang, China
Forest ecosystems and dynamics	Long term	Department of Housing and Urban-rural Development of Xinjiang Uygur Autonomous Region, Administrative Commission of Xinjiang Tianchi , Xinjiang, China

Plant species and their number	1 year	Administrative Commission of Tianchi Lake of Tianshan Mountain, Xinjiang, China, Forestry Bureau of Fukang county
Animal species and their number	5 years	Administrative Commission of Xinjiang Tianchi , Xinjiang, China, Forestry Bureau of Fukang county
Exotic species and the threats	Long term	Administrative Commission of Xinjiang Tianchi , Xinjiang, China, Forestry Bureau of Fukang county
Hydrological dynamics and water quality	1 month	Administrative Commission of Xinjiang Tianchi , Xinjiang, China, Environment Protection Bureau of Fukang county
Soil properties	1 year	Administrative Commission of Xinjiang Tianchi , Xinjiang, China, Environment Protection Bureau of Fukang county
Weather and climate	Daily	Administrative Commission of Xinjiang Tianchi , Xinjiang, China, Meteorology Bureau of Fukang county
Tourism and recreation in touristic areas	1 year	Administrative Commission of Tianchi Lake of Tianshan Mountian, Xinjiang, China, Tourism Bureau of Fukang county
Number of visitors and tourism projects	1 year	Administrative Commission of Xinjiang Tianchi, Tourism Bureau of Fukang county
Natural disasters	1 year	Administrative Commission of Xinjiang Tianchi, Land and Resources Bureau of Fukang county
Forest fires	1 year	Administrative Commission of Xinjiang Tianchi , Xinjiang, China, Forestry Bureau of Fukang county
Villages and population, resident status within the heritage	1 year	Administrative Commission of Xinjiang Tianchi
Ambient Air quality	1 month	Environment Protection Bureau of Changji Hui Autonomous Prefecture
Water quality	1 month	Environment Protection Bureau of Changji Hui Autonomous Prefecture
Noise	1 month	Environment Protection Bureau of Changji Hui Autonomous Prefecture
Solid waste	1 month	Environment Protection Bureau of Changji Hui Autonomous Prefecture

14.3 Current Monitoring System

(1) The way of monitoring

The current monitoring system is composed of commission monitoring and self-monitoring. The routine monitoring of forest-fire prevention, forest pests, the number and the types of tourists, the quality of tourism services and facilities, construction projects, population and socio-economic status is executes by the administrative departments of nominated property. Due to the restrictions of technicians or equipment, some monitoring cannot be executed by the administrative departments. For these items, such as geomorpohologic landscape, biological, air and water environment, commission monitoring will be done periodically or regularly by the relevant functional departments or scientific research institutes, such as mining, forestry, environmental monitoring, etc. Some are cooperating with universities and research institutes to establish monitoring and research bases so that the monitoring can be executed.

(2) Means of monitoring

Fixed-point observation, instrument monitoring, community monitoring and statistical investigation are used in the nominated property. In every conservation station, there are one or two monitors who are engaged by the administrative departments of the nominated properties. They are mainly responsible for monitoring of forest fire prevention, geological disasters, illegal hunting, illegal specimen collection and illegal logging of trees.

(3) Data processing

Some nominated properties have founded research centers or institutes (affiliated to the monitoring center), and a digital information control center. They are responsible for data collection and analysis, timely delivery of information in emergencies to the administration departments and to provide feedback on decisions and approaches to the high-level leaders,. They also deliver information to the relevant departments regularly. The administrative departments commission universities or research institutes to analyze the monitoring data regularly in order to receive solutions and suggestions about serious problems in a timely fashion.

(4) Achievements of monitoring

Current monitoring shows that the quality of the surface water of the nominated properties meets the standard of I-II types in Environmental quality standard for surface water(GB3838□2002); ambient air meets the standard of I type in Ambient air quality standard(GB3095□1996); ambient

noise meets standard of 0 type functional district in Standard of environmental noise of urban area(GB3096—1993); soil meets the standard of I type in Environmental quality standard for soils(GB15618—1995).

The monitoring systems of the nominated properties are as follow:

Table 14-5 Current monitoring system of theTomur component

Location	No.	Monitoring site	Content of monitoring
Nominated Property	I1	Qiongkezibayi	Glacier, biology, fire prevention, tourism
	I2	Xiaotianlan	Water quality, biology, fire prevention, tourism
	I3	Bayili	Air, fire prevention, noise, tourism
	I4	Pingtaizi	Biology, tourism
	I5	Tomur Grand Canyon	Water quality, air, noise, biology, tourism
Buffer Zone	II1	Management Centre of Nominated Site	Noise, tourism
	II2	Tagelake	Water quality, air, noise, biology, tourism
	II3	Bozidun	Water quality, tourism
	II4	Xiaokuzibayi	Biology, fire prevention
	II5	Ateaoyinake	Glacier

Table 14-6 Current monitoring system of the Kalajun-Kuerdening component

Location		No.	Monitoring site	Content of monitoring
Kuerdening	Nominated Property	I1	Erbotu	Water quality, noise, biology, fire prevention, tourism
		I2	Kuerdening	Soil, biology, fire prevention, tourism
		I3	Kuerdening River	Water quality, biology, fire prevention
	Buffer Zone	II1	Dapingtai	Air, fire prevention
		II2	Reception Centre	Water quality, noise, tourism
Kalajun	Nominated Property	I1	Qiongmiergen	Soil, biology, tourism
		I2	Kaisikentuobie	Water quality, biology, tourism
		I3	Xukongtuhule	Biology, tourism
		I4	Habudale	Biology, tourism
		I5	Kuerdai RiverGrand Canyon	Air, noise, biology, fire prevention
		I6	Kuerdai River	Water quality, biology
	Buffer Zone	II1	Aketasisayi	Air, noise, tourism

Table 14-7 Current monitoring system of the Bayinbuluke component

Location	No.	Monitoring site	Content of monitoring
Nominated Property	I1	Upper reaches of Kaidu river	Water quality, air, biology
	I2	No 1 watching tower	Noise, soil, fire prevention, biology
	I3	Rescuing center of wildlife	Biology
	I4	Lower reaches of Kaidu river	Air, water quality
	I5	Hongqimuchang	Biology
	I6	Bayangol	Water quality, biology
	I7	Baxilige	Noise, tourism
Buffer Zone	II1	Bayinwulu	Air, water quality, biology
	II2	No 2 watching tower	Air, noise, biology, fire prevention

Table 14-8 Current monitoring system of the Bogda component

Location	No.	Monitoring site	Content of monitoring
Nominated Property	I1	Baiyanggou	Biology, fire prevention, tourism
	I2	Sigong River	Biology, fire prevention, tourism
	I3	Sigongliang	Tourism
	I4	Sigongnantaizi	Air, noise, biology, tourism
	I5	Haibei	Air, tourism
	I6	Outlet of Tianchi	Water quality
	I7	Centre of Tianchi	Water quality
	I8	Intake of Tianchi	Water quality
	I9	Hainan	Biology, fire prevention, tourism
	I10	Dadonggou	Biology, fire prevention
	I11	Haxionggou	Biology, fire prevention
	I12	Malugou	Biology, fire prevention
	I13	Jiyanjiangou	Glacier, environment, biology
	I14	Camp One of Bogda Peak	Soil, glacier
	I15	Sangecha	Air, glacier
Buffer Zone	II1	Laolinchang	Biology, fire prevention
	II2	Maya Mountain	Fire prevention, tourism
	II3	Denggan Mountain	Fire prevention, tourism
	II4	Tourist Centre	Noise, Tourism
	II5	Three Leveled Sluice	Water quality
	II6	Shixia	Tourism

14.4 Improvement of the Monitoring System

14.4.1 Establishment of a scientific research and information center

A “Heritage science and information center” should be established among the nominated properties to improve the equipment for scientific research and information processing functions. Besides, this center should be responsible for monitoring and collecting relevant information for protection and management of the nominated properties and buffer zones, making regular scientific analysis of monitoring information, submitting results and suggestions to administrative authorities and providing the decision makers with technical support. Furthermore, this institution should hold the responsibility of communicating with research institutions, universities and colleges as well as part-time experts.

14.4.2 Improvement of the Distribution and Control among Monitoring Points, and Remote Tele-video Monitoring

- The monitoring of the geomorphologic landscape: continuous monitoring of varied types of typical geomorphologic landscapes, including glacial landforms and red bed canyon landforms.

- The monitoring of forest and vegetation: timely monitoring of the current situation and dynamics of forest resource, growth laws, environmental dynamics and biodiversity changes of the forest; forest fire prevention, the invasion of harmful exotic species, as well as human activities.

- The monitoring of animals and their habitats: the timely monitoring of animal species, their quantities, current situation and the changing conditions of their habitats.

- The monitoring of the boundaries of the nominated properties and buffer zones: all nominated properties and buffer zones should undertake boundary surveys and mark them. Boundary monitoring points will be established along with construction of protection spots and observations on main routes.

- Tourism monitoring: monitoring points for the number of tourists, visitor programs, service facilities and quality must be established at main tourism activity spaces and routes for tourists in the nominated properties.

- Environmental monitoring: on the basis of current environmental monitoring points in the nominated properties, it is necessary to add more environmental monitoring points and facilities. In general, the hydrology and water environment monitoring stations are built at places where the river is entering or flowing out the nominated property and downstream of

main pollution sources; the atmospheric environment monitoring stations are built in the down-wind direction of main excursion and service areas; the sound environment monitoring stations are built at the service base and near the main sound sources; and the environmental sanitation monitoring points are built in the main excursion, service and residential areas.

14.4.3 The Establishment of a Digital Information Monitoring Center

Each nominated property should establish a digital information monitoring center which can make daily scientific analyses of monitoring information and submit the results and suggestions to administrative authorities. With regard to some different issues, they should be sent to mandatory institutions, universities and experts, all of which can provide technical support.

14.4.4 The improvement of Monitoring Methods

The monitoring methods are the combination of device monitoring, community patrol monitoring and statistical survey and fixed and moving modes. Protection and conservation stations are fixed monitoring points that combine a variety of service facilities and are equipped with necessary devices and 1-2 professionals. They can also use remote tele-video monitoring systems which can process real-time monitoring data in a digital management system. Additionally, moving monitoring site can be set up in accordance with different monitoring objectives. Information from the monitoring system will be analyzed and released regularly and irregularly.

14.4.5 Improvement of Facilities and Construction of Equipment

(1) Data base system: GIS, GPS, RS, computer and network will be integrated to digitalize the heritage resources and form a spatial data platform.

(2) Network video monitoring system: with help of a large screen system, real-time monitoring of the heritage and automatic inspection of all images sent from the front of the network will be available, and you can position the image based on electronic maps so as to undertake centralized control of fronts.

(3) Dispatching system: with the help of computer, network, communication, and management information system, decision support system will be formed to support the real time dispatch of resources.

14.4.6 Improvement of Equipment for Field Staff

(1) Equipment for fire-proofing in monitoring and wildlife observation sites, such as fire-extinguisher and alarms;

(2) Equipment for field patrols in monitoring points (GPS for example);

(3) Equipment for transportation and communication in monitoring points;

(4) fire control equipment such as extinguisher and forecasting ones.

14.5 Planning for Monitoring Systems of Each Nominated Property

Table 14-9 Planned monitoring system of the Tomur component

Location	No.	Monitoring Site	Content of Monitoring
Nominated Property	I6	Kekeqi	Water quality, Glacier
	I7	Wukuer	Glacier
	I8	Tugebieliqi	Glacier
	I9	Qiongsubeixi	Glacier
	I10	Kalegatilekewengkuerkuotan	Glacier
	I11	Sanxiaodui	Geology
	I12	Tomur	Glacier

Table 14-10 Planned monitoring system of the Kalajun-Kuerdening component

Location		No.	Monitoring Site	Content of Monitoring
Kuerdening	Nominated Property	I4	Botu	Air, Fire Prevention, Tourism
		I5	Jingyishibulake	Biology, Fire Prevention, Tourism
		I6	Shatebulake	Water quality, Biology, Fire Prevention, Tourism
		I7	Aketuyeke]	Biology, Fire Prevention, Tourism
Kalajun	Nominated Property	I7	Qiongkushitai	Air, Biology, Fire Prevention, Tourism
		I8	Kalazhuoen	Air, Biology
		I9	Kezilesiyeerkungeyi	Biology

Table 14-11 Planned monitoring system of the Bogda component

Location	No.	Monitoring Site	Content of Monitoring
Nominated Property	I16	Shuiquangou	Fire Prevention, Tourism
	I17	Banzigou	Biology, Fire Prevention
	I18	Bogda	Glacier

15. Plans and Budgets

Funds to conserve Xinjiang Tianshan are included in the financial budget of Xinjiang People's Government. Governments above county level can raise special funds to conserve the properties through government investment and donations.

Funds for construction will be allocated for five years as follows:

(1) Fund for infrastructure

This is mainly used for the service center, exhibition center, conservation station (sentry), boundary markers, sign boards, transportation, communications, electric power, heating, water supply and drainage.

(2) Fund for biological protection

This is mainly used for converting breeding grounds to pasture at the edge and in the buffer zone of the nominated property, relocation and resettlement of herdsmen, and environmental management and ecological restoration.

(3) Fund for environment monitoring

This is used mainly for monitoring equipments.

(4) Fund for biological resources and conservation of habitat

This is mainly used for wildlife protection project, protection of endangered animals and plants, etc.

(5) Fund for scientific research

This is mainly used for scientific research and the building of research bases.

(6) Fund for raising awareness

This is mainly used to raise the awareness of heritage conservation.

(7) Fund for training

This is mainly used for the training of various levels of administrative staff and professional technical staff.

(8) Reserve fund

This accounts for 5% of the total investment in a year.

Table 15-1 Budgets on conservation of Xinjiang Tianshan (2011-2015)

Unit: 10,000 yuan

Project	Tomur	Kalajun-Kuerdening		Bayinbuluke	Bogda	Total
		Kalajun	Kuerdening			
Infrastructure construction	40,595	27,535	26,818	40,000	87,670	222,618
Biological protection	46,700	1,870	1,180	26,800	6,500	83,050
Environment monitoring	885	3,700	481	1,860	1,500	8,426
Protection on Biological Resources and Habitats	890	1,600	9,656	2,580	1,500	16,226
Scientific research	675	500	1,000	5,000	500	7,675
Awareness raising	840	350	200	650	1,000	3,040
Train	150	230	100	115	250	845
Reserve funds	5,441	1,790	2076	3,851	5,207	18,365
Total	96,176	37,575	41,511	80,856	104,127	360,245

Table 15-2 Budgets on conservation of the Tomur component (2011-2015)

Project	Gross investment (10,000 yuan)	Annual quota (10,000 yuan)				
		2011	2012	2013	2014	2015
Infrastructure construction	40,595	3,230	9,500	12,300	9,100	6,465
Environmental protection	46,700	3,250	20,800	15,200	5,500	1,950
Environment monitoring	885	85	480	150	120	50
Protection on Biological Resources and Habitats	890	90	455	160	100	85
Scientific research	675	28	420	110	65	52
Awareness raising	840	5	540	130	95	70
Train	150	4	35	40	41	30
Reserve funds	5,441	400	1,934	1,685	900	522
Total	96,176	7,092	34,164	29,775	15,921	9,224

Table 15-3 Budgets on conservation of the Kalajun component (2011-2015)

Project	Gross investment (10,000 yuan)	Annual quota (10,000 yuan)				
		2011	2012	2013	2014	2015
Infrastructure construction	27,535	3,000	11,000	7,000	4,000	2,535
Environmental protection	1,870	500	500	300	300	270
Environmental monitoring	3,700	1,000	1,500	700	300	200
Protection of Biological Resources and Habitats	1,600	500	600	200	200	100
Scientific research	500	50	100	150	100	100
Awareness raising	350	50	150	50	50	50
Train	230	20	100	50	30	30
Reserve funds	1,790	260	700	420	245	165
Total	37,575	5,380	14,650	8,870	5,225	3,450

Table 15-4 Budgets on conservation of the Kuerdening component (2011-2015)

Project	Gross investment (10,000 yuan)	Annual quota (10,000 yuan)				
		2011	2012	2013	2014	2015
Infrastructure Construction	26,818	2,682	8,045	8,045	4,023	4,023
Environmental Protection	1,180	118	413	354	177	118
Environment Monitoring	481	48	168	144	72	48
Protection on Biological Resources and Habitats	9,656	1,416	2,890	2,450	1,450	1,450
Scientific Research	1,000	100	300	200	200	200
Awareness raising	200	20	50	50	40	40
Train	100	20	20	20	20	20
Reserve Funds	2,076	716	772	397	102	89
Total	41,511	5,120	12,659	11,661	6,084	5,988

Table 15-5 Budgets on conservation of the Bayinbuluke component (2011-2015)

Project	Gross investment (10,000 yuan)	Annual quota (10,000 yuan)				
		2011	2012	2013	2014	2015
Infrastructure construction	40,000	12,000	10,000	8,000	5,000	5,000
Environmental protection	26,800	3,000	8,200	8,500	3,700	3,400
Environment monitoring	1,860	500	420	430	280	230
Protection on Biological Resources and Habitats	2,580	300	600	630	360	690
Scientific research	5,000	700	850	1,000	1,000	1,450
Awareness raising	650	50	100	150	150	200
Train	115	15	20	20	30	30
Reserve funds	3,851	828	1,010	937	526	550
Total	80,856	17,393	21,200	19,667	11,046	11,550

Table 15-6 Budgets on conservation of the Bogda component (2011-2015)

Project	Gross investment (10,000 yuan)	Annual quota (10,000 yuan)				
		2011	2012	2013	2014	2015
Infrastructure construction	87,670	27,670	37,750	16,250	3,000	3,000
Environmental protection	6,500	500	3,000	2,000	500	500
Environment monitoring	1,500	150	300	450	300	300
Protection on Biological Resources and Habitats	1,500	300	300	300	300	300
Scientific research	500	80	120	100	100	100
Awareness raising	1,000	400	300	100	100	100
Train	250	20	50	80	50	50
Reserve funds	5,207	1,533	2,201	1,015	229	229
Total	104,127	30,653	44,021	20,295	4,579	4,579

Annex 1 Coordinates

Annex 1-1 Coordinates of the Tomur component

No.	Latitude	Longitude
T-1	N41°59′17″	E79°51′10″
T-2	N 41°58′29″	E 79°52′40″
T-3	N 41°56′26″	E 79°51′51″
T-4	N 41°55′34″	E 79°52′09″
T-5	N 41°54′32″	E 79°51′45″
T-6	N 41°53′43″	E 79°50′31″
T-7	N 41°53′01″	E 79°51′10″
T-8	N 41°50′47″	E 79°49′57″
T-9	N 41°48′14″	E 79°50′04″
T-10	N 41°49′05″	E 79°51′45″
T-11	N 41°48′00″	E 79°54′02″
T-12	N 41°47′48″	E 80°01′03″
T-13	N 41°46′52″	E 80°02′00″
T-14	N 41°46′01″	E 80°05′17″
T-15	N 41°44′31″	E 80°06′37″
T-16	N 41°44′51″	E 80°08′40″
T-17	N 41°45′31″	E 80°09′18″
T-18	N 41°46′13″	E 80°11′27″
T-19	N 41°46′19″	E 80°15′46″
T-20	N 41°46′56″	E 80°16′36″
T-21	N 41°46′28″	E 80°17′55″
T-22	N 41°46′47″	E 80°18′37″
T-23	N 41°45′07″	E 80°24′09″

T-24	N 41°44′13″	E 80°25′17″
T-25	N 41°41′25″	E 80°27′01″
T-26	N 41°38′31″	E 80°31′39″
T-27	N 41°36′27″	E 80°32′56″
T-28	N 41°35′36″	E 80°34′06″
T-29	N 41°35′01″	E 80°36′53″
T-30	N 41°35′10″	E 80°38′36″
T-31	N 41°33′51″	E 80°40′17″
T-32	N 41°34′35″	E 80°43′30″
T-33	N 41°35′52″	E 80°43′25″
T-34	N 41°36′14″	E 80°45′01″
T-35	N 41°37′02″	E 80°43′14″
T-36	N 41°37′42″	E 80°43′53″
T-37	N 41°38′50″	E 80°43′23″
T-38	N 41°39′04″	E 80°44′13″
T-39	N 41°40′11″	E 80°44′31″
T-40	N 41°40′39″	E 80°43′17″
T-41	N 41°41′43″	E 80°42′49″
T-42	N 41°42′10″	E 80°41′57″
T-43	N 41°42′02″	E 80°38′56″
T-44	N 41°42′48″	E 80°37′07″
T-45	N 41°44′39″	E 80°34′14″
T-46	N 41°45′57″	E 80°33′25″
T-47	N 41°47′09″	E 80°34′20″
T-48	N 41°48′00″	E 80°33′51″
T-49	N 41°49′06″	E 80°34′10″
T-50	N 41°49′35″	E 80°35′16″

T-51	N 41°51′07″	E 80°35′56″
T-52	N 41°52′05″	E 80°37′55″
T-53	N 41°53′42″	E 80°39′20″
T-54	N 41°57′05″	E 80°38′41″
T-55	N 41°58′35″	E 80°39′45″
T-56	N 41°59′47″	E 80°39′08″
T-57	N 42°00′40″	E 80°39′46″
T-58	N 42°01′04″	E 80°41′03″
T-59	N 42°03′23″	E 80°41′10″
T-60	N 42°04′28″	E 80°40′41″
T-61	N 42°05′50″	E 80°42′31″
T-62	N 42°06′39″	E 80°42′10″
T-63	N 42°06′56″	E 80°39′42″
T-64	N 42°08′59″	E 80°36′23″
T-65	N 42°10′14″	E 80°37′29″
T-66	N 42°10′35″	E 80°39′28″
T-67	N 42°11′10″	E 80°40′19″
T-68	N 42°12′29″	E 80°39′56″
T-69	N 42°14′49″	E 80°40′47″
T-70	N 42°16′08″	E 80°38′03″
T-71	N 42°18′34″	E 80°38′26″
T-72	N 42°21′16″	E 80°37′29″
T-73	N 42°21′37″	E 80°35′12″
T-74	N 42°21′07″	E 80°31′42″
T-75	N 42°18′11″	E 80°25′18″
T-76	N 42°18′58″	E 80°22′33″
T-77	N 42°18′37″	E 80°18′53″
T-78	N 42°19′05″	E 80°17′01″

Annex 1-2 Coordinates of the buffer zone of Tomur component

No.	Latitude	Longitude
T-1	N 41°53′23″	E 79°46′08″
T-2	N 41°51′52″	E 79°46′00″
T-3	N 41°50′57″	E 79°47′38″
T-4	N 41°48′37″	E 79°49′06″
T-5	N 41°46′06″	E 79°49′03″
T-6	N 41°45′12″	E 79°51′51″
T-7	N 41°44′11″	E 79°52′42″
T-8	N 41°45′33″	E 80°00′00″
T-9	N 41°42′50″	E 80°05′33″
T-10	N 41°43′08″	E 80°08′28″
T-11	N 41°44′09″	E 80°09′08″
T-12	N 41°43′25″	E 80°11′28″
T-13	N 41°44′04″	E 80°17′45″
T-14	N 41°40′40″	E 80°24′47″
T-15	N 41°38′50″	E 80°24′20″
T-16	N 41°37′39″	E 80°25′06″
T-17	N 41°37′51″	E 80°29′02″
T-18	N 41°35′02″	E 80°31′50″
T-19	N 41°33′41″	E 80°34′38″
T-20	N 41°32′33″	E 80°39′25″
T-21	N 41°33′36″	E 80°44′53″
T-22	N 41°36′47″	E 80°46′23″
T-23	N 41°39′57″	E 80°46′34″
T-24	N 41°43′47″	E 80°41′25″
T-25	N 41°45′48″	E 80°40′43″

T-26	N 41°46′38″	E 80°41′24″
T-27	N 41°48′16″	E 80°40′59″
T-28	N 41°49′47″	E 80°39′04″
T-29	N 41°52′13″	E 80°42′44″
T-30	N 41°51′52″	E 80°44′23″
T-31	N 41°53′40″	E 80°48′18″
T-32	N 41°53′21″	E 80°50′04″
T-33	N 41°54′01″	E 80°49′40″
T-34	N 41°54′37″	E 80°50′26″
T-35	N 41°56′25″	E 80°48′43″
T-36	N 41°56′35″	E 80°49′47″
T-37	N 41°57′21″	E 80°48′37″
T-38	N 41°58′13″	E 80°50′46″
T-39	N 41°59′53″	E 80°49′35″
T-40	N 41°59′55″	E 80°45′57″
T-41	N 42°02′09″	E 80°45′37″
T-42	N 42°03′03″	E 80°46′54″
T-43	N 42°05′50″	E 80°44′33″
T-44	N 42°06′58″	E 80°42′04″
T-45	N 42°08′25″	E 80°42′23″
T-46	N 42°08′19″	E 80°47′22″
T-47	N 42°09′43″	E 80°48′56″
T-48	N 42°08′09″	E 80°51′36″
T-49	N 42°08′14″	E 80°53′32″
T-50	N 42°10′27″	E 80°57′20″
T-51	N 42°09′51″	E 80°58′39″
T-52	N 42°11′17″	E 81°00′09″

T-53	N 42°10′43″	E 81°03′34″
T-54	N 42°12′26″	E 81°04′31″
T-55	N 42°11′44″	E 81°06′27″
T-56	N 42°12′48″	E 81°12′21″
T-57	N 42°14′55″	E 81°14′36″
T-58	N 42°16′58″	E 81°14′57″
T-59	N 42°19′03″	E 81°13′29″
T-60	N 42°19′25″	E 81°10′41″
T-61	N 42°22′27″	E 81°12′19″
T-62	N 42°24′42″	E 81°10′51″
T-63	N 42°24′57″	E 81°08′34″
T-64	N 42°23′33″	E 81°07′45″
T-65	N 42°24′39″	E 81°05′43″
T-66	N 42°25′22″	E 81°05′22″
T-67	N 42°27′10″	E 81°06′23″
T-68	N 42°26′59″	E 81°07′34″
T-69	N 42°27′57″	E 81°08′21″
T-70	N 42°28′45″	E 81°07′20″
T-71	N 42°30′32″	E 81°07′27″
T-72	N 42°29′38″	E 81°06′22″
T-73	N 42°29′51″	E 81°03′24″
T-74	N 42°28′06″	E 81°01′16″
T-75	N 42°29′26″	E 80°58′30″
T-76	N 42°26′53″	E 80°51′19″
T-77	N 42°28′09″	E 80°45′04″
T-78	N 42°27′17″	E 80°42′21″
T-79	N 42°28′08″	E 80°42′02″

T-80	N 42°28′50″	E 80°39′59″
T-81	N 42°28′52″	E 80°37′38″
T-82	N 42°27′56″	E 80°36′22″
T-83	N 42°28′19″	E 80°31′16″
T-84	N 42°25′52″	E 80°30′28″
T-85	N 42°24′58″	E 80°28′41″
T-86	N 42°25′22″	E 80°26′02″
T-87	N 42°23′01″	E 80°25′35″
T-88	N 42°23′02″	E 80°20′55″
T-89	N 42°21′05″	E 80°19′07″
T-90	N 42°22′05″	E 80°15′12″
T-91	N 42°21′34″	E 80°13′33″

Annex 1-3 Coordinates of the Kalajun-Kuerdening component

No.	Latitude	Longitude
T-1	N 42°59′56″	E 82°52′02″
T-2	N 43°01′10″	E 82°51′31
T-3	N 43°07′56″	E 82°51′16
T-4	N 43°09′16″	E 82°52′43
T-5	N 43°09′09″	E 82°55′27
T-6	N 43°10′13″	E 82°56′13
T-7	N 43°09′00″	E 82°58′18
T-8	N 43°09′27″	E 83°00′07
T-9	N 43°08′21″	E 83°03′48
T-10	N 43°05′37″	E 83°07′11
T-11	N 42°59′44″	E 83°06′07
T-12	N 42°59′58″	E 83°00′03

T-13	N 42°59′27″	E 82°59′17
T-14	N 42°59′08″	E 82°56′01
T-15	N 42°59′56″	E 82°52′02
T-16	N 42°52′08″	E 82°23′50
T-17	N 42°51′40″	E 82°21′31
T-18	N 42°53′08″	E 82°20′42
T-19	N 42°53′17″	E 82°17′06
T-20	N 42°53′42″	E 82°16′17
T-21	N 42°53′26″	E 82°15′07
T-22	N 42°54′39″	E 82°14′28
T-23	N 42°54′53″	E 82°13′06
T-24	N 42°57′03″	E 82°12′23
T-25	N 42°57′51″	E 82°10′59
T-26	N 42°59′26″	E 82°10′41
T-27	N 43°03′18″	E 82°12′47
T-28	N 43°03′19″	E 82°17′30
T-29	N 43°02′12″	E 82°19′20
T-30	N 43°03′09″	E 82°21′51
T-31	N 43°02′26″	E 82°23′00
T-32	N 43°02′13″	E 82°24′57
T-33	N 43°03′37″	E 82°28′35
T-34	N 43°01′55″	E 82°30′38
T-35	N 43°00′59″	E 82°31′08
T-36	N 42°57′13″	E 82°30′24
T-37	N 42°55′38″	E 82°30′51
T-38	N 42°51′44″	E 82°29′30
T-39	N 42°52′08″	E 82°23′50

Annex 1-4 Coordinates of the buffer zone of the Kalajun-Kuerdening component

No.	Latitude	Longitude
T-1	N 42°48′18″	E 82°21′32″
T-2	N 42°48′56″	E 82°19′50″
T-3	N 42°49′58″	E 82°19′58″
T-4	N 42°50′25″	E 82°19′25″
T-5	N 42°52′14″	E 82°13′45″
T-6	N 42°56′24″	E 82°10′58″
T-7	N 42°59′19″	E 82°07′38″
T-8	N 43°01′35″	E 82°10′14″
T-9	N 43°05′03″	E 82°09′36″
T-10	N 43°05′28″	E 82°11′23″
T-11	N 43°04′42″	E 82°14′46″
T-12	N 43°05′06″	E 82°15′45″
T-13	N 43°03′36″	E 82°24′49″
T-14	N 43°06′11″	E 82°38′01″
T-15	N 43°05′45″	E 82°40′51″
T-16	N 43°07′08″	E 82°41′13″
T-17	N 43°07′11″	E 82°42′15″
T-18	N 43°08′24″	E 82°43′34″
T-19	N 43°06′57″	E 82°48′05″
T-20	N 43°08′08″	E 82°49′58″
T-21	N 43°09′18″	E 82°49′36″
T-22	N 43°10′12″	E 82°50′20″
T-23	N 43°11′24″	E 82°52′58″
T-24	N 43°13′03″	E 82°54′18″
T-25	N 43°13′33″	E 82°55′33″
T-26	N43°12′31″	E 82°58′03″

T-27	N 43°11′48″	E 83°04′30″
T-28	N 43°10′36″	E 83°06′03″
T-29	N 43°10′34″	E 83°07′15″
T-30	N 43°09′03″	E 83°08′11″
T-31	N 43°07′48″	E 83°07′43″
T-32	N 43°05′47″	E 83°10′08″
T-33	N 43°05′10″	E 83°09′41″
T-34	N 43°01′38″	E 83°09′57″
T-35	N 42°58′58″	E 83°08′30″
T-36	N 42°57′38″	E 83°06′14″
T-37	N 42°56′09″	E 83°05′20″
T-38	N 42°57′24″	E 83°02′38″
T-39	N 42°57′52″	E 82°59′30″
T-40	N 42°56′32″	E 82°56′57″
T-41	N 42°57′02″	E 82°55′08″
T-42	N 42°56′22″	E 82°50′45″
T-43	N 42°57′01″	E 82°48′38″
T-44	N 42°55′54″	E 82°47′22″
T-45	N 42°56′21″	E 82°43′34″
T-46	N 42°56′59″	E 82°42′23″
T-47	N 42°55′51″	E 82°40′59″
T-48	N 42°56′01″	E 82°35′36″
T-49	N 42°55′18″	E 82°33′58″
T-50	N 42°53′47″	E 82°33′16″
T-51	N 42°52′10″	E 82°32′42″
T-52	N 42°49′00″	E 82°33′03″
T-53	N 42°47′27″	E 82°26′45″
T-54	N 42°47′32″	E 82°22′31″

Annex 1-5 Coordinates of the Bayinbuluke component

No.	Latitude	Longitude
T-01	N 42°43′53″	E 84°27′44″
T-02	N 42°43′09″	E 84°30′31″
T-03	N 42°44′46″	E 84°34′19″
T-04	N 42°4414″	E 84°36′17″
T-05	N 42°40′40″	E 84°31′22″
T-06	N 42°41′07″	E 84°28′00″
T-07	N 42°42′59″	E 84°22′58″
T-08	N 42°42′32″	E 84°22′18″
T-09	N 42°41′46″	E 84°22′12″
T-10	N 42°40′07″	E 84°24′11″
T-11	N 42°39′26″	E 84°22′55″
T-12	N 42°39′53″	E 84°15′57″
T-13	N 42°42′14″	E 84°14′15″
T-14	N 42°43′50″	E 84°06′15″
T-15	N 42°43′36″	E 84°05′43″
T-16	N 42°41′59″	E 84°04′59″
T-17	N 42°42′30″	E 83°59′60″
T-18	N 42°43′53″	E 83°56′29″
T-19	N 42°46′43″	E 83°56′07″
T-20	N 42°50′04″	E 83°53′23″
T-21	N 42°49′59″	E 83°51′55″
T-22	N 42°50′51″	E 83°49′24″

T-23	N 42°50′51″	E 83°43′26″
T-24	N 42°53′29″	E 83°43′07″
T-25	N 42°53′46″	E 83°44′03″
T-26	N 42°52′59″	E 83°46′09″
T-27	N 42°53′36″	E 83°46′33″
T-28	N 42°53′35″	E 83°53′04″
T-29	N 42°54′57″	E 83°54′59″
T-30	N 42°53′29″	E 84°02′24″
T-31	N 42°53′30″	E 84°05′36″
T-32	N 42°54′50″	E 84°06′15″
T-33	N 42°58′01″	E 84°06′43″
T-34	N 42°58′22″	E 84°07′56″
T-35	N 42°55′59″	E 84°10′36″
T-36	N 42°52′36″	E 84°19′32″
T-37	N 42°51′45″	E 84°20′12″
T-38	N 42°49′32″	E 84°20′33″
T-39	N 42°48′56″	E 84°24′47″
T-40	N 42°47′58″	E 84°25′27″
T-41	N 42°46′43″	E 84°24′55″
T-42	N 42°46′33″	E 84°25′31″
T-43	N 42°45′38″	E 84°25′54″
T-44	N 42°45′02″	E 84°27′27″
T-45	N 42°48′00″	E 84°09′35″

Annex 1-6 Coordinates of the buffer zone of the Bayinbuluke component

No.	Latitude	Longitude
H-1	N 42°50′55″	E 83°39′37″
H-2	N 42°48′44″	E 83°39′11″
H-3	N 42°47′50″	E 83°39′47″
H-4	N 42°47′50″	E 83°43′33″
H-5	N 42°47′12″	E 83°47′01″
H-6	N 42°43′13″	E 83°51′50″
H-7	N 42°41′37″	E 83°53′01″
H-8	N 42°41′56″	E 83°54′40″
H-9	N 42°41′23″	E 83°56′15″
H-10	N 42°40′30″	E 83°57′05″
H-11	N 42°40′57″	E 83°59′09″
H-12	N 42°39′38″	E 84°02′01″
H-13	N 42°39′54″	E 84°04′33″
H-14	N 42°40′37″	E 84°05′09″
H-15	N 42°40′58″	E 84°06′23″
H-16	N 42°41′20″	E 84°12′02″
H-17	N 42°38′59″	E 84°14′49″
H-18	N 42°37′59″	E 84°17′37″
H-19	N 42°37′32″	E 84°22′19″
H-20	N 42°38′16″	E 84°24′21″
H-21	N 42°39′02″	E 84°24′42″
H-22	N 42°38′49″	E 84°29′03″
H-23	N 42°40′15″	E 84°32′52″
H-24	N 42°42′33″	E 84°36′12″
H-25	N 42°44′21″	E 84°37′53″
H-26	N 42°44′49″	E 84°37′03″

H-27	N 42°45′27″	E 84°37′18″
H-28	N 42°46′29″	E 84°35′02″
H-29	N 42°46′22″	E 84°32′08″
H-30	N 42°48′03″	E 84°30′05″
H-31	N 42°49′23″	E 84°29′43″
H-32	N 42°51′19″	E 84°25′14″
H-33	N 42°51′16″	E 84°24′03″
H-34	N 42°52′19″	E 84°24′42″
H-35	N 42°52′55″	E 84°24′06″
H-36	N 42°53′03″	E 84°21′21″
H-37	N 42°54′35″	E 84°20′32″
H-38	N 42°54′38″	E 84°18′16″
H-39	N 42°55′45″	E 84°14′30″
H-40	N 42°59′28″	E 84°07′29″
H-41	N 42°55′02″	E 83°48′02″
H-42	N 42°55′12″	E 83°42′28″
H-43	N 42°54′10″	E 83°40′17″
H-44	N 42°45′02″	E 84°27′27″
H-45	N 42°48′00″	E 84°09′35″

Annex 1-7 Coordinates ofthe Bogda component

No.	Latitude	Longitude
T-01	N 43°44′56″	E 88°21′23″
T-02	N 43°45′10″	E 88°22′18″
T-03	N 43°43′36″	E 88°23′04″
T-04	N 43°43′46″	E 88°23′55″
T-05	N 43°45′20″	E 88°25′11″

T-06	N 43°45′03″	E 88°25′51″
T-07	N 43°44′20″	E 88°25′46″
T-08	N 43°43′53″	E 88°26′22″
T-09	N 43°44′19″	E 88°26′41″
T-10	N 43°43′54″	E 88°27′55″
T-11	N 43°45′49″	E 88°28′28″
T-12	N 43°46′01″	E 88°29′11″
T-13	N 43°47′07″	E 88°29′53″
T-14	N 43°48′10″	E 88°29′09″
T-15	N 43°48′28″	E 88°27′52″
T-16	N 43°49′27″	E 88°27′32″
T-17	N 43°49′50″	E 88°26′46″
T-18	N 43°49′41″	E 88°24′10″
T-19	N 43°50′45″	E 88°21′54″
T-20	N 43°51′39″	E 88°21′27″
T-21	N 43°51′14″	E 88°19′44″
T-22	N 43°50′33″	E 88°19′25″
T-23	N 43°50′06″	E 88°16′59″
T-24	N 43°51′24″	E 88°15′50″
T-25	N 43°53′51″	E 88°15′29″
T-26	N 43°56′54″	E 88°12′26″
T-27	N 43°57′08″	E 88°11′26″
T-28	N 43°56′23″	E 88°09′43″
T-29	N 43°56′03″	E 88°06′32″
T-30	N 43°53′52″	E 88°07′21″
T-31	N 43°51′47″	E 88°06′52″
T-32	N 43°46′47″	E 88°08′30″
T-33	N 43°45′32″	E 88°08′25″

T-34	N 43°45′01″	E 88°11′41″
T-35	N 43°45′20″	E 88°14′22″
T-36	N 43°46′12″	E 88°15′04″
T-37	N 43°46′07″	E 88°16′03″
T-38	N 43°46′55″	E 88°16′00″
T-39	N 43°47′23″	E 88°16′29″
T-40	N 43°46′01″	E 88°18′26″
T-41	N 43°46′07″	E 88°20′56″

Annex 1-8 Coordinates of the buffer zone of the Bogda component

No.	Latitude	Longitude
H-1	N 43°43′13″	E 88°24′49″
H-2	N 43°43′33″	E 88°25′53″
H-3	N 43°43′04″	E 88°27′17″
H-4	N 43°43′54″	E 88°29′42″
H-5	N 43°45′34″	E 88°29′20″
H-6	N 43°47′27″	E 88°30′33″
H-7	N 43°48′53″	E 88°30′05″
H-8	N 43°49′31″	E 88°30′32″
H-9	N 43°51′01″	E 88°29′46″
H-10	N 43°51′45″	E 88°27′07″
H-11	N 43°51′28″	E 88°25′45″
H-12	N 43°52′37″	E 88°24′08″
H-13	N 43°51′30″	E 88°22′53″
H-14	N 43°51′34″	E 88°22′18″
H-15	N 43°52′23″	E 88°21′54″
H-16	N 43°52′47″	E 88°17′18″
H-17	N 43°57′30″	E 88°14′01″
H-18	N 43°58′43″	E 88°11′43″

H-19	N 43°59′01″	E 88°09′00″
H-20	N 43°59′53″	E 88°07′45″
H-21	N 44°03′18″	E 88°05′42″
H-22	N 44°04′50″	E 88°05′26″
H-23	N 44°04′02″	E 88°03′00″
H-24	N 43°58′01″	E 88°02′19″
H-25	N 43°56′54″	E 88°00′35″
H-26	N 43°54′17″	E 88°01′24″
H-27	N 43°53′22″	E 88°00′41″
H-28	N 43°52′25″	E 88°01′02″
H-29	N 43°51′25″	E 88°02′20″
H-30	N 43°50′47″	E 88°04′08″
H-31	N 43°48′53″	E 88°04′40″
H-32	N 43°46′50″	E 88°03′42″
H-33	N 43°46′12″	E 88°05′52″
H-34	N 43°44′55″	E 88°06′15″
H-35	N 43°44′11″	E 88°07′46″
H-36	N 43°45′00″	E 88°08′54″
H-37	N 43°44′12″	E 88°09′43″
H-38	N 43°44′52″	E 88°10′45″
H-39	N 43°44′30″	E 88°13′46″
H-40	N 43°45′43″	E 88°17′03″
H-41	N 43°45′13″	E 88°17′58″
H-42	N 43°44′20″	E 88°17′31″
H-43	N 43°43′12″	E 88°18′18″
H-44	N 43°43′56″	E 88°19′09″
H-45	N 43°43′28″	E 88°19′59″
H-46	N 43°44′09″	E 88°20′29″
H-47	N 43°42′52″	E 88°22′53″
H-48	N 43°43′18″	E 88°23′25″

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Map 2 Location of the Nominated Xinjiang Tianshan in Xinjiang Uygur Autonomous Region
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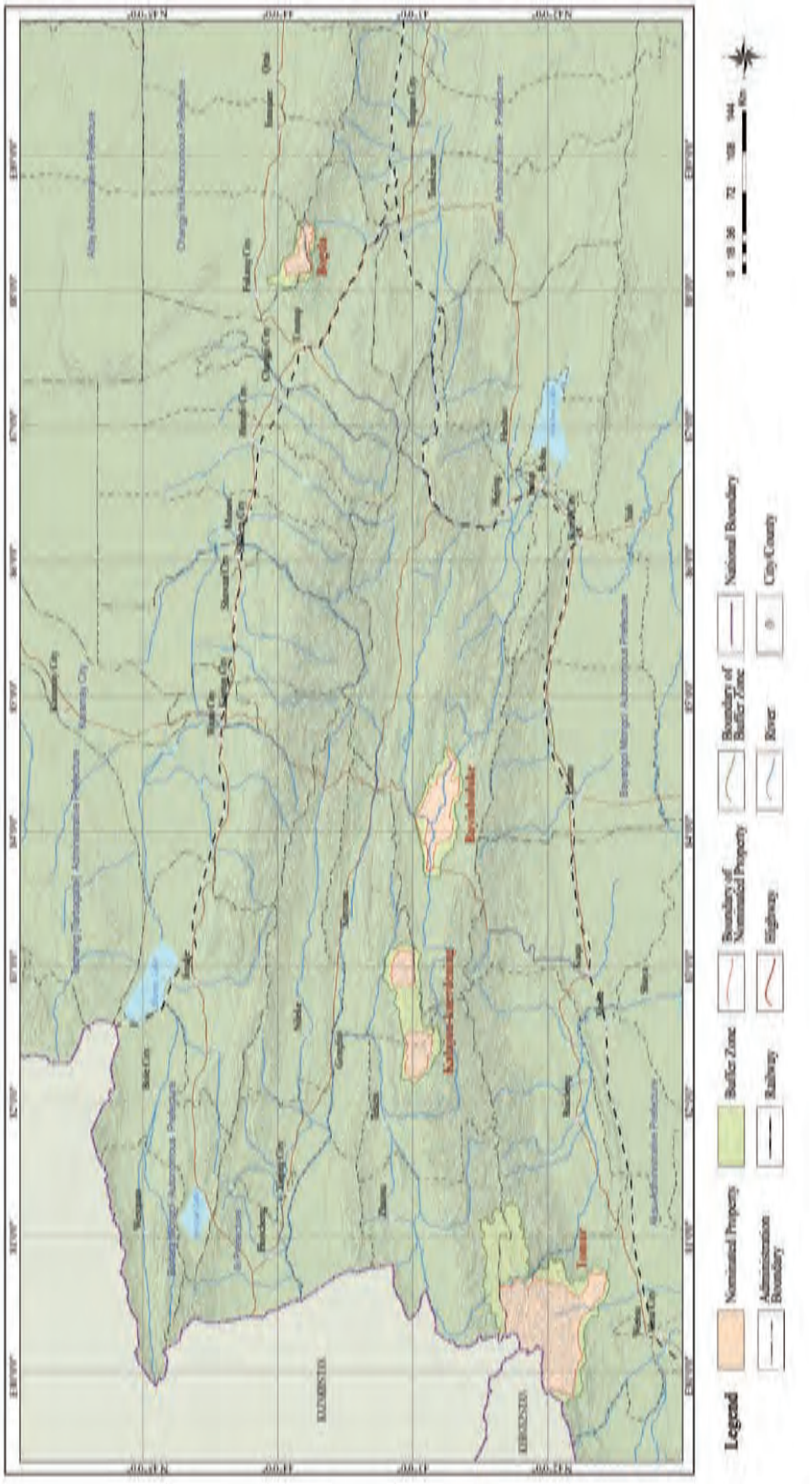
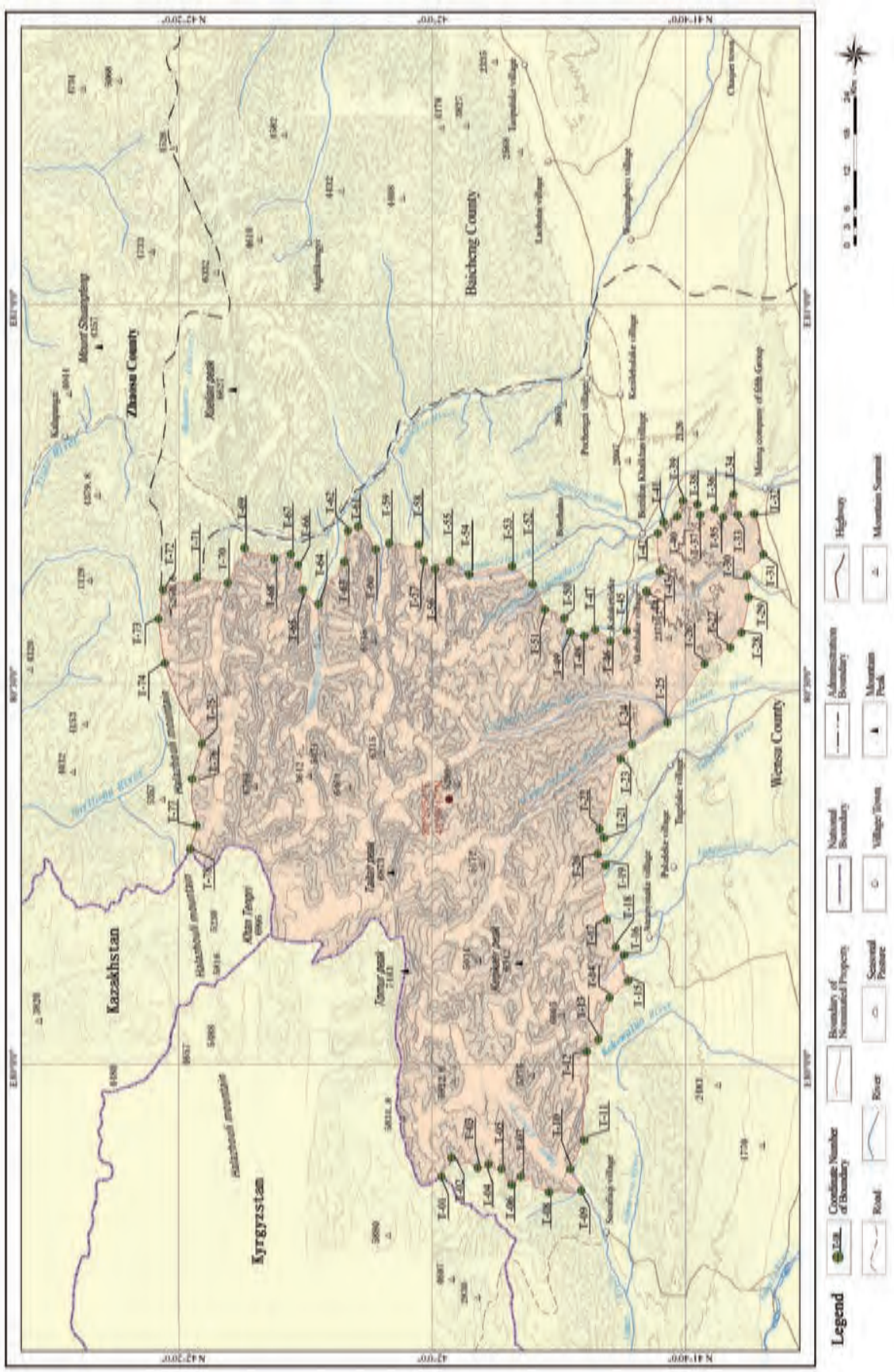
Map 1 Location of the Nominated Xinjiang Tianshan in China

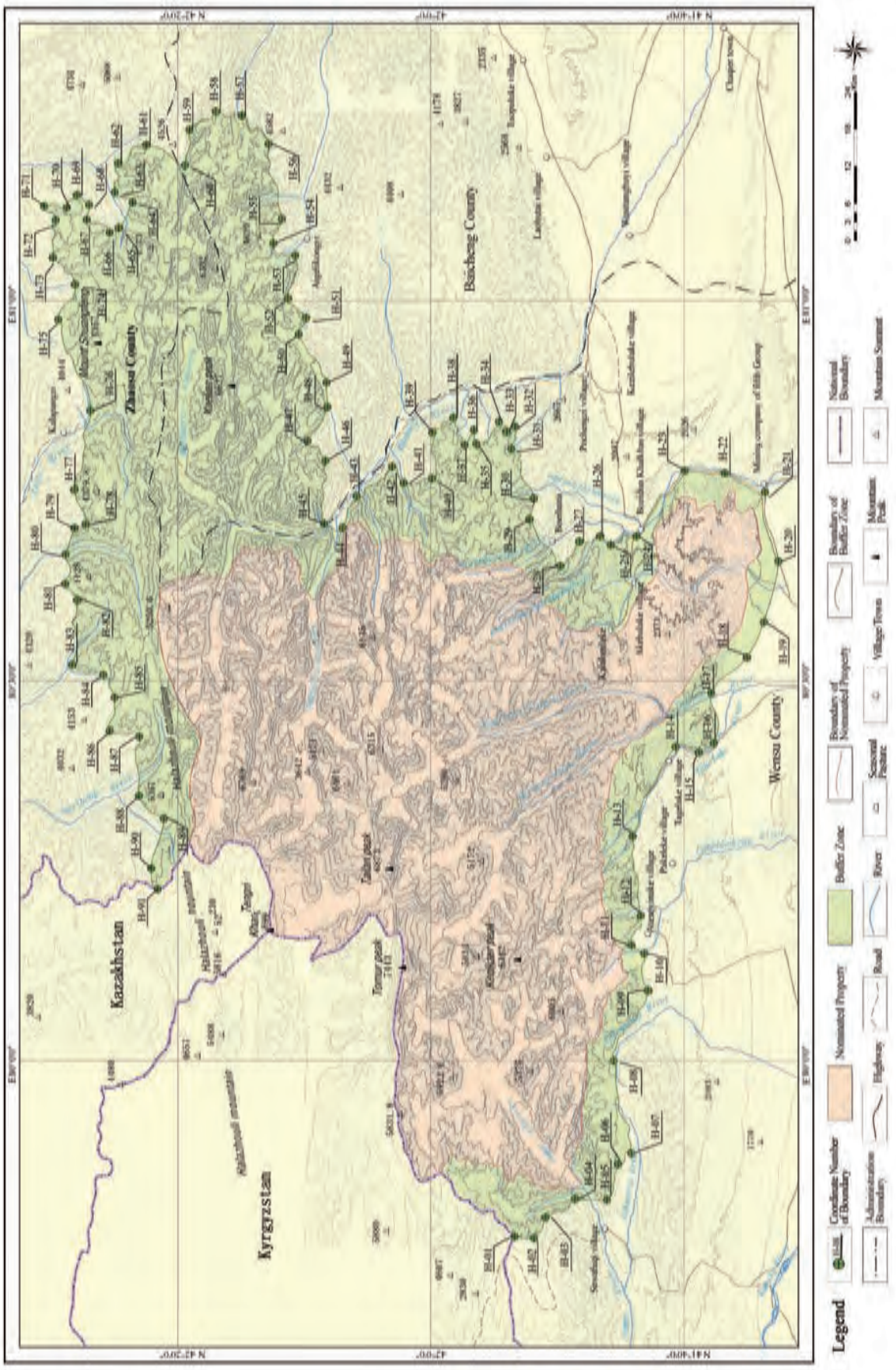
Map 2 Location of the Nominated Xinjiang Tianshan in Xinjiang Uygur Autonomous Region



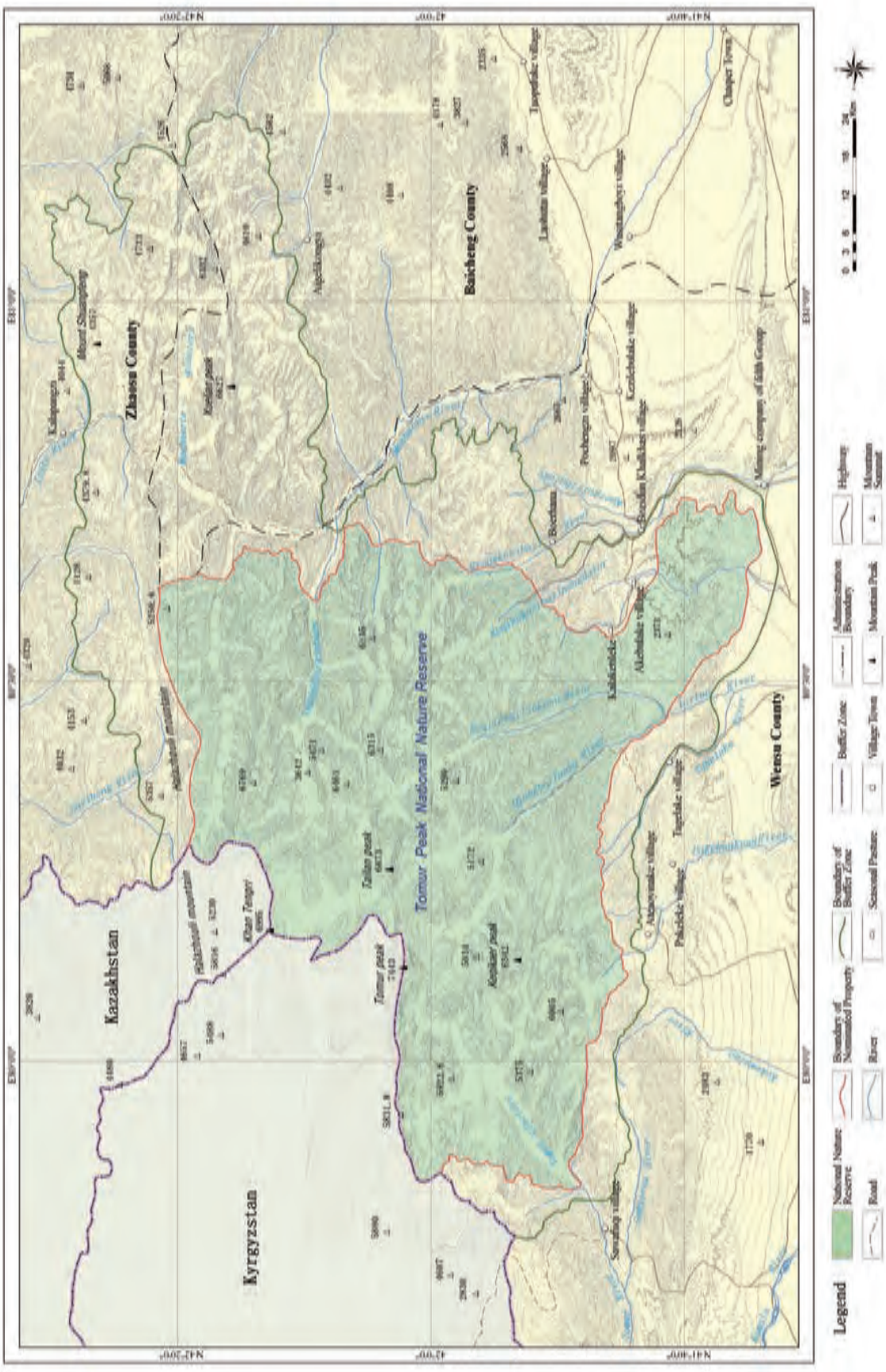
Map 3 Detailed Map of the Serially Nominated Xinjiang Tianshan



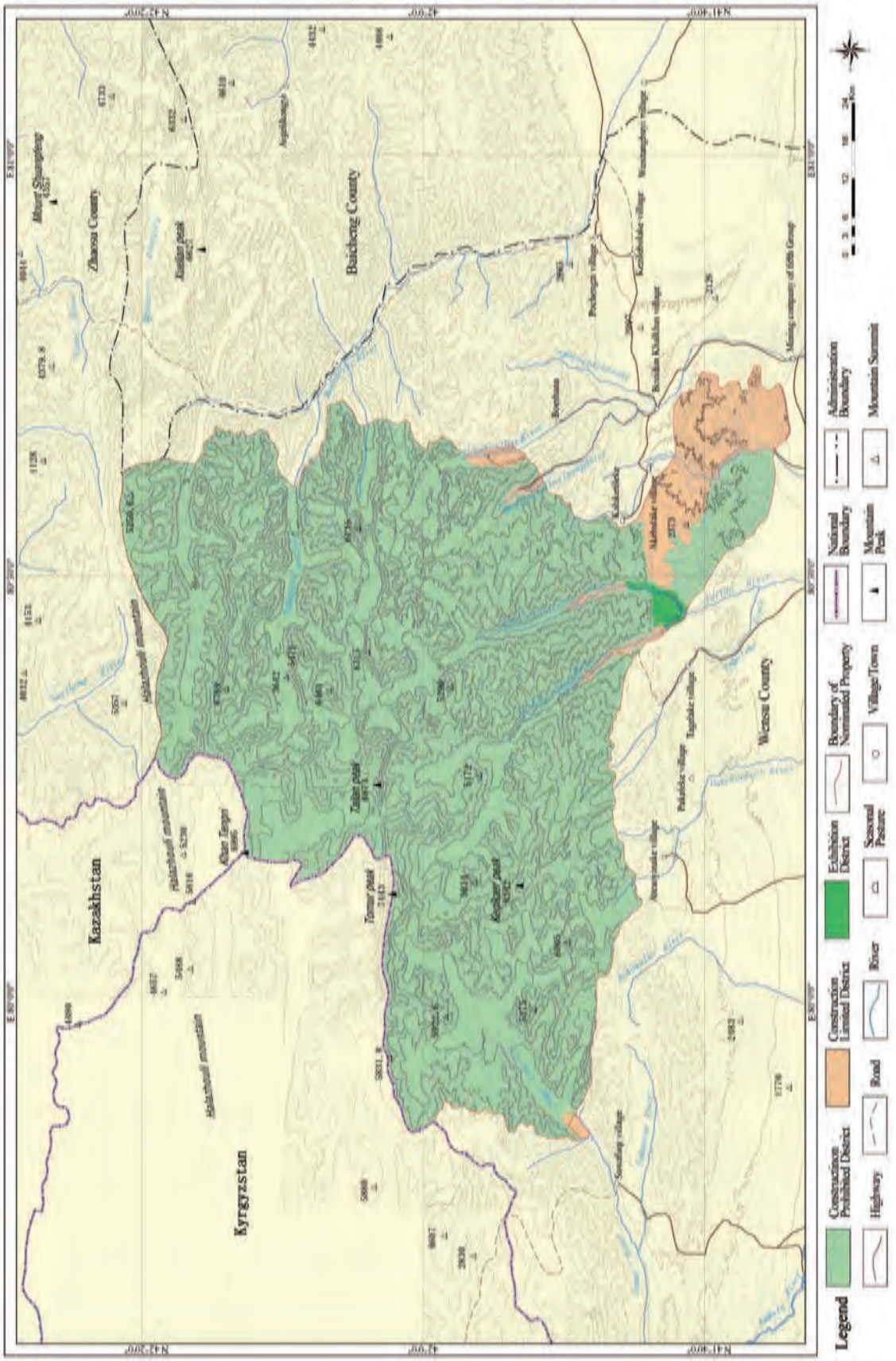
Map 4 Coordinate of the Tomur component



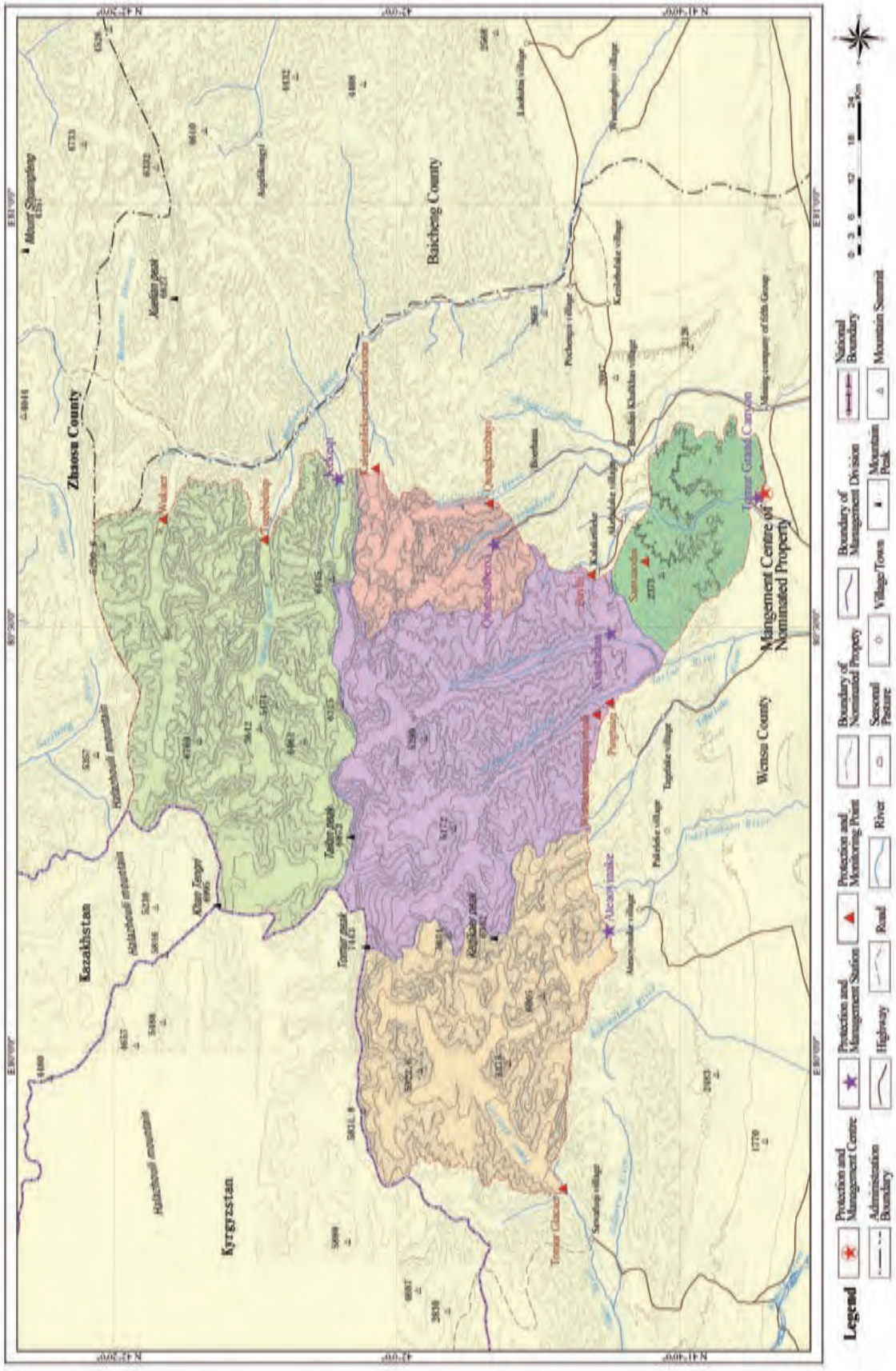
Map 5 Coordinate of the buffer zone of the Tomur component



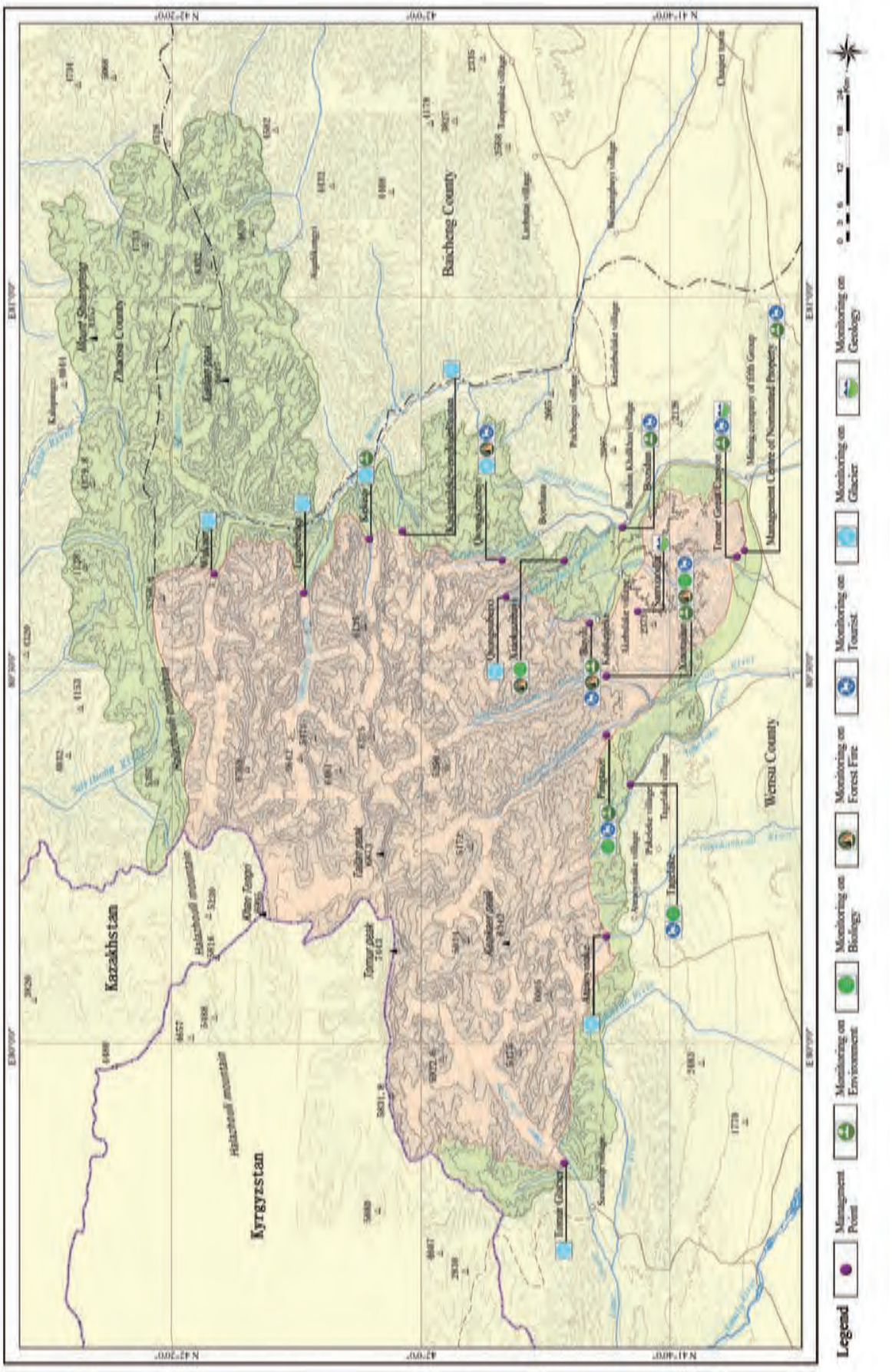
Map 6 Map Showing Relationship of the Tomur component to the Existing Protected Area



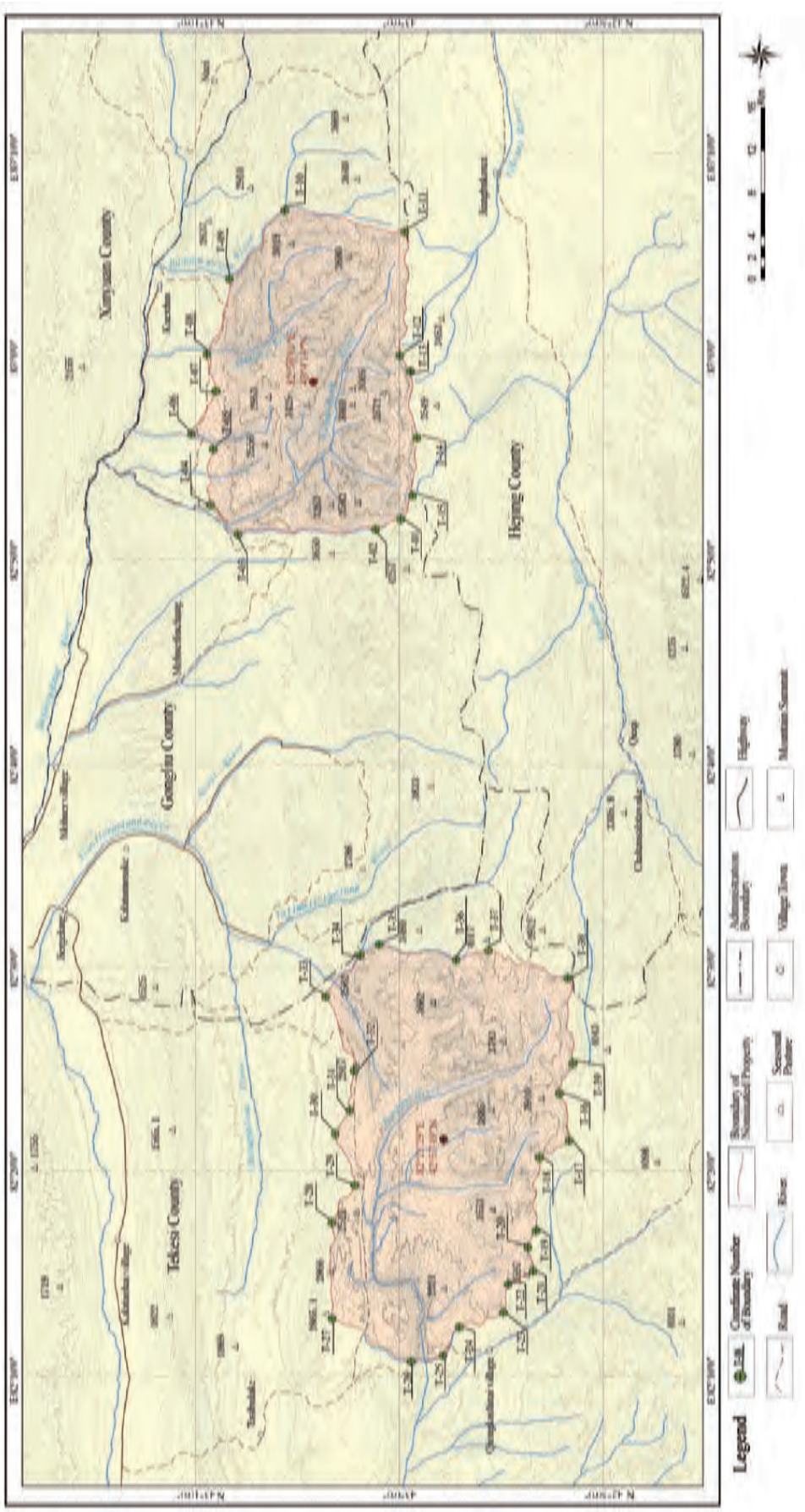
Map 7 Protection partition map of the Tomur component



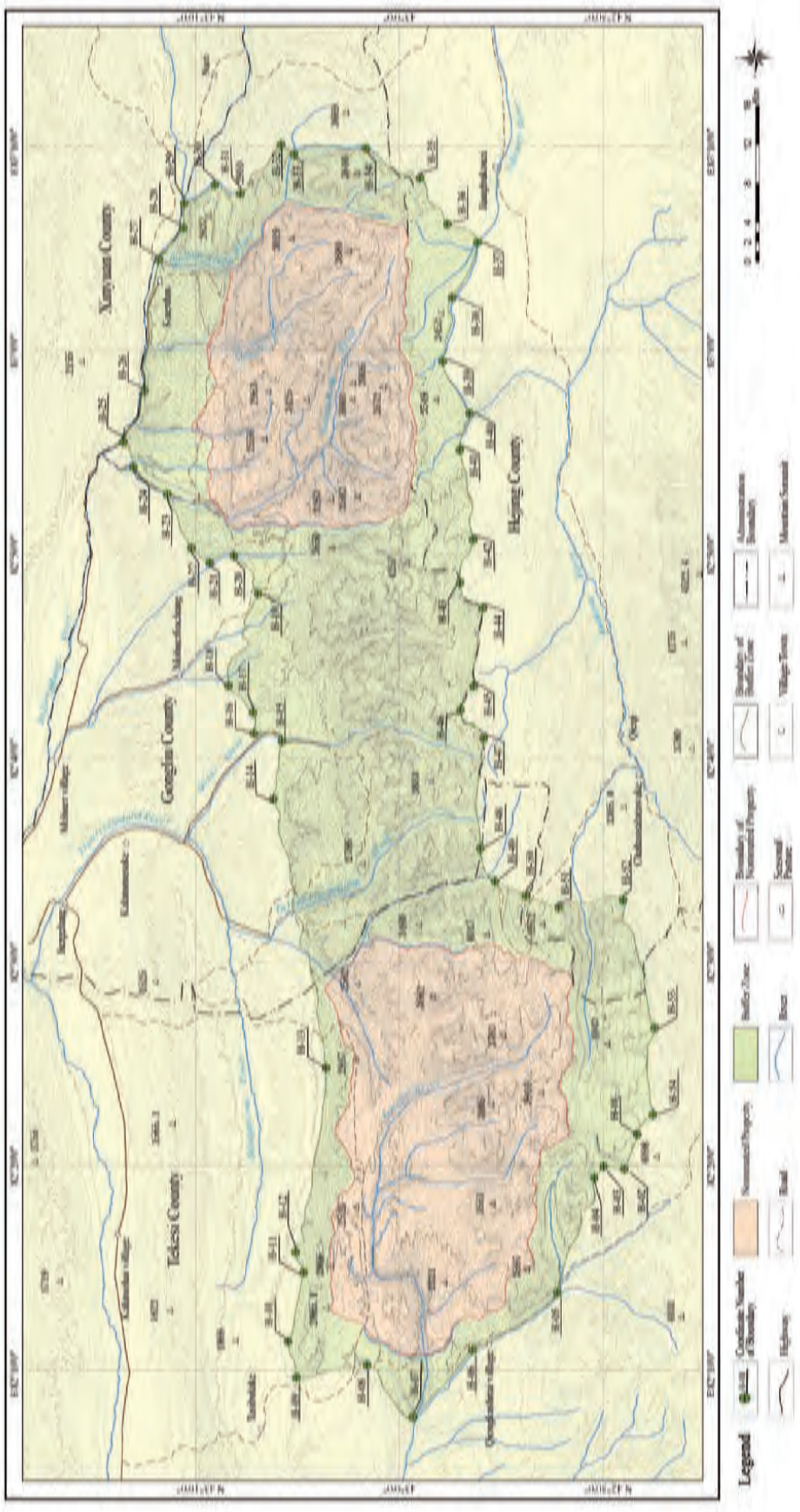
Map 8 Management partition map of the Tomur component



Map 9 Plan of monitoring system in the Tomur component

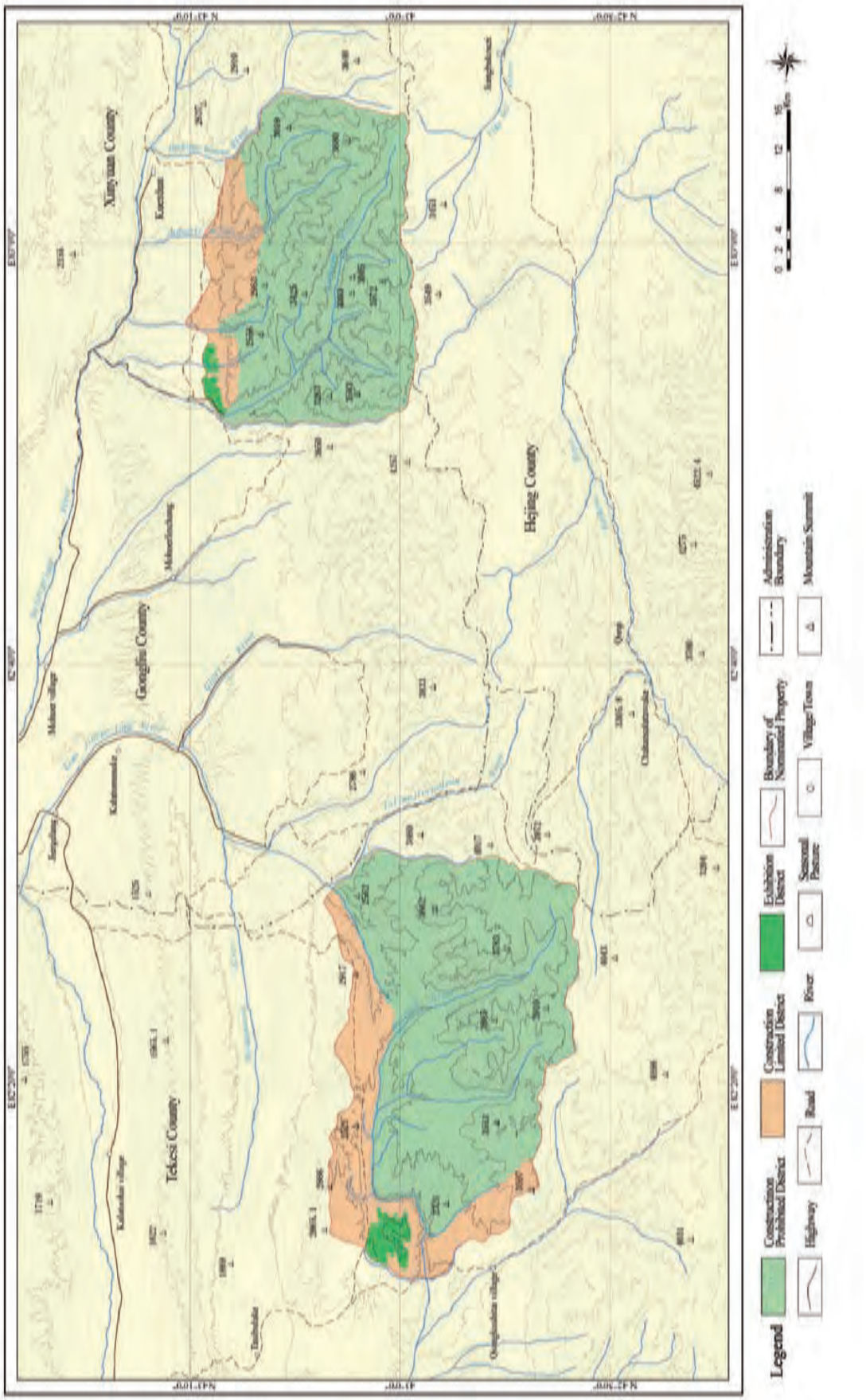


Map 10 Coordinate of the Kalajun-Kuerdening component

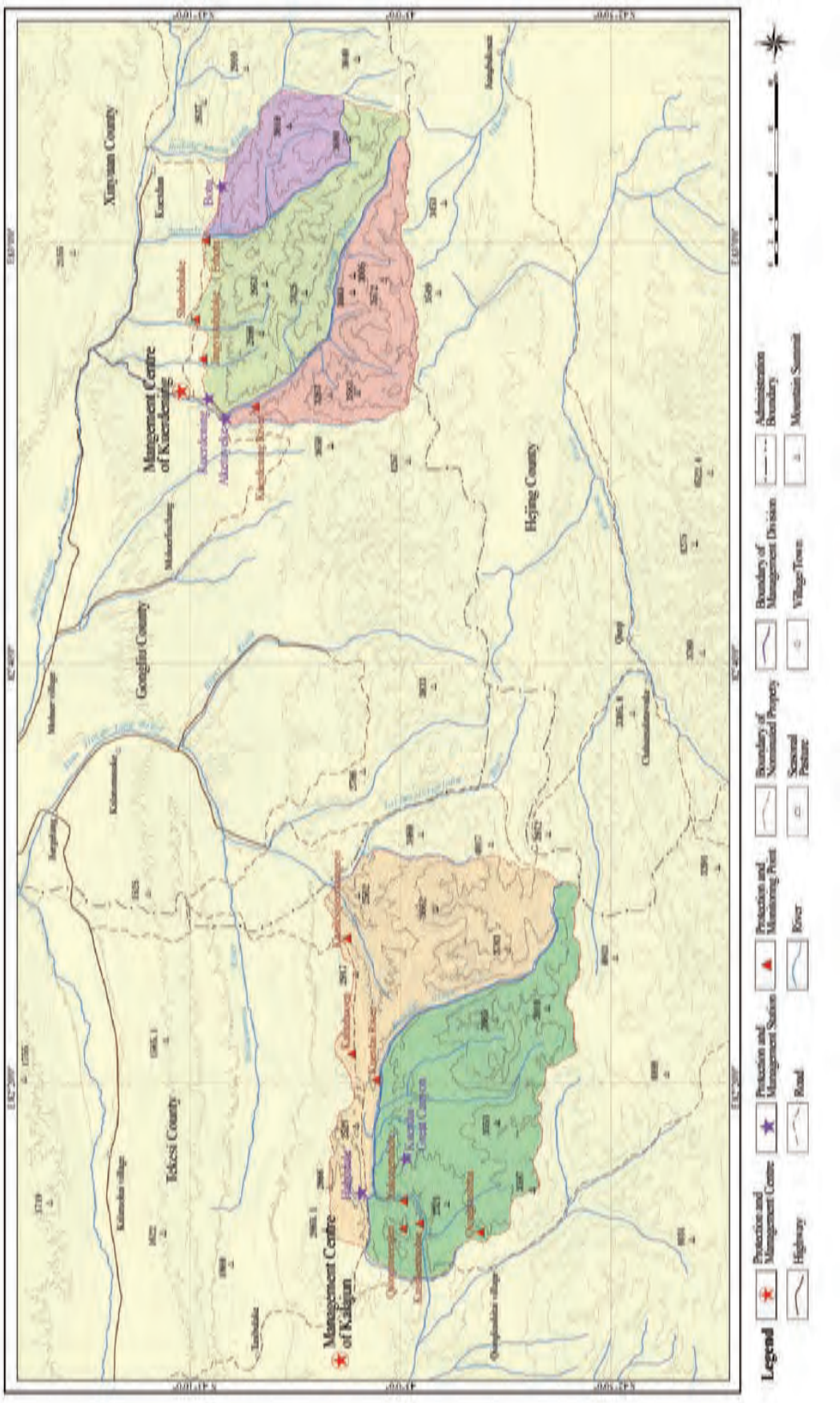


Map 11 Coordinate of the buffer zone of the Kalajun-Kuerdening component

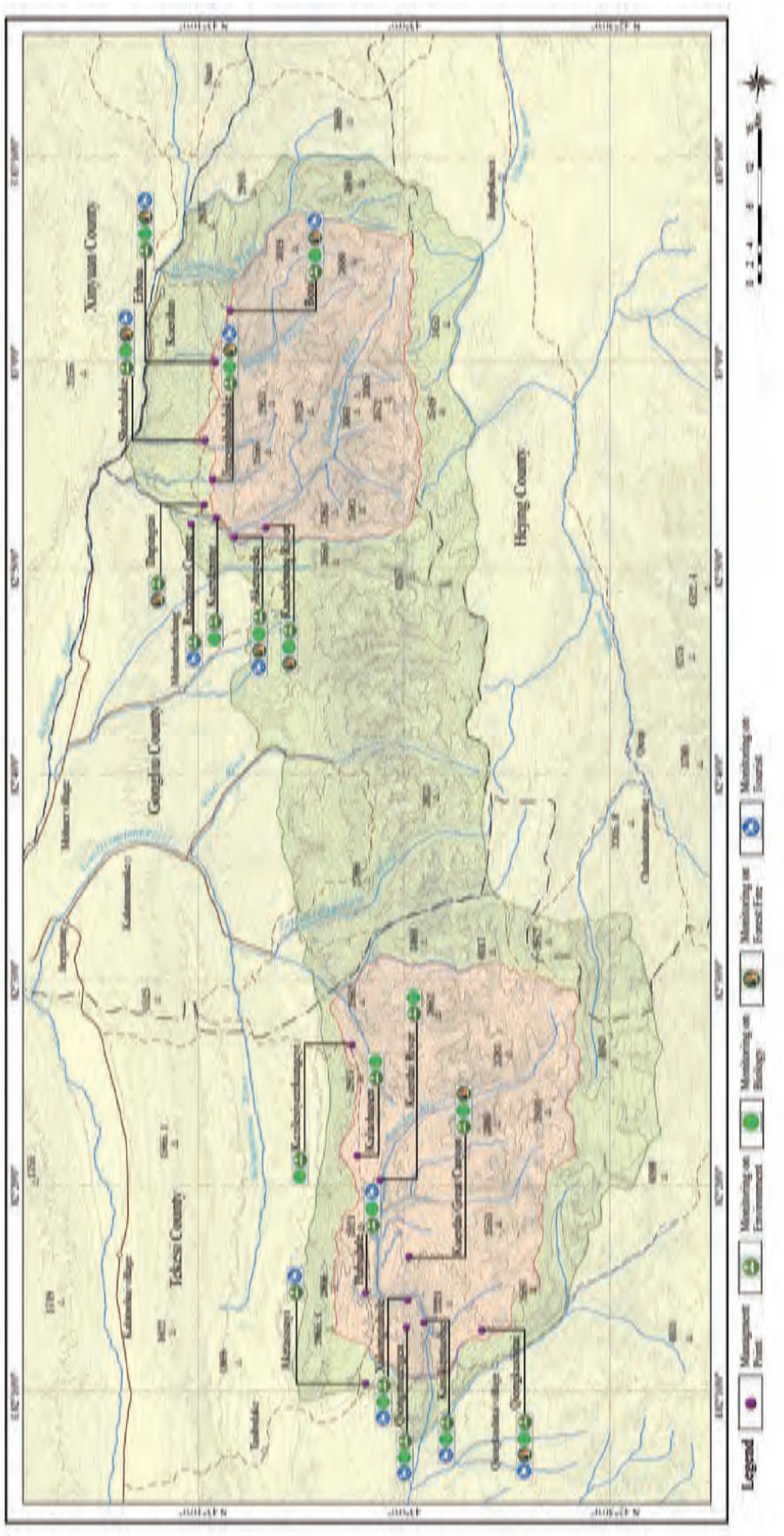
Map 12 Map Showing Relationship of the Kalajun-Kuerdening component to the Existing Protected Areas

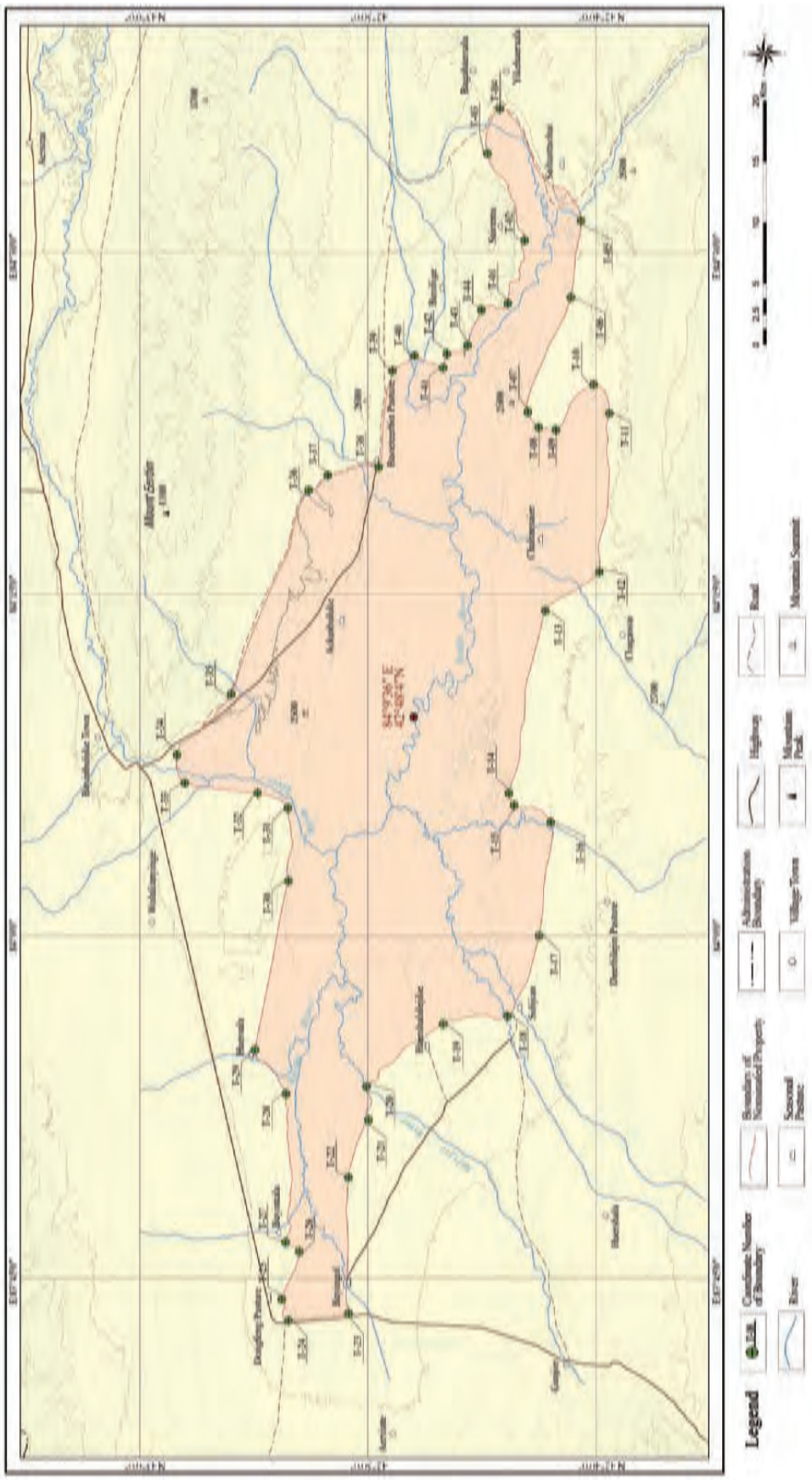


Map 13 Protection partition map of the Kalajun-Kuerdening component

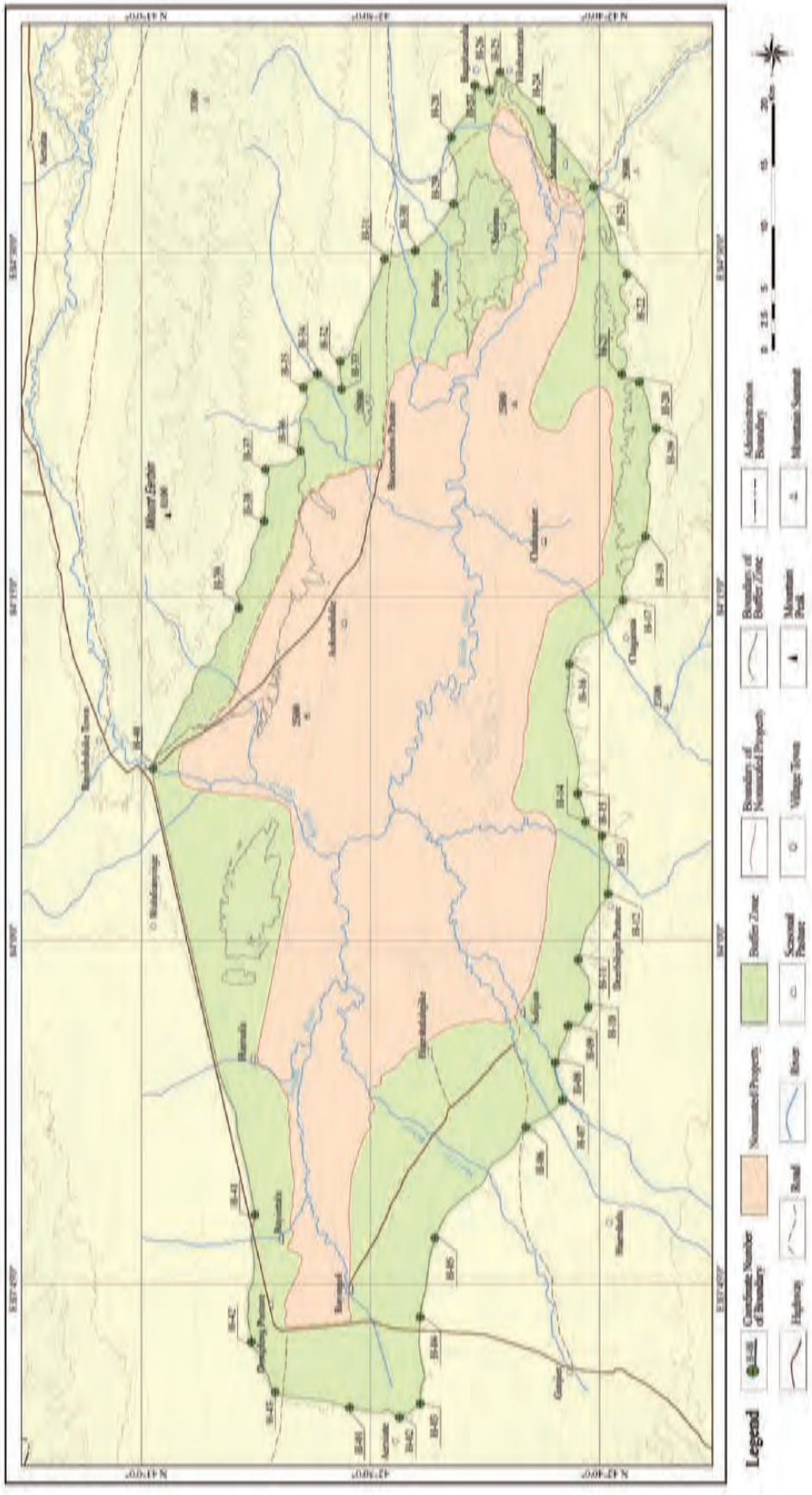


Map 14 Management partition map of the Kalajun-Kuerdening component

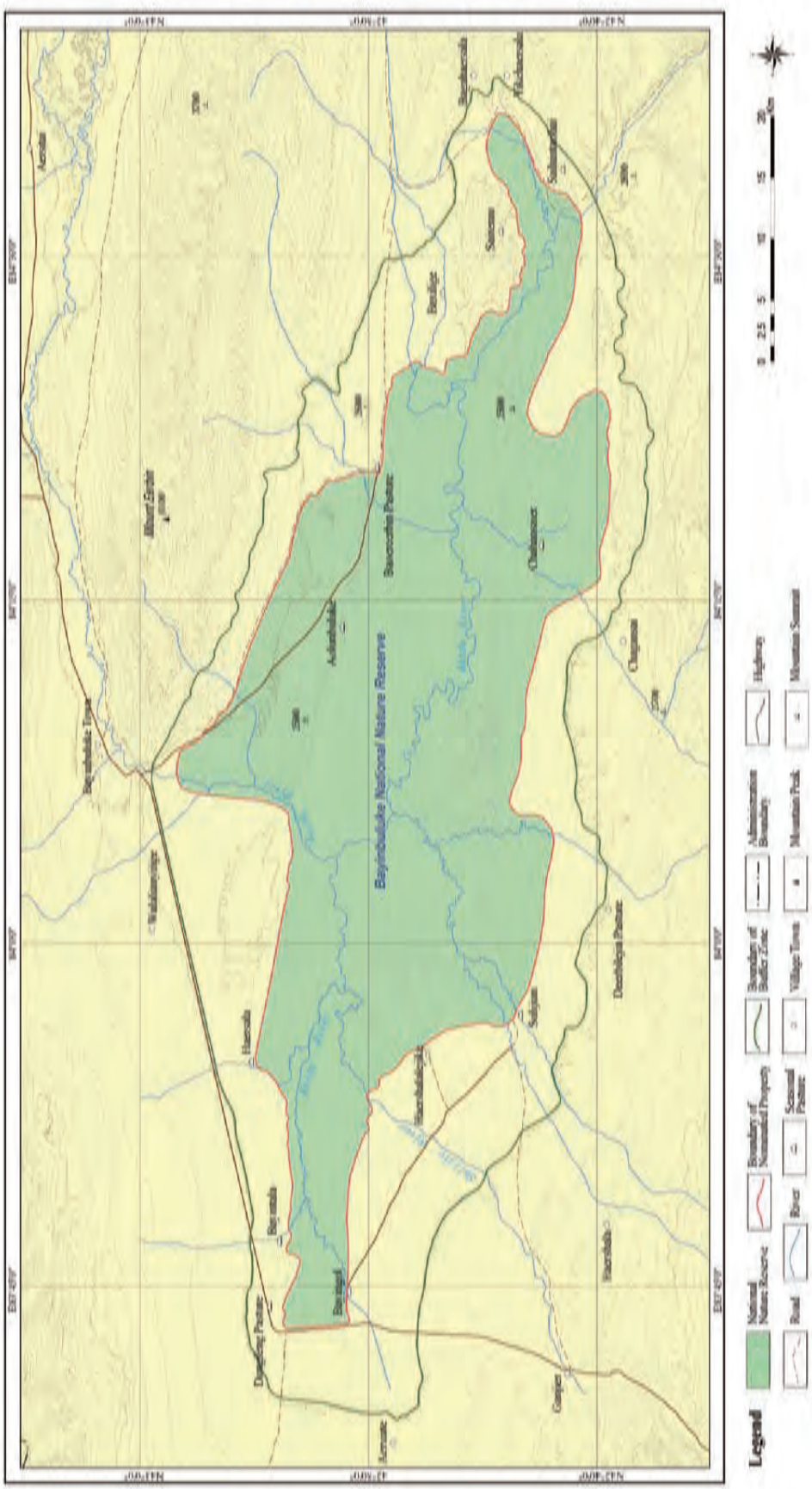

Legend
Management Post
Monitoring on Environment
Monitoring on Biology
Monitoring on Forest Fire
Monitoring on Insects
Xinyuan County
Tekesi County
Gongliu County
Nilka County
Huocheng County
Yining County
Kuitun City
Karkara River
Kaidu River
Kaidu Great Canyon
Kuitun River
Kuitun Reservoir
Kuitun Reservoir Canyon
Kuitun Canyon
Qingshuihe
Qingshuihe Canyon
Qingshuihe River
Qingshuihe Reservoir
Qingshuihe Reservoir Canyon
Qingshuihe Canyon



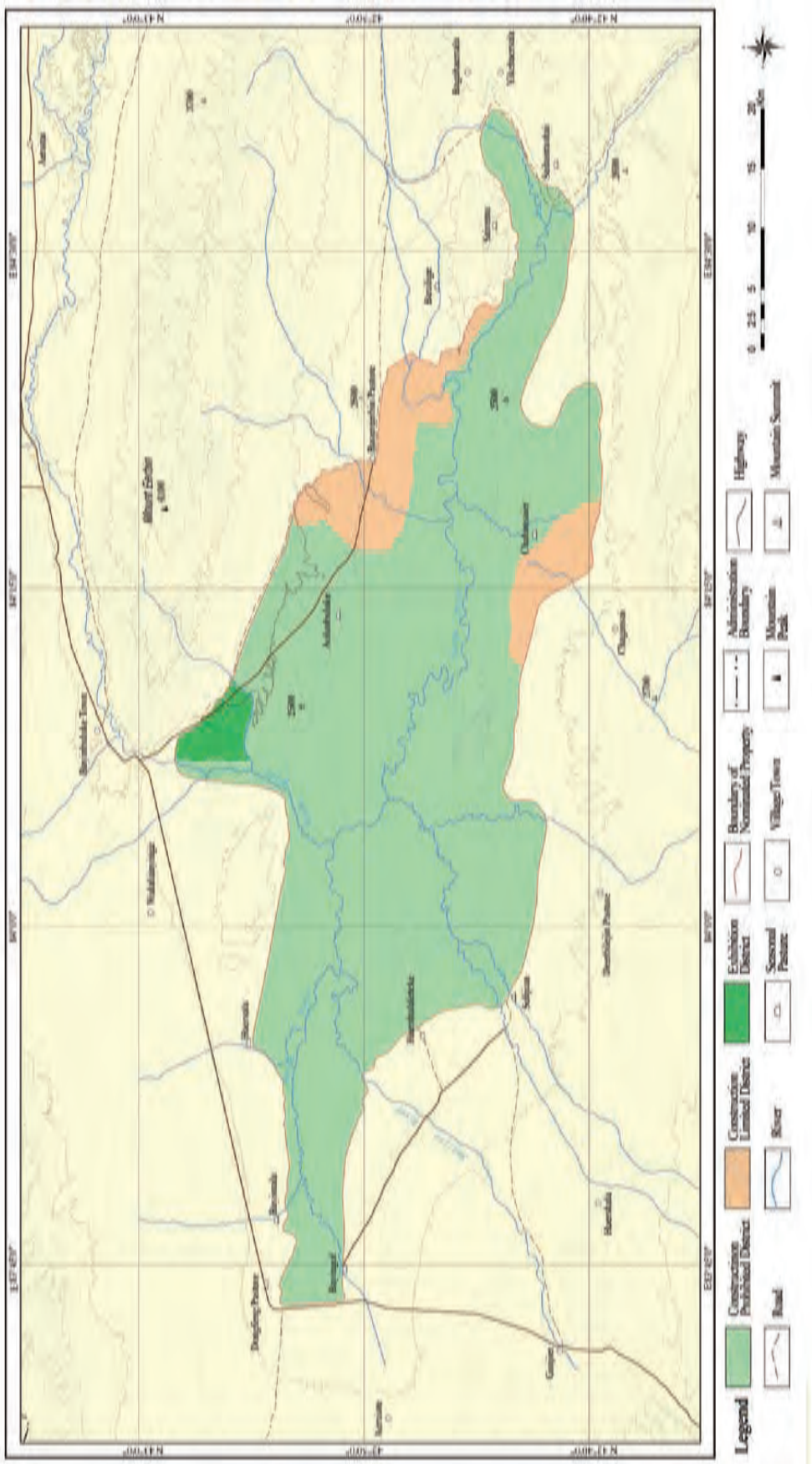
Map 16 Coordinate of the Bayinbuluke component



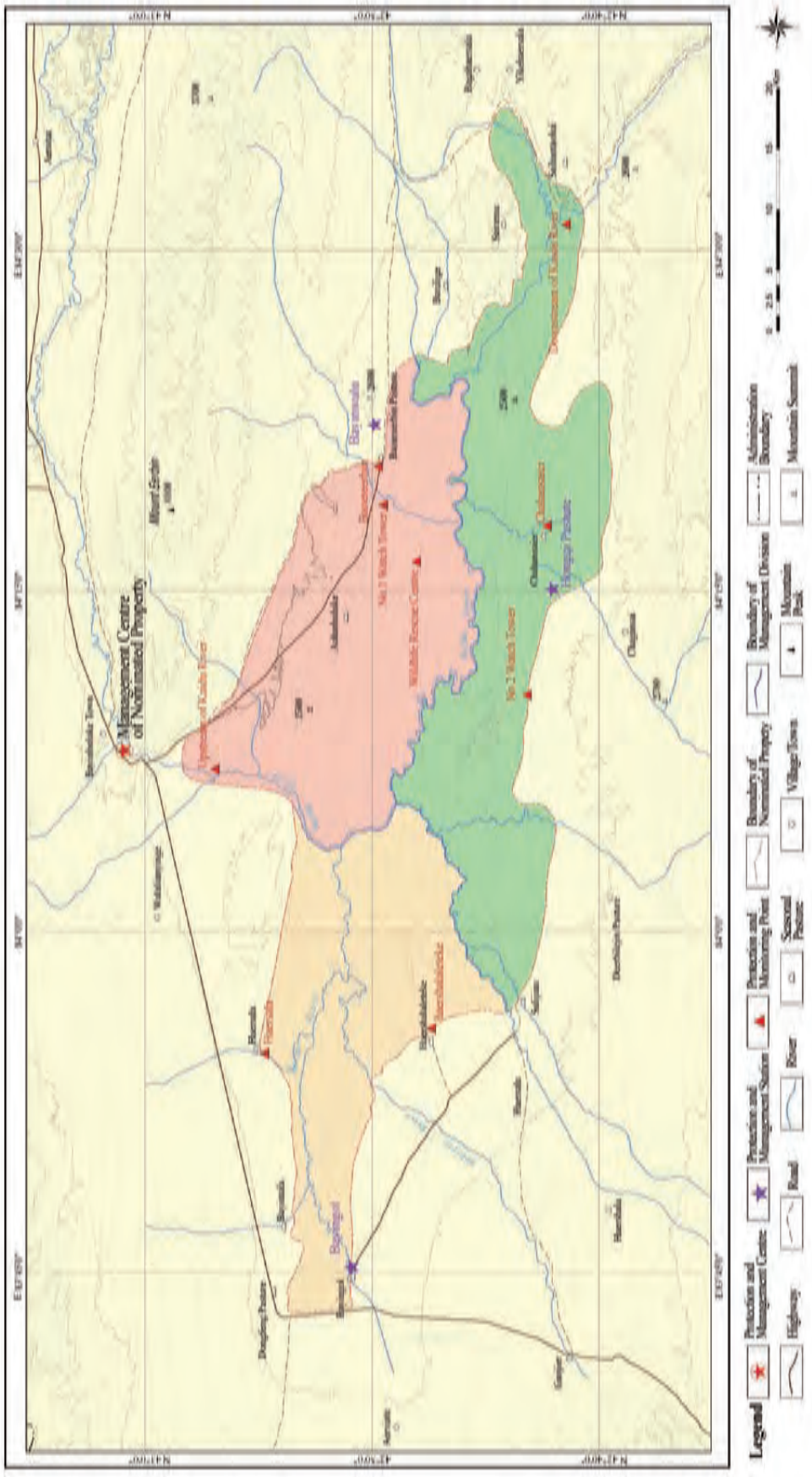
Map 17 Coordinate of the buffer zone of the Bayinbuluke component

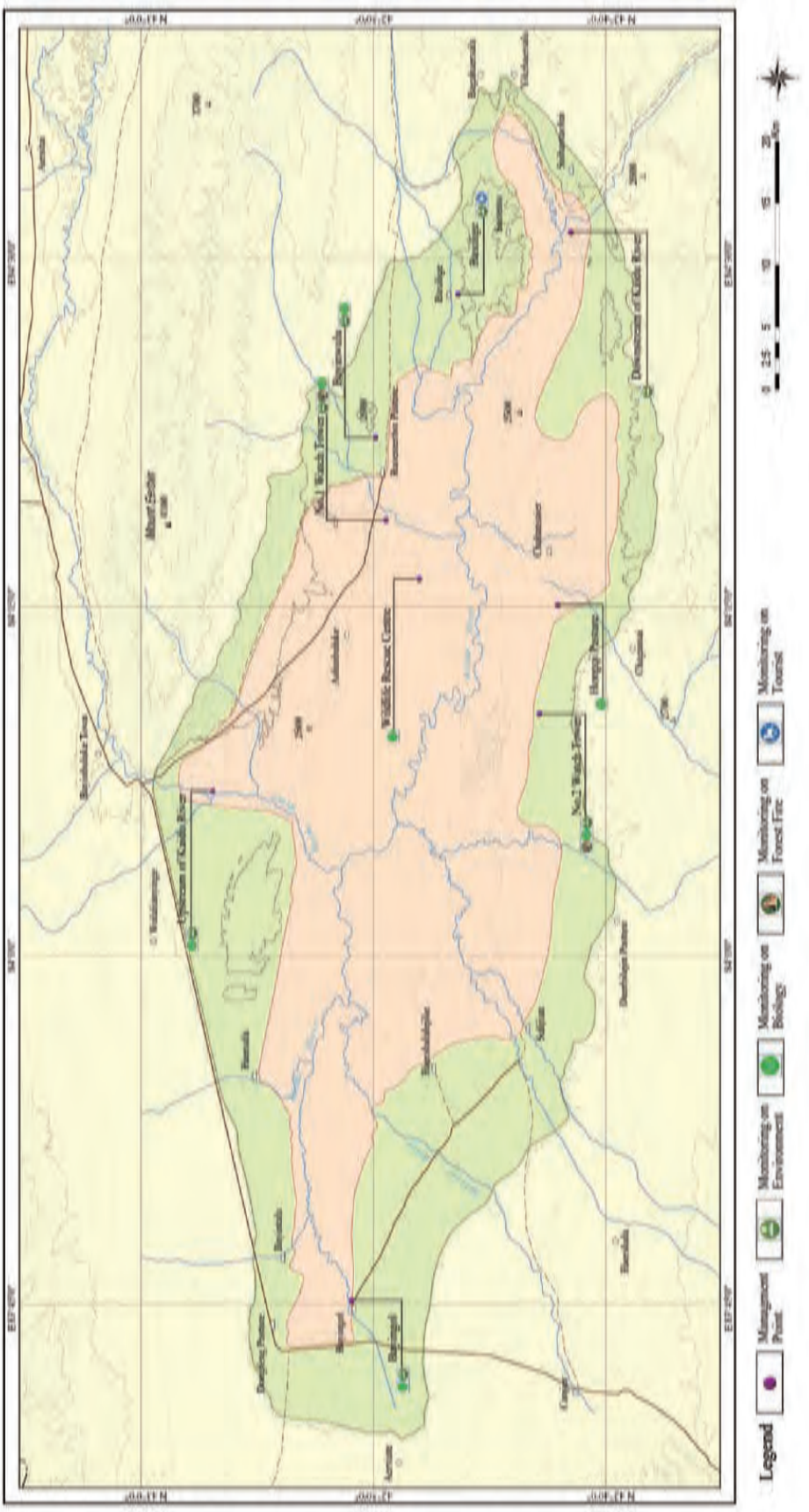


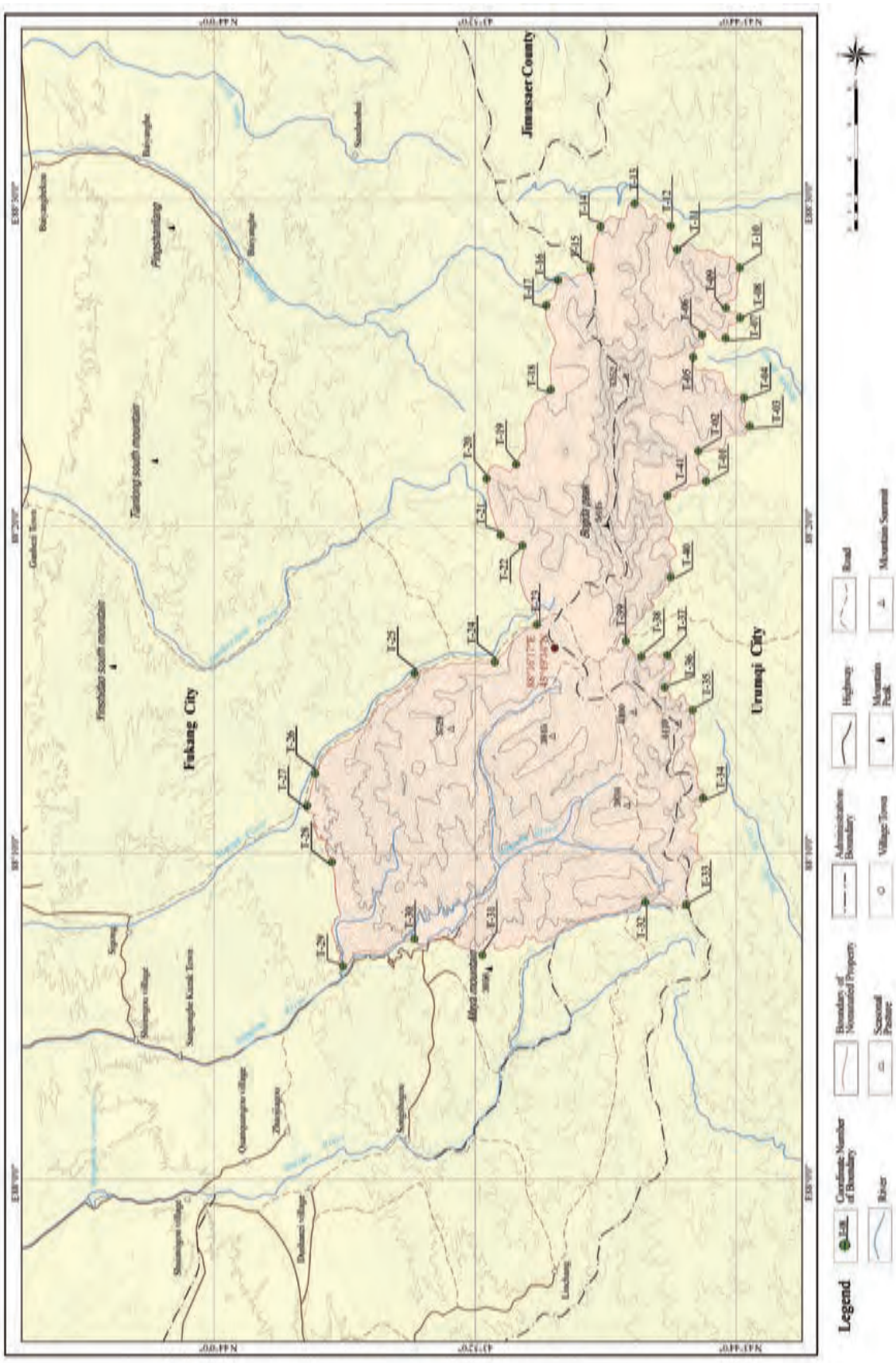
Map 18 Map Showing Relationship of the Bayinbulluke component to the Existing Protected Area



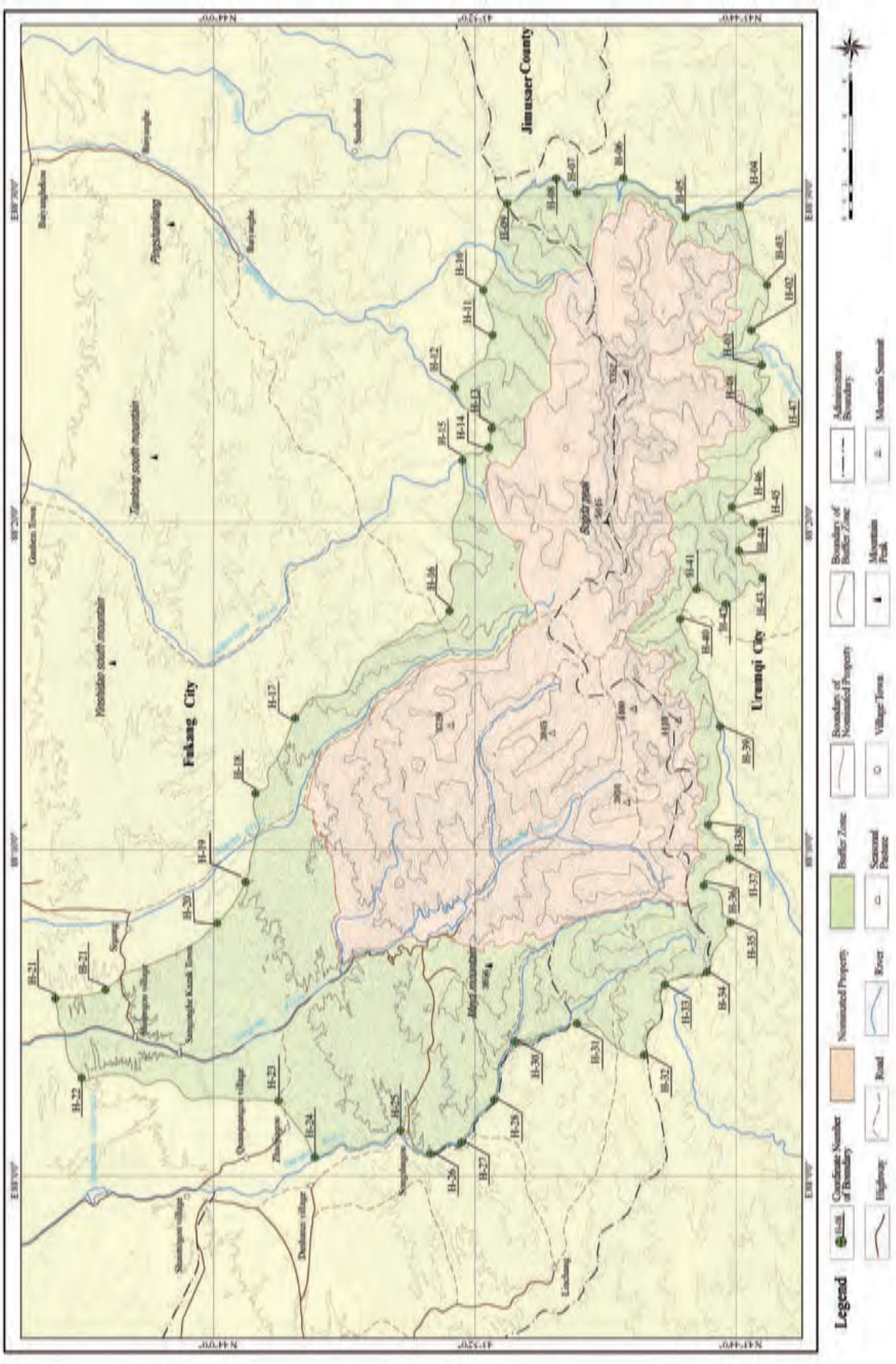
Map 19 Protection partition map of the Bayinbuluke component


Legend
Protection and Management Centre
Protection and Management Station
Protection and Monitoring Point
Second Point
Village/Town
Boundary of Nominated Property
Boundary of Management Division
Administration Boundary
Highway
Road
River
Mountain Pass
Mountain Summit
Management Centre of Nominated Property
Bayinbuluke Town
Bayinbuluke Patrol
Bayinbuluke Protection and Management Station
Bayinbuluke Protection and Monitoring Point
Bayinbuluke Second Point
Bayinbuluke Village
Bayinbuluke Mountain Pass
Bayinbuluke Mountain Summit
Bayinbuluke Boundary of Nominated Property
Bayinbuluke Boundary of Management Division
Bayinbuluke Administration Boundary
Bayinbuluke Road
Bayinbuluke River
Bayinbuluke Highway
Wild Horse Nature Reserve
Wild Horse Nature Reserve Centre
Wild Horse River
Wild Horse River Patrol
Wild Horse River Protection and Management Station
Wild Horse River Protection and Monitoring Point
Wild Horse River Second Point
Wild Horse River Village/Town
Wild Horse River Boundary of Nominated Property
Wild Horse River Boundary of Management Division
Wild Horse River Administration Boundary
Wild Horse River Road
Wild Horse River River
Wild Horse River Mountain Pass
Wild Horse River Mountain Summit
Chahan
Chahan Village
Chahan Boundary of Management Division
Chahan Administration Boundary
Chahan Road
Chahan River
Chahan Mountain Pass
Chahan Mountain Summit
Dongdaban Protection and Management Station
Dongdaban Protection and Monitoring Point
Dongdaban Second Point
Dongdaban Village
Dongdaban Boundary of Nominated Property
Dongdaban Boundary of Management Division
Dongdaban Administration Boundary
Dongdaban Road
Dongdaban River
Dongdaban Mountain Pass
Dongdaban Mountain Summit
Bayinbuluke Protection and Management Station
Bayinbuluke Protection and Monitoring Point
Bayinbuluke Second Point
Bayinbuluke Village
Bayinbuluke Boundary of Nominated Property
Bayinbuluke Boundary of Management Division
Bayinbuluke Administration Boundary
Bayinbuluke Road
Bayinbuluke River
Bayinbuluke Mountain Pass
Bayinbuluke Mountain Summit
Bayinbuluke Highway

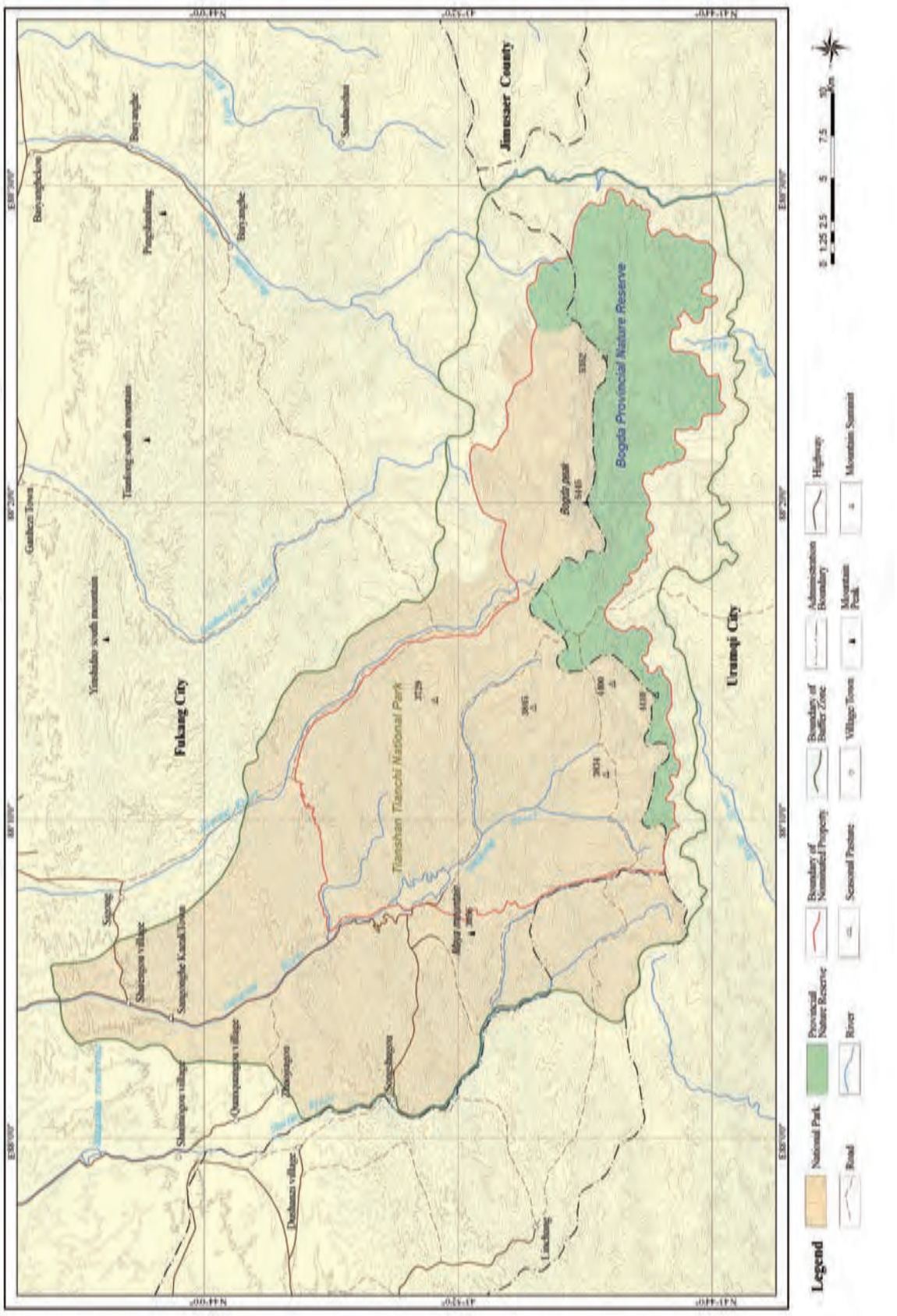

Legend
Management Point
Monitoring on Environment
Monitoring on Biology
Monitoring on Forest Fire
Monitoring on Tourist
Wildlife Rescue Center
No.1 Watch Tower
No.2 Watch Tower
Bayinbuluke Town
Bayinbuluke Patrol
Dashuiquan Patrol
Kuokesu Patrol
Bagemaxi
Bayinbuluke Village
Dashuiquan
Kuokesu
Bagemaxi Village
Bayinbuluke Forest Farm
Bayinbuluke Forest Farm Branch
Bayinbuluke Forest Farm Branch
Bayinbuluke Forest Farm Branch



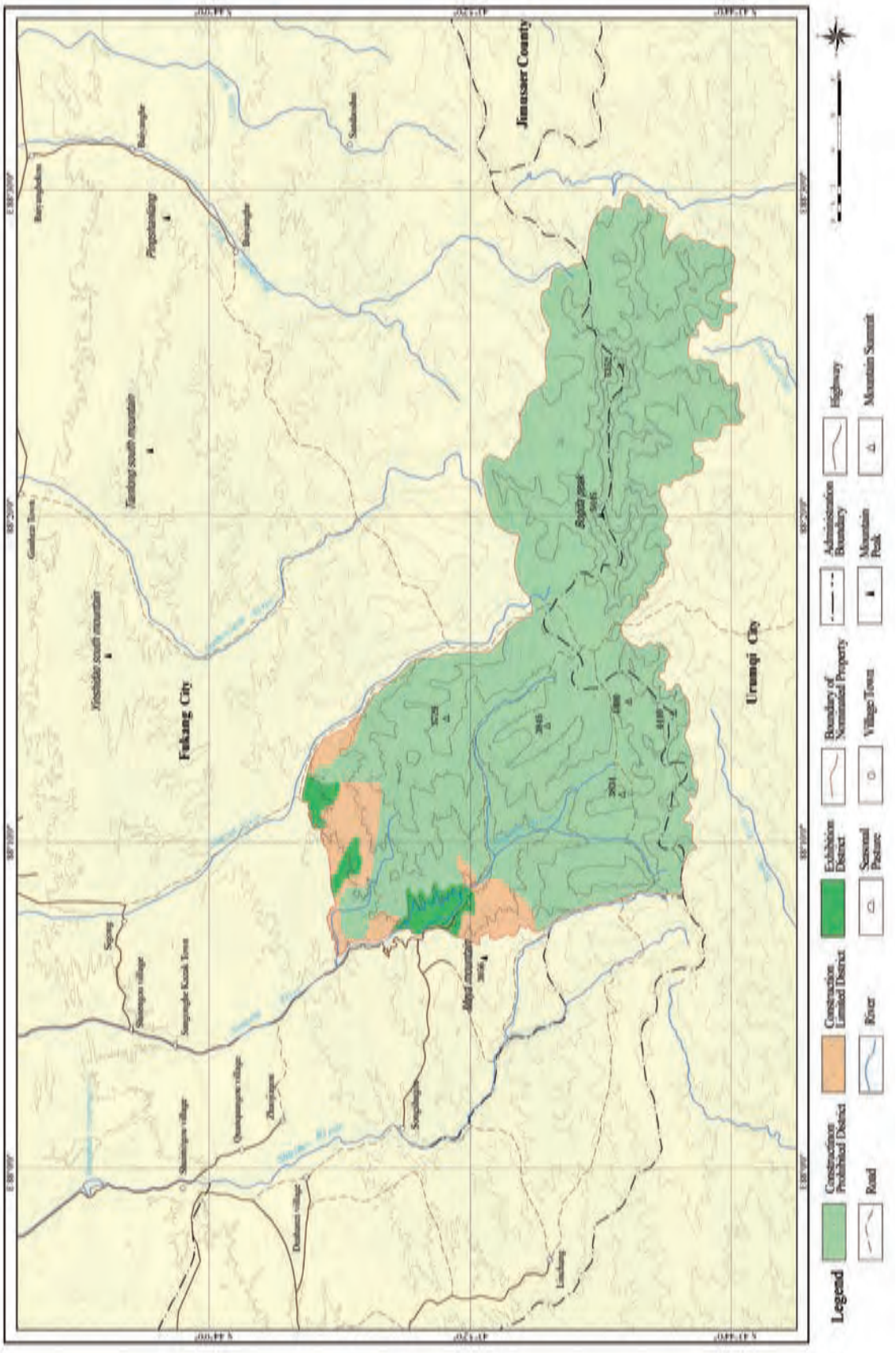
Map 22 Coordinate of the Bogda component



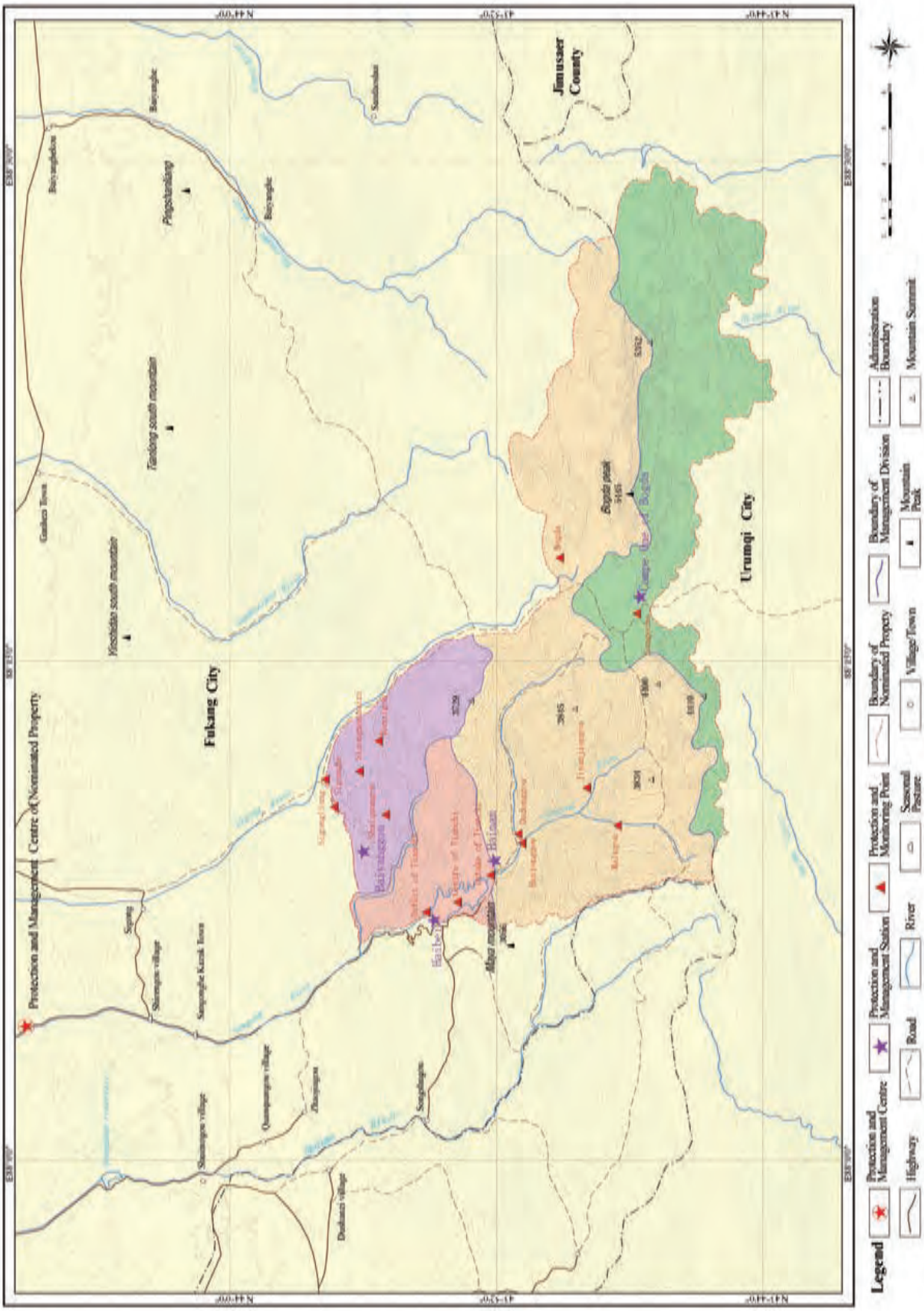
Map 23 Coordinate of the buffer zone of the Bogda component



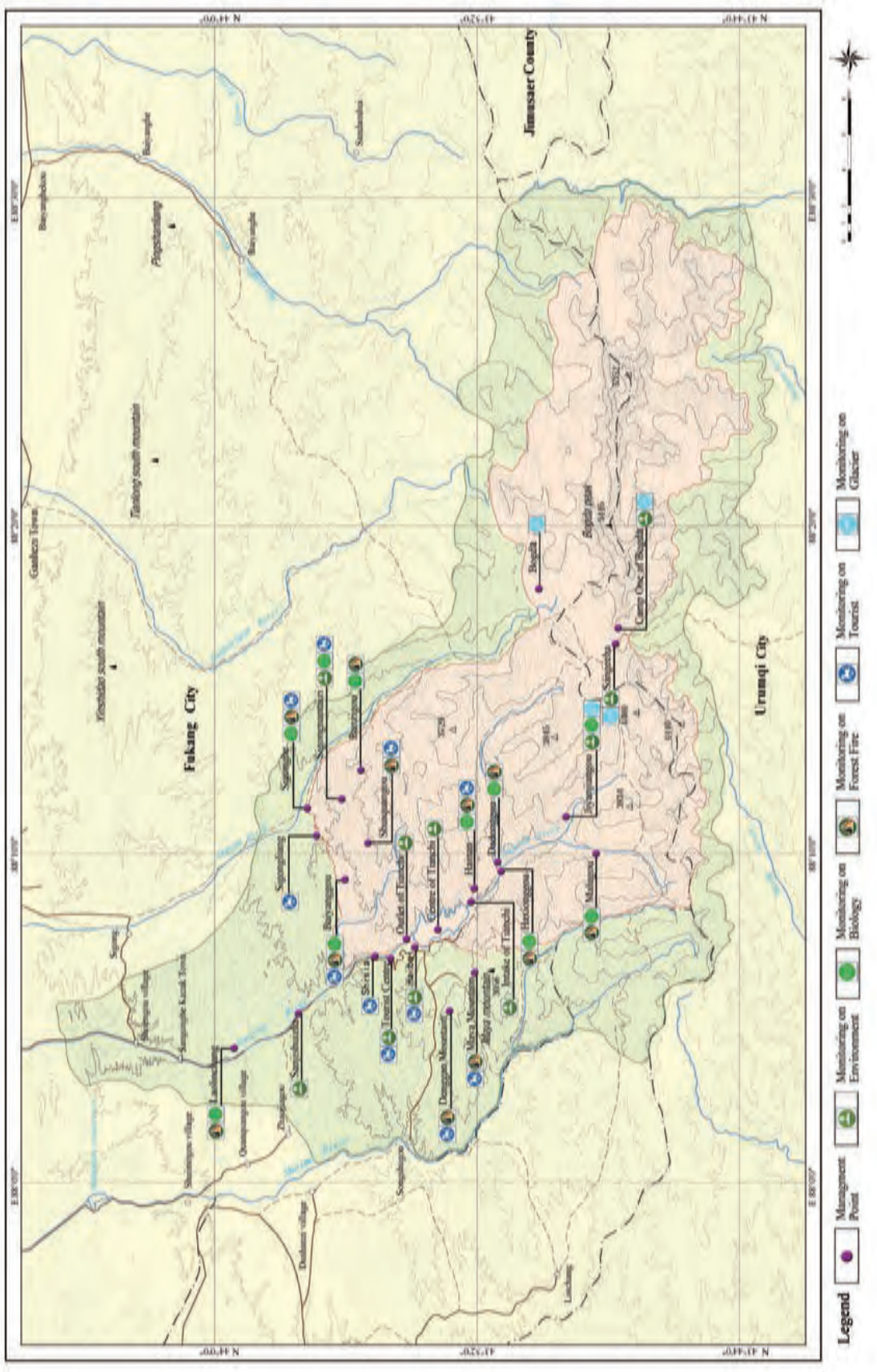
Map 24 Map Showing Relationship of the Bogda component to the Existing Protected Areas



Map 25 Protection partition map of the Bogda component



Map 26 Management partition map of the Bogda component



Map 27 Monitoring system in the Bogda component

World Heritage Nomination

Natural Heritage·China

Xinjiang Tianshan

Appendix 4

Property Inventory and the Latest Record

Ministry of Housing and Urban-Rural
Development of the People's Republic of China
2012.1

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1. Property Inventory of Xinjiang Tianshan

1.1 Natural Landscape of the Nominated Property

Xinjiang Tianshan is the most typical representative of integrated mountain landscapes in the world's arid desert region. The outstanding landscape resources include snow peaks and glaciers, rivers and swamps, alpine lakes, flowerous meadows, forests and steppes, wetlands and meanders, red canyons and deserts and Gobi and so on.

No.	Coordinates	Name	Type	Conservation Condition	Record Time
Tomur					
1	N 42°2.2' E 80°7.3'	Tomur peak	Convex peak	Intact	2010
2	N 42°12.65' E 80°10.52'	Khan Tengri peak	Convex peak	Intact	2010
3	N 42°04' E 80°17'	Tailan peak	Convex peak	Intact	2010
4	N 42°07' E 80°17'	Tugebieliqi	Convex peak	Intact	2010
5	N 42°03' E 80°15'	Wei peak	Convex peak	Intact	2010
6	N 42°15.73' E 80°53.32'	Saussurea peak	Convex peak	Intact	2010
7	N 42°07.72' E 80°07.11'	South-Inuoleqiek glaciers	Glacier	Intact	1983
8	N 41°55.75' E 79°51.76'	Ayilangsu glaciers	Glacier	Intact	1983
9	N 41°55.17' E 80°00.20'	Tomur glaciers	Glacier	Intact	1983
10	N 41°45.51' E 79°54.43'	Qingbingtan glaciers	Glacier	Intact	1983
11	N 41°44.64' E 79°56.61'	Bingtan glaciers	Glacier	Intact	1983
12	N 41°45.16' E 79°58.81'	Qiongkulmu glaciers	Glacier	Intact	1983
13	N 41°46.07' E 80°00.46'	Kekel glaciers	Glacier	Intact	1983
14	N 41°46.04' E 80°01.81'	Kekewulong glaciers	Glacier	Intact	1983
15	N 41°48.77' E 80°10.20'	Keqikalbaxi glaciers	Glacier	Intact	1983
16	N 41°47.53' E 80°13.08'	Xitalege glaciers	Glacier	Intact	1983
17	N 41°47.58' E 80°14.67'	Paheluk glaciers	Glacier	Intact	1983
18	N 41°46.94' E 80°17.20'	Sukalak glaciers	Glacier	Intact	1983
19	N 41°49.54' E 80°13.23'	Shayisheba glaciers	Glacier	Intact	1983
20	N 41°56.95' E 80°08.41'	Qiongkulian glacier	Glacier	Intact	1983
21	N 42°01.92' E 80°22.20'	Keqiktielieksu gaciers	Glacier	Intact	1983

22	N 41°56.61' E 80°33.87'	Keqikkuziwayi glaciers	Glacier	Intact	1983
23	N 42°00.49' E 80°35.40'	Qiongkuziwayi glaciers	Glacier	Intact	1983
24	N 41°55.41' E 80°44.50'	Shuirik glaciers	Glacier	Intact	1983
25	N 42°03.32' E 80°36.11'	Kekqi glaciers	Glacier	Intact	1983
26	N 42°08.54' E 80°20.97'	Tugebieliqi glaciers	Glacier	Intact	1983
27	N 42°15.79' E 80°22.77'	Wukuer glaciers	Glacier	Intact	1983
28	N 42°17.43' E 81°02.16'	Muzhaerte glaciers	Glacier	Intact	1983
29	N 42°26'27" E 80°50'50"	Xiata meadow	Grassland	Intact	2010
30	N 42°25'04" E 80°51'23"	Adengbulak snow spruce forest	Forest	Intact	2010
31	N 41°43.3' E 80°21.7'	Baoer mountains	Mountain typical tourism area	Intact	2010
32	N 40°51' E 80°43'	Old-man mountains	Mountain typical tourism area	Intact	2010
33	N 41°37.6'~41°40'E 80°25'	Tagelak Danxia mountains	Danxia landform	Intact	2010
34	N 41°45'~41°48.5' E 80°53.5'~80°58'	Pochengzi glacial moraine	Glacial relics	Intact	2010
35	N 41°34.6' E 80°23.7'	Red-rack waterfall	Waterfalls	Intact	2010
36	N 41°51.9' E 80°26.1'	Sanzhe waterfall	Waterfalls	Intact	2010
37	N 41°50.4' E 80°41.1'	Flying-cloud water fall	Waterfalls	Intact	2010
38	N 41°50.2' E 80°38.1'	Xiaoshixia waterfall	Waterfalls	Intact	2010
39	N 41°54.8' E 80°26.9'	Cliff waterfall	Waterfalls	Intact	2010
40	N 41°52.5' E 80°40.0'	Mandarin duck spring	Thermal spring	Intact	2010
41	N 41°47.9'~41°50.4' E 80°27.6'	Small Tailan river	Tourism and recreation river	Intact	2010
42	N 41°45.8'~41°55.2' E 80°38.7'~80°42.0'	Great Kuzibayi river	Tourism and recreation river	Intact	2010
43	N 41°48.4'~41°53.8' E 80°35.8'~80°38.8'	Small Kuzibayi river	Tourism and recreation river	Intact	2010
44	N 41°48' E 80°20.8'	Small Tailan poplar forest	Forest land	Intact	2010
45	N 41°46.2' E 80°23.9'	Great Tailan forests	Forest land	Intact	2010
46	N 41°54.6' E 80°26.2'	Small Tailan virgin forest	Forest land	Intact	2010
47	N 41°50.9' E 80°40.6'	Great Kuzibayi mingled forest	Forest land	Intact	2010
48	N 41°43.7' E 81°18.5'	Great Sida forests	Forest land	Intact	2010
49	N 41°50.4' E 80°37.8'	Three-pine-tree	Clustered trees	Intact	2010
50	N 41°49.7' E 80°39'	Look-forward-to-return poplar tree	Single tree	Intact	2010
51	N 41°42.8' E 80°21.7'	Fairy platform	Natural landmarks	Intact	2010

52	N 41°44.1' E 80°22.9'	Nuoshika flat platform	Natural landmarks	Intact	2010
53	N 41°47.0' E 80°40.3'	Nameless platform	Natural landmarks	Intact	2010
54	N 41°34' E 80°45'	Baozidun mountains of salt	Mineral accumulation	Intact	2010
55	N 41°54.9' E 80°25.9'	Fantastic-rocks beach	Gully land	Intact	2010
56	N 41°37'50" E 80°41'07"	Millenary-lovers figure	Pictographic rocks	Intact	2010
57	N 41°38'12" E 80°41'45"	A Thread of Sky	Pictographic rocks	Intact	2010
58	N 41°38'24" E 80°41'59"	One pillar to prop up the sky	Pictographic rocks	Intact	2010
59	N 41°39'05" E 80°40'58"	Origin of life	Pictographic rocks	Intact	2010
60	N 41°38'39" E 80°41'11"	Whistling wind gate	Pictographic rocks	Intact	2010
61	N 41°38'50" E 80°41'20"	Beacon tower	Pictographic rocks	Intact	2010
62	N 41°36'47" E 80°41'24"	Monkeys seeing the sea	Pictographic rocks	Intact	2010
63	N 41°38'59" 80°40'32"	Great hawk spreading wings	Pictographic rocks	Intact	2010
64	N 41°38'13" E 80°40'56"	The beauty of loulan	Pictographic rocks	Intact	2010
65	N 41°38'20" E 80°39'58"	Fossil pile	Pictographic rocks	Intact	2010
Kalajun—Kuerdening					
1	N 42°59'37" E 82°49'43"	Kebanbayi peak	Convex peak	Intact	2010
2	N 43°09'22" E 82°52'18"	Kuerdening river valley	Tourism and recreation river		2010
3	N 43°04'08" E 82°49'12"	Kuksayi snow spruce forest	Forest land	Intact	2010
4	N 43°04'45" E 82°51'35"	Arktuyek snow spruce forest	Forest land	Intact	2010
5	N 43°05'28" E 82°53'23"	Kalamalakayi snow spruce forest	Forest land	Intact	2010
6	N 43°09'25" E 82°54'16"	Jingyishikebulak forests	Forest land	Intact	2010
7	N 43°10'06" E 80°56'17"	Shatebulak forests	Forest land	Intact	2010
8	N 43°11'04" E 82°58'12"	Xietiande forests	Forest land	Intact	2010
9	N 43°09'25" E 83°00'25"	Erbtu forests	Forest land	Intact	2010
10	N 43°11'30" E 83°02'22"	Keksayi forests	Forest land	Intact	2010
11	N 43°06'52" E 83°05'32"	Botu forests	Forest land	Intact	2010
12	N 43°09'39" E 82°53'26"	Kuerdening great platform	Grassland	Intact	2010
13	N 43°09'34" E 82°55'09"	Kuerdun meadow	Grassland	Intact	2010
14	N 43°02'06" E 82°16'38"	Karajun prairie	Grassland	Intact	2010
15	N 42°56'34" E 82°12'12"	Kushitai grassland	Grassland	Intact	2010
16	N 42°59'23" E 82°13'54"	Qiongmiergen grassland	Grassland	Intact	2010

17	N 43º02'53" E 82º27'48"	Kezilesiyerkungeyi grassland	Grassland	Intact	2010
18	N 42º59'56" E 82º16'41"	Tiegelik	Pasture-flowers land	Intact	2010
19	N 43º01'55" E 82º03'36"	Kaisikantuobie	Pasture-flowers land	Intact	2010
20	N 43º03'35" E 82º12'57"	Arktasi	Pasture-flowers land	Intact	2010
21	N 43º02'06" E 82º16'38"	Kuerdai forests	Forest land	Intact	2010
22	N 42º57'15" E 82º13'11"	Qiongkuerbulak forests	Forest land	Intact	2010
23	N 42º56'39" E 80º15'24"	Kengbulak forests	Forest land	Intact	2010
24	N 42º56'57" E 82º16'15"	Kedamanbulak forests	Forest land	Intact	2010
25	N 42º57'02" E 82º16'37"	Tikbulak forests	Forest land	Intact	2010
26	N 42º58'22" E 82º16'40"	Kaibiebulak forests	Forest land	Intact	2010
27	N 42º57'50" E 82º19'17"	Qingbulak forests	Forest land	Intact	2010
28	N 42º57'54" E 82º23'48"	Kuerdai forests	Forest land	Intact	2010
29	N 42º58'18" E 82º27'02"	Arkwuzeng forests	Forest land	Intact	2010
30	N 42º59'22" E 82º30'50"	Kewuzhen forests	Forest land	Intact	2010
31	N 42º59'30" E 82º33'16"	Talemushuomal forests	Forest land	Intact	2010
32	N 43º01'13" E 82º14'54"	Kuerdai great canyon	Canyon passage	Intact	2010
33	N 43º04'15" E 82º08'35"	Tuhule great canyon	Canyon passage	Intact	2010
Bayinbuluke					
1	N 42°50'52" E 84°17'15"	Small Swan Lake	Bird Habitat	Intact	2010
2	N 42°49'44" E 84°18'33"	Watching Tower of Swan	Tower Building	Intact	2010
3	N 42°16' E 84°18'	Twists and Bends in Kadu River	River Section	Intact	2010
4	N 42°45'49" E 84°25'25"	Viewing Pavilion of Baxilike	Viewing Spot	Intact	2010
5	N 42°45'08" E 84°21'46"	Island in Middle of Lake	Bird Habitat	Intact	2010
6	N 42°51'32" E 84°09'57"	Bailuzhou	Bird Habitat	Intact	2010
7	N 42°43'52" E 84°14'13"	Hometown of Swan	Bird Habitat	Intact	2010
Bogda					
1	N 43°51'56" E 88°06'19"	Bogda peak	Convex peak	Intact	2010
2	N 43°51'09" E 88°06'22"	Maya mountains	Peak cluster	Intact	2010
3	N 43°54'17" E 88°07'31"	East small Tianchi	Natural lake	Intact	2010
4	N 43°54'47" E 88°06'36"	West small Tianchi	Natural lake	Intact	2010
5	N 43°55'46" E 88°09'29"	Baiyanggou aspen forest	Forest land	Intact	2010

6	N 43°53'47" E 88°07'29"	Iron Rod	Single tree	Intact	2010
7	N 43°54'39" E 88°06'38"	Shimen fault	Canyon passage	Intact	2010
8	N 43°54'33" E 88°06'24"	White dragon spitting bead	Natural pool and marsh	Intact	2010
9	N 43°54'19" E 88°07'35"	Suspended springs and immortal rainbow	Natural pool and marsh	Intact	2010
10	N 43°48' E 88°19'	Bogda glacier	Glacier	Intact	2010
11	N 43°53'30" E 88°07'21"	Tianchi	Glacial erosion remains	Intact	2010
12	N 43°51'43" E 88°09'18"	Dadonggou glacial U-valley	Glacial erosion remains	Intact	2010
13	N 43°47'48" E 88°13'18"	Jiyanjian glacial U-valley	Glacial erosion remains	Intact	2010
14	N 43°53'22" E 88°06'39"	Small Guodi pit	Glacial erosion remains	Intact	2010
15	N 43°47'28" E 88°13'18"	Malugou glacial U-valley	Glacial erosion remains	Intact	2010
16	N 43°53'28" E 88°05'48"	Great Guodi pit	Glacial erosion remains	Intact	2010
17	N 43°51'53" E 88°10'48"	Glacial boulders of Dadonggou gate	Glacial erosion remains	Intact	2010
18	N 43°54'08" E 88°07'20"	End moraine of Tianchi Embankment	Glacier accumulation	Intact	2010
19	N 43°54'29" E 88°06'38"	Shimen canyon	Canyon passage	Intact	2010
20	N 43°54'33" E 88°06'24"	Jade pool and silvery curtain	waterfalls	Intact	2010
21	N 43°52'55" E 88°06'16"	Tianchi Fairy Sheep	Pictographic rocks	Intact	2010
22	N 43°52'32" E 88°05'59"	Triumphant general	Pictographic rocks	Intact	2010
23	N 43°52'29" E 88°08'27"	Volcanic breccias at Temple of Queen Mother of the West	Palisades and gull	Intact	2010
24	N 43°53'37" E 88°07'21"	Volcanic breccias to the W	Palisades and gull	Intact	2010
25	N 43°51'25' E 88°06'13"	Mayashan stone forest	Stone forest	Intact	2010
26	N 43°47'48" E 88°13'18"	Malugou stone forest	Stone forest	Intact	2010
27	N 43°51'43" E 88°09'48"	Dadonggou stone forest	Stone forest	Intact	2010
28	N 43°52'15" E 88°08'31"	Joints at Haidong wharf	Stone forest	Intact	2010
29	N 43°52'15" E 88°08'39"	Recumbent fold at Hainan	Folded rocks	Intact	2010
30	N 43°53'30" E 88°03'29"	Profile of moraine dam of Tianchi	Stratigraphic section	Intact	2010
31	N 43°52'15" E 88°08'43"	Hainan fault	Fault	Intact	2010
32	N 43°51'42" E 88°09'56"	Dadonggou fault	Fault	Intact	2010

1.2 Rare and Endangered Plants of the Nominated Property

There are about 110 rare and endangered plants of different varieties in Xinjiang Tianshan, accounting for 4.23% of the total vascular plants in the property. Of them, 18 varieties are on the IUCN Red List, and 16 varieties are on the CITES List (2010), and under protection of Convention on International Trade in Endangered Species of Wild Fauna and Flora.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)	National Key Protected Wild Plants List (1999)	Xinjiang Provincial Key Protected Wild Plants List (2007)	Growth	Record Time
1	*Botrychium luncaria*				I	Present	2010
2	*Polypodium vulgare*				I	Present	2010
3	*Picea schrenkiana*	LC				Present	2010
4	*Larix sibirica*	LC				Present	2010
5	*Juniperus sibirica*				II	Present	2010
6	*Juniperus sabina*	LC			II	Present	2010
7	*Juniperus pseudosabina*	LC				Present	2010
8	*Ephedra przewalskii*				I	Present	2010
9	*Ephedra lomatolepis*				I	Present	2010
10	*Ephedraprzewalskii* var. *kaschgarica*				I	Present	2010
11	*Ephedra intermedia.*				I	Present	2010
12	*Ephedra glauca*				I	Present	2010
13	*Ephedra distachya*				I	Present	2010
14	*Ephedra regeliana*				I	Present	2010
15	*Ephedra equisetina*				I	Present	2010
16	*Ephedra monosperma*				I	Present	2010
17	*Ephedra fedtschenkoae*				I	Present	2010
18	*Popuplus iliensis*				II	Present	2010
19	*Populus pruinosa*	NT			I	Present	2010
20	*Juglans regia*	NT			I	Present	2010

21	*Betula tianschanica*	EN			I	Present	2010
22	*Calligonum ebi-nuricum*				II	Present	2010
23	*Calligonum roborovskii.*				II	Present	2010
24	*Haloxyon persicum*				I	Present	2010
25	*Haloxylon ammodendron*				I	Present	2010
26	*Gymnocarpos przewalskii*				I	Present	2010
27	*Paeonia anomala*				I	Present	2010
28	*Circaeaster agrestis*				I	Present	2010
29	*Leontice incerta*				II	Present	2010
30	*Roemeria refracta*				II	Present	2010
31	*Capparis spinosa*				II	Present	2010
32	*Thellungiella salsuginea*				I	Present	2010
33	*Rhodiola pamiro-alaica*					Present	2010
34	*Rhodiola rosea*				I	Present	2010
35	*Rhodiola telephioides*				II	Present	2010
36	*Rhodiola kirilowii.*				II	Present	2010
37	*Crataegus songorica*				II	Present	2010
38	*Sorbus tianschanica*	LC				Present	2010
39	*Malus sieversii*	VU			I	Present	2010
40	*Roan peraicn*				II	Present	2010
41	*Rosa platyacantha*				II	Present	2010
42	*Armeniaca vulgaris*	EN			I	Present	2010
43	*Prunus sogdiana*				I	Present	2010
44	*Cerasus tianschanica*				II	Present	2010
45	*Padus avium*				II	Present	2010
46	*Eremosparton songoricum*				II	Present	2010
47	*Ammodendron bifolium*				I	Present	2010
48	*Ammopiptanthus nanu*	CR				Present	2010
49	*Zygophyllum kaschgaricum*	DD				Present	2010
50	*Glycyrrhiza aspera*				I	Present	2010

51	*Glycyrrhiza uralensis*				I	Present	2010
52	*Glycyrrhiza inflata*				I	Present	2010
53	*Glycyrrhiza glabra*				I	Present	2010
54	*Astragalus membranaceus*				I	Present	2010
55	*Astragalus lehmannianus*				I	Present	2010
56	*Dictamnus angustifolius*				II	Present	2010
57	*Chrozophora sabulosa*				II	Present	2010
58	*Acer semenovii*				I	Present	2010
59	*Rhamnus songorica*				II	Present	2010
60	*Reaumuria kaschgarica*				I	Present	2010
61	*Helianthemum soongaricum*				I	Present	2010
62	*Elaeagnus oxycarpa*				II	Present	2010
63	*Cynomorium songaricum*				I	Present	2010
64	*Ferula sinkiangensis*				I	Present	2010
65	*Ferula fukangensis*				I	Present	2010
66	*Ferula ferulaeoides*				I	Present	2010
67	*Ferula lehmannii*				I	Present	2010
68	*Ferula krylovii*				I	Present	2010
69	*Arctous alpinus*				II	Present	2010
70	*Ikonnikovia kaufmanniana*					Present	2010
71	*Fraxinus sogdiana*	NT			I	Present	2010
72	*Centaurium pulchellum*	LC				Present	2010
73	*Myosotis alpestris*	NT				Present	2010
74	*Berberis kaschgarica*	LC				Present	2010
75	*Apocynum venetum*				I	Present	2010
76	*Poacynum hendersonii*				I	Present	2010
77	*Poacynum pictum*				I	Present	2010
78	*Cynanchum kashgaricum*				II	Present	2010
79	*Arnebia tschimganica*				I	Present	2010
80	*Arnebia euchroma*				I	Present	2010

81	*Lycium dasystemum*				II	Present	2010
82	*Lycium cylindricum*				II	Present	2010
83	*Cistanche deserticola*	CR	II		I	Present	2010
84	*Cistanche salsa*				I	Present	2010
85	*Cistanche tubulosa*				I	Present	2010
86	*Saussurea involucrata*				II	Present	2010
87	*Alisma lanceolatum*				II	Present	2010
88	*Leersia oryzoides*				I	Present	2010
89	*Triticum petropavlovskyi*				I	Present	2010
90	*Elymus breviaristatus*			II		Present	2010
91	*Tulipa sinkiangensis*	EN			I	Present	2010
92	*Fritillaria pallidiflora*				I	Present	2010
93	*Fritillaria walujewii*				I	Present	2010
94	*Fritillaria walujewii* var. *plena*				I	Present	2010
95	*Fritillaria karelinii*				I	Present	2010
96	*Neottia camtschatea*		II			Present	2010
97	*Corallorhiza trifida*		II			Present	2010
98	*Listera ovata*		II			Present	2010
99	*Listera tianschanica*		II			Present	2010
100	*Epipactis helleborine*		II			Present	2010
101	*Epipactis palustris*		II			Present	2010
102	*Epipactis xanthophaea*		II			Present	2010
103	*Goodyera repens*		II			Present	2010
104	*Coeloglossum viride*		II			Present	2010
105	*Platanthera minutiflora*		II			Present	2010
106	*Orchis roborovskii*		II			Present	2010
107	*Orchis latifolia*		II			Present	2010
108	*Orchis umbrosa*		II			Present	2010
109	*Orchis cruenta*		II			Present	2010
110	*Orchis fuchsii*		II			Present	2010

1.3 Rare and Endangered Animal of the Nominated Property

There are 367 varieties of rare and endangered vertebrates, including 62 kinds of mammals, 292 kinds of birds, 4 kinds of reptiles, 2 kinds of amphibians and 7 kinds of fishes.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)	China Species Red List (2004)	National Key Protected Wild Animals List (1988)	Distribution	Record Time
MAMMALIAREPTILIA							
1	*Hemiechinus auritus*	LC				Present	2010
2	*Sorex asper*	LC				Present	2010
3	*Sorex minutus*	LC				Present	2010
4	*Sorex caecutiens*	LC				Present	2010
5	*Crocidura leucodon*	LC				Present	2010
6	*Crocidura suaveolens*	LC				Present	2010
7	*Myotis mystacinus*	LC				Present	2010
8	*Plecotus auritus*	LC				Present	2010
9	*Nyctalus noctula*	LC				Present	2010
10	*Barbastella leucomelas*	LC				Present	2010
11	*Eptesicus serotinus*	LC				Present	2010
12	*Canis lupus*	LC	II	VU		Present	2010
13	*Ursus arctos*	LC	I	EN	II	Present	2010
14	*Vulpes corsac*	LC				Present	2010
15	*Vulpes vulpes*	LC				Present	2010
16	*Martes foina*	LC		VU	II	Present	2010
17	*Mustela erminea*	LC				Present	2010
18	*Mustela altaica*	NT				Present	2010
19	*Vormela peregusna*	VU		R		Present	2010
20	*Lutra lutra*	NT	I	VU	II	Present	2010
21	*Panthera uncia*	EN	I	EN	I	Present	2010
22	*Lynx lynx*	LC	II	VU	II	Present	2010
23	*Felis manul*		II	VU	II	Present	2010

24	*Felis silvestris*	LC	II	EN	II	Present	2010
25	*Sus scrofa*	LC				Present	2010
26	*Cervus elaphus songaricus*			EN	II	Present	2010
27	*Capreolus capreolus*	LC				Present	2010
28	*Ovis ammon*	NT	II	EN	II	Present	2010
29	*Capra sibirica* (*Capra ibex*)	LC		EN	I	Present	2010
30	*Gazella subgutturosa*	VU		LR	II	Present	2010
31	*Lepus capensis*	LC				Present	2010
32	*Ochotona macrotis*	LC				Present	2010
33	*Ochotona roylei*	LC				Present	2010
34	*Ochotona iliensis*	EN				Present	2010
35	*Dryomys nitedula*	LC		VU		Present	2010
36	*Marmota bobak*	LC				Present	2010
37	*Spermophilus relictus*	LC				Present	2010
38	*Spermophilus erythrogenys*	LC				Present	2010
39	*Spermophilus major*	LC				Present	2010
40	*Cricetulus migratorius*	LC				Present	2010
41	*Meriones tamariscinus*	LC				Present	2010
42	*Meriones libycus*	LC				Present	2010
43	*Meriones meridianus*	LC				Present	2010
44	*Rhombomys opimus*	LC				Present	2010
45	*Arvicola terrestris*	LC				Present	2010
46	*Ellobius talpinus*	LC				Present	2010
47	*Clethrionomys frater*	LC				Present	2010
48	*Clethrionomys centralis*	LC				Present	2010
49	*Alticola roylei*	NT				Present	2010
50	*Alticola argentatus*	LC				Present	2010
51	*Lagurus lagurus*	LC				Present	2010
52	*Microtus socialis*	LC				Present	2010
53	*Microtus arvalis*	LC				Present	2010
54	*Microtus ilaeus*	LC				Present	2010
55	*Sicista tianschanica*	LC				Present	2010

56	*Allactaga elater*	LC				Present	2010
57	*Allactaga sibirica*	LC				Present	2010
58	*Pygeretmus pumilio*	LC				Present	2010
59	*Dipus sagitta*	LC				Present	2010
60	*Rattus norvegicus*	LC				Present	2010
61	*Mus musculus*	LC				Present	2010
62	*Apodemus sylvaticus*	LC				Present	2010
AVES							
1	*Podiceps auritus*	LC			II	Present	2010
2	*Podiceps cristatus*	LC				Present	2010
3	*Podiceps grisegena*	LC			II	Present	2010
4	*Pelecanus onocrotalus*	LC		NI	II	Present	2010
5	*Phalacrocorax carbo*	LC				Present	2010
6	*Ardea cinerea*	LC				Present	2010
7	*Egretta alba*	LC				Present	2010
8	*Botaurus stellaris*	LC				Present	2010
9	*Ixobrs minutus*				II	Present	2010
10	*Ciconia ciconia*	LC			I	Present	2010
11	*Ciconia nigra*	LC	II	EN	I	Present	2010
12	*Platalea leucorodia*	LC	II	VU	II	Present	2010
13	*Anser cygnoides*	VU				Present	2010
14	*Anser fabalis*	LC			II	Present	2010
15	*Anser anser*	LC				Present	2010
16	*Anser indicus*	LC				Present	2010
17	*Cygnus cygnus*	LC		VU	II	Present	2010
18	*Cygnus columbianus*	LC		VU	II	Present	2010
19	*Cygnus olor*	LC		VU	II	Present	2010
20	*Tadorna ferruginea*	LC				Present	2010
21	*Tadorna tadorna*	LC				Present	2010
22	*Anas acuta*	LC				Present	2010
23	*Anas crecca*	LC				Present	2010
24	*Anas platyrhynchos*	LC				Present	2010

25	*Anas strepera*	LC				Present	2010
26	*Anas penelope*	LC				Present	2010
27	*Anas querquedula*	LC				Present	2010
28	*Anas clypeata*	LC				Present	2010
29	*Marmaronetta angustirostris*	VU				Present	2010
30	*Netta rufina*	LC				Present	2010
31	*Aythya ferina*	LC				Present	2010
32	*Aythya nyroca*	NT				Present	2010
33	*Aythya baeri*	EN				Present	2010
34	*Aythya fuligula*	LC				Present	2010
35	*Bucephala clangula*	LC				Present	2010
36	*Mergus serrator*	LC				Present	2010
37	*Mergus merganser*	LC				Present	2010
38	*Pandion haliaetus*	LC	II	R	II	Present	2010
39	*Milvus korschun(migrans)*		II		II	Present	2010
40	*Accipiter gentilis*		II		II	Present	2010
41	*Accipiter badius*	LC	II	R	II	Present	2010
42	*Accipiter nisus*	LC	II		II	Present	2010
43	*Accipiter virgatus*	LC	II		II	Present	2010
44	*Circus cyaneus*	LC	II		II	Present	2010
45	*Circus macrourus*	NT	II		II	Present	2010
46	*Circus aeruginosus*	LC	II		II	Present	2010
47	*Circus pygargus*	LC	II		II	Present	2010
48	*Buteo rufinus*	LC	II	R	II	Present	2010
49	*Buteo hemilasius*	LC	II		II	Present	2010
50	*Buteo buteo*	LC	II		II	Present	2010
51	*Buteo lagopus*	LC	II		II	Present	2010
52	*Aquila chrysaetos*	LC	II	VU	II	Present	2010
53	*Aquila heliaca*	VU	I	VU	I	Present	2010
54	*Aquila rapax*	LC	II	R	II	Present	2010
55	*Aquila clanga*	VU	II	R	II	Present	2010
56	*Haliaeetus leucoryphus*	VU	II	VU	I	Present	2010

57	*Haliaeetus albicilla*	LC	I	NI	I	Present	2010
58	*Circaetus ferox*		II	NI	II	Present	2010
59	*Aegypius monachus*	NT	II	VU	II	Present	2010
60	*Gyps himalayensis*	LC	II	R	II	Present	2010
61	*Gypaegus barbatus*		II	VU	I	Present	2010
62	*Falco cherrug*	VU	II	R	II	Present	2010
63	*Falco altaicus*		II		II	Present	2010
64	*Falco rusticolus*	LC	I		II	Present	2010
65	*Falco peregrinus*	LC	I	R	II	Present	2010
66	*Falco pelegrinoides*	LC	I		II	Present	2010
67	*Falco subbuteo*	LC	II		II	Present	2010
68	*Falco columbarius*	LC	II		II	Present	2010
69	*Falco naumanni*	VU	II		II	Present	2010
70	*Falco tinnunculus*	LC	II		II	Present	2010
71	*Lyrurus(Tetrao)tetrix*			NI	II	Present	2010
72	*Tetraogallus himalayensis*	LC		R	II	Present	2010
73	*Alectoris chukar*	LC				Present	2010
74	*Coturnix coturnix*	LC				Present	2010
75	*Phasianus colchicus*	LC				Present	2010
76	*Grus grus*	LC	II		II	Present	2010
77	*Grus leucogeranus*	CR	I	EN	I	Present	2010
78	*Anthropoides virgo*		II	NI	II	Present	2010
79	*Crex crex*	LC			II	Present	2010
80	*Porzana parva*	LC				Present	2010
81	*Porzana pusilla*	LC				Present	2010
82	*Gallinula chloropus*	LC				Present	2010
83	*Fulica atra*	LC				Present	2010
84	*Otis tarda*	VU	II	VU	I	Present	2010
85	*Haematopus ostralegus*	LC				Present	2010
86	*Vanellus vanellus*	LC				Present	2010
87	*Pluvialis squatarola*	LC				Present	2010
88	*Charadrius dubius*	LC				Present	2010

89	*Charadrius alexandrinus*	LC				Present	2010
90	*Charadrius mongolus*	LC				Present	2010
91	*Charadrius leschenaultii*	LC				Present	2010
92	*Charadrius asiaticus*	LC				Present	2010
93	*Numenius phaeopus*	LC				Present	2010
94	*Numenius arquata*	NT				Present	2010
95	*Limosa limosa*	NT				Present	2010
96	*Limosa lapponica*	LC				Present	2010
97	*Tringa erythropus*	LC				Present	2010
98	*Tringa stagnatilis*	LC				Present	2010
99	*Tringa nebularia*	LC				Present	2010
100	*Tringa ochropus*	LC				Present	2010
101	*Tringa glareola*	LC				Present	2010
102	*Xenus cinereus*	LC				Present	2010
103	*Gallinago solitaria*	LC				Present	2010
104	*Gallinago gallinago*	LC				Present	2010
105	*Scolopax rusticola*	LC				Present	2010
106	*Lymnocryptes minimus*	LC				Present	2010
107	*Calidris temminckii*	LC				Present	2010
108	*Calidris alpina*	LC				Present	2010
109	*Calidris ferruginea*	LC				Present	2010
110	*Limicola falcinellus*	LC				Present	2010
111	*Philomachus pugnax*	LC				Present	2010
112	*Phalaropus lobatus*	LC				Present	2010
113	*Phalaropus fulicarius*	LC				Present	2010
114	*Ibidorhyncha struthersii*	LC				Present	2010
115	*Himantopus himantopus*	LC				Present	2010
116	*Recurvirostra avosetta*	LC				Present	2010
117	*Burhinus oedicnemus*	LC				Present	2010
118	*Glareola pratincola*	LC				Present	2010
119	*Glareola maldivarum*	LC				Present	2010
120	*Larus argentatus*	LC				Present	2010

121	*Larus ridibundus*	LC				Present	2010
122	*Larus brunnicephalus*	LC				Present	2010
123	*Larus minutus*	LC			II	Present	2010
124	*Chlidonias niger*				II	Present	2010
125	*Sterna hirundo*	LC				Present	2010
126	*Sterna albifrons*	LC				Present	2010
127	*Pterocles orientalis*	LC		NI	II	Present	2010
128	*Columba rupestris*	LC				Present	2010
129	*Columba livia*	LC				Present	2010
130	*Columba oenas*	LC				Present	2010
131	*Columba eversmanni*	VU				Present	2010
132	*Columba palumbus*	LC			II	Present	2010
133	*Streptopelia turtur*	LC				Present	2010
134	*Streptopelia orientalis*	LC				Present	2010
135	*Streptopelia decaocto*	LC				Present	2010
136	*Streptopelia senegalensis*			NI		Present	2010
137	*Cuculus canorus*	LC				Present	2010
138	*Otus brucei*	LC	II		II	Present	2010
139	*Otus scops*	LC	II		II	Present	2010
140	*Bubo bubo*	LC	II	R	II	Present	2010
141	*Surnia ulula*	LC	II		II	Present	2010
142	*Athene noctua*	LC	II		II	Present	2010
143	*Strix nebulosa*	LC	II	NI	II	Present	2010
144	*Asio otus*	LC	II		II	Present	2010
145	*Asio flammeus*	LC	II		II	Present	2010
146	*Aegolius funereus*	LC	II	NI	II	Present	2010
147	*Apus apus*	LC				Present	2010
148	*Merops apiaster*	LC				Present	2010
149	*Coracias garrulus*	NT				Present	2010
150	*Upupa epops*	LC				Present	2010
151	*Jynx torquilla*	LC				Present	2010
152	*Melanocorypha bimaculata*	LC				Present	2010

153	*Calandrella cinerea*	LC				Present	2010
154	*Calandrella acutirostris*	LC				Present	2010
155	*Calandrella rufescens*	LC				Present	2010
156	*Galerida cristata*	LC				Present	2010
157	*Alauda arvensis*	LC				Present	2010
158	*Eremophila alpestris*	LC				Present	2010
159	*Riparia riparia*	LC				Present	2010
160	*Hirundo rupestris*	LC				Present	2010
161	*Hirundo rustica*	LC				Present	2010
162	*Hirundo daurica*	LC				Present	2010
163	*Delichon urbica*	LC				Present	2010
164	*Anthus novaeseelandiae*	LC				Present	2010
165	*Anthus campestris*	LC				Present	2010
166	*Anthus trivialis*	LC				Present	2010
167	*Anthus hodgsoni*	LC				Present	2010
168	*Anthus pratensis*	LC				Present	2010
169	*Anthus spinoletta*	LC				Present	2010
170	*Motacilla flava*	LC				Present	2010
171	*Motacilla citreola*	LC				Present	2010
172	*Motacilla cinerea*	LC				Present	2010
173	*Motacilla alba*	LC				Present	2010
174	*Cinclus cinclus*	LC				Present	2010
175	*Cinclus pallasii*	LC				Present	2010
176	*Troglodytes troglodytes*	LC				Present	2010
177	*Prunella collaris*	LC				Present	2010
178	*Prunella himalayana*	LC				Present	2010
179	*Prunella atrogularis*	LC				Present	2010
180	*Luscinia megarhynchos*	LC				Present	2010
181	*Luscinia pectoralis*	LC				Present	2010
182	*Erithacus rubecula*	LC				Present	2010
183	*Phoenicurus phoenicurus*	LC				Present	2010
184	*Phoenicurus erythronotus*	LC				Present	2010

185	*Phoenicurus caeruleocephalus*	LC				Present	2010
186	*Phoenicurus ochruros*	LC				Present	2010
187	*Phoenicurus frontalis*	LC				Present	2010
188	*Saxicola insignis*	VU				Present	2010
189	*Saxicola torquata*	LC				Present	2010
190	*Oenanthe isabellina*	LC				Present	2010
191	*Oenanthe oenanthe*	LC				Present	2010
192	*Oenanthe deserti*	LC				Present	2010
193	*Oenanthe hispanica*	LC				Present	2010
194	*Monticola saxatilis*	LC				Present	2010
195	*Zoothera dauma*	LC				Present	2010
196	*Turdus obscurus*	LC				Present	2010
197	*Turdus ruficollis*	LC				Present	2010
198	*Turdus naumanni*	LC				Present	2010
199	*Turdus pilaris*	LC				Present	2010
200	*Turdus viscivorus*	LC				Present	2010
201	*Cettia cetti*	LC				Present	2010
202	*Locustella naevia*	LC				Present	2010
203	*Locustella lanceolata*	LC				Present	2010
204	*Locustella luscinioides*	LC				Present	2010
205	*Acrocephalus arundinaceus*	LC				Present	2010
206	*Acrocephalus agricola*	LC				Present	2010
207	*Acrocephalus schoenobaenus*	LC				Present	2010
208	*Acrocephalus dumetorum*	LC				Present	2010
209	*Hippolais caligata*	LC				Present	2010
210	*Sylvia nisoria*	LC				Present	2010
211	*Sylvia communis*	LC				Present	2010
212	*Sylvia curruca*	LC				Present	2010
213	*Phylloscopus collybita*	LC				Present	2010
214	*Phylloscopus affinis*	LC				Present	2010
215	*Phylloscopus subaffinis*	LC				Present	2010
216	*Phylloscopus ygriseolus*	LC				Present	2010

217	*Phylloscopus inornatus*	LC				Present	2010
218	*Phylloscopus trochiloides*	LC				Present	2010
219	*Phylloscopus sibilatrix*	LC				Present	2010
220	*Regulus regulus*	LC				Present	2010
221	*Ficedula parva*	LC				Present	2010
222	*Muscicapa striata*	LC				Present	2010
223	*Panurus biarmicus*	LC				Present	2010
224	*Remiz pendulinus*	LC				Present	2010
225	*Remiz coronatus*	LC				Present	2010
226	*Aegithalos caudatus*	LC				Present	2010
227	*Parus major*	LC				Present	2010
228	*Parus cyanus*	LC				Present	2010
229	*Parus rubidiventris*	LC				Present	2010
230	*Parus palustris*	LC				Present	2010
231	*Parus montanus*	LC				Present	2010
232	*Sitta europaea*	LC				Present	2010
233	*Tichodroma muraria*	LC				Present	2010
234	*Certhia familiaris*	LC				Present	2010
235	*Oriolus oriolus*	LC				Present	2010
236	*Lanius isabellinus*	LC				Present	2010
237	*Lanius collurio*	LC				Present	2010
238	*Lanius minor*	LC				Present	2010
239	*Lanius excubitor*	LC				Present	2010
240	*Pica pica*	LC				Present	2010
241	*Podoces hendersoni*	LC				Present	2010
242	*Podoces biddulphi*	NT				Present	2010
243	*Nucifraga caryocatactes*	LC				Present	2010
244	*Pyrrhocorax pyrrhocorax*	LC				Present	2010
245	*Pyrrhocorax graculus*	LC				Present	2010
246	*Corvus frugilegus*	LC				Present	2010
247	*Corvus monedula*	LC				Present	2010
248	*Corvus dauuricus*	LC				Present	2010

249	*Corvus corone*	LC				Present	2010
250	*Sturnus roseus*	LC				Present	2010
251	*Sturnus vulgaris*	LC				Present	2010
252	*Acridotheres tristis*	LC				Present	2010
253	*Passer ammodendri*	LC				Present	2010
254	*Passer domesticus*	LC				Present	2010
255	*Montifringilla nivalis*	LC				Present	2010
256	*Montifringilla blanfordi*	LC				Present	2010
257	*Fringilla coelebs*	LC				Present	2010
258	*Fringilla montifringilla*	LC				Present	2010
259	*Leucosticte nemoricola*	LC				Present	2010
260	*Leucosticte brandti*	LC				Present	2010
261	*Carpodacus erythrinus*	LC				Present	2010
262	*Carpodacus synoicus*	LC				Present	2010
263	*Carpodacus rhodochlamys*	LC				Present	2010
264	*Carpodacus rubicilla*	LC				Present	2010
265	*Loxia curvirostra*	LC				Present	2010
266	*Carduelis chloris*	LC				Present	2010
267	*Carduelis carduelis*	LC				Present	2010
268	*Carduelis flammea*	LC				Present	2010
269	*Carduelis hornemanni*	LC				Present	2010
270	*Carduelis flavirostris*	LC				Present	2010
271	*Carduelis cannabina*	LC				Present	2010
272	*Serinus pusillus*	LC				Present	2010
273	*Pyrrhula pyrrhula*	LC				Present	2010
274	*Coccothraustes coccothraustes*	LC				Present	2010
275	*Mycerobas carnipes*	LC				Present	2010
276	*Rhodopechys githaginea*	LC				Present	2010
277	*Uragus sibiricus*	LC				Present	2010
278	*Emberiza calandra*	LC				Present	2010
279	*Emberiza melanocephala*	LC				Present	2010
280	*Emberiza bruniceps*	LC				Present	2010

281	*Emberiza rutila*	LC				Present	2010
282	*Emberiza aureola*	VU				Present	2010
283	*Emberiza citrinella*	LC				Present	2010
284	*Emberiza hortulana*	LC				Present	2010
285	*Emberiza buchanani*	LC				Present	2010
286	*Emberiza cia*	LC				Present	2010
287	*Emberiza cioides*	LC				Present	2010
288	*Emberiza rustica*	LC				Present	2010
289	*Emberiza pusilla*	LC				Present	2010
290	*Emberiza pallasi*	LC				Present	2010
291	*Emberiza schoeniclus*	LC				Present	2010
292	*Calcarius lapponicus*	LC				Present	2010
REPTILIA							
1	*Testudo horsfieldii*	VU	II	CR	I	Present	2010
2	*Alsophylax pipiens*	LC				Present	2010
3	*Lacerta agilis*	LC				Present	2010
4	*Vipera ursinii*	VU	I			Present	2010
AMPHIBIA							
1	*Rana chensinensis*	LC		VU		Present	2010
2	*Rana asiatica*	LC				Present	2010
PISCES							
1	*Acipenser nudiventris*	CR	II			Present	2010
2	*Abramis brama*	LC				Present	2010
3	*Leuciscus leuciscus*	LC				Present	2010
4	*Aspius aspius*	LC				Present	2010
5	*Cyprinus carpio*	VU				Present	2010
6	*Silurus glanis*	LC				Present	2010
7	*Perca schrenki*	DD				Present	2010

1.4 Endemic Plant Species of the Nominated Property

There are 118 varieties of plants endemic to Tianshan, accouting for 4.5% of the total vascular plants in the nominated property. Of them, there are 7 species of ferns and 111 species of angiosperms.

No.	Species Name	Growth	Record Time
PTERIDOPHYTA			
1	*Asplenium tianshanicum*	Present	2010
2	*Asplenium chingianum*	Present	2010
3	*Asplenium xinjiangense*	Present	2010
4	*Asplenium minutum*	Present	2010
5	*Polystichum parasinense*	Present	2010
6	*Polystichum xinjiangense*	Present	2010
7	*Polystichum alatawshanicum*	Present	2010
ANGIOSPERMAE			
8	*Salix pyrolifolia*	Present	2010
9	*Calligonum roborovskii*	Present	2010
10	*Salsola junatovii*	Present	2010
11	*Arenaria meyeri*	Present	2010
12	*Silene huochenensis*	Present	2010
13	*Aconitum sinchiangense*	Present	2010
14	*Delphinium wentsaii*	Present	2010
15	*Delphinium mollifolium*	Present	2010
16	*Delphinium elliptico-ovatum*	Present	2010
17	*Delphinium winkerianum*	Present	2010
18	*Delphinium tianshanicum*	Present	2010
19	*Delphinium wuqiaense*	Present	2010
20	*Delphinium kaschgaricum*	Present	2010
21	*Ranunculus hamiensis*	Present	2010
22	*Ranunculus balikunesis*	Present	2010
23	*Brassica xinjiangensis*	Present	2010
24	*Arabidopsis tuemurica*	Present	2010
25	*Erysimum eseptatum*	Present	2010

26	*Erysimum brevifolium*	Present	2010
27	*Neotorularia rosulfolia*	Present	2010
28	*Camelina microphylla*	Present	2010
29	*Rhodiola telephioides*	Present	2010
30	*Caragana soongorica*	Present	2010
31	*Oxytropis bogdoschanica*	Present	2010
32	*Oxytropis przewalskii*	Present	2010
33	*Astragalus hamiensis*	Present	2010
34	*Astragalus pseudoborodinii*	Present	2010
35	*Astragalus hegingensis*	Present	2010
36	*Stenocoelium popovii*	Present	2010
37	*Eriocycla peliotii*	Present	2010
38	*Ferula sinkiangensis*	Present	2010
39	*Pyrola xinjiangensis*	Present	2010
40	*Onosma apiculatum*	Present	2010
41	*Eritrichium confertiflorum*	Present	2010
42	*Eritrichium pendulifructum*	Present	2010
43	*Eritrichium oligacanthum*	Present	2010
44	*Eritrichium deltodentum*	Present	2010
45	*Eritrichium sinomicrocarpum*	Present	2010
46	*Lappula ramulosa*	Present	2010
47	*Lappula monocarpa*	Present	2010
48	*Scutellaria orthotricha*	Present	2010
49	*Nepeta virgata*	Present	2010
50	*Lagochilus lanatonodus*	Present	2010
51	*Lagochilus xinjiangensis*	Present	2010
52	*Physochlaina capitata*	Present	2010
53	*Linaria vulgaris*	Present	2010
54	*Pedicularis myriophylla*	Present	2010
55	*Campanula xinjiangensis*	Present	2010
56	*Galatella bogidaica*	Present	2010

57	*Hippolytia kaschgarica*	Present	2010
58	*Seriphidium sawanense*	Present	2010
59	*Seriphidium borotalense*	Present	2010
60	*Doronicum tianshanicum*	Present	2010
61	*Ligularia xinjiangensis*	Present	2010
62	*Ligularia tianshanica*	Present	2010
63	*Ligularia tulupanica*	Present	2010
64	*Ligularia hamiica*	Present	2010
65	*Echinops sylvicola*	Present	2010
66	*Jurinea pilostemonoides*	Present	2010
67	*Jurinea flaccida*	Present	2010
68	*Jurinea pamirica*	Present	2010
69	*Jurinea scapiformis*	Present	2010
70	*Jurinea kaschgarica*	Present	2010
71	*Saussurea alberti*	Present	2010
72	*Saussurea involucrata*	Present	2010
73	*Saussurea pulviniformis*	Present	2010
74	*Saussurea mucronulata*	Present	2010
75	*Saussurea canescens*	Present	2010
76	*Saussurea lomatolepis*	Present	2010
77	*Saussurea tuoliensis*	Present	2010
78	*Cousinia lasiophylla*	Present	2010
79	*Cousinia sclerolepis*	Present	2010
80	*Olgaea roborowskyi*	Present	2010
81	*Alfredia aspera*	Present	2010
82	*Alfredia fetissowii*	Present	2010
83	*Serratula rugosa*	Present	2010
84	*Centaurea dschungarica*	Present	2010
85	*Scorzonera tianshanensis*	Present	2010
86	*Taraxacum xinyuanicum*	Present	2010
87	*Taraxacum alatopetiolum*	Present	2010

88	*Mulgeium alatoicum*	Present	2010
89	*Crepis hsawanica*	Present	2010
90	*Crepis tianshanica*	Present	2010
91	*Crepis pseudonaniforma*	Present	2010
92	*Poa membranigluma*	Present	2010
93	*Poa florida*	Present	2010
94	*Poa macroanthera*	Present	2010
95	*Poa major*	Present	2010
96	*Puccinellia florida*	Present	2010
97	*Puccinellia microanthera*	Present	2010
98	*Triticum petropavlovskyi*	Present	2010
99	*Agropyron sinkiangense*	Present	2010
100	*Elymus sylvaticus*	Present	2010
101	*E1ymus platyphyllus*	Present	2010
102	*Elymus viridulus*	Present	2010
103	*Elymus magnicaespes*	Present	2010
104	*E1ymus sinkiangensis*	Present	2010
105	*Phlomis chinghoensis*	Present	2010
106	*Hexinia polydichotoma*	Present	2010
107	*Juncus subglobosus*	Present	2010
108	*E1ymus glaberrimus*	Present	2010
109	*Leymus yiunensis*	Present	2010
110	*Agrostis sinkiangensis*	Present	2010
111	*Gagea nigra*	Present	2010
112	*Gegea subalpina*	Present	2010
113	*Gagea stepposa*	Present	2010
114	*Allium sinkiangense*	Present	2010
115	*Ixiolirion songaricum*	Present	2010
116	*Iris curvifolia*	Present	2010
117	*Tulipa sinkiangensis*	Present	2010
118	*Listera tianschanica*	Present	2010

1.5 Endemic Animal Species of the Nominated Property

There are 153 endemic species or subspecies of vertebrates in Xinjiang Tianshan, including 36 varieties of mammals, 97 varieties of birds, 4 varieties of reptiles and 16 varieties of fishes.

No.	Species Name	Distribution	Record Time
MAMMALIA			
M—1	*Crocidura suaveolens ilensis*	Present	2010
M—2	*Ursus arctos isabellinus*	Present	2010
M—3	*Mustela eversmanni michnoi*	Present	2010
M—4	*Mustela erminea ferghanae*	Present	2010
M—5	*Meles meles tianschanensis*	Present	2010
M—6	*Felis silvestris arnate*	Present	2010
M—7	*Sus scrofa nigripes*	Present	2010
M—8	*Cervus elephus songaricus*	Present	2010
M—9	*Capreolus capreolus pygargus*	Present	2010
M—10	*Ovis ammon littledalei*	Present	2010
M—11	*Capra sibirica alaiana*	Present	2010
M—12	*Ochotona roylei macrotis*	Present	2010
M—13	*Ochotona iliensis*	Present	2010
M—14	*Dryomys nitedula angelus*	Present	2010
M—15	*Marmota bobak centralis*	Present	2010
M—16	*Spermophilus undulates stramineus*	Present	2010
M—17	*Spermophilus relictus nikaensis*	Present	2010
M—18	*Spermophilus major ungae*	Present	2010
M—19	*Spermophilus erythrogenys carruthersi*	Present	2010
M—20	*Cricetulus migratorius caesius*	Present	2010
M—21	*Meriones libycus aquilo*	Present	2010
M—22	*Meriones meridianus penicilliger*	Present	2010
M—23	*Ellobius talpinus coenosus*	Present	2010
M—24	*Alticola roylei leucurus*	Present	2010
M—25	*Alticola argentatus leucurus*	Present	2010
M—26	*Lagurus lagurus altorum*	Present	2010
M—27	*Microtus gragalis tianschanicus*	Present	2010

M—28	*Microtus oeconomus montiumcaelestinum*	Present	2010
M—29	*Microtus socialis bogdoensis*	Present	2010
M—30	*Microtus arvalis obscurus*	Present	2010
M—31	*Microtus ilaeus*	Present	2010
M—32	*Allactaga elater dzugariae*	Present	2010
M—33	*Allactaga sibirica altorum*	Present	2010
M—34	*Pygeretmus pumilio aralensis*	Present	2010
M—35	*Mus musculus decolor*	Present	2010
M—36	*Apodemus sylvaticus tscherga*	Present	2010
AVES			
B—1	*Podiceps ruficolis capensis*	Present	2010
B—2	*Ciconia ciconia asiatica*	Present	2010
B—3	*Anser fabalis rossicus*	Present	2010
B—4	*Accipiter gentiles buteoides*	Present	2010
B—5	*Accipiter gentiles schvedowi*	Present	2010
B—6	*Accipiter badius cenchroides*	Present	2010
B—7	*Buteo buteo vulpinus*	Present	2010
B—8	*Falco rusticolus obsoletus*	Present	2010
B—9	*Falco peregrinus babynicus*	Present	2010
B—10	*Falco columbarius*	Present	2010
B—11	*Alectoris chukar falki*	Present	2010
B—12	*Alectoris chukar dzungaria*	Present	2010
B—13	*Phasianus colchicus mongolicus*	Present	2010
B—14	*Rallu aquaticus korejewi*	Present	2010
B—15	*Charadrius mongolus pamirensis*	Present	2010
B—16	*Burhinus oedicnemus astutus*	Present	2010
B—17	*Larus argantatus cachinnans*	Present	2010
B—18	*Pyerocles orientalis arenarius*	Present	2010
B—19	*Columba rupestris turkestanica*	Present	2010
B—20	*Columba livia neglecta*	Present	2010
B—21	*Columba oenas yarkandensis*	Present	2010
B—22	*Columba palumbus casiotis*	Present	2010
B—23	*Cuculus canorus subtelephonus*	Present	2010

B—24	*Otus scops pulchllus*	Present	2010
B—25	*Bubo bubo hemachalana*	Present	2010
B—26	*Surnia ulula tianschanica*	Present	2010
B—27	*Athene noctua orientalis*	Present	2010
B—28	*Coracias garrulous semennowi*	Present	2010
B—29	*Picoides major tianshaniocus*	Present	2010
B—30	*Pocoides leucopterus leptorbynchus*	Present	2010
B—31	*Picodes tridactylus tianschanicus*	Present	2010
B—32	*Calandrella cinerea longipennis*	Present	2010
B—33	*Calandrella rufescens rseebohmi*	Present	2010
B—34	*Galerida cristata magna*	Present	2010
B—35	*Alauda arvensis dulcivor*	Present	2010
B—36	*Eremophila alpestris albigula*	Present	2010
B—37	*Riparia riparia diluta*	Present	2010
B—38	*Anthus novaeseelandiae centralasiae*	Present	2010
B—39	*Anthus campestris griseus*	Present	2010
B—40	*Anthus trivialis haringtoni*	Present	2010
B—41	*Anthus spinoletta coutellii*	Present	2010
B—42	*Motacilla flava melanogrisea*	Present	2010
B—43	*Motacilla citreola werae*	Present	2010
B—44	*Motacilla alba personata*	Present	2010
B—45	*Cinclus cinclus leucogaster*	Present	2010
B—46	*Troglodytes troglodytes tianschanicus*	Present	2010
B—47	*Prunella collaris rufilata*	Present	2010
B—48	*Prunella atrogularis huttoni*	Present	2010
B—49	*Luscinia megarhynchos hafisi*	Present	2010
B—50	*Luscinia svecica saturatior*	Present	2010
B—51	*Luscinia pectoralis ballioni*	Present	2010
B—52	*Phoenicurus ochruros phoinicuroides*	Present	2010
B—53	*Saxicola torquata maura*	Present	2010
B—54	*Turdus merulu intermedea*	Present	2010
B—55	*Turdus pilaris subpilaris*	Present	2010
B—56	*Turdus viscivorus bonapartei*	Present	2010

B—57	*Cettia cetti albiventris*	Present	2010
B—58	*Locustella naevia straminea*	Present	2010
B—59	*Acrocephalus arundinaceus zarudnyi*	Present	2010
B—60	*Acrocephalus agricola brevipennis*	Present	2010
B—61	*Hippolais pallida elaeica*	Present	2010
B—62	*Sylvia nisoria merzbacheri*	Present	2010
B—63	*Sylvia communis rubicola*	Present	2010
B—64	*Phylloscopus inornatus humei*	Present	2010
B—65	*Phylloscopus trochiloides viridanus*	Present	2010
B—66	*Regulus regulus tristis*	Present	2010
B—67	*Muscicapa striata meumanni*	Present	2010
B—68	*Remiz pendulinus stoliczkae*	Present	2010
B—69	*Parus bokharensis iliensis*	Present	2010
B—70	*Sitta europaea seorsa*	Present	2010
B—71	*Certhia familiaris tianschanica*	Present	2010
B—72	*Lanius isabellinus phoenicuroides*	Present	2010
B—73	*Lanius minor turanicua*	Present	2010
B—74	*Lanius excubitor leucopterus*	Present	2010
B—75	*Pica pica bactriana*	Present	2010
B—76	*Nucifraga caryocatactes rothschildi*	Present	2010
B—77	*Corvus corone sharpii*	Present	2010
B—78	*Sturnus vulgaris poltaratskyi*	Present	2010
B—79	*Passer ammodendri nigricans*	Present	2010
B—80	*Passer domesticus bactrianus*	Present	2010
B—81	*Passer montanus dilutus*	Present	2010
B—82	*Pelronia pelronia intermedia*	Present	2010
B—83	*Montifringilla nivalis alpicola*	Present	2010
B—84	*Leucosticte nemoricola altaica*	Present	2010
B—85	*Carpodacus synoicus stolizkae*	Present	2010
B—86	*Carpodacus rubicilla kobdensis*	Present	2010
B—87	*Loxia curvirostra tianschanica*	Present	2010
B—88	*Carduelis carduelis parapanisi*	Present	2010
B—89	*Carduelis flavirostris korejivi*	Present	2010

B—90	*Carduelis cannabina bella*	Present	2010
B—91	*Mycerobas carnipes centralis*	Present	2010
B—92	*Emberiza buchanani neobscura*	Present	2010
B—93	*Emberiza cia decolorata*	Present	2010
B—94	*Emberiza cia par*	Present	2010
B—95	*Emberiza godlewskii decolorata*	Present	2010
B—96	*Emberiza schoeniclus pallidior*	Present	2010
B—97	*Emberiza schoeniclus pyrrhuloides*	Present	2010
REPTILIA			
R—1	*Laudakia stoliczkana*	Present	2010
R—2	*Asymblepharus alaicus*	Present	2010
R—3	*Terotoscincus scincus*	Present	2010
R—4	*Phrynocephalus mystaceus*	Present	2010
PISCES			
F—1	*Phoxinus brachyurus*	Present	2010
F—2	*Leuciscus liuciscus*	Present	2010
F—3	*Diptychus machlatus*	Present	2010
F—4	*Gymnodiptychus dybowskii*	Present	2010
F—5	*Triplophysas strauchii*	Present	2010
F—6	*Schizothorax argentatus*	Present	2010
F—7	*Schizothorax pseudoksaiensis*	Present	2010
F—8	*Schizothorax biddulphi*	Present	2010
F—9	*Schizothorax eurystomus*	Present	2010
F—10	*Barbatula labiata*	Present	2010
F—11	*Triplophysa(T.)Dorsalis*	Present	2010
F—12	*Triplophysa strauchii*	Present	2010
F—13	*Triplophysa stoliczkae*	Present	2010
F—14	*Triplophysa minuta*	Present	2010
F—15	*Triplophysa dorsonotatus*	Present	2010
F—16	*Perca schrenki*	Present	2010

1.6 Relic Species of the Nominated Property

Xinjiang Tianshan was once an important biological refuge in the hinterland of Eurasia during the climatic fluctuation of Quaternary Ice Age. 94 species of relic plants existing before the Quaternary Ice Age have been well reserved, accounting for 3.59% of the total vascular plants in the nominated property, including one-species of fern belonging to one genera of one family, five species of gymnosperms belonging to four generas of three families and 78 species of angiosperms belonging to 73 generas of 31 families.

No.	Species Name	Growth	Record Time
PTERLDOPHYTA			
1	*Ophioglossum vulgatum*	Present	2010
GYMNOSPERMAE			
2	*Picea schrenkiana*	Present	2010
3	*Larix sibirica*	Present	2010
4	*Juniperus sibirica*	Present	2010
5	*Juniperus sabina*	Present	2010
6	*Ephedra przewalskii*	Present	2010
ANGIOSPERMAE			
7	*Populus euphratica*	Present	2010
8	*Populus pruinosa*	Present	2010
9	*Populus tremula*	Present	2010
10	*Juglans regia*	Present	2010
11	*Betula pendula*	Present	2010
12	*Ulmus pumila*	Present	2010
13	*Oxyria dihyna*	Present	2010
14	*Koenigia islandica*	Present	2010
15	*Calligonum roborovskii*	Present	2010
16	*Londesia eriantha*	Present	2010
17	*Kirilowia eriantha*	Present	2010
18	*Borszczowia aralocaspica*	Present	2010
19	*Ceratocarpus arenarius*	Present	2010
20	*Sympegma regelii*	Present	2010
21	*Iljinia regelii*	Present	2010
22	*Bassia dasyphylla*	Present	2010
23	*Aellenia glauca*	Present	2010
24	*Halocnemum strobilaceum*	Present	2010

25	*Halostachys caspica*	Present	2010
26	*Haloxylon ammodendron*	Present	2010
27	*Anabasis salsa*	Present	2010
28	*Anabasis cretacea*	Present	2010
29	*Anabasis eriopoda*	Present	2010
30	*Nanophyton erinaceum*	Present	2010
31	*Portulaca oleracea*	Present	2010
32	*Gymnocarpos przewalskii*	Present	2010
33	*Capparis spinosa*	Present	2010
34	*Eruca sativa*	Present	2010
35	*Crataegus songorica*	Present	2010
36	*Crataegus chlorocarpa*	Present	2010
37	*Crataegus sanguinea*	Present	2010
38	*Sorbus tianschanica*	Present	2010
39	*Malus sieversii*	Present	2010
40	*Dryas oxyodonta*	Present	2010
41	*Armeniaca vulgaris*	Present	2010
42	*Prunus sogdiana*	Present	2010
43	*Cerasus tianschanica*	Present	2010
44	*Padus avium*	Present	2010
45	*Ammodendron bifolium*	Present	2010
46	*Ammopiptanthus nanus*	Present	2010
47	*Glycyrrhiza glabra*	Present	2010
48	*Halimodendron halodendron*	Present	2010
49	*Alhagi sparsifolia*	Present	2010
50	*Peganum harmala*	Present	2010
51	*Nitraria sphaerocarpa*	Present	2010
52	*Nitraria roborowskii*	Present	2010
53	*Tribulus terrestris*	Present	2010
54	*Zygophyllum kaschgaricum*	Present	2010
55	*Euonymus semenovii*	Present	2010
56	*Acer semenovii*	Present	2010
57	*Reaumuria soongorica*	Present	2010
58	*Reaumuria kaschgarica*	Present	2010
59	*Helianthemum soongoricum*	Present	2010
60	*Elaeagnus oxycarpa*	Present	2010

61	*Cynomori songaricum*	Present	2010
62	*Eryngium planum*	Present	2010
63	*Angelica sylvestris*	Present	2010
64	*Pachypleurum alpinum*	Present	2010
65	*Pyrola rotundifolia*	Present	2010
66	*Moneses uniflora*	Present	2010
67	*Monotropa hypopitys*	Present	2010
68	*Arctous alpinus*	Present	2010
69	*Fraxinus sogdiana*	Present	2010
70	*Apocynum venetum*	Present	2010
71	*Poacynum hendersonii*	Present	2010
72	*Verbena officinalis*	Present	2010
73	*Lycium ruthenicum*	Present	2010
74	*Hyoscyamus niger*	Present	2010
75	*Dayura stramonium*	Present	2010
76	*Cistanche tubulosa*	Present	2010
77	*Cistanche deserticola*	Present	2010
78	*Cistanche salsa*	Present	2010
79	*Viburnum opulus*	Present	2010
80	*Karelinia caspica*	Present	2010
81	*Aristida heymannii*	Present	2010
82	*Aristida pennata*	Present	2010
83	*Polypogon fugax*	Present	2010
84	*Polypogon monspeliensis*	Present	2010
85	*Chloris virgata*	Present	2010
86	*Cynodon dactylon*	Present	2010
87	*Arthraxon hispidus*	Present	2010
88	*Setaria viridis*	Present	2010
89	*Pennisetum centrasiaticum*	Present	2010
90	*Bothriochloa ischaemum*	Present	2010
91	*Asparagus persicus*	Present	2010
92	*Asparagus neglectus*	Present	2010
93	*Asparagus angulofractus*	Present	2010
94	*Asparagus officinalis*	Present	2010

2. The Latest Record of Xinjiang Tianshan

2.1 Vascular Plant List in the Nominated Property

There are vascular plants 2,622 species, belonging to 635 generas of 106 families, including 41 species of ferns, belonging to 19 generas of 14 families, 15 species of gymnosperms, belonging to four generas of three families, and 2,566 species of angiosperms, belonging to 612 generas of 89 families.

2.1.1 PTERLDOPHYTA

I. Huperziaceae

1. *Huperzia* Bernh.

（1）*Huperzia selago* (Linn.) Bernh.ex Schrank et Mart.

II. Lycopodiaceae

2. *Lycopodium* L.

（2）*Lycopodium japonicum* Thunb.

III. Selaginellaceae

3. *Selaginella* Spring

（3）*Selaginella sanguinolenta* (L.) Spring

IV. Equisetaceae

4. *Equisetum* L.

（4）*Equisetum arvense* L.

（5）*Equisetum sylvaiticum* L.

（6）*Equisetum pratense* Ehrh.

（7）*Equisetum palustre* L.

（8）*Equisetum scirpoides* Michx.

（9）*Equisetum hyemale* L.

（10）*Equisetum ramosissimum* Desf.

V. Ophioglossaceae

5. *Ophioglossum* Linn.

（11）*Ophioglossum vulgatum* Linn.

VI. Botrychiaceae

6. *Botrychium* Sw.

（12）*Botrychium lunaria* (L.) Sw.

VII. Sinopteridaceae

7. *Cryptogramma* R.Brown.

（13）*Cryptogramma stelleeri* (Gmel.)

8. *Aleuritopteris* Fee

（14）*Aleuritopteris argentea* (Gmel.) Fee

9. *Pellaea* Link

（15）*Pellaea straminea* Ching

VIII. Adiantaceae

10. *Adiantum* L.

（16）*Adiantum capillus-veneris* L.

IX. Athyriaceae

11. *Cystopteris* Bernh.

（17）*Cystopteris montana* (Lam.) Bernh.ex Desv.

（18）*Cystopteris fragilis* (L.) Bernh.

（19）*Cystopteris dickieana* R.Sim.

X. Aspleniaceae

12. *Cetrach* DC.

（20）*Cetrac officinarum* DC.

13. *Asplenium* L.

（21）*Asplenium trichomanes* L.

（22）*Asplenium septentrionale* (L.) Hoffm.

（23）*Asplenium viride* Hudson

（24）*Asplenium pseudofontanum* C.Koss.

（25）*Asplenium rutamuraria* L.

（26）*Asplenium nesii* Christ.

（27）*Asplenium tianshanicum* Ching

（28）*Asplenium chingianum* C.Y.Yang

（29）*Asplenium xinjiangense* Cheing

（30）*Asplenium minutum* C.Y.Yang

XI. Thelypteridaceae

14. *Thelypteris* Schmidel.

（31）*Thelypteris palustris* Schott

XII. Woodsiaceae

15. *Woodsia* R.Br.

（32）*Woodsia glabella* R.Br

XIII. Dryopteridaceae

16. *Polystichum* Roth.

（33）*Polystichum parasinense* C.Y.Yang

（34）*Polystichum braunii* (Spenn.) Fee

（35）*Polystichum lonchitis* (L.) Roth.

（36）*Polystichum xinjiangense ex* C.Y.Yang

（37）*Polystichum alatawshanicum* C.Y.Yang

17. *Dryopteris* Adans.

（38）*Dryopteris filix-mas* (L.) Schott

（39）*Dryopteris carthusiana* (Vill.) H.P.Fuchs

XIV. Polypodiaceae

18. *Lepisorus* (J.Smith) Ching

（40）*Lepisorus albertii* (Rgl.) Ching

19. *Polypodium* L.

（41）*Polypodium vulgare* L.

2.1.2 GYMNOSPERMAE

I. Pinaceae

1. *Picea* Dietr.

（1）*Picea schrenkiana* Fisch.et Mey.

2. *Larix* Mill.

（2）*Larix sibirica* Ledeb.

II. Cupressaceae

3. *Juniperus* L.

（3）*Juniperus sibirica* Burgsd.

（4）*Juniperus sabina* L.

（5）*Juniperus pseudosabina* Fisch.et Mey.

III. Ephedraceae

4. *Ephedra* L.

（6）*Ephedra przewalskii* Stapf

（7）*Ephedra lomatolepis* Schrenk

（8）*Ephedra przewalskii var.Kaschgarica* (B.Fedtsch.et Bobr.) C.Y.Cheng

（9）*Ephedra intermedia* Schrenk.

（10）*Ephedra glauca* Regel

（11）*Ephedra distachya* L

（12）*Ephedra regeliana* Florin

（13）*Ephedra equisetina* Bge.

（14）*Ephedra monosperma* J.G.Gmel.C.A.Mey.

（15）*Ephedra fedtschenkoae* Pauls.

2.1.3 ANGIOSPERMAE

Dicotyledoneae

Choripetalae

I. Salicaceae

1. *Populus* L.

（1）*Populus euphratica* Oliv.

（2）*Populus tremula* L.

（3）*Populus iliensis* Drob.

（4）*Populus laurifolia* Ldb.

（5）*Populus pruinosa* Schrenk

（6）*Populus talassica* Kom.

（7）*Populus talassica var.*Tomurtensis C.Y.Yang

（8）*Populus talassica var.cordata* C.Y.Yang

（9）*Populus pilosa* Rehd.

2. *Salix* L.

（10）*Salix songarica* Anderss.

（11）*Salix alatavica Kar.et* Kir.ex Stchegl.

（12）*Salix tianschanica* Rgl.

（13）*Salix pyrolifolia* Ledeb.

（14）*Salix karelinii* Turcz.

（15）*Salix cinerea* L.

（16）*Salix iliensis* Rgl.

（17）*Salix caesia* Vill.

（18）*Salix wilhelmsiana* M.B.

（19）*Salix michelsonii* Goerz ex Nas.

（20）*Salix capusii* Franch.

（21）*Salix albertii* Rgl.

（22）*Salix linearifolia* E.Wolf.

（23）*Salix serrulatifolia* E.Wolf

（24）*Salix serrulatifolia var.subintegrifoila* C.Y.Yang

（25）*Salix rosmarinifolia* L.

（26）*Salix turanica* Nas.

（27）*Salix argyracea* E.Wolf

（28）*Salix alba* L.

II. Jaglandaceae

3. *Juglans* L.

（29）*Juglans regia* L.

III. Betulaceae

4. *Betula* L.

（30）*Betula pendula* Roth.

（31）*Betula tianschanica* Rupr.

IV. Ulmaceae

5. *Ulmus* L.

（32）*Ulmus* pumila L.

V. Cannabinaceae

6. *Cannabis* L.

（33）*Cannabis sativa* L.

7. *Humulus* L.

（34）*Humulus luplus* L.

VI. Urticaceae

8. *Urtica* L.

（35）*Urtica urens* L.

（36）*Urtica cannabina* L.

（37）*Urtica dioica* L.

VII. Santalaceae

9. *Thesium* L.

（38）*Thesium alatavicum* Kar.et Kir.

（39）*Thesium refractum* C.A.Mey.

（40）*Thesium refractum var.hirtulum.*Kryl.

VIII. Polygonaceae

10. *Oxyria* Hill

（41）*Oxyria dihyna* (L.) Hill

11. *Rheum* L.

（42）*Rheum wittrockii* Lundstr.

（43）*Rheum nanum* Siev.ex pall.

（44）*Rheum rhizostachyum* Schrenk

（45）*Rheum reticulatum* A.Los.

12. *Koenigia* L.

（46）*Koenigia islandica* L.

13. *Rumex* L.

（47）*Rumex acetosa* L.

（48）*Rumex halacsyi* Rech.

（49）*Rumex marschallianus* Rchb.

（50）*Rumex ucranicus* Fisch.ex Spreng.

（51）*Rumex maritimus* L.

（52）*Rumex stenophyllus* Ledeb.

（53）*Rumex pseudonatronatus* Borb.

（54）*Rumex pamiricus* Rech.

（55）*Rumex aquaticus* L.

（56）*Rumex aquaticus subsp.schischkinii* (A.Los)Rech.

（57）*Rumex tianschanicus* A.Los.

（58）*Rumex crispus* L.

（59）*Rumex rechingerianus* A.Los.

14. *Atraphaxis* L.

（60）*Atraphaxis compacta* Ledeb.

（61）*Atraphaxis spinosa* L.

（62）*Atraphaxis replicata* Lam.

（63）*Atraphaxis laetevirens* (Ledeb.) Jaub.et Spach

（64）*Atraphaxis pungens* (M.B.)Jaub.et Spach

（65）*Atraphaxis pyrifolia* Bge.

（66）*Atraphaxis decipiens* Jaub.et Spach

（67）*Atraphaxis frutescens* (L.) Ewersm.

（68）*Atraphaxis virgata* (Rgl.)Krassn.

15. *Calligonum* L.

（69）*Calligonum junceum* (Fisch.et Mey.)Litv.

（70）*Calligonum leucocladum* (Schrenk) Bge.

（71）*Calligonum aphyllum* (Pall.)Gurke.

（72）*Calligonum densum* Borszcz.

（73）*Calligonum klementzii* A.Los.

（74）*Calligonum mongolicum* Turcz.

（75）*Calligonum pumilum* A.Los.

（76）*Calligonum trifarium* Z.M.Mao

（77）*Calligonum ebi-nuricum Ivanova ex* Y.D.Soskov

（78）*Calligonum roborovskii* A.Los.

（79）*Calligonum kuerlese* Z.M.Mao

16. *Polygonum* L.

（80）*Polygonum cognatum* Meissn.

（81）*Polygonum convolvulus* L.

（82）*Polygonum dumetorum* L.

（83）*Polygonum thymifolium* Jaub.et Spach

（84）*Polygonum plebium* R.Br.

（85）*Polygonum aviculare* L.

（86）*Polygonum acetosum* M.B.Fl.

（87）*Polygonum polycnemoides* Jaub.et Spach

（88）*Polygonum acerosum* Ledeb.ex Meisn.

（89）*Polygonum patulum* M.B.

（90）*Polygonum junceum* Ledeb.

（91）*Polygonum bistorta* L.

（92）*Polygonum nitens* (Fisch.et Mey.) V.Petr.ex Kom.

（93）*Polygonum lapathifolium* L.

（94）*Polygonum viviparum* L.

（95）*Polygonum amphibium* L.

（96）*Polygonum persicaria* L.

（97）*Polygonum hydropiper* L.

（98）*Polygonum alpinum* All.

（99）*Polygonum coriarium* Grig.

（100）*Polygonum songoricum* Schrenk

（101）*Polygonum sibiricum* Laxm.

IX. Chenopodiaceae

17. *Polycenmum* L.

（102）*Polycenmum arvense* L.

18. *Salicornia* L.

（103）*Slicornia europaea* L.

19. *Kalidium* Moq.

（104）*Kalidium foliatum* (Pall.)Moq.

（105）*Kalidium cuspidatum* (Ung.-Sternb.) Grub.

（106）*Kalidium schrenkianum* Bge.ex Ung.-Sternb.

（107）*Kalidium caspicum* (L.)Ung.-Sternb.

（108）*Kalidium gracile* Fenzl

20. *Halocnemum* Bieb.

（109）*Halocnemum strobilaceum* (Pall.)Bieb.

21. *Halostachys* C.A.Mey.

（110）*Halostachys caspica* (M.B.)C.A.Mey.

22. *Axyris* L.

（111）*Axyris amaranthoides* L.

（112）*Axyris hybrida* L.

（113）*Axyris prostrata* L.

23. *Ceratoides* (Tourn.) Gagnebin.

（114）*Ceratoides latens* (J.F.Gmel.) Reveal et Holmgren

（115）*Ceratoides ewersmanniana* (Stschegl.ex losinsk.)Botsch.et Ikonn.

24. *Atriplex* L.

（116）*Atriplex aucheri* Moq.

（117）*Atriplex micrantha* C.A.Mey.

（118）*Atriplex hastata* L.

（119）*Atriplex oblongifolia* Waldst.et Kit.

（120）*Atriplex verrucifera* Bieb.

（121）*Atriplex cana* C.A.Mey.

（122）*Atriplex patens* (Litv.) Iljin

（123）*Atriplex laevis* C.A.Mey.

（124）*Atriplex sibirca* L.

（125）*Atriplex fera* (L.)Bge.

（126）*Atriplex centralasiatica* Iljin

（127）*Atriplex dimorphostegia* Kar.et.Kir.

（128）*Atriplex dimorphostgia* Kar.et Kir.

（129）*Atriplex dimorphostgia var.sagittiformis* Aellen

（130）*Atriplex tatarica* L.

25. *Agriophyllum* Bieb.

（131）*Agriophyllum minus* Fisch.et Mey.

（132）*Agriophyllum squarrosum* (L.) Moq.

26. *Corispermum* L.

（133）*Corispermum lehmannianum* Bge.

（134）*Corispermum heptapotamicum* Iljin

（135）*Corispermum mongolicum* Iljin

（136）*Corispermum dutreuillii* Iljin

27. *Chenopodium* L.

（137）*Chenopodium aristatum* L.

（138）*Chenopodium botrys* L.

（139）*Chenopodium foliosum* (Moench) Aschers.

（140）*Chenopodium glaucum* L.

（141）*Chenopodium chenopodioides* (L.) Aellen

（142）*Chenopodium prostratum* Bge.

（143）*Chenopodium iljinii* Golosk.

（144）*Chenopodium urbicum* L.

（145）*Chenopodium hybridum* L.

（146）*Chenopodium serotinum* L.

（147）*Chenopodium strictum* Roth

（148）*Chenopodium album* L.

28. *Kochia* Roth

（149）*Kochia prostrata* (L.) Schrad.

（150）*Kochia prostrata var.canescens* Mop.

（151）*Kochia prostrata var.villosissima* Bong.et.Mey.

（152）*Kochia odontoptera S*chrenk.

（153）*Kochia iranica* Litv.

（154）*Kochia scoparia* (L.) Schrad.

（155）*Kochia scoparia var.sieversiana* (Pall.) Ulbr.ex Aschers.et Graebn

29. *Bassia* All.

（156）*Bassia dasyphylla* (Fisch.et Mey.) O.Kuntze

（157）*Bassia sedoides* (Pall.)Aschers.

（158）*Bassia hyssopifolia* (Pall.) O.Kuntze

30. *Panderia Fisch.et Mey.*

（159）*Panreria turkestanica Iljin.*

31. *Camphorosma* L.

（160）*Camphorosma monspeliaca L.*

（161）*Camphorosma monspeliaca subsp.lessingii (Litv.) Aellen*

32. *Londesia* Fish.et Mey.

（162）*Londesia eriantha* Fisch.et Mey

33. *Kirilowia* Bge.

（163）*Kirilowia eriantha* Beg.

34. *Borszczowia* Bge.

（164）*Borszczowia aralocaspica* Beg.

35. *Ceratocarpus* L.

（165）*Ceratocarpus arenarius* L.

36. *Suaeda* Forsk.ex Scop.

（166）*Suaeda microphylla* (C.A.Mey.)Pall.

（167）*Suaeda dendroides* (C.A.Mey.) Moq.

（168）*Suaeda glauca* (Bge.)Bge.

（169）*Suaeda altissima* (L.)Pall.

（170）*Suaeda paradoxa* Bge.

（171）*Suaeda linifolia* Pall.

（172）*Suaeda physophora* Pall.

（173）*Suaeda acuminata* (C.A.Mey.) Moq.

（174）*Suaeda pterantha* (Kar.et Kir.) Bge.

（175）*Suaeda corniculata* (C.A.Mey)Bge

（176）*Suaeda heterophylla* (Kar.et Kir.) Bge.

（177）*Suaeda stellatifolia* G.L.Chu

（178）*Suaeda prostrata* Pall.

（179）*Suaeda crassifolia* Pall.

37. *Horaninowia* Fish.et Mey.

（180）*Horaninowia ulicina* Fisch.

38.*Haloxylon* Bge.

（181）*Haloxyon persicum* Bge.

（182）*Haloxylon ammodendron* (C.A.Mey.)Bge.

39. *Arthrophytum* Schrenk

（183）*Arthrophytum longibracteatum* Korov.

（184）*Arthrophytum iliense* Iljin

40. *Anabasis* L.

（185）*Anabasis elatior* (C.A.Mey.) Schischk.

（186）*Anabasis brevifolia* C.A.Mey.

（187）*Anabasis aphylla* L.

（188）*Anabasis salsa* (C.A.Mey.)Benth.ex Volkens

（189）*Anabasis cretacea* Pall.

（190）*Anabasis truncata* (Schrenk) Bge.

（191）*Anabasis eriopoda* (Schrenk) Benth.ex Volkens

41. *Girgensohnia* Bge.

（192）*Girgensohnia oppositiflora* (Pall.)Fenzl

42. *Sympegma* Bge.

（193）*Sympegma regelii* Bge.

43. *Halogeton* C.A.Mey.

（194）*Halogeton glomertus* (Bieb.)C.A.Mey.

（195）*Halogeton glomertus var.tibeticus* (Bge) Grubov

（196）*Halogeton arachnoideus* Moq.

44. *Iljinia* Korov.

（197）*Iljinia regelii* (Bge.) Korov.

45. *Aellenia* Ulbr.

（198）*Aellenia glauca* (Bieb.)Aellen

46. *Salsola* L.

（199）*Salsola orientalis* S.G.Gmel

（200）*Salsola dschungarica* Iljin

（201）*Salsola arbuscula* Pall.

（202）*Salsola abrotanoides* Bge.

（203）*Salsola junatovii* Botsch.

（204）*Salsola laricifolia* Turcz.et Litv.

（205）*Salsola arbusculiformis* Drob.

（206）*Salsola micranthera* Botsch.

（207）*Salsola nitraria* Pall.

（208）*Salsola implicata* Botsch.

（209）*Salsola foliosa* (L.) Schrad.

（210）*Salsola subcrassa* M.Pop.

（211）*Salsola heptapotamica* Iljin

（212）*Salsola lanata* Pall.

（213）*Salsola korshinskyi Drob.*

（214）*Salsola ferganica Drob.*

（215）*Salsola sukaczevii (Botsch.) A.J.Li*

（216）*Salsola brachiata Pall.*

（217）*Salsola affinis C.A.Mey.*

（218）*Salsola aperta Pauls.*

（219）*Salsola collina Pall.*

（220）*Salsola zaidamica Iljin*

（221）*Salsola rosacea L.*

（222）*Salsola rosacea* L.

（223）*Salsola praecox* Litv.

（224）*Salsola paulsenii* Litv.

（225）*Salsola pellucida* Litv.

（226）*Salsola sinkiangensis* A.J.Li

（227）*Salsola ruthenica* Iljin

47. *Nanophyton* Less.

（228）*Nanophyton erinaceum* (Pall.) Bge.

48. *Halimocnemis* C.A.Mey.

（229）*Halimocnemis villosa* Kar.et Kir.

（230）*Halimocnemis longifolia* Bge.

49. *Petrosimonia* Bge.

（231）*Petrosimonia sibirica* (Pall.) Bge.

（232）*Petrosimonia glaucescens* (Bge.)Iljin

（233）*Petrosimonia squarrosa* (Schrenk.)Bge.

X. Amaranthaceae

50. *Celosial* L.

（234）*Celosial argentea* L.

51. *Amaranthus* L.

（235）*Amaranthus paniculatus* L.

（236）*Amaranthus retroflexus* L.

（237）*Amaranthus albus* L.

（238）*Amaranthus roxburghianus* Kung.

（239）*Amaranthus lividus* L.

XI. Portulacaceae

52. *Portulaca* L.

（240）*Portulaca oleracea* L.

XII. Caryophyllaceae

53. *Stellaria* L.

（241）*Stellaria media* (L.) Vill.

（242）*Stellaria dichotoma* L.

（243）*Stellaria dichotoma var.lanceolata* Bge.

（244）*Stellaria graminea* L.

（245）*Stellaria brachypetala* Bge.

（246）*Stellaria alatavica* M.Pop.

（247）*Stellaria discolor* Turcz.

（248）*Stellaria umbellata* Turcz.ex Kar.et Kir.

（249）*Stellaria uliginosa* Murr.

（250）*Stellaria longifolia* Muehl.ex Willd.

（251）*Stellaria soongorica* Roshev.

（252）*Stellaria crassifolia* Ehrh.

（253）*Stellaria kotschyana* Fenzl ex Boiss.

（254）*Stellaria bistyla* Y.Z.Zhao

54. *Pseudostellaria* Pax

（255）*Pseudostellaria davidii* (Franch.)Pax

55. *Myosoton* Moench

（256）*Myosoton aquaticum* (L.)Moench

56. *Cerastium* L.

（257）*Cerastium cerastoides* (L.) Britt.

（258）*Cerastium pauciflorum* Stev.ex Ser.

（259）*Cerastium bungeanum* Vved.

（260）*Cerastium arvense* L.

（261）*Cerastium lithospermifolium* Fisch.

（262）*Cerastium daxuricum* Fisch.ex Spreng.

（263）*Cerastium dichotomum* L.

（264）*Cerastium tianschanicum* Schischk.

（265）*Cerastium fischerianum* Ser.

（266）*Cerastium pusillum* Ser.

（267）*Cerastium arvense var.angustifolium* Fenzl

57. *Holosteum* L.

（268）*Holosteum umbellatum* L.

58. *Sagina* L.

（269）*Sagina saginoides* (L.) Deutsche

59. *Lepyrodiclis* Fenzl

（270）*Lepyrodiclis bolosteoides* (C.A.M.) Fisch.

（271）*Lepyrodiclis stellarioides* Schrenk

60. *Minuartia* L.

（272）*Minuartia regeliana* (Trautv.)Mattf.

（273）*Minuartia helmii* (Fisch.ex Ser.) Schischk.

（274）*Minuartia kryloviana* Schischk.

（275）*Minuartia litvinovii* Schischk.

（276）*Minuartia verna* (L.) Hiern.

（277）*Minuartia stricta* (Sw.)Hiern.

（278）*Minuartia schischkinii* Ady.

（279）*Minuartia stricta* (Sw.) Hiern.

61. *Arenaria* L.

（280）*Arenaria festucoides* Benth.

（281）*Arenaria meyeri* Fenzl

（282）*Arenaria leptoclados* (Reichb.) Guss.

（283）*Arenaria serpyllifolia* L.

62. *Moehringia* L.

（284）*Moehringia trinervia* (L.) Clairv.

（285）*Moehringia umbrosa* (Bge.) Fenzl

（286）*Moehringia lateriflora* (L.) Fenzl

63. *Thylacospermum* Fenzl

（287）*Thylacospermum caespitosum* (Camb.) Schischk.

64. *Agrostemma* L.

（288）*Agrostemma githago* L.

65. *Silene* L.

（289）*Silene venosa* (Gilib.) Aschers.

（290）*Silene wallichiana* Klotzsch et Garcke

（291）*Silene huochenensis* X.M.Pi X.L.Pan

（292）*Silene vulgaris var. commutata* (Guss.) Coode et Cullen

（293）*Silene adenopetala* H. Raik.

（294）*Silene lithophila* Kir.et Kir.

（295）*Silene graminifolia* Otth.

（296）*Silene jininsseensis* Wild.

（297）*Silene tachtensis* Franch.

（298）*Silene odoratissima* Bge.

（299）*Silene olgiana* B.Fedtsch.

（300）*Silene alexandrae* B.Kellr

（301）*Silene tianschanica* Schischk.

（302）*Silene heptapotamica* Schischk.

（303）*Silene repens* Patr.

（304）*Silene repens var.latifolia* Turcz.

（305）*Silene sibirica* (L.) Pers.

（306）*Silene gebleriana* Schrenk

（307）*Silene komarovii* Schischk.

（308）*Silene pseudotenuis* Schischk.

（309）*Silene nana* Kar.et Kir.

（310）*Silene wolgensis* (Willd.) Bess.ex Spreng.

（311）*Silene conoidea* L.

66. *Lychnis* L.

（312）*Lychnis chalcedonica* L.

67. *Melandrium* Roehl.

（313）*Melandrium viscosum* (L.)Cel.

（314）*Melandrium quadrilobum* (Turcz.ex Kar.et Kir.) Schischk.

（315）*Melandrium noctiflorum* (L.)Fries

（316）*Melandrium apricum* (Turcz.ex Fisch.et Mey.) Rohrb.

（317）*Melandrium triste* (Bge.) Fenzl

（318）*Melandrium apetalum* (L.) Fenzl

（319）*Melandrium tenellum* Tolm.

（320）*Melandrium brachypetalum* (Horn.) Fenzl

（321）*Melandrium album* (Mill.) Garcke

68. *Gypsophila* L.

（322）*Gypsophila altissima* L.

（323）*Gypsophila cephalotes* (Schrenk) William.

（324）*Gypsophila paniculata* L.

（325）*Gypsophila perfoliata* L.

（326）*Gypsophila elegans* M.B.

（327）*Gypsophila patrinii* Ser.

（328）*Gypsophila capituliflora* Rupr.

69. *Fiedleria* Reichb.

（329）*Fiedleria alpina* (Habl.) Ovcz.

70. *Acanthophyllum* C.A.Mey.

（330）*Acanthophyllum pungens* (Bge.) Bioss.

71. *Vaccaria* N.M.Wolf

（331）*Vaccaria hispanica* Mill.

72. Dianthus L.

（332）*Dianthus barbatus* L.

（333）*Dianthus chinensis* L.

（334）*Dianthus versicolor* Fisch.ex Link

（335）*Dianthus turkestanicus* Preobr.

（336）*Dianthus elatus* Ldb.

（337）*Dianthus acicularis* Fisch.ex Ldb.

（338）*Dianthus kuschakewiczii* Regel et Schmalh.

（339）*Dianthus soongoricus* Schischk.

（340）*Dianthus orientalis* Adams

（341）*Dianthus superbus* L.

（342）*Dianthus hoeltzeri* Winkl.

XIII. Paronychiaceae

73. *Spergularia* (Pers.) J.et C.Presl

（343）*Spergularia diandra* (Guss.) Heldr.et Sart.

（344）*Spergularia rubra* (L.)J.et C. Presl

（345）*Spergularia marina* (L.) Griseb.

74. *Gymnocarpos* Forsk.

（346）*Gymnocarpos przewalskii* Maxim.

75. *Herniaria* L.

（347）*Herniaria polygama* J.Gay.

XIV. Ranunculaceae

76. *Trollius* L.

（348）*Trollius lilacinus* Bge.

（349）*Trollius asiaticus* L.

（350）*Trollius dschungaricus* Regel

（351）*Trollius altaicus* C.A.Mey.

77. *Aconitum* L.

（352）*Aconitum apetalum* (Huth) B.Fedtsch.

（353）*Aconitum leucostomum* Worosch.

（354）*Aconitum monticola* Steinb.

（355）*Aconitum barbatum var.hispidum* DC.

（356）*Aconitum barbatum var.Puberulum* Ledeb.

（357）*Aconitum rotundifolium* Kar.et Kir.

（358）*Aconitum sinchiangense* W.T.Wang

（359）*Aconitum soongaricum* Stapf.

（360）*Aconitum soongaricum var.pubescens* Steinb

（361）*Aconitum karakolicum* Rapaics

（362）*Aconitum karakolicum var.patentipilum* W.T.Wang

（363）*Aconitum talassicum var.villosulum* W.T.Wang

（364）*Aconitum nemorum* M.Pop.

（365）*Aconitum anthoroideum* DC.

78. *Delphinium* L.

（366）*Delphinium biternatum* HuTH

（367）*Delphinium wentsaii* Y.Z.Zhao

（368）*Delphinium iliense* Huth

（369）*Delphinium mollifolium* W.T.Wang

（370）*Delphinium naviculare* W.T.Wang

（371）*Delphinium naviculare var.lasiocarpum* W.T.Wang

（372）*Delphinium elliptico-ovatum* W.T.Wang

（373）*Delphinium kaschgaricum* C. Y. Yang et B.Wang

（374）*Delphinium wuqiaense* W. T. Wang.

（375）*Delphinium winklerianum* Huth

（376）*Delphinium tianshanicum* W.T.Wang

79. *Consolida* (DC.)S.F.Gray

（377）*Consolida rugulosa* (Boiss.)Schrod.

80. *Isopyrum* L.

（378）*Isopyrum anemonoides* Kar.et Kir.

81. *Leptopyrum* Reochb.

（379）*Leptopyrum fumarioides* (L.)Reichb.

82. *Paraquilegia* Drumm.et Hutch.

（380）*Paraquilegia anemonoides* (Willd.) Ulbr.

（381）*Paraquilegia microphylla* (Royle) Drumm.et Hutch.

（382）*Paraquilegia caespitosa* (Bioss.et Hohen.) Drumm.J.et Hutch

83. *Aquilegia* L.

（383）*Aquilegia glandulosa* Fisch.ex Link.

（384）*Aquilegia karelini* (Baker) O.et B.Fedtsch.

（385）*Aquilegia lactiflora* Kar.et Kir.

（386）*Aquilegia atrovinosa* M.Pop.ex Gamajun

84. *Thalictrum* L

（387）*Thalictrum alpinum* L.

（388）*Thalictrum petaloideum* L.

（389）*Thalictrum foetidum* L.

（390）*Thalictrum isopyroides* C.A.Mey.

（391）*Thalictrum minus* L.

（392）*Thalictrum minus var.stipellatum* (C.A.Mey.) Tamura

（393）*Thalictrum simplex* L.

（394）*Thalictrum flavum* L.

85. *Anemone* L.

（395）*Anemone gortschakovii* Kar.et Kir.

（396）*Anemone silvestris* L.

（397）*Anemone obtusiloba ssp.ovalifolia* Bruhl

（398）*Anemone rivularis var. flore-minore* Maxin

（399）*Anemone narcissiflora var.paotracta* Ulbr.

（400）*Anemone narcissiflora var.crinata* (Juz.) Tamura

（401）*Anemone narcissiflora var.turkestanica* Schipz.

86. *Hepatica* Mill.

（402）*Hepatica falconeri* (Thoms.) Juz.

87. *Pulsatilla* Adans.

（403）*Pulsatilla kostyczewii* (Korsh.) Juz.

（404）*Pulsatilla ambigua* Turcz.et Pritz.

（405）*Pulsatilla ambigua var.barbata* J.G.Liu

（406）*Pulsatilla campanella* Fisch.ex Rgl.et Tilling

88. *Clematis* L.

（407）*Clematis sibirica* (L.) Mill.

（408）*Clematis sibirica var.iliensis* (Y.S.Hou et W.H.Hou) J.G.Liu

（409）*Clematis orientalis* L.

（410）*Clematis songarica* Bge.

（411）*Clematis glauca* Willd.

（412）*Clematis tangutica* (Maxim.) Korsh.

89. *Callianthemum* C.A.Mey.

（413）*Callianthemum alatavicum* Freyn

90. *Adonia* L.

（414）*Adonia chrysocyatha* Hook.f.et Thoms.

（415）*Adonia tianschanica* (Adolf.) Lipsch.

（416）*Adonia aestivalis* L.

（417）*Adonis parviflora* (M.Bieb.) Fisch.

91. *Ranunculus* L.

（418）*Ranunculus natans* C.A.Mey.

（419）*Ranunculus radicans* C.A.Mey.

（420）*Ranunculus nephelogenes var.longicaulis* (Trautv.) W.T.Wang

（421）*Ranunculus nephelogenes var.pseudohirculus* (Trautv.) J.G.Liu

（422）*Ranunculus pulchellus* C.A.Mey.

（423）*Ranunculus monophyllus* Ovcz.

（424）*Ranunculus brotherusii* Freyn

（425）*Ranunculus popovii* Ovcz.

（426）*Ranunculus pedatifidus* Sm.

（427）*Ranunculus rigescens* Turcz.ex Ovcz.

（428）*Ranunculus polyrhizus* Steph.

（429）*Ranunculus transiliensis* M.Pop.ex Ovcz.

（430）*Ranunculus alberti* Regel.et Schmalk.

（431）*Ranunculus hamiensis* J.G.Liu

（432）*Ranunculus balikunesis* J.G.Liu

（433）*Ranunculus songoricus* Schrenk

（434）*Ranunculus trautvetterianus* Regel.ex Ovcz.

（435）*Ranunculus rubrocalyx* Rege.et Kom.

（436）*Ranunculus gelidus* Kar.et Kir.

（437）*Ranunculus sceleratus* L.

（438）*Ranunculus chinensis* Bge.

（439）*Ranunculus repens* L.

（440）*Ranunculus grandifolius* C.A.Mey.

（441）*Ranunculus japonicus* Thunb.

（442）*Ranunculus polyanthemus* L.

（443）*Ranunculus meyerianus* Rupr.

（444）*Ranunculus acer* L.

（445）*Ranunculus platyspermus* Fisch.

（446）*Ranunculus regelianus* Ovcz.

92. *Oxygraphis* Bge.

（447）*Oxygraphis glacialis* (Fisch.) Bunge

93. *Halerpestes* Greene

（448）*Halerpestes ruthenica* (Jacq.) Ovcz.

（449）*Halerpestes tricuspis* (Maxim.) Hand.-Mazz

（450）*Halerpestes sarmentosa* (Adams) Kom.

94. *Batrachium* J.F.Gray

（451）*Batrachium kauffmannii* (Clerc)Ovcz.

（452）*Batrachium divaricatum* (Schrank)Schur

95. *Ceratocephalus* Moench

（453）*Ceratocephalus testiculatus* (Crantz) Bess.

XV. Paeoniaceae

96. *Paeonia* L.

（454）*Paeonia anomala* L.

（455）*Paeonia hybrida* Pall.

XVI. Circaeasteraceae

97. *Circaeaster* Maxim

（456）*Circaeaster agrestis* Maxim

XVII. Berberidaceae

98. *Berbris* L.

（457）*Berberis kaschgarica* Rupr.

（458）*Berbris heteropoda* Schrenk

（459）*Berbris nummularia* Bge.

99. *Leontice* L.

（460）*Leontice incerta* Pall.

XVIII. Papaveraceae

100. *Dicranostigma* Hook.f.et Thoms.

（461）*Dicranostigma iliensis* C.Y.Wu et H.Chuang

101. *Chelidonium* L.

（462）*Chelidonium majus* L.

102. *Roemeria* Medik.

（463）*Roemeria refracta* (Stev.) DC.

103. *Glaucium* Mill.

（464）*Glaucium squamigerum* Kar.et Kir.

（465）*Glaucium elegans* Fisch.et Mey.

104. *Papaver* L.

（466）*Papaver pavoninum* Schrenk

（467）*Papaver litvinovii* Fedde.ex Bornm.

（468）*Papaver nudicaule* L.

（469）*Papaver croceum* Ldb.

（470）*Papaver tianschanicum* M.Pop.

105. *Hypecoum* L.

（471）*Hypecoum erectum* L.

（472）*Hypecoum parviflorum* Kar.et Kir.

（473）*Hypecoum ferrugineum-maculae* Z.X.An

106. *Fumaria* L.

（474）*Fumaria schleicheri* Soy.-Will.

（475）*Fumaria vaillantii* Loisl.

107. *Corydalis* Vent.

（476）*Corydalis ledebouraiana* Kar.et Kir.

（477）*Corydalis sewerzovii* Rgl.

（478）*Corydalis schanginii* (Pall.)B.Fedtsch.

（479）*Corydalis inconspicua* Bge.

（480）*Corydalis capnoides* (L.)Pers.

（481）*Corydalis adiantifolia* Hook.f.et Thoms.

（482）*Corydalis glaucescens* Rgl.

（483）*Corydalis stricta* Steph

（484）*Corydalis semenovii* Rgl.

（485）*Corydalis gortschakovii* Schrenk

（486）*Corydalis kaschgarica* Rupr.

（487）*Corydalis fedtschenkoana* Rgl.

XIX. Capparidaceae

108. *Capparis* L.

（488）*Capparis spinosa* L.

XX. Cruciferae

109. *Brassica* L.

（489）*Brassica xinjiangensis* Y.C.Lan et T.Y.Cheo

110. *Sinapis* L.

（490）*Sinapis arvensis* L.

（491）*Sinapis arvensis var.brachycarpa* (Busch) O.E.Schulz

111. *Eruca* Mill.

（492）*Eruca sativa* Mill.

112. *Crambe* L.

（493）*Crambe kotschyana* Boiss.

113. *Conringia* Adans.

（494）*Conringia planisiliqua* Fisch.et Mey.

114. *Lepidium* L.

（495）*Lepidium cordatum* Willd.ex Stev.

（496）*Lepidium cartilagineum* (J.May.) Thell.

（497）*Lepidium ferganense* Korsh.

（498）*Lepidium latifolium* L.

（499）*Lepidium apetalum* Willd.

（500）*Lepidium latifolium* L.

（501）*Lepidium perfoliatum* L.

（502）*Lepidium obtusum* Basin.

（503）*Lepidium ruderale* L.

115. *Cardaria* Desv.

（504）*Cardaria draba* (L.) Desv.

（505）*Cardaria chalepensis* (L.) Hand.-Mazz.

（506）*Cardaria pubescens* (C.A.Mey.) Jarm

116. *Isatis* L.

（507）*Isatis violascens* Bge.

（508）*Isatis tinctoria var.prarcox* (Kit.)Koch.

（509）*Isatis indigotica* Fortune

（510）*Isatis oblongata* DC.

（511）*Isatis costata* C.A.Mey.

117. *Pachypterygium* Bge.

（512）*Pachypterygium multicaule* (Kar.et Kir.)Bge.

118. *Thlaspi* L.

（513）*Thlaspi arvense* L.

（514）*Thlaspi ferganense* N.Busch

119. *Capsella* Medic.

（515）*Capsella bursa-pastoria* (L.) Medic.

120. *Hedinia* Ostenf.

（516）*Hedinia tibetica* (Tboms.)Ostenf.

（517）*Hedinia taxkorganica var.hejingensis* G.L.Zhou.et Z.X.An

121. *Hymenolobus* Nuttall

（518）*Hymenolobus procumbens* (L.) Nutt.ex O.E.Schulz

122. *Dilophia* Tboms.

（519）*Dilophia fontana* Maxim.

123. *Litwinowia* Woron.

（520）*Litwinowia tenuissima* (Pall.) N.Busch

124. *Stroganowia* Kar.et Kir.

（521）*Stroganowia barchyota* Kar.et Kir.

125. *Lachnoloma* Bge.

（522）*Lachnoloma lehmannii* Bge.

126. *Spirorrhynchus* Kar.et Kir.

（523）*Spirorrhynchus sabulosus* Kar.et Kir.

127. *Tauscheria* Fisch.ex DC.

（524）*Tauscheria lasiocarpa* Fisch.ex DC.

（525）*Tauscheria lasiocarpa var.gymnocarpa* (Fisch.ex DC.)Boiss.

128. *Euclidium* R.Br.

（526）*Euclidium syriacum* L.

129. *Neslia* Desv.

（527）*Neslia paniculata* (L.) Desv.

130. *Alyssum* L.

（528）*Alyssum linifolium* Steph.ex Willd.

（529）*Alyssum desertorum* Stapf.

（530）*Alyssum dasycarpum* Steph.ex Willd.

（531）*Alyssum minus* (L.) Roth

131. *Berteroa* DC.

（532）*Berteroa incana* (L.) DC.

（533）*Berteroa potanini* Maxim.

（534）*Berteroa potanini var.latifolia* Z.X.An

132. *Draba* L.

（535）*Draba involucrata* (W.W.Smith) W.W.Smith

（536）*Draba oreades* Schrenk

（537）*Draba oreades var.tafellii* O.E.Schulz

（538）*Draba oreades var.commutata* (Rgl.) O.E.Schulz

（539）*Draba rockii* O.E.Schulz

（540）*Draba turczaninovii* Pohle et N.Busch

（541）*Draba tibetica var.duthiei* O.E.Schulz

（542）*Draba altaica* (C.A.Mey.) Bge.

（543）*Draba altaica var.racemosa* O.E.Schulz

（544）*Draba altaica var.microcaroa* O.E.

（545）*Draba altaica var.modesta* (W.W.Smith) O.E.Schulz

（546）*Draba glomerata* Royle

（547）*Draba glomerata var.dasycarpa* O.E.Schulz

（548）*Draba ladyginii* Pohle

（549）*Draba lanceolata* Royle

（550）*Draba lanceolata var.leiocarpa* O.E.Schulz

（551）*Draba lanceolata var.brachycarpa* O.E.Schulz

（552）*Draba stylaris J.Gay.ex* E.Thoms.

（553）*Draba stylaris var.leiocarpa* L.L.Lou et T.Y.Cheo

（554）*Draba huetii* Boiss

（555）*Draba borealis* DC.Syst.

（556）*Draba incana* L.

（557）*Draba mongolica* Turcz.

（558）*Draba parviflora* (Royle) O.E.Schulz

（559）*Draba hirta* L.

（560）*Draba subampexicaulis* C.A.Mey.

（561）*Draba eriopoda* Turcz.

（562）*Draba stenocarpa* Hook.f.et Thoms.

（563）*Draba stenocarpa var.leiocarpa* (Lipsky)O.E.Schulz

（564）*Draba nemorosa* L.

（565）*Draba nemorosa var.leiocarpa* Lindl.

（566）*Draba nemorosa f.latifolia* M.B.

（567）*Draba melanopus* Kom.

（568）*Draba melanopus f.hebecarpa* Pohle

133. *Cardamine* L.

（569）*Cardamine macrophylla var.crenata* Trautv.et Mey.

（570）*Cardamine impatiens* L.

（571）*Cardamine impatiens var.angustifolia* O.E.Schulz

134. *Barbarea* R.Br.

（572）*Barbarea orthoceras* Ldb.

（573）*Barbarea vulgaris* R.Br.

135. *Arabis* L.

（574）*Arabis fruticulosa* C.A.Mey.

（575）*Arabis auriculata* Lam.

（576）*Arabis pendula* L.

（577）*Arabis hirsuta* (L.) Scop.

（578）*Arabis borealis* Andrz.

136. *Arabidopsis* (DC.) Heynh.

（579）*Arabidopsis tuemurica* K.C.Kuan et Z.X.An

（580）*Arabidopsis pumila* (Steph.) N.Busch

（581）*Arabidopsis toxophylla* (M.B) N.Busch

137. *Christolea* Camb.

（582）*Christolea kaschgarica* (Botsch.) Z.X.An

138. *Turritis* L.

（583）*Turritis glabra* L.

139. *Rorippa* Scop.

（584）*Rorippa islandica* (Oed.) Borb.

（585）*Rorippa sylvestris* (L.) Bess.

140. *Dontostenmon* Andrz.ex Ldb.

（586）*Dontostenmon senilis* Maxim.

（587）*Dontostenmon elegans* Maxim.

141. *Dimorhpostemon* Kitag.

（588）*Dimorhpostemon glandulosus* (Kar.et Kir.)Golubk.

142. *Solms-Laubachia* Muschi.

（589）*Solms-Laubachia platycarpa* (Hook.f.et Thoms) Botsch.

143. *Tetracme* Bge.

（590）*Tetracme quadricornis* (Sreph.) Bge.

（591）*Tetracme recurvata* Bge.

（592）*Tetracme contorta* Boiss.

144. *Matthiola* R.Br.

（593）*Matthiola stoddarto* Bge.

（594）*Matthiola odoratissima* (Pall.)R.Br.

145. *Chorispora* R.Br.

（595）*Chorispora tenella* (Pall.) DC.

（596）*Chorispora sibirica* (L.) DC.

（597）*Chorispora soongarica* Schrenk

（598）*Chorispora bungeana* Fisch.et Mey.

（599）*Chorispora greigii* Rgl.

（600）*Chorispora macropoda* Trautv.

（601）*Chorispora tianshanica* Z.X.An

146. *Diptychocarpus* Trautv.

（602）*Diptychocarpus strictus* (Fisch.ex M.B.) Trautv.

147. *Parrya* R.Br.

（603）*Parrya exscapa* C.A.Mey.

（604）*Parrya pinnatifida* Kar.et Kir.

（605）*Parrya pinnatifida var.hirsuta* N.Busch

（606）*Parrya pinnatifida var.glabra* N.Busch

（607）*Parrya fruticulosa Rgl.et* Schmalh.

（608）*Parrya pulvinata* M.Pop.

（609）*Parrya subsiliquosa* M.Pop.

148. *Leptaleum* DC.

（610）*Leptaleum filifolium* (Willd.)DC.

149. *Malcolmia* R.Br.

（611）*Malcolmia africana* (L.) R.Br.

（612）*Malcolmia africana var.stenopetala* Claus

（613）*Malcolmia africana var.trichocarpa* (Boiss.et Buhse) Boiss.

（614）*Malcomia hispida* Litw.

（615）*Malcomia scorpioides* (Bge.) Boiss.

150. *Hesperis* L.

（616）*Hesperis pseudonivea* Tzvel.

（617）*Hesperis sibirica* L.

151. *Sterigmostemum* B.Mieb.

（618）*Sterigmostemum tomentosum* (Willd.) M.B.

（619）*Sterigmostemum grandiflorum* K.C.Kuan

（620）*Sterigmostemum sulfureum* (Banks et Soland.)Bornm.

152. *Goldbachia* DC.

（621）*Goldbachia laevigata* (M.B.) DC.

153. *Erysimum* L.

（622）*Erysimum hieracifolium* L.

（623）*Erysimum cheiranthoides* L.

（624）*Erysimum odoratum* Ehrh.

（625）*Erysimum diffusum* Ehrh.

（626）*Erysimum sisymbrioides* C.A.Mey.

（627）*Erysimum brevifolium* Z.X.An

（628）*Erysimum eseptatum* Z.X.An

（629）*Erysimum altaicum* C.A.Mey.

（630）*Erysimum humillimum* (Ldb.) N.Busch

（631）*Erysimum flavum* (Georgi) Bobrov

154. *Syrenia* Andrz. ex DC.

（632）*Syrenia siliculosa* (M.B.)Andrz.

155. *Taphrospermum* C.A.Mey.

（633）*Taphrospermum altaicum* C.A.Mey.

（634）*Taphrospermum altaicum var.macrocarpum* Z.X.An

156. *Eutrema* R.Br.

（635）*Eutrema edwardsii* R.Br.

（636）*Eutrema integrifolium* (DC.) Bge.

（637）*Eutrema pseudocardifolium* M.Pop.

（638）*Eutrema compactum* O.E.Schulz

157. *Sisymbrium* L.

（639）*Sisymbrium brassiciforme* C.A.Mey.

（640）*Sisymbrium irio* L.

（641）*Sisymbrium polymorphum* (Murray) Roth.

（642）*Sisymbrium polymorphum var.latifolium* (Korsh.) O.E.Schulz

（643）*Sisymbrium polymorphum var.soongaricum* (Rgl.et Herder) O.E.Schulz

（644）*Sisymbrium altissimum* L.

（645）*Sisymbrium heteromallum* C.A.Mey.

（646）*Sisymbrium loeselii* L.

（647）*Sisymbrium loeselii var.brevicarpum* Z.X.An

158. *Aphragmus* Andrz.ex DC.

（648）*Aphragmus oxycarpus var.microcarpus* Z.X.An

159. *Neotorularia*（Coss. Hedge et J.Leonard.

（649）*Neotorularia humilis* (C.A.Mey.) Hedge et J.Leonard

（650）*Neotorularia humilis f.grandiflora* (O.E.Schulz)Z.X.An

（651）*Neotorularia korolkovii* (Rgl.et Schmalh.)Hedge et J.Leonard

（652）*Neotorularia korolkovii var.longicarpa* (Z.X.An) Z.X.An

（653）*Neotorularia rosulfolia* (K.C.Kuan et Z.X.An) Z.X.An

160. *Braya* Sternb.et Hoppe

（654）*Braya tibetica Hook.f.et* Thoms.

（655）*Braya rosea* (Turcz.)Bge.

161. *Thellungiella* O.E.Schulz

（656）*Thellungiella salsuginea* (Pall.) O.E.Schulz

162. *Camelina* Crantz

（657）*Camelina microcarpa* Andrz.

（658）*Camelina microphylla* Z.X.An

163. *Descurainia* Webb.et Berth.

（659）*Descurainia sophia* (L.) Webb.

164. *Yinshania* Y.C.Ma et Y.Z.Zhao

（660）*Yinshania albiflora var.gobica* Z.X.An

165. *Smelowskia* C.A.Mey.

（661）*Smelowskia asplenifolia* Turcz.

（662）*Smelowskia alba* (Pall.) Rgl.

XXI. Crassulaceae

166. *Orostachys* (DC.) Fisch.

（663）*Orostachys spinosus* (L.) C.A.Mey.

（664）*Orostachys thyrsiflorus* Fisch.

167. *Hylotelephium* H.Ohba.

（665）*Hylotelephium ewersii* (Ldb.) H.Ohba.

168. *Pseudosedum* (Boiss) Berger.

（666）*Pseudosedum affine* (Schrenk) Berger.

（667）*Pseudosedum lievenii* (Ldb.) Berger.

169. *Rosularia* (DC.) Stapf.

（668）*Rosularia turkestanica* (Rgl.et Winkl.) Berger

（669）*Rosularia alpestris* (Kar.et Kir.) A.Bor.

（670）*Rosularia platyphylla* (Schrenk) Berger.

170. *Sedum* L.

（671）*Sedum hybridum* L.

171. *Rhodiola* L.

（672）*Rhodiola semenovii* (Regel et Hard.) A.Bor.

（673）*Rhodiola gelida* Schrenk

（674）*Rhodiola quadrifida* (Pall.) Fisch.et Mey.

（675）*Rhodiola rosea* L.

（676）*Rhodiola coccinea* (Royle) A.Bor.

（677）*Rhodiola kaschgarica* A.Bor.

（678）*Rhodiola pamiro-alaica* A.Bor.

（679）*Rhodiola litwinowii* A.Bor.

（680）*Rhodiola telephioides* (Maxim.)S.H.Fu

（681）*Rhodiola heterodonta* (Hook.f.et Thoms.) A.Bor.

（682）*Rhodiola kirilowii* (Regel) Maxim.

（683）*Rhodiola linearifolia* A.Bor.

XXII. Saxifragaceae

172. *Saxifraga* Tourn.ex L.

（684）*Saxifraga punctata* L.

（685）*Saxifraga sibirica* L.

（686）*Saxifraga cernua* L.

（687）*Saxifraga montana* H.Smith

（688）*Saxifraga hirculus* L.

（689）*Saxifraga stenophylla* Royle Illustr.

173. *Chrysosplenium* L.

（690）*Chrysosplenium nudicaule* Bge.

（691）*Chrysosplenium axillare* Maxim.

174. *Parnassia* L.

（692）*Parnassia oreophylla* Hance

（693）*Parnassia laxmannii* Pall.

（694）*Parnassia bifolia* Nekrassova

（695）*Parnassia palustris* L.

175. *Ribes* L.

（696）*Ribes heteotrichum* C.A.Mey.

（697）*Ribes pulchellum* Turcz.

（698）*Ribes saxatile* Pall.

（699）*Ribes graveolens* Bge.

（700）*Ribes nigrum* L.

（701）*Ribes meyeri* Maxim.

（702）*Ribes meyeri var.pubescens* L.T.Lu

176. *Grossularia* Mill.

（703）*Grossularia acicularis* (Smith.) Spach

XXIII. Rosaceae

177. *Spiraea* L.

（704）*Spiraea hypericifolia* L.

（705）*Spiraea chamaedryfolia* L.

（706）*Spiraea media* Schmidt

（707）*Spiraea alpina* Pall.

（708）*Spiraea tianschanica* Pojark.

178. *Cotoneaster* B.Ehrhart

（709）*Cotoneaster submultiflorus* M.Pop.

（710）*Cotoneaster songoricus* (Rgl.et Herd.) M.Pop.

（711）*Cotoneaster oliganthus* Pojark.

（712）*Cotoneaster melanocarpus* Lodd.

（713）*Cotoneaster suavis* Pojark.

（714）*Cotoneaster megalocarpus* M.Pop.

（715）*Cotoneaster roborowskii* Pojark.

（716）*Cotoneaster allochrous* Pojark.

179. *Crataegus* L.

（717）*Crataegus songorica* C.Koch.

（718）*Crataegus chlorocarpa* Lenne et C.Koch

（719）*Crataegus sanguinea* Pall.

180. *Sorbus* L.

（720）*Sorbus tianschanica* Rupr.

（721）*Sorbus tianschanica var.tomentosa* Yang et Han

181. *Pyrus* L.

（722）*Pyrus sinkiangensis* Yu

182. *Malus* Mill

（723）*Malus sieversii* (Ldb.) Roem.

183. *Filipendula* Mill.

（724）*Filipendula vulgaris* Moench

（725）*Filipendula ulmaria* (L.) Maxim.

184. *Rubus* L.

（726）*Rubus saxatilis* L.

（727）*Rubus sachalinensis* Levl.

（728）*Rubus idaeus* L.

（729）*Rubus caesius* L.

185. *Dryas* L.

（730）*Dryas oxyodonta* Juz.

186. *Geum* L.

（731）*Geum aleppicum* Jacq.

（732）*Geum rivale* L.

187. *Pentaphylloides* Ducham.

（733）*Pentaphylloides fruticosa* (L.)O.Schwarz

（734）*Pentaphylloides fruticosa var.albicans* Rehd.et Wils.

（735）*Pentaphylloides parvifolia* (Fisch.ex Lehm.) Sojak

（736）*Pentaphylloides phyllocalyx* (Juz.) Sojark

188. *Potentilla* L.

（737）*Potentilla bifurca* L.

（738）*Potentilla bifurca var.humilior* Rupr.et Osten-Sacken

（739）*Potentilla bifurca var.major* Ldb.

（740）*Potentilla biflora* Willd.ex Schlecht.

（741）*Potentilla anserina* L.

（742）*Potentilla anserina var.sericea* Hayne

（743）*Potentilla multifida* L.

（744）*Potentilla multifida var.ornithopoda* Wolf

（745）*Potentilla multifida var.nubigena* Wolf

（746）*Potentilla pamiroalaica* Juz.

（747）*Potentilla soongarica* Bge.

（748）*Potentilla sericea* L.

（749）*Potentilla conferta* Bge.

（750）*Potentilla nivea* L.

（751）*Potentilla strigosa* Pall.ex Pursh.

（752）*Potentilla hololeuca* Boiss.

（753）*Potentilla nervosa* Juz.

（754）*Potentilla evestita* Wolf.

（755）*Potentilla virgata* Lehm.

（756）*Potentilla angustiloba* Yu et Li

（757）*Potentilla inclinata* Vill.

（758）*Potentilla argentea* L.

（759）*Potentilla longifolia* Willd.

（760）*Potentilla supina* L.

（761）*Potentilla reptans* L.

（762）*Potentilla recta* L.

（763）*Potentilla chrysantha* Trev.

（764）*Potentilla asiatica* (Wolf) Juz.

（765）*Potentilla gelida* C.A.Mey.

（766）*Potentilla gelida var.sericea* Yu et Li

189. *Comarum* L.

（767）*Comarum salesovianum* (Steph.) Aschers.et Grachn.

190. *Sibbaldia* L.

（768）*Sibbaldia terandra* Bge.

（769）*Sibbaldia adpressa* Bge.

191. *Chamaerhodos* Bge.

（770）*Chamaerhodos erecta* (L.)Bge.

192. *Fragaria* L.

（771）*Fragaria vesca* L.

（772）*Fragaria viridis* (Duch.) Weston

193. *Hulthemia* Dumort

（773）*Hulthemia berberifolia* (Pall.) Dumort.

194. *Rosa* L.

（774）*Rosa beggeriana* Schrenk

（775）*Rosa platyacantha* Schrenk

（776）*Rosa acicularis* Lindl.

（777）*Rosa spinosissima* L.

（778）*Rosa silverhjelmii* Schrenk

（779）*Rosa albertii* Rgl.

（780）*Rosa acicularis* Lindl.

（781）*Rosa laxa* Retz.

（782）*Rosa fedtschenkoana* Rgl.

（783）*Rosa nanothamnus* Bouleng.

195. *Agrimonia* L.

（784）*Agrimonia pilosa* Ldb.

（785）*Agrimonia asiatica* Juz.

196. *Sanguisorba* L.

（786）*Sanguisorba officinalis* L.

（787）*Sanguisorba alpina* Bge.

197. *Alchemilla* L.

（788）*Alchemilla tianschanica* Juz.

（789）*Alchemilla sibirica* Zam.

（790）*Alchemilla krylovii* Juz.

198. *Armeniaca* Mill.

（791）*Armeniaca vulgaris* Lam.

199. *Prunus* L.

（792）*Prunus sogdiana* Vass.

200. *Cerasus* Mill.

（793）*Cerasus tianschanica* Pojark.

201. *Padus* Mill.

（794）*Padus avium* Mill.

XXIV. Leguminosae

202. *Sophora* L.

（795）*Sophora alopecuroides* L.

203. *Ammodendron* Fisch.

（796）*Ammodendron bifolium* (Pall.) Jakovl.

204. *Ammopiptanthus* Cheng f.

（797）*Ammopiptanthus nanus* (M.Pop.) Cheng f.

205. *Sphaerophysa* DC.

（798）*Sphaerophysa salsula* (Pall.) DC.

206. *Thermopsis* R.Br.

（799）*Thermopsis alpina* (Pall.) Ldb.

（800）*Thermopsis alpestris* Czefr.

（801）*Thermopsis lanceolata* R.Br.

207. *Lotus* L.

（802）*Lotus frondosus* (Freyn) Kuprian.

（803）*Lotus tenuis* Wald.et Kit.ex Willd.

208. *Ononis* L.

（804）*Ononis arvensis* L.

209. *Melilotus* Mill.

（805）*Melilotus suaveolens* Ldb.

（806）*Melilotus officinalis* (L.)Desr.

（807）*Melilotus albus* Desr.

（808）*Melilotus dentatus* (Waldst.et Kit.)Pers.

210. *Trigonella* L.

（809）*Trigonella arcuata* C.A.Mey.

（810）*Trigonella cancellata* Desf.ex Pers.

（811）*Trigonella orthoceras* Kar.et Kir.

（812）*Trigonella geminiflora* Bge.

（813）*Trigonella tenella* Fischl.

211. *Turukhania* Vass.

（814）*Turukhania karkarensis* (Semen.) Vass.

（815）*Turukhania platycarpos* (L.) Vass.

212. *Medicago* L.

（816）*Medicago lupulina* L.

（817）*Medicago falcata* L.

（818）*Medicago schishknii* Sumn.

（819）*Medicago tianschanica* Vass.

（820）*Medicago sativa* L.

（821）*Medicago rivularis* Vass.

213. *Trifolium* L.

（822）*Trifolium lupinaster* L.

（823）*Trifolium pratenes* L.

（824）*Trifolium repens* L.

（825）*Trifolium fragiferum* L.

214. *Eremosparton* Fisch.et Mey.

（826）*Eremosparton songoricum* (Litw.) Vass.

215. Caragana Fabr.

（827）*Caragana frutex* (L.) C.Koch.

（828）*Caragana camilli-schneideri* Kom.

（829）*Caragana laeta* Kom.

（830）*Caragana kirghisorum* Pojark.

（831）*Caragana pumila* Pojark.

（832）*Caragana aurantiaca* Koehne.

（833）*Caragana plelophylla* (Rgl.) Pojark.

（834）*Caragana jubata* (Pall.) Poir.

（835）*Caragana* 1*eucophyloea* Pojark.

（836）*Caragana soongorica* Grub.

（837）*Caragana acanthophylla* Kom.

（838）*Caragana turkestanica* Kom.

（839）*Caragana turfanensis* (Krassn.) Kom.

（840）*Caragana dasyphylla* Pojark.

（841）*Caragana pruinosa* Kom.

216. *Glycyrrhiza* L.

（842）*Glycyrrhiza aspera* Pall.

（843）*Glycyrrhiza uralensis* Fisch.

（844）*Glycyrrhiza inflata* Batalin

（845）*Glycyrrhiza glabra* L.

217. *Halimodendron* Fisch.

（846）*Halimodendron halodendron* (Pall.)Vass

218. *Oxytropis* DC.

（847）*Oxytropis aciphylla* Ledeb.

（848）*Oxytropis spinifer* Vass.

（849）*Oxytropis merkensis* Bge.

（850）*Oxytropis nutans* Bge.

（851）*Oxytropis penduliflora* Gontsch.

（852）*Oxytropis chantengriensis* Vass.

（853）*Oxytropis pagobia* Bge.

（854）*Oxytropis bogdoschanica* Jurtz.
（855）*Oxytropis humifusa* Kar.et Kir.
（856）*Oxytropis rupifraga* Bge.
（857）*Oxytropis avis* Saposhn.
（858）*Oxytropis glabra* (Lam.) DC.
（859）*Oxytropis ochroleuca* Bge.
（860）*Oxytropis deflexa* (Pall.) DC.
（861）*Oxytropis chorgossica* Vass.
（862）*Oxytropis cana* Bge.
（863）*Oxytropis gorbunovii* Boriss.
（864）*Oxytropis lapponica* (Wahl.) Gay
（865）*Oxytropis pauciflora* Bge.
（866）*Oxytropis przewalskii* Kom.
（867）*Oxytropis platysema* Schrenk
（868）*Oxytropis chionobia* Bge.
（869）*Oxytropis pseudofrigida* Saposhn.
（870）*Oxytropis assiensis* Vass.
（871）*Oxytropis dichroantha* Schrenk
（872）*Oxytropis pulvinoides* Vass.
（873）*Oxytropis podoloba* Kar.et Kir.
（874）*Oxytropis biloba* Saposhn.
（875）*Oxytropis meinshausenii* Schrenk
（876）*Oxytropis pilosa* (L.) DC.
（877）*Oxytropis frigida* Kar.et Kir.
（878）*Oxytropis kctmenica* Saposhn.
（879）*Oxytropis macrocarpa* Kar.et Kir.
（880）*Oxytropis semenovii* Bge.
（881）*Oxytropis trichocalycina* Bge.
（882）*Oxytropis melanotricha* Bge.
（883）*Oxytropis platonychia* Bge.
（884）*Oxytropis globiflora* Bge.
（885）*Oxytropis pulvinata* Saposhn.
（886）*Oxytropis microsphaera* Bge.
（887）*Oxytropis caespitosula* Gontsch.
（888）*Oxytropis tianschanica* Bge.
（889）*Oxytropis fruticulosa* Bge.
（890）*Oxytropis chionophylla* Schrenk

219. Astragalus L.

（891）*Astragalus vicarius* Lipsky.
（892）*Astragalus contortuplicatus* L.
（893）*Astragalus alopicias* Pall.
（894）*Astragalus dshimensis* Gontsch.
（895）*Astragalus hamiensis* S.B.Ho
（896）*Astragalus pseudoborodinii* S.B.Ho
（897）*Astragalus hegingensis* Liou f
（898）*Astragalus lithophilus* Kar.et Kir.
（899）*Astragalus aksuensis* Bge.
（900）*Astragalus lepsensis* Bge.
（901）*Astragalus ammophilus* Kar.et Kir.
（902）*Astragalus sesamoides* Boiss.
（903）*Astragalus ammodytes* Pall.
（904）*Astragalus arpilobus* Kar.et Kir.
（905）*Astragalus commixtus* Bge.
（906）*Astragalus filicaulis* Fisch.et C.A.Mey.
（907）*Astragalus flexus* Fisch.
（908）*Astragalus karkarensis* M.Pop.
（909）*Astragalus lasiophyllus* Ledeb
（910）*Astragalus monophyllus* Bge.
（911）*Astragalus oxyglottis* Stev.ex Bieb.
（912）*Astragalus tibetanus* Benth.ex Bge.
（913）*Astragalus densiflorus* Kar.et Kir.
（914）*Astragalus pseudobrachytropis* Gontsch.
（915）*Astragalus macropterus* DC.
（916）*Astragalus alpinus* L.
（917）*Astragalus kuschakevitschii* B.Fedtsch.ex O.Fedtsch.
（918）*Astragalus beketovii* (Krassn.) B.Fedtsch.
（919）*Astragalus laceratus* Lipsky.
（920）*Astragalus alatavicus* Kar.et Kir.
（921）*Astragalus buchtormensis* Pall.
（922）*Astragalus mendax* Freyn
（923）*Astragalus ceratoides* M.B.
（924）*Astragalus onobrychis* L.
（925）*Astragalus platyphyllus* Kar.et Kir.
（926）*Astragalus arbuscula* Pall.

（927）*Astragalus kessieri* Trautv.

（928）*Astragalus heptapotamicus* Sumn.

（929）*Astragalus alberti* Bge.

（930）*Astragalus borodinii* Krassn.

（931）*Astragalus leucocladus* Bge.

（932）*Astragalus intermedius* Kar.et Kir.

（933）*Astragalus nivalis* Kar.et Kir.

（934）*Astragalus dschangartensis* Sumn.

（935）*Astragalus suidunensis* Bge.

（936）*Astragalus ellipsoideus* Ledeb.

（937）*Astragalus dsharkenticus* M.Pop.

（938）*Astragalus macroceras* C.A.Mey.

（939）*Astragalus tribuloides* Delil.

（940）*Astragalus alopecurus* Pall.

（941）*Astragalus longipes* Kar.et Kie.

（942）*Astragalus ortholobiformis* Sumn.

（943）*Astragalus semenovii* Bge.

（944）*Astragalus tyttocarpus* Gontsch.

220. *Alhagi* Gagneb.

（945）*Alhagi sparsifolia* (B.Keller et Shap.) Shap.

221. *Hedysarum* L.

（946）*Hedysarum semenovii* Rgl.

（947）*Hedysarum kirghisorum* B.Fedtsch.

（948）*Hedysarum neglectum* Ldb.

（949）*Hedysarum gmelini* Ledeb

（950）*Hedysarum montanum* (B.Fedtsch.) B.Fedtsch.

（951）*Hedysarum subgiabrum* (Kar.et Kir.) B.Fedtsch.

（952）*Hedysarum ferganense* Korsh.

（953）*Hedysarum songoricum* Bong.

（954）*Hedysarum austro-sibiricum* B.Fedtsch.

（955）*Hedysarum iliense* B.Fedtsch.

222. *Onobrychis* Mill.

（956）*Onobrychis tanaitica* Spreng.

223. *Cicer* L.

（957）*Cicer songoricum Steph.ex* DC.

224. *Vicia* L.

（958）*Vicia tetrasperma* (L.) Moench.

（959）*Vicia angustifolia* L.

（960）*Vicia semenovii* (Rgl.et Herd.) B.Fedtsch.

（961）*Vicia tenuifolia* Roth.

（962）*Vicia cracca* L.

（963）*Vicia subvillosa* (Ldb.) Trautv.

（964）*Vicia castata* Ldb.

225. *Lathyrus* L.

（965）*Lathyrus pratensis* L.

（966）*Lathyrus tuberosus* L.

（967）*Lathyrus pisiformis* L.

226. *Orobus* L.

（968）*Orobus lutens* L.

XXV. Geraniaceae

227. *Biebersteinia* Steph.ex Fisch.

（969）*Biebersteinia heterostemon* Maxim.

（970）*Biebersteinia odora* Steph.

228. *Geranium* L.

（971）*Geranium divaricatum* Ehrh.

（972）*Geranium transversale* (Kar.et Kir.) Vved.

（973）*Geranium sibiricum* L.

（974）*Geranium pratense* L.

（975）*Geranium collinum* Steph.ex Willd.

（976）*Geranium rectum* Trautv.

（977）*Geranium pseudosibiricum* J.Mayer

（978）*Geranium albiflorum* Ldb.

（979）*Geranium saxatile* Kar.et Kir.

（980）*Geranium robertianum* L.

（981）*Geranium rotundifolium* L.

229. *Erodium* L,Her.

（982）*Erodium stephanianum* Willd.

（983）*Erodium tibetanum* Edgew.

（984）*Erodium oxyrrhynchum* M.B.Fl.

XXVI. Linaceae

230. *Linum* L.

（985）*Linum heterosepalum* Rgl.

（986）*Linum pallescens* Bge.

（987）*Linum altaicum* Ldb.

XXVII. Zygophyllaceae

231. *Peganum* L.

（988）*Peganum harmala* L.

232. *Nitraria* L.

（989）*Nitraria sphaerocarpa* Maxim.

（990）*Nitraria tangutorum* Bobr.

（991）*Nitraria roborowskii* Kom.

（992）*Nitraria sibirica* Pall.

233. *Tribulus* L.

（993）*Tribulus terrestris* L.

234. *Zygophyllum* L.

（994）*Zygophyllum macropterum* C.A.M.

（995）*Zygophyllum rosovii* Bge.

（996）*Zygophyllum macropodum* Boriss.

（997）*Zygophyllum fabago* L.

（998）*Zygophyllum xanthoxylum* (Bge.) Maxim.

（999）*Zygophyllum kaschgaricum* Boriss.

（1000）*Zygophyllum brachypterum* Kar.et Kir.

（1001）*Zygophyllum obliquum* M.Pop.

（1002）*Zygophyllum pterocarpum* Bge.

（1003）*Zygophyllum lehmannianum* Bge.

（1004）*Zygophyllum potaninii* Maxim.

（1005）*Zygophyllum cuspidatum* Boriss.

XXVIII. Rutaceae

235. *Dictamnus* L.

（1006）*Dictamnus angustifolius* G.Don ex Sweet.

236. *Haplophyllum* Juss.

（1007）*Haplophyllum perforatum* Kar.et Kir.

XXIX. Polygalaceae

237. *Polygala* L.

（1008）*Polygala hybrida* DC.

XXX. Euphorbiaceae

238. *Chrozophora* Neck.

（1009）*Chrozophora sabulosa* Kar.et Kir.

239. *Euphorbia* L.

（1010）*Euphorbia humifusa* Willd.

（1011）*Euphorbia helioscopia* L.

（1012）*Euphorbia esula* L.

（1013）*Euphorbia buchtormensis* C.A.Mey.ex Ldb.

（1014）*Euphorbia alatavica* Boiss.

（1015）*Euphorbia pachyrrhiza* Kar.et Kir.

（1016）*Euphorbia seguieriana* Neck.

（1017）*Euphorbia latifolia* C.A.Mey.ex Ldb.

（1018）*Euphorbia rapulum* Kar.et Kir.

（1019）*Euphorbia glomerulans* Prokh.

（1020）*Euphorbia monocyathium* Prokh.

（1021）*Euphorbia turkestanica* Rgl.

（1022）*Euphorbia inderiensis* Less.ex Kar.et Kir.

（1023）*Euphorbia jaxartica* Prokh.

（1024）*Euphorbia turczaninowii* Kar.et Kir.

（1025）*Euphorbia virgata* Waldst.et Kit.

（1026）*Euphorbia soongarica* Boiss.

XXXI. Celastraceae

240. *Euonymus* L.

（1027）*Euonymus semenovii* Rgl.

XXXII. Aceraceae

241. *Acer* L.

（1028）*Acer semenovii* Rgl.

XXXIII. Balsaminaceae

242. *Impatiens* L.

（1029）*Impatiens brachycentra* Kar.et Kir.

（1030）*Impatiens parviflora* DC.

XXXIV. Rhamnaceae

243. *Rhamnus* L.

（1031）*Rhamnus cathartica* L.

（1032）*Rhamnus songorica* Gontsch.

XXXV. Malvaceae

244. *Abutilon* Mill.

（1033）*Abutilon theophrasti* Medik.

245. *Malva* L.

（1034）*Malva rotundifolia* L.

（1035）*Malva neglecta* Wallr.

（1036）*Malva verticillata* L.

246. *Lavatera* L.

（1037）*Lavatera thuringiaca* L.

247. *Hibiscus* L.

（1038）*Hibiscus trionum* L.

248. *Althaea* L.

（1039）*Althaea officinalis* L.

（1040）*Althaea nudiflora* Lindl.

（1041）*Althaea rhyticarpa* Trautv.

XXXVI. Hypericaceae

249. *Hypericum* L.

（1042）*Hypericum hirsutum* L.

（1043）*Hypericum scabrum* L.

（1044）*Hypericum perforatum* L.

XXXVII. Elatinaceae

250. *Elatine* L.

（1045）*Elatine alsinastrum* L.

XXXVIII. Tamaricaceae

251. *Reaumuria* L.

（1046）*Reaumuria soongorica* (Pall.) Maxim.

（1047）*Reaumuria kaschgarica* Rupr.

252. *Tamarix* L.

（1048）*Tamarix arceuthoides* Bunge

（1049）*Tamarix elongata* Ldb.

（1050）*Tamarix hohenackeri* Bge.

（1051）*Tamarix laxa* Willd.

（1052）*Tamarix leptostachys* Bge.

（1053）*Tamarix ramosissima* Ldb.

253. *Myricaria* Desv.

（1054）*Myricaria squamosa* Desv.

（1055）*Myricaria alopecuroides* Schrenk

XXXIX. Cistaceae

254. *Helianthemum* Adans.

（1056）*Helianthemum soongoricum Schrenk*

XL、Violaceae

255. *Viola* L.

（1057）*Viola biflora L.*

（1058）*Viola tianschanica Maxim.*

（1059）*Viola altaica Ker-Gawl.*

（1060）*Viola hirta L.*

（1061）*Viola collina Bess.*

（1062）*Viola arenaria DC.*

（1063）*Viola dissecta Ldb.*

（1064）*Viola selkirki* Pursh.ex Golde.

（1065）*Viola elatior* L.

（1066）*Viola acutifolia* (Kar.et Kir.) W.Bckr.

（1067）*Viola tarbagatica* Klok.

XLI. Thymelaeaceae

256. *Diathron* Turcz.

（1068）*Diathron vesiculosum* (Fisch.et Mey.)C.A.Mey.

257. *Thymelaea* Mill.

（1069）*Thymelaea passerina* (L.) Coss.et Germ.

258. *Stelleropsis* Pobed.

（1070）*Stelleropsis altaica* (Thieb.) Pobed.

（1071）*Stelleropsis tianschanica* Pobed.

XLII. Elaeagnaceae

259. *Elaeagnus* L.

（1072）*Elaeagnus oxycarpa* Schlecht.

260. *Hippophae* L.

（1073）*Hippophae rhamnoides* L.

XLIII. Lythraceae

261. *Lythrum* L.

（1074）*Lythrum salicaria* L.

XLIV. Onagraceae

262. *Chamaenerion* Seguier

（1075）*Chamaenerion angustifolium* (L.) Scop.

（1076）*Chamaenerion latifolium* (L.) Th.Fr.et Lange

263. *Epilobium* L.

（1077）*Epilobium tianschanicum* Pavl.

（1078）*Epilobium tetragonum* L.

（1079）*Epilobium royleanum* Hausskn.

（1080）*Epilobium roseum* Schreber.

（1081）*Epilobium hirsuum* L.

（1082）*Epilobium palustre* L.

（1083）*Epilobium parviflorum* Schreb.

XLV. Hippuridaceae

264. *Hippurida* L.

（1084）*Hippurida vulgaris* L.

XLVI. Cynomoriaceae

265. *Cynomorium* L.

（1085）*Cynomori songaricum* Rupr.

XLVII. Umbelliferae

266. *Eryngium* L.

（1086）*Eryngium planum* L.

267. Krasnovia M.Pop.

（1087）*Krasnovia longiloba* (Kar.et Kir.) M.Pop.

268. *Anthriscus* Pers.

（1088）*Anthriscus sylvestris* (L.) Hoffm.

（1089）*Anthriscus nemorosa* (M.B.) Spreng.

269. *Turgenia* Hoffm.

（1090）*Turgenia latifolia* (L.) Hoffm.

270. *Schrenkia* Fisch.et Mey.

（1091）*Schrenkia vaginata* (Ldb.) Fisch.et Mey.

271. *Cachrys* L.

（1092）*Cachrys macrocarpa* Ldb.

272. *Archangelica* N.M.Wolf.

（1093）*Archangelica brevicaulis* (Rupr.) Rchb.

273. *Angelica* L.

（1094）*Angelica multicaulis* M.Pimen.

（1095）*Angelica ternata Rgl.et* Schmalh.

（1096）*Angelica sylvestris* L.

274. *Bupleurum* L.

（1097）*Bupleurum tianschanicum* Freyn

（1098）*Bupleurum aureum* Fisch.

（1099）*Bupleurum krylovianum* Schischk.

（1100）*Bupleurum densiflorum* Rupr.

（1101）*Bupleurum exaltatum* M.B.

（1102）*Bupleurum scorzonerifolium* Willd.

275. *Seselopsis* Schischk.

（1103）*Seselopsis tianschanicum* Schischk.

276. *Soranthus* Ldb.

（1104）*Soranthus meyeri* Ldb.

277. *Pachypleurum* Ldb.

（1105）*Pachypleurum mucronatum* (Schrenk) Schischk.

（1106）*Pachypleurum alpinum* Ldb.

（1107）*Pachypleurum gayoides* (Rgl.et Schmalh.) Schischk.

278. *Conioselinum* Hoffm.

（1108）*Conioselinum tataricum* Hoffm.

279. *Carum* L.

（1109）*Carum carvi* L.

280. *Hymenolaena* DC.

（1110）*Hymenolaena nana* Rupr.

281. *Hymenolyma* Korov.

（1111）*Hymenolyma trichophyllum* (Schrenk) Korov.

（1112）*Hymenolaena bupleuroides* (Schrenk) Korov.

282. *Scaligeria* DC.

（1113）*Scaligeria setacea* (Schrenk) Korov.

283. *Schulzia* Spreng.

（1114）*Schulzia crinita* (Pall.) Spreng.

（1115）*Schulzia albiflora* (Kar.et Kir.) M.Pop.

284. *Aegopodium* L.

（1116）*Aegopodium alpestre* Ldb.

（1117）*Aegopodium podagraria* L.

285. *Cicuta* L.

（1118）*Cicuta virosa* L.

286. *Sium* L.

（1119）*Sium medium* Fisch.et Mey.

（1120）*Sium sisarum* L.

287. *Stenocoelium* Ldb.

（1121）*Stenocoelium popovii* V.Vinogr.et Fedoronczuk

（1122）*Stenocoelium athamantoides* (M.Bieb.)Ldb.

（1123）*Stenocoelium trichocarpum* Schrenk

288. *Libanotis* Hill.

（1124）*Libanotis schrenkiana* C.A.Mey.

（1125）*Libanotis buchtormensis* (Fisch.) DC.

（1126）*Libanotis iliensis* (Lipsky) Korov.

289. *Seseli* L.

（1127）*Seseli valentinae* M.Pop.

（1128）*Seseli sessiliflorum* Schrenk

（1129）*Seseli aemulans* M.Pop.

290. Eriocycla Lindl.

（1130）*Eriocycla peliotii (Boiss.) Wolff.*

291. *Aulacospermum* Ldb.

（1131）*Aulacospermum simplex* Rupr.

（1132）*Aulacospermum rupestre* M.Pop.

292. *Trachydium* Lindl.

（1133）*Trachydium tianschanicum* Korov.

293. *Conium* L.

（1134）*Conium maculatum* L.

294. *Talassia* Korov.

（1135）*Talassia transiliensis* (Herd.) Korov.

295. *Ferula* L.

（1136）*Ferula conocaula* Korov.

（1137）*Ferula karataviensis* (Regel et Schmalh.) Korov.

（1138）*Ferula lapidosa* Korov.

（1139）*Ferula lehmannii* Boiss.

（1140）*Ferula sinkiangensis* K.M.Shen

（1141）*Ferula pseudooreoselinum* (Rgl.et Schmalh.) K.-Pol.

（1142）*Ferula moschata* (Reinsch) K.-Pol.

（1143）*Ferula fukangensis* K.M.Shen

（1144）*Ferula syreitschikowii* K.-Pol.

296. *Heracleum* L.

（1145）*Heracleum dissectum* Ldb.

297. *Semenovia* Rgl.et Herd.

（1146）*Semenovia dasycarpa* (Regel et Schmalh.)Korov.

（1147）*Semenovia transiliensis* Rgl.et Herd.

（1148）*Semenovia rubtzovii* (Schischk.) Manden.

（1149）*Semenovia pimpinelloides* (Nevski) Manden.

298. *Platytaenia* Rgl.et Herd.

（1150）*Platytaenia dasycarpa* (Rgl.et Schmalh.) Korov.

（1151）*Platytaenia rubtzovii* Schischk.

299. *Daucus* L.

（1152）*Daucus carota* L.

XLVIII. Pyrolaceae

300. *Pyrola* L.

（1153）*Pyrola minor* L.

（1154）*Pyrola rotundifolia* L.

（1155）*Pyrola xinjiangensis* Y.L.Chou

301. *Moneses* Salisb.ex S.F.Gray.

（1156）*Moneses uniflora* (L.) A.Gray.

302. *Orthilia* Rafin.

（1157）*Orthilia secunda* (L.) House.

（1158）*Orthilia obtusata* (Turcz.) Hara.

303. *Monotropa* L.

（1159）*Monotropa hypopitys* (L.) Nied.

XLIX. Ericaceae

304. *Arctous* Nied.

（1160）*Arctous alpinus* (L.) Nied.

L、Primulaceae

305. *Lysimachia* L.

（1161）*Lysimachia vulgaris* L.

306. *Glaux* L.

（1162）*Glaux maritima* L.

307. *Cortusa* L.

（1163）*Cortusa brotheri* Pax.ex Lipsky

308. *Kaufmannia* Rgl.

（1164）*Kaufmannia semenovii* (Herd.) Rgl.

309. *Androsace* L.

（1165）*Androsace filiformis* Retz.

（1166）*Androsace septentrionalis* L.

（1167）*Androsace fedtschenkoi* Ovcz.

（1168）*Androsace maxima* L.

（1169）*Androsace ovczinnikovii* Schischk.et Bobr.

（1170）*Androsace sericea* Ovcz.

（1171）*Androsace olgae* Ovcz.

（1172）*Androsace dasyphylla* Bge.

310. *Primula* L.

（1173）*Primula algida* Adam.

（1174）*Primula longiscapa* Ldb.

（1175）*Primula nutans* Georgi.

（1176）*Primula knorringiana* Fed.

（1177）*Primula pamirica* Fed.

（1178）*Primula nivalis* Pall.

（1179）*Primula turkestanica* (Rgl.) E.A.White.

LI. Plumbaginaceae

311. *Plumbagella* Spach.

（1180）*Plumbagella micrantha* (Ldb.) Spach.

312. *Acantholimon* Boiss.

（1181）*Acantholimon alatavicum* Bge.

（1182）*Acantholimon alatavicum var.laevigatum* Peng.

（1183）*Acantholimon borodinii* Krassn.

（1184）*Acantholimon popovii* Czerniak.

（1185）*Acantholimon kokandense* Bge.

（1186）*Acantholimon hedinii* Ostenf.

（1187）*Acantholimon diapensioides* Boiss.

（1188）*Acantholimon tianschanicum* Czerniak.

313. *Ikonnikovia* Lincz.

（1189）*Ikonnikovia kaufmanniana* (Rgl.) Lincz.

314. *Goniolimon* Boiss.

（1190）*Goniolimon speciosum* (L.) Boiss.

（1191）*Goniolimon speciosum var.strictum* (Rgl.) Peng

（1192）*Goniolimon dschungaricum* (Rgl.) O.et B.Fedtsch.

（1193）*Goniolimon callicomum* (C.A.M.) Boiss.

（1194）*Goniolimon eximium* (Schrenk) Boiss.

315. *Limonium* Mill.

（1195）*Limonium suffruticosum* (L.)Kuntze.

（1196）*Limonium otolepis* (Schrenk)O.Kuntze

（1197）*Limonium coralloides* (Tausch.) Lincz.

（1198）*Limonium gmelinii* (Willd.) Kuntze.

（1199）*Limonium myrianthum* (Schrenk)Kuntze

（1200）*Limonium leptolobum* (Rgl.) Kuntze.

（1201）*Limonium kaschgaricum* (Rupr.) Ik.-Gal.

（1202）*Limonium roborowskii* Ik.-Gal.

（1203）*Limonium aureum* (L.)Hill ex O.Kuntz

（1204）*Limonium chrysocomum* (Kar.et Kir.) Kuntze.

（1205）*Limonium chrysocomum var.semenovii* (Herd.)Peng.

（1206）*Limonium chrysocomum var.chrysocephalum* (Rgl.) Peng.

（1207）*Limonium chrysocomum var.sedoides* (Rgl.) Peng.

LII. Oleaceae

316. *Fraxinus* L.

（1208）*Fraxinus sogdiana* Bge.

LIII. Gentianaceae

317. *Centaurium* (Gilib.) Hill.

（1209）*Centaurium pulchellum* (Sw.) Druce.

318. *Gentiana* (Tourn.) L.

（1210）*Gentiana decumbens* L.

（1211）*Gentiana tianschanica* Rupr.

（1212）*Gentiana olgae* Rgl.et Schmalh.

（1213）*Gentiana walujewii* Rgl.

（1214）*Gentiana kaufmanniana* Rgl.

（1215）*Gentiana macrophylla* Pall.

（1216）*Gentiana fetissowii* Rgl.et Winkl.

（1217）*Gentiana olivieri* Griseb.

（1218）*Gentiana uniflora* Georgi.

（1219）*Gentiana dschungarica* Rgl.

（1220）*Gentiana algida* Pall.

（1221）*Gentiana prostrata* Haenke

（1222）*Gentiana karelinii* Griseb.

（1223）*Gentiana squarrosa* Ldb.

（1224）*Gentiana leucomelaena* Maxim.

（1225）*Gentiana aquatica* L.

（1226）*Gentiana pseudo-aquatica* Kusnez.

（1227）*Gentiana riperia* Kar.et Kir.

319. *Gentianopsis* Ma

（1228）*Gentianopsis barbata* (Froel.) Ma

（1229）*Gentianopsis vvedenskyi* Grossh.

320. *Comastoma* (Wettst.) Toyokuni

（1230）*Comastoma falcatum* (Turcz.ex Kar.et Kir.) Toyokuni

（1231）*Comastoma tenellum* (Rottb.) Toyokuni

321. *Gentianella* Moench.

（1232）*Gentianella turkestanorum* (Gand.) Holub.

（1233）*Gentianella azurea* (Bge.) Holub.

（1234）*Gentianella acuta* (Michx.) Hulten

（1235）*Gentianella pygmaea* (Rgl.et Schmalh.) H.Smith.et Nilsson.

322. *Lomatogonium* A.Br.

（1236）*Lomatogonium carinthiacum* (Wulfen.) A.Br.

（1237）*Lomatogonium rotatum* (L.) Fries ex Nym.

323. *Swertia* L.

（1238）*Swertia marginata* Schrenk

（1239）*Swertia obtusa* Ldb.

（1240）*Swertia connata* Schrenk

（1241）*Swertia dichotoma* L.

（1242）*Swertia graciliflora* Gontsch.

324. *Halenia* Borkh.

（1243）*Halenia elliptica* D.Don.

LIV. Apocynaceae

325. *Apocynum* L.

（1244）*Apocynum venetum* L.

326. *Poacynum* Baill.

（1245）*Poacynum pictum* (Schrenk) Baill.

（1246）*Poacynum hendersonii* (Hook.f.)Woodson.

LV. Asclepiadaceae

327. *Cynanchum* L.

（1247）*Cynanchum kashgaricum* Liou f.

（1248）*Cynanchum sibiricum* Willd.

（1249）*Cynanchum cathayense* Tsiang et Zhang.

LVI. Convolvulaceae

328. *Calystegia* R.Br.

（1250）*Calystegia hederacea* Wall.

（1251）*Calystegia sepium* (L.) R.Br.

（1252）*Calystegia pellita* (Ldb.)G.Don.

329. *Convolvulus* L.

（1253）*Convolvulus gortschakovii* Schrenk

（1254）*Convolvulus fruticosus* Pall.

（1255）*Convolvulus tragacanthoides* Turcz.

（1256）*Convolvulus pseudocantabrica* Schrenk

（1257）*Convolvulus ammannii* Desr.

（1258）*Convolvulus lineatus* L.

（1259）*Convolvulus arvensis* L.

330. *Cuscuta* L.

（1260）*Cuscuta australis* R.Br.

（1261）*Cuscuta chinensis* Lam.

（1262）*Cuscuta lupuliformis* Krocker.

（1263）*Cuscuta monogyna* Vahl.

（1264）*Cuscuta europaea* L.

（1265）*Cuscuta cupulata* Engelm.

LVII. Polemoniaceae

331. *Polemonium* L.

（1266）*Polemonium coeruleum* L.

LVIII. Boraginaceae

332. *Heliotropium* L.

（1267）*Heliotropium arguzioides* Kar.et Kir.

（1268）*Heliotropium ellipticum* Ldb.

（1269）*Heliotropium micranthum* (Pall.)Bge.

（1270）*Heliotropium acutiflorum* Kar.et Kir.

（1271）*Heliotropium europaeum* L.

333. *Lithospermum* L.

（1272）*Lithospermum officinale* L.

334. *Arnebia* Forsk.

（1273）*Arnebia decumbens* (Vent.) Coss.et Kral.

（1274）*Arnebia tschimganica* (Fedtsch.) G.L.Chu

（1275）*Arnebia guttata* Bge.

（1276）*Arnebia obovata* Bge.

（1277）*Arnebia euchroma* (Royle) Johnst.

335. *Onosma* L.

（1278）*Onosma irritans* M.Pop.ex N.Pavl.

（1279）*Onosma echioides* L.

（1280）*Onosma apiculatum* Riedl.

336. *Echium* L.

（1281）*Echium vulgare* L.

337. *Anchusa* L.

（1282）*Anchusa ovata* Lehm.

338. *Nonea* Medic.

（1283）*Nonea caspica* (Willd.) G.Don.

339. *Gastrocotyle* Bge.

（1284）*Gastrocotyl ehispida* (Forsk.)Bge.

340. *Symphytum* L.

（1285）*Symphytum officinale* L.

341. *Myosotis* L.

（1286）*Myosotis sparsiflora* Mikan.

（1287）*Myosotis caespitosa* Schultz.

（1288）*Myosotis alpestris* F.W.Schmidt.

（1289）*Myosotis suaveolens* W.et K.

（1290）*Myosotis asiatica* Schischk.et Serg.

（1291）*Myosotis micrantha* Pall.ex Lehm.

342. *Trigonotis* Stev.

（1292）*Trigonotis peduncularis* (Trev.) Benth.ex Baker et Moore.

343. *Hackelia* Opiz.

（1293）*Hackelia deflexa* (Wahlenb.) Opiz.

344. *Mertensia* Roth.

（1294）*Mertensia tarbagataica* B.Fedtsch.

（1295）*Mertensia dshagastanica* Rge.

（1296）*Mertensia meyeriana* J.F.Macbr.

（1297）*Mertensia pallasii* (Ldb.) G.Don.

345. *Amblynotus* Johnst.

（1298）*Amblynotus rupestris* (Pall.ex Georgi) M.Pop.ex L.Serg.

346. *Eritrichium* Schrad.

（1299）*Eritrichium latifolium* Kar.et Kir.

（1300）*Eritrichium pseudolatifolium* M.Pop.

（1301）*Eritrichium confertiflorum* W.T.Wang

（1302）*Eritrichium pendulifructum* Lian et J.Q.Wang

（1303）*Eritrichium oligacanthum* Lian et J.Q.Wang

（1304）*Eritrichium fetissovii* Rgl.

（1305）*Eritrichium deltodentum* Lian et J.Q.Wang

（1306）*Eritrichium sinomicrocarpum* W.T.Wang

（1307）*Eritrichium villosum* (Ldb.) Bge.

347. *Microula* Benth.

（1308）*Microula tibetica var.pratensis* (Maxim.) W.T.Wang

348. *Lappula* V.Wolf.

（1309）*Lappula spinocarpa* (Forsk.) Aschers.ex Kuntze.

（1310）*Lappula lipschitzii* M.Pop.

（1311）*Lappula sinaica* (DC.)Aschers.ex Schweinf.

（1312）*Lappula occultata* M.Pop.

（1313）*Lappula ramulosa* C.J.Wang et X.D.Wang

（1314）*Lappula balchaschensis* M.Pop.ex N.Pavl.

（1315）*Lappula brachycentra* (Ldb.) Gurke.

（1316）*Lappula macra* M.Pop.ex N.Pavl.

（1317）*Lappula duplicicarpa* N.Pavl.

（1318）*Lappula semiglabra* (Ldb.) Guerke.

（1319）*Lappula semiglabra var.heterocaryoides* M.Pop.

（1320）*Lappula tenuis* (Ldb.) Guerke.

（1321）*Lappula stricta*(Ldb.) Guerke.

（1322）*Lappula patula* (Lehm.) Aschers.ex Guerke.

（1323）*Lappula redowskii* (Hornem.) Greene.

（1324）*Lappula microcarpa* (Ledeb.) Guerke

（1325）*Lappula tadshikorum* M.Pop.

（1326）*Lappula tianschanica* M.Pop.et Zak.

（1327）*Lappula sericata* M.Pop.

（1328）*Lappula myosotis* V.Wolf.

（1329）*Lappula squarrosa* (Retz.) Dum.spp.heterocantha (Ldb.)Chater.

（1330）*Lappula consanguinea* (Fisch.et Mey.) Gerke.

（1331）*Lappula consanguinea var.cupuliformis* C.J.Wang

（1332）*Lappula alatavica* (M.Pop.)Golosk.

（1333）*Lappula heteromorpha* C.J.Wang

（1334）*Lappula marginata* (M.B.)Gurke.

（1335）*Lappula ferganensis* M.Pop.

（1336）*Lappula monocarpa* C.J.Wang

349. *Heterocaryum* DC.

（1337）*Heterocaryum rigidum* DC.

350. *Craniospermum* Lehm.

（1338）*Craniospermum mongolicum* Johnst.

351. *Asperugo* L.

（1339）*Asperugo procumbens* L.

352. *Rochelia* Reichb.

（1340）*Rochelia bungei* Trautv.

（1341）*Rochelia leiocarpa* Ldb.

（1342）*Rochelia peduncularis* Boiss.

353. *Cynoglossum* L.

（1343）*Cynoglossum divaricatum steph.ex* Lehm.

（1344）*Cynoglossum officinale* L.

（1345）*Cynoglossum viridiflorum* Pall.ex Lehm.

354. *Lindelofia* Lehm.

（1346）*Lindelofia stylosa* (Kar.et Kir.) Brand.

355. *Solenanthus* Ldb.

（1347）*Solenanthus circinnatus* Ldb.

LIX. Verbenaceae

356. *Verbena* L.

（1348）*Verbena officinalis* L.

LX. Labiatae

357. *Teucrium* L.

（1349）*Teucrium scordium* L.

（1350）*Teucrium scrodioides* Schrenk

358. *Scutellaria* L.

（1351）*Scutellaria galericulata* L.

（1352）*Scutellaria przewalskii* Juz.

（1353）*Scutellaria sieversii* Bge.

（1354）*Scutellaria supina* L.

（1355）*Scutellaria prostrata* Jacq.

（1356）*Scutellaria oligodonta* Juz.

（1357）*Scutellaria orthotricha* C.Y.Wu et H.W.Li

（1358）*Scutellaria jodudiana* B.Fedtsch.

359. *Marrubium* L.

（1359）*Marrubium vulgare* L.

360. *Lagopsis* Bge.ex Benth.

（1360）*Lagopsis flava* Kar.et Kir.

（1361）*Lagopsis eriostachys* (Benth.) Ik.-Gal.ex Knorr.

（1362）*Lagopsis supine* (Steph.) Ik.-Gal.ex Knorr.

361. *Sideritis* L.

（1363）*Sideritis montana* L.

（1364）*Sideritis balanse* Boiss.

362. *Lophanthus* Adans.

（1365）*Lophanthus chinensis* Benth.

（1366）*Lophanthus krylovii* Lipsky.

（1367）*Lophanthus schrenkii* Levin.

363. *Schizonepeta* Briq.

（1368）*Schizonepeta multifida* (L.)Briq.

（1369）*Schizonepeta annua* (Pall.)Schischk.

364. *Nepeta* L.

（1370）*Nepeta longibracteata* Benth.

（1371）*Nepeta glutinosa* Benth.

（1372）*Nepeta kokanica* Rgl.

（1373）*Nepeta kokamirica* Rgl.

（1374）*Nepeta densiflora* Kar.et Kir.

（1375）*Nepeta supina* Stev.

（1376）*Nepeta transiliensis* Pojark.

（1377）*Nepeta cataria* L.

（1378）*Nepeta mariae* Rgl.

（1379）*Nepeta pulchella* Pojark.

（1380）*Nepeta micrantha* Bge.

（1381）*Nepeta pannonica* L.

（1382）*Nepeta virgata* C.Y.Wu et Hesuan

（1383）*Nepeta ucranica* L.

（1384）*Nepeta pungens* (Bge.) Benth.

（1385）*Nepeta fedtschenkoi* Pojark.

365. *Glechoma* L.

（1386）*Glechoma hederacea* L.

366. *Fedtschenkiella* Kudr.

（1387）*Fedtschenkiella staminea* (Kar.et Kir.) Kudr.

367. *Dracocephalum* L.

（1388）*Dracocephalum bipinnatum* Rupr.

（1389）*Dracocephalum heterophyllum* Benth.

（1390）*Dracocephalum peregrinum* L.

（1391）*Dracocephalum integrifolium* Bge.

（1392）*Dracocephalum integrifolium var.album* G.J.Lin

（1393）*Dracocephalum nutans* L.

（1394）*Dracocephalum nodulosum* Rupr.

（1395）*Dracocephalum imberbe* Bge.

（1396）*Dracocephalum grandiflorum* L.

（1397）*Dracocephalum origanoides* Steph.et Willd.

（1398）*Dracocephalum paulsenii* Briq.

（1499）*Dracocephalum ruyschiana* L.

368. *Lallemantia* Fisch.et Mey.

（1400）*Lallemantia royleana* Benth.

（1401）*Lallemantia peltata* Fisch.et Mey.

369. *Prunella* L.

（1402）*Prunella vulgaris* L.

370. Eremostachys Bge.

（1403）*Eremostachys zenaidae* M.Pop.

（1404）*Eremostachys speciosa* Rupr.

（1405）*Eremostachys phlomoides* Bge.

（1406）*Eremostachys moluccelloides* Bge.

（1407）*Eremostachys fulgens* Bge.

（1408）*Eremostachys karatavica* N.Pavl.

371. *Phlomis* L.

（1409）*Phlomis alpina* Pall.

（1410）*Phlomis pratensis* Kar.et Kir.

（1411）*Phlomis oreophila* Kar.et Kir.

（1412）*Phlomis chinghoensis* C.Y.Wu

（1413）*Phlomis tuberosa* L.

（1414）*Phlomis agraria* Bge.

372. *Galeopsis* L.

（1415）*Galeopsis bifida* Boenn.

373. *Lamium* L.

（1416）*Lamium album* L.

（1417）*Lamium amplexicaule* L.

374. *Alajja* S.Ikonn.

（1418）*Alajja anomala* (Juz.) S.Ikonn.

375. *Chaiturus* Ehrh.ex Willd.

（1419）*Chaiturus marrubiastrum* (L.) Spenn.

376. *Stachyopsis* M.Pop.et Vved.

（1420）*Stachyopsis lamiiflora* (Rupr.) M.Pop.et Vved.

（1421）*Stachyopsis marrubioides* (Rgl.) Ik.-Gal.

（1422）*Stachyopsis oblongata* (Schrenk) M.Pop.et Vved.

377. *Leonurus* L.

（1423）*Leonurus artemisia* (Lour.) S.Y.Hu

（1424）*Leonurus turkestanicus* V.Krecz.et Kupr.

378. *Panzeria* Moench.

（1425）*Panzeria parviflora* C.Y.Wu et H.W.Liu

379. *Lagochilus* Bge.

（1426）*Lagochilus pungens* Schrenk

（1427）*Lagochilus lanatonodus* C.Y.Wu et Hsuan

（1428）*Lagochilus grandiflorus* C.Y.Wu et Hsuan

（1429）*Lagochilus xinjiangensis* G.J.Liu

（1430）*Lagochilus macrodentus* Knorr.

（1431）*Lagochilus platyacanthus* Rupr.

（1432）*Lagochilus diacanthophyllus* (Pall.) Benth.

（1433）*Lagochilus kaschgricus* Rupr.

380. *Stachys* L.

（1434）*Stachys palustris* L.

（1435）*Stachys sylvatica* L.

381. *Metastachydium* Airy-Shaw.

（1436）*Metastachydium sagittatum* (Rgl.) C.Y.Wu et H.W.Li

382. *Chamaesphacos* Schrenk

（1437）*Chamaesphacos ilicifolius* Schrenk

383. *Salvia* L.

（1438）*Salvia deserta* Schang.

（1439）*Salvia deserta var.albiflora* G.J.Liu

384. *Ziziphora* L.

（1440）*Ziziphora clinopodioides* Lam.

（1441）*Ziziphora tenuior* L.

（1442）*Ziziphora pamiroalaica* Juz.ex Nevski.

385. *Calamintha* Mill.

（1443）*Calamintha debilis* (Bgr.) Benth.

386. *Origanum* L.

（1444）*Origanum vulgare* L.

（1445）*Origanum tyttanthum* Gontsch.

387. *Thymus* L.

（1446）*Thymus marschallianus* Willd.

（1447）*Thymus proximus* Serg.

（1448）*Thymus altaicus* Klok.et Schost.

（1449）*Thymus roseus* Schipcz.

（1450）*Thymus seravschanicus* Klok.

388. *Mentha* L.

（1451）*Mentha asiatica* Boriss.

（1452）*Mentha haplocalyx* Briq.

（1453）*Mentha haplocalyx var.pilosa* G.J.Liu

389. *Lycopus* L.

（1454）*Lycopus exaltatus* L.

（1455）*Lycopus europaeus* L.

390. *Elsholtzia* Willd.

（1456）*Elsholtzia densa* Benth.

（1457）*Elsholtzia ciliata* (Thunb.) Hyland.

LXI. Solanaceae

391. *Lycium* L.

（1458）*Lycium ruthenicum* Murr.

（1459）*Lyciu dasystemum* Pojark.

（1460）*Lyciu cylindricum* Kuang et A.M.Lu

（1461）*Lycium barbarum* L.

（1462）*Lycium chinense* Mill.

392. *Hyoscyamus* L.

（1463）*Hyoscyamus pusillus* L.

（1464）*Hyoscyamus niger* L.

393. *Physochlaina* G.Don.

（1465）*Physochlaina physaloides* (L.)G.Don.

（1466）*Physochlaina capitata* Kuang et A.M.Lu

394. *Physalis* L.

（1467）*Physalis alkekengi* L.var.francheti (Mast.)

395. *Solanum* L.

（1468）*Solanum nigrum* L.

（1469）*Solanum alatum* Moench.

（1470）*Solanum boreali-sinense* C.Y.Wu et S.C.Huang

（1471）*Solanum japonense* Nakai.

396. *Dayura* L.

（1472）*Dayura stramonium* L.

LXII. Scrophulariaceae

397. *Verbascum* L.

（1473）*Verbascum thapsus* L.

（1474）*Verbascum phoeniceum* L.

（1475）*Verbascum chaixii Vill.spp.orientale* Hayek.

（1476）*Verbascum songoricum* Schrenk ex Fisch.et Mey.

398. *Scrophularis* L.

（1477）*Scrophularis kiriloviana* Schischk.

（1478）*Scrophularis incisa* Weinm.

（1479）*Scrophularia heucheriiflora* Schrenk ex Fisch.et Mey.

399. *Dodartia* L.

（1480）*Dodartia orientalis* L.

400. *Linaria* Mill.

（1481）*Linaria bungei* Kuprian.

（1482）*Linaria kulabensis* B.Fedtsch.

（1483）*Linaria vulgaris* Mill.

401. *Lagotis* J.Gaertn.

（1484）*Lagotis integrifolia* (Willd.) Schischk.ex Vikulova.

（1485）*Lagotis decumbens* Rupr.

402. *Leptorhabdos* Schrenk

（1486）*Leptorhabdos parviflora* Benth.

403. *Rhinanthus* L.

（1487）*Rhinanthus glaber* Lam.

404. *Veronica* L.

（1488）*Veronica pinnata* L.

（1489）*Veronica alatavica* M.Pop.

（1490）*Veronica spicata* L.

（1491）*Veronica spuria* L.

（1492）*Veronica longifolia* L.

（1493）*Veronica densiflora* Ldb.

（1494）*Veronica serpyllifolia* L.

（1495）*Veronica verna* L.

（1496）*Veronica arvensis* L.

（1497）*Veronica didyma* Tenore.

（1498）*Veronica persica* Poir.

（1599）*Veronica tenuissima* Boiss.

（1500）*Veronica cardicarpa* (Kar.et Kir.) Walpers.

（1501）*Veronica biloba* L.

（1502）*Veronica campylopoda* Boiss.

（1503）*Veronica ciliata* Fisch.

（1504）*Veronica beccabunga* L.

（1505）*Veronica oxycarpa* Boiss.

（1506）*Veronica undulata* Wall.

405. *Euphrasia* L.

（1507）*Euphrasia pectinata* Ten.

（1508）*Euphrasia regelii* Wettst.

（1509）*Euphrasia hirtella* Jord.ex Reuter.

406. *Odontites* Ludwig.

（1510）*Odontites serotina* (Lam.) Dum.

407. *Pedicularis* L.

（1511）*Pedicularis oederi* Vahl.

（1512）*Pedicularis breviflora* Rgl.

（1513）*Pedicularis dasystachys* Schrenk

（1514）*Pedicularis physocalyx* Bge.

（1515）*Pedicularis achilleifolia* Steph.ex Wild.

（1516）*Pedicularis venusta* Schangan ex Bge.

（1517）*Pedicularis mariae* Rgl.

（1518）*Pedicularis altaica* Steph.ex Stev.

（1519）*Pedicularis dolichorrhiza* Schrenk

（1520）*Pedicularis elata* Willd.

（1521）*Pedicularis songarica* Schrenk

（1522）*Pedicularis rhinanthoides* Schrenk ex Fisch.et Mey.

（1523）*Pedicularis semenovii* Rgl.

（1524）*Pedicularis abrotanifolia* M.B.ex Stev.

（1525）*Pedicularis leptorhiza* Rupr.

（1526）*Pedicularis violascens* Schrenk

（1527）*Pedicularis verticillata* L.

（1528）*Pedicularis cheilanthifo1ia* Schrenk

（1529）*Pedicularis myriophylla* Pall.

（1530）*Pedicularis pseudocurvituba* Tsoong.

LXIII. Orobanchaceae

408. *Cistanche* Hoffmg.et Link.

（1531）*Cistanche tubulosa* (Schrenk)Wight.

（1532）*Cistanche deserticola* Ma

（1533）*Cistanche salsa* (C.A.M.)G.Beck.

409. *Orobanche* L.

（1534）*Orobanche caesia* Reichenb.

（1535）*Orobanche coelestis* Boiss. et Reut.

（1536）*Orobanche aegyptiaca* Pers.

（1537）*Orobanche cernua* L

（1538）*Orobanche amoena* C.A.M.

（1539）*Orobanche major* L.

（1540）*Orobanche caryophyllacea* Smith.

LXIV. Lentibulariaceae

410. *Utricularia* L.

（1541）*Utricularia vulgaris* L.

LXV. Plantaginaceae

411. *Plantago* L.

（1542）*Plantago asiatica* L.

（1543）*Plantago major* L.

（1544）*Plantago arachnoidea* Schrenk

（1545）*Plantago depressa* Willd.

（1546）*Plantago cornui* Gouan.

（1547）*Plantago maritima var.salsa* (Pall.) Pilger

（1548）*Plantago lanceolata* L.

（1549）*Plantago lessingii* Fisch.et Mey.

（1550）*Plantago minuta* Pall.

（1551）*Plantago maxima* Juss.et Jucq.

LXVI. Rubiaceae

412. *Galium* L.

（1552）*Galium soongaricum* Schrenk

（1553）*Galium tricorne* Stokes.

（1554）*Galium aparine var.echinospermum* (Wallr.) Cuf.

（1555）*Galium aparine var.tenerum* (Gren.et Godr.) Rchb.

（1556）*Galium aparine var.leiospermum* (Wallr.) Cuf.

（1557）*Galium tenuissimum* M.B.

（1558）*Galium karakulense* Pobed.

（1559）*Galium boreale* L.

（1560）*Galium boreale var.rubioides* (L.) Celak.

（1561）*Galium boreale var.lancilimbum* W.C.Chen

（1562）*Galium boreale var.hyssopifolium* (Pres.) DC.

（1563）*Galium boreale var.kamtschaticum* (Maxim.) Nakai

（1564）*Galium boreale var.ciliatum* Nakai

（1565）*Galium boreale var.latifolium* Turcz.

（1566）*Galium verum* L.

（1567）*Galium verum var.trachyphyllum* Walr.

（1568）*Galium verum var.trachycarpum* DC.

（1569）*Galium verum var.tomentosum* (Nakai) Nakai.

（1570）*Galium bullatum* Lipsky.

（1571）*Galium majmechense* Bordz.

（1572）*Galium xinjiangensis* W.C.Chen

（1573）*Galium humifusum* M.B.

（1574）*Galium turkestanicum* Pobed.

（1575）*Galium saurense* Litw.

413. *Rubia* L.

（1576）*Rubia tinctorum* L.

（1577）*Rubia chitralensis* Ehrendorf.

（1578）*Rubia tibetica* Hook.f.

（1579）*Rubia deserticola* Pojark.

（1580）*Rubia dolichophylla* Schrenk

（1581）*Rubia schugnanica* B.Fedtsch.ex Pojark.

414. *Microphysa* Schrenk

（1582）*Microphysa elongata* (Schrenk) Pobed.

415. *Leptunis* Stev.

（1583）*Leptunis trichoides* (J.Gay.) Schischk.

LXVII. Caprifoliaceae

416. *Viburnum* L.

（1584）*Viburnum opulus* L.

417. *Lonicera* L.

（1585）*Lonicera alberti* Rgl.

（1586）*Lonicera simulatrix* Pojark.

（1587）*Lonicera microphylla* Willd.ex Roem.et Schult.

（1588）*Lonicera iliensis* Pojark.

（1589）*Lonicera heterophylla* Decne.

（1590）*Lonicera caerulea var.altaica* Pall.

（1591）*Lonicera hispida* Pall.ex Roem.

（1592）*Lonicera semenovii* Rgl.

（1593）*Lonicera humilis* Kar.et Kir.

（1594）*Lonicera altmannii* Rgl.

（1595）*Lonicera tatarica* L.

（1596）*Lonicera tatarica var.micrantha* Trautv.

（1597）*Lonicera japonica* Thunb.

LXVIII. Adoxaceae

418. *Adoxa* L.

（1598）*Adoxa moschatellina* L.

LXIX. Valerianaceae

419. *Patrinia* Juss.

（1599）*Patrinia intermedia* (Horn.) Roem.et Schult.

420. *Valeriana* L.

（1600）*Valeriana fedtschenkoi* Coincy.

（1601）*Valeriana sisymbriifolia* Vahl.

（1602）*Valeriana ficariifolia* Boiss.

（1603）*Valeriana officinalis* L.

（1604）*Valeriana dubia* Bge.

（1605）*Valeriana turkestanica* Sumn.

421. *Valerianaella* Mill.

（1606）*Valerianaella cymbocarpa* C.A.Mey.

LXX. Dipsacaceae

422. *Morina* L.

（1607）*Morina parviflora* Kar.et Kir.

423. *Scabiosa* L.

（1608）*Scabiosa alpestris* Kar.et Kir.

（1609）*Scabiosa olivieri* Coult.

（1610）*Scabiosa ochroleuca* L.

（1611）*Scabiosa soongorica* Schrenk

LXXI. Campanulaceae

424. *Campanula* L.

（1612）*Campanula sibirica* L.

（1613）*Campanula glomerata* L.

（1614）*Campanula austro-xinjiangensis* Y.K.Yang

（1615）*Campanula fedtschenkoana* Trautv.

（1616）*Campanula albertii* Trautv.

（1617）*Campanula wolgensis* P.Smirn.

425. *Adenophora* Fisch.

（1618）*Adenophora liliifolia* (L.) Bess.

（1619）*Adenophora lamarckii* Fisch.

（1620）*Adenophora hymalayana* Feer.

426. *Codonopsis* Wall.

（1621）*Codonopsis clematidea* (Schrenk) C.B.Clarke.

LXXII. Compositae

427. *Solidago* L.

（1622）*Solidago virgaurea* L.

（1623）*Solidago virgaurea var.dahurica* Kitag.

428. *Heteropappus* Less.

（1624）*Heteropappus altaicus* (Willd.) Novopokr.

（1625）*Heteropappus altaicus var.canescens* (Nees) Serg.

429. *Aster* L.

（1626）*Aster alpinus* L.

（1627）*Aster alpinus var.serpentimontanus* (Tamamsch.) Ling

（1628）*Aster alpinus var.diversisquamus* Ling

（1629）*Aster flaccidus* Bge.

430. *Krylovia* Schischk.

（1630）*Krylovia limoniifolia* (Less.) Schischk.

（1631）*Krylovia eremopjila* (Bge.) Schischk.

431. *Asterothamnus* Novopokr.

（1632）*Asterothamnus fruticosus* (C.Winkl.)Novopokr.

（1633）*Asterothamnus centrali-asiaticus var.procerior* Novopokr.

（1634）*Asterothamnus poliifolius* Novopokr.

432. *Galatella* Cass.

（1635）*Galatella chromopappa* Novopokr.

（1636）*Galatella altaica* Tzvel.

（1637）*Galatella bogidaica* Y.Wei et Z.X.An

（1638）*Galatella songorica* Novopokr.

（1639）*Galatella songorica var.discoidea* Ling et Y.L.Chen

（1640）*Galatella songorica var.angustifolia* Novopokr.

（1641）*Galatella songorica var.latifolia* Ling et Y.L.Chen

（1642）*Galatella punctata* (Waldst.et Kit.) Nees et Esenb.

（1643）*Galatella fastigiiformis* Novopokr.

（1644）*Galatella biflora* (L.) Nees

（1645）*Galatella regelii* Tzvel.

（1646）*Galatella tianschanica* Novopokr.

433. *Tripolium* Nees.

（1647）*Tripolium vulgare* Nees.

434. *Brachyactis* Ledeb.

（1648）*Brachyactis ciliata* Ledeb.

（1649）*Brachyactis roylei* (DC.) Wendelbo

（1650）*Brachyactis pubescens* (DC.) Aitch.et Clarke

435. *Erigeron* L.

（1651）*Erigeron leioreades* M.Pop.

（1652）*Erigeron seravschanicus* M.Pop.

（1653）*Erigerom altaicue* M.Pop

（1654）*Erigeron auranitiacus* Rgl.

（1655）*Erigeron allochrous* Botsch.

（1656）*Erigeron petiolaris* Vierh.

（1657）*Erigeron lachnocephalus* Botsch.

（1658）*Erigerom kamtschaticus* DC.

（1659）*Erigeron acer* L.

（1660）*Erigeron elongatus* Ledeb.

（1661）*Erigeron krylovii* Serg.

（1662）*Erigeron pseudoseravschanicus* Botsch.

（1663）*Erigeron tianschanicus* Botsch.

（1664）*Erigeron schmalhausenii* M.Pop.

436. *Conyza* Less.

（1665）*Conyza canadensis* (L.) Cronq.

437. *Karelinia* Less.

（1666）*Karelinia caspica* (Pall.) Less.

438. *Felago* L.

（1667）*Felago arvensis* L.

（1668）*Felago spathulata* Presl.

439. *Antennaria* Gaertn.

（1669）*Antennaria dioica* (L.) Gaertn.

440. *Leontopodium* R.Br.

（1670）*Leontopodium brachyactis* Gandog.

（1671）*Leontopodium campestre* (Ledeb.) Hand.-Mazz.

（1672）*Leontopodium ochroleucum* Beauv.

（1673）*Leontopodium leontopodioides* (Willd.) Beauv.

441. *Helichrysum* Mill.

（1674）*Helichrysum tianschanicum* Rgl.

442. *Inula* L.

（1675）*Inula racemosa* Hook.

（1676）*Inula helenium* L.

（1677）*Inula rhizocephala* Schrenk

（1678）*Inula salsoloides* (Turcz.) Ostenf.

（1679）*Inula aspera* Poir.

（1680）*Inula caspica* Blume

（1681）*Inula caspica var.scaberrima* Trautv.

（1682）*Inula caspica var.paniculaca* Z.X.An

（1683）*Inula britanica* L.

（1684）*Inula britanica var.angustifolia* Beck.

（1685）*Inula britanica var.ramosissima* Ledeb.

（1686）*Inula britanica var.sublanata* Kom.

（1687）*Inula britanica var.japonica* (Thunb.) Franch.et Savat.

443. *Carpesium* L.

（1688）*Carpesium cernuum* L.

（1689）*Carpesium abrotanoides* L.

444. Xanthium L.

（1690）*Xanthium sibiricum* Patrin.ex Widder

（1691）*Xanthium sibiricum var.subinerme* (Winkl.) Widder.

（1692）*Xanthium mongolicum* Kitag.

445. *Bidens* L.

（1693）*Bidens tripartite* L.

（1694）*Bidens tripartite var.quinquelobus* Z.X.An

（1695）*Bidens cernua* L.

（1696）*Bidens leptophylla* Z.X.An

446. *Achillea* L.

（1697）*Achillea millefolium* L.

（1698）*Achillea setacea* Waldst.et Kit.

（1699）*Achillea asiatica* Serg.

447. *Handelia* Heimerl

（1700）*Handelia trichophylla* (Schrenk ex Fisch.et Mey.) Heimerl

448. *Brachanthemum* DC.

（1701）*Brachanthemum mogolicum* Krasch.

449. *Matricaria* L.

（1702）*Matricaria recutita* L.

450. *Tripleurospermum* Sch.-Bip.

（1703）*Tripleurospermum ambiguum* (Ledeb.) Franch.et Sav.

（1704）*Tripleurospermum inodorum* (L.) Sch.-Bip.

451. *Pyrethrum* Zinn.

（1705）*Pyrethrum kaschgaricum* Krasch.

（1706）*Pyrethrum pyrethroides* (Kar.et Kir.) B.Fedtsch.ex Krasch.

（1707）*Pyrethrum leontopoium* (Winkl.)Tzvel.

（1708）*Pyrethrum richterioides* (Winkl.) Krassn.

（1709）*Pyrethrum arrasanicum* (Winkl.) O.et B.Fedtsch.

（1710）*Pyrethrum transiliense* (Herd.) Rgl.et Schmalh.

（1711）*Pyrethrum pulchrum* Ledeb

（1712）*Pyrethrum krylovianum* Krasch.

（1713）*Pyrethrum alatavicum* (Herd.) O.et B.Fedtsch.

452. *Tanacetum* L.

（1714）*Tanacetum vulgare* L.

453. *Waldheimia* Kar.et Kir.

（1715）*Waldheimia tridactylites* Kar.et Kir.

（1716）*Waldheimia glabra* (Decne.) Rgl.

454. *Hippolytia* Poljak

（1717）*Hippolytia herdri* (Rgl.et Schmalh.) Poljak.

（1718）*Hippolytia kaschgarica* (Krasch.) Poljak.

（1719）*Hippolytia megacephala* (Rupr.) Poljak.

455. *Elachanthemum* Ling et Y.R..Ling

（1720）*Elachanthemum intricatum* (Franch.) Ling et Y.R..Ling

456. *Cancrinia* Kar.et Kir.

（1721）*Cancrinia discoidea* (Ledeb.) Poljak.

（1722）*Cancrinia chrysocephala* Kar.et Kir.

（1723）*Cancrinia tianschanica* (Krasch.) Tzvel.

（1724）*Cancrinia maximowiczii* Winkl.

457. *Ajania* Poljak.

（1725）*Ajania scharnhorstii* (Rgl.et Schmalh.) Tzvel.

（1726）*Ajania fastigiata* (C.Winkl.) Poljak.

（1727）*Ajania fruticulosa* (Ledeb.) Poljak.

458. *Kaschgaria* Poljak.

（1728）*Kaschgaria brachanthemoides* (Winkl.)Poljak.

（1729）*Kaschgaria komarovii* (Krasch.et N.Rubtz.)Poljak.

459. *Neopallasia* Poljak.

（1730）*Neopallasia pectinata* (Pall.) Poljak.

460. *Artemisia* L.

（1731）*Artemisia macrocephala* Jacq.ex Bess.

（1732）*Artemisia sieversiana* Ehrhart.ex Willd.

（1733）*Artemisia aschurbajewii* Wink.

（1734）*Artemisia absinthium* L.

（1735）*Artemisia frigida* Willd.

（1736）*Artemisia rupestris* L.

（1737）*Artemisia xerophytica* Krasch.

（1738）*Artemisia rutifolia* Steph.ex Speng.

（1739）*Artemisia rutifolia var.altaica* (Kry.)Krasch.

（1740）*Artemisia disjuncta* Krasch.

（1741）*Artemisia macrantha* Ledeb.

（1742）*Artemisia gmelinii* Web.ex Stechm.

（1743）*Artemisia vestita* Wa11. ex Bess

（1744）*Artemisia phaeolepis* Krasch.

（1745）*Artemisia annua* L.

（1746）*Artemisia hedinii* Ostenf.et Pauls.

（1747）*Artemisia tournefortiana* Reichb.

（1748）*Artemisia austriaca* Jacq.

（1749）*Artemisia succulenta* Ledeb.

（1750）*Artemisia lavandulaefolia* DC.

（1751）*Artemisia vulgaris* L.

（1752）*Artemisia leucophylla* (Turcz.ex Bess.)Clarke Comp.

（1753）*Artemisia mongolica (Fisch.ex Bess.) Nakai*

（1754）*Artemisia dracunculus* L.

（1755）*Artemisia dracunculus var.turkestanica* Krasch.

（1756）*Artemisia dracunculus var.changaica* (Krasch.) Y.R.Ling

（1757）*Artemisia dracunculus var.pamirica* (C.Winkl.) Y.R.Ling et C.J.Humphries

（1758）*Artemisia sphaerocephala* Krasch.

（1759）*Artemisia songarica* Krasch

（1760）*Artemisia campestris* L.

（1761）*Artemisia marschalliana* Spreng.

（1762）*Artemisia marschalliana var.sericophylla* (Rupr.)Y.R.Ling

（1763）*Artemisia scoparia* Waldst.et Kit.

（1764）*Artemisia pewzowii* Winkl.

461. *Seriphidium* (Bess.) Poljak.

（1765）*Seriphidium schrenkianum* (Ledeb.) Poljak.

（1766）*Seriphidium transiliense* (Poljak.) Poljak.

（1767）*Seriphidium nitrosum* (Web.ex Stechm.) Poljak.

（1768）*Seriphidium nitrosum var.gobicum* (Krasch.ex Poljak.) Y.R.Ling

（1769）*Seriphidium sawanense* Y.R.Ling et C.J.Humphries

（1770）*Seriphidium scopiforme* (Ledeb.) Poljak.

（1771）*Seriphidium kaschgaricum* (Krasch.) Poljak.

（1772）*Seriphidium kaschgaricum var.dshungaricum* (Filat.) Y.R.Ling

（1773）*Seriphidium fedtschenkoanum* (Krasch.) Poljak.

（1774）*Seriphidium issykkulense* (Poljak.) Poljak.

（1775）*Seriphidium ferganense* (Krasch.ex Poljak.) Poljak.

（1776）*Seriphidium gracilescens* (Krasch.et Iljin) Poljak.

（1777）*Seriphidium terrae-albae* (Krasch.) Poljak.

（1778）*Seriphidium santolinum* (Schrenk)Poljak.

（1779）*Seriphidium borotalense* (Poljak.) Ling et Y.R.Ling

（1780）*Seriphidium rhodanthum* (Rupr.) Poljak.

（1781）*Seriphidium minchunense* Y.R.Ling

（1782）*Seriphidium junceum* (Kar.et Kir.) Poljak.

462. *Tussilago* L.

（1783）*Tussilago farfara* L.

463. *Doronicum* L.

（1784）*Doronicum altaicum* Pall.

（1785）*Doronicum tianshanicum* Z.X.An

（1786）*Doronicum turkestanicum* Cavill.

464. *Senecio* L.

（1787）*Senecio erucifolius* L.

（1788）*Senecio jacobaea* L.

（1789）*Senecio nemorensis* L.

（1790）*Senecio tianschanicus* Rgl.et Schmalh.

（1791）*Senecio resedifolius* Less.

（1792）*Senecio asiaticus* Schischk.et Serg.

（1793）*Senecio dubitabilis* Jaffer et Y.L.Chen

（1794）*Senecio dubitabilis var.linearifolius* Z.X.An et S.L.Keng

（1795）*Senecio dubitabilis var.densicapitata* Z.X.An

（1796）*Senecio kraschenninnikoxii* Schischk.

（1797）*Senecio subdentatus* Ledeb

465. *Ligularia* Cass.

（1798）*Ligularia songarica* (Fisch.et Mey.)Ling

（1799）*Ligularia thomsonii* (Clarke) Pojark.

（1800）*Ligularia xinjiangensis* C.Y.Yang et S.L.Keng

（1801）*Ligularia tianshanica* C.Y.Yang et S.L.Keng

（1802）*Ligularia knorringiana* Rojark.

（1803）*Ligularia schischkinii* N.Rubiz.

（1804）*Ligularia thyrsoidea* (Ledeb)DC.

（1805）*Ligularia tulupanica* Z.X.An

（1806）*Ligularia hamiica* Z.X.An

（1807）*Ligularia narynensis* (Winkl.) O.et B.Fedtsch.

（1808）*Ligularia macrophylla* (Ledeb.) DC.

（1809）*Ligularia heterophylla* Rupr.

（1810）*Ligularia altaica* DC.

（1811）*Ligularia alpigena* Pojark.

466. *Echinops* L.

（1812）*Echinops tianschanicus* Bobr.

（1813）*Echinops ritro* L.

（1814）*Echinops talassicus* Golosk.

（1815）*Echinops chantavicus* Trautv.

（1816）*Echinops sylvicola* Shih

（1817）*Echinops sphaerocephalus* L.

（1818）*Echinops gmelinii* Turcz.

（1819）*Echinops nanus* Bge.

467. *Jurinea* Cass.

（1820）*Jurinea pilostemonoides* Iljin

（1821）*Jurinea flaccida* Shih

（1822）*Jurinea lanipes* Rupr.ex Osten.-Sacken et Rupr.

（1823）*Jurinea suidunensis* (Winkl.) Korsh.

（1824）*Jurinea dshungarica* (Rubtz.) Iljin

（1825）*Jurinea lipskyi* Iljin

（1826）*Jurinea kaschgarica* Iljin

（1827）*Jurinea algida* Iljin

（1828）*Jurinea pamirica* Shih

（1829）*Jurinea scapiformis* Shih

（1830）*Jurinea chaetocarpa* Ledeb.

468. *Pilostemon* Iljin

（1831）*Pilostemon filifolia* (Winkl.) Iljin

469. *Saussurea* DC.

（1832）*Saussurea involucrata* (Kar.et Kir.) Sch.-Bip.

（1833）*Saussurea gnaphalodes* (Royle) Sch.-Bip.

（1834）*Saussurea amara* (L.)DC.

（1835）*Saussurea prostrata* Winkl.

（1836）*Saussurea robusta* Ledeb.

（1837）*Saussurea grubovii* lipsch.

（1838）*Saussurea laciniata* Ledeb.

（1839）*Saussurea frolovii* Ledeb.

（1840）*Saussurea kuschakewiczii* Winkl.

（1841）*Saussurea chondrilloides* Winkl.

（1842）*Saussurea pulviniformis* Winkl.

（1843）*Saussurea famintziniana* Krassn.

（1844）*Saussurea lacostei* Danguy.

（1845）*Saussurea turgaiensis* B.Fedtsch.

（1846）*Saussurea pseudosalsa* Lipsch.

（1847）*Saussurea davurica* Adams.

（1848）*Saussurea kaschgarica* Rupr.

（1849）*Saussurea salsa* (Pall.)Spreng.

（1850）*Saussurea ovata* Benth.

（1851）*Saussurea alberti* Rgl.et Winkl.

（1852）*Saussurea larionowii* Winkl.

（1853）*Saussurea mucronulata* Lipsch.

（1854）*Saussurea coronata* Schrenk

（1855）*Saussurea popovii* Lipsch.

（1856）*Saussurea cana* Ledeb.

（1857）*Saussurea canescens* Winkl.

（1858）*Saussurea salemannii* Winkl.

（1859）*Saussurea elegans* Ledeb.

（1860）*Saussurea lomatolepis* Lipsch.

（1861）*Saussurea leucophylla* Schrenk

（1862）*Saussurea schanginiana* (Wydl.) Fisch.ex Herd.

（1863）*Saussurea sordida* Kar.et Kir.

（1864）*Saussurea tuoliensis* K.M.Shen

（1865）*Saussurea alpina* (L.) DC.

470. *Cousinia* Cass.

（1866）*Cousinia alata* Schrenk

（1867）*Cousinia leiocephala* (Rgl.) Juz.

（1868）*Cousinia platylepis* Schrenk ex Fisch.et Mey.

（1869）*Cousinia affinis* Schrenk

（1870）*Cousinia polycephala* Rupr.

（1871）*Cousinia lasiophylla* Shih

（1872）*Cousinia sclerolepis* Shih

（1873）*Cousinia caespitosa* Winkl.

（1874）*Cousinia tenella* Fisch.et Mey.

471. *Schmalhausenia* Winkl.

（1875）*Schmalhausenia nidulans* (Rgl.) Petrak

472. *Arctium* L.

（1876）*Arctium lappa* L.

（1877）*Arctium tomentosum* Mill.

473. *Acroptilon* Cass.

（1878）*Acroptilon repens* (L.) DC.

474. *Olgaea* Iljin

（1879）*Olgaea pectinata* Iljin

（1880）*Olgaea roborowskyi* Iljin

（1881）*Olgaea lanips* (Winkl.) Iljin

475. *Alfredia* Cass.

（1882）*Alfredia nivea* Kar.et Kir.

（1883）*Alfredia aspera* Shih

（1884）*Alfredia acantholepis* Kar.et Kir.

（1885）*Alfredia fetissowii* Iljin

476. *Syreitschikovia* Pavl.

（1886）*Syreitschikovia tenuis* (Bge.) Botsch.

477. *Cirsium* Mill.

（1887）*Cirsium vulgare* (Savi) Ten.

（1888）*Cirsium esculentum* (Sievers) C.A.Mey.

（1889）*Cirsium alatum* (S.G.Gmel.) Bobr.

（1890）*Cirsium semenovii* Rgl.et Schmalh.

（1891）*Cirsium sairamense* (Winkl.) O.et B.Fedtsch.

（1892）*Cirsium alberti* Rgl.et Schmalh.

（1893）*Cirsium glabrifolium* (Winkl.) O.et B.Fedtsch.

（1894）*Cirsium sieversii* (Fisch.et Mey.) Petrak

（1895）*Cirsium setosum* (Willd.) M.B.

（1896）*Cirsium arvense* (L.) Scop.

（1897）*Cirsium lanatum* (Roxb.ex Willd.)Spreng.

478. *Ancathia* DC.

（1898）*Ancathia igniaria* (Spreng.)DC.

479. *Onopordum* L.

（1899）*Onopordum acanthium* L.

480. *Carduus* L.

（1900）*Carduus nutans* L.

（1901）*Carduus crispus* L.

481. *Oligochaeta* C.Kpch.

（1902）*Oligochaeta minima* (Boiss.) Briq.

482. *Crupina* Cass.

（1903）*Crupina vulgaris* Cass.

483. *Serratula* L.

（1904）*Serratula suffruticosa* Schrenk

（1905）*Serratula alatavica* C.A.Mey.

（1906）*Serratula procumbens* Rgl.

（1907）*Serratula lyratifolia* Schrenk

（1908）*Serratula rugosa* Iljin

（1909）*Serratula algida* Iljin

（1910）*Serratula coronata* L.

484. *Russowia* Winkl.

（1911）*Russowia sogdiana* (Bge.)B.Fedtsch.

485. *Plagiobasis* Schrenk

（1912）*Plagiobasis centauroides* Schrenk

486. *Centaurea* L.

（1913）*Centaurea adpressa* Ledeb.

（1914）*Centaurea squarrosa* Willd.

（1915）*Centaurea iberica* Trev.

（1916）*Centaurea ruthenica* Lam.

（1917）*Centaurea kasakorum* Iljin

（1918）*Centaurea dschungarica* Shih

487. *Schischkinia* Iljin

（1919）*Schischkinia albispina* (Bge.) Iljin

488. *Chartolepis* Cass

（1920）*Chartolepis intermedia* Biagn.

489. *Hyalea* (DC.) Jaub.et Spach.

（1921）*Hyalea pulchella* (Ledeb.) C.Koch.

490. *Cichorium* L.

（1922）*Cichorium intybus* L.

491. *Koelpinia* Pall.

（1923）*Koelpinia linearis* Pall.

492. *Garhadiolus* Jaub.et Spach.

（1924）*Garhadiolus papposus* Boiss.et Buhse.

493. *Heteracia* Fisch.et Mey.

（1925）*Heteracia szovitsii* Fisch.et Mey.

494. *Picris* L.

（1926）*Picris japonica* Thunb.

（1927）*Picris hieracioides* L.

（1928）*Picris similis* Vass.

495. *Tragopogon* L.

（1929）*Tragopogon capitatus* S.Nikit.

（1930）*Tragopogon pseudomajor* S.Nikit.

（1931）*Tragopogon orientalis* L.

（1932）*Tragopogon pratensis* L.

（1933）*Tragopogon songoricus* S.Nikit.

（1934）*Tragopogon sibiricus* Ganesch.

（1935）*Tragopogon ruber* S.G.Gmel.

（1936）*Tragopogon marginifolius* Pavl.

（1937）*Tragopogon montanus* S.Nikit.

（1938）*Tragopogon elongatus* S.Nikit.

（1939）*Tragopogon kasahstanicus* S.Nikit.

496. *Scorzonera* L.

（1940）*Scorzonera subacaulis* (Rgl.) Lipsch.

（1941）*Scorzonera austriaca* Willd

（1942）*Scorzonera austriaca var.hebecarpus* Z.X.An et X.L.He

（1943）*Scorzonera radiata* Fisch.

（1944）*Scorzonera parviflora* Jacq.

（1945）*Scorzonera luntaiensis* Shih

（1946）*Scorzonera mongolica* Maxim

（1947）*Scorzonera iliensis* Krasch.

（1948）*Scorzonera transiliensis* M.Pop.

（1949）*Scorzonera pubescens* DC.

（1950）*Scorzonera inconspicua* Lipsch.ex Pavl.

（1951）*Scorzonera tianshanensis* Z.X.An

（1952）*Scorzonera pseudodivaricata* Lipsch.

（1953）*Scorzonera pusilla* Pall.

（1954）*Scorzonera pusilla var.latifolia* Lipsch.

（1955）*Scorzonera elongata* Z.X.An et X.L.He

（1956）*Scorzonera tuberosa* Pall.

（1957）*Scorzonera sericeo-lanata* (Bge.) Krasch.et Lipsch.

（1958）*Scorzonera circumflexa* Krasch.et Lipsch.

497. *Hexinia* H.L.Yang

（1959）*Hexinia polydichotoma* (Ostenf.) H.L.Yang

498. *Epilasia* (Bge.)Benth.et Hook.f.

（1960）*Epilasia acrolasia* (Bge.)C.B.Clarke

（1961）*Epilasia hemilasia* (Bge.)C.B.Clarke

499. *Taraxacum* Wigg.

（1962）*Taraxacum pseudominutilobum* S.Kovalevsk.

（1963）*Taraxacum dissectum* (Ledeb.) Ledeb.

（1964）*Taraxacum dealbatum* Hand.-Mazz.

（1965）*Taraxacum bessarabicum* (Homem.)Hand.-Mazz.

（1966）*Taraxacum kok-saghyz* Rodin

（1967）*Taraxacum bicorne* Dahlst.

（1968）*Taraxacum lilacinum* Krassn.ex Schischk.

（1969）*Taraxacum pseudoroseum* Schischk.

（1970）*Taraxacum glabrym* DC.

（1971）*Taraxacum pseudoatratum* Oraz.

（1972）*Taraxacum xinyuanicum* D.T.Zhai et Z.X.An

（1973）*Taraxacum compactum* Schischk.

（1974）*Taraxacum alatopetiolum* D.T.Zhai et Z.X.An

（1975）*Taraxacum pseudoalpinum* Schischk.ex Oraz.

（1976）*Taraxacum altaicum* Schischk.

（1977）*Taraxacum pingue* Schischk.

（1978）*Taraxacum erythrospermum* Andrz.

（1979）*Taraxacum repandum* Pavl.

（1980）*Taraxacum tianschanicum* Pavl.

（1981）*Taraxacum sumneviczii* Schischk.

（1982）*Taraxacum monochlamydeum* Hand.-Mazz.

（1983）*Taraxacum longipyramidatum* Schischk.

（1984）*Taraxacum multiscaposum* Schischk.

（1985）*Taraxacum ecornutum* S.Kovalevsk.

（1986）*Taraxacum officinale* Wigg.

500. *Chondrilla* L.

（1987）*Chondrilla brevirostris* Fisch.et Mey.

（1988）*Chondrilla phaeocephala* Rupr.

（1989）*Chondrilla ornata* Iljin

（1990）*Chondrilla lejosperma* Kar.et Kir.

（1991）*Chondrilla rouillieri* Kar.et Kir.

（1992）*Chondrilla piptocoma* Fisch.et Mey.

（1993）*Chondrilla laticoronata* Leonova

（1994）*Chondrilla ambigua* Fisch.ex Kar.et Kir.

（1995）*Chondrilla pauciflora* Ledeb.

501. *Sonchus* L.

（1996）*Sonchus oleraceus* L.

（1997）*Sonchus asper* (L.) Hill.

（1998）*Sonchus arvensis* L.

502. *Lactuca* L.

（1999）*Lactuca serriola* Tomer ex L.

（2000）*Lactuca altaica* Fisch.et Mey.

（2001）*Lactuca auriculata* DC.

（2002）*Lactuca undulata* Ledeb.

（2003）*Lactuca undulata var.albicaulis* Z.X.An

503. *Mulgedium* Cass.

（2004）*Mulgedium tataricum* (L.) DC.

（2005）*Mulgedium alatoicum* Z.X.An

504. *Cephalorrhynchus* Boiss.

（2006）*Cephalorrhynchus soongaricus* (Rgl.) Kovalevsk.

505. *Cicerbita* Wallr.

（2007）*Cicerbita azurea* (Ledeb.) Beauv.

（2008）*Cicerbita tianschanica* (Rgl.et Schmalh.) Beauv.

506. *Youngia* Cass.

（2009）*Youngia diversifolia* (Ledeb.) Ledeb.

（2010）*Youngia altaica* (Babc.et Stebb.) Czer.

（2011）*Youngia seravschanica* (B.Fedtsch.) Babc.et Stebb.

507. *Ixeridium* (A.Gray)Tzvel.

（2012）*Ixeridium gramineum* (Fisch.)Tzvel.

508. *Crepis* L.

（2013）*Crepis sibirica* L.

（2014）*Crepis polytricha* (Ledeb.) Turcz.

（2015）*Crepis oreades* Schrenk

（2016）*Crepis multicaulis* Ledeb.

（2017）*Crepis shawanica* Shih

（2018）*Crepis flexuosa* (Ledeb.) Clarke

（2019）*Crepis nana* Richardson

（2020）*Crepis melantherus* Z.X.An

（2021）*Crepis tianshanica* Shih

（2022）*Crepis pseudonaniforma* Shih

509. *Hieracium* L.

（2023）*Hieracium virosum* Pall.

（2024）*Hieracium virosum var.latifolium* Troel.

（2025）*Hieracium robustum* Fries

（2026）*Hieracium umbellatum* L.

（2027）*Hieracium regelianum* Zahn.

（2028）*Hieracium krylovii* Nevski

（2029）*Hieracium korshinskyi* Zahn.

（2030）*Hieracium asiaticum* Naeg.et Peter.

（2031）*Hieracium dublitzkii* B.Fedtsch.et Nevski

LXXIII. Typhaceae

510. *Typha* L.

（2032）*Typha latifolia* L.

（2033）*Typha laxmannii* Lep.

（2034）*Typha angustata* Bory et Chaub.

（2035）*Typha angustifolia* L.

（2036）*Typha pallida* Pob.

（2037）*Typha gracilis* Jord.

（2038）*Typha minima* Funk ex Hoppe

LXXIV. Sparganiaceae

511. *Sparganium* L.

（2039）*Sparganium microcarpum* Celak.

（2040）*Sparganium stoloniferum* (Graebn.) Buch.-Ham.ex Juz.

（2041）*Sparganium angustifolium* Michx.

LXXV. Potamogetonaceae

512. Potamogeton L.

（2042）*Potamogeton pamiricus* Baagoe

（2043）*Potamogeton filiformis* Pers.

（2044）*Potamogeton vaginatus* Turcz.

（2045）*Potamogeton pectinatus* L.

（2046）*Potamogeton obtusifolius* Mert.et Koch

（2047）*Potamogeton pusillus* L.

（2048）*Potamogeton crispus* L.

（2049）*Potamogeton perfoliatus* L.

（2050）*Potamogeton malaianus* Miq.

（2051）*Potamogeton lucens* L.

（2052）*Potamogeton natans* L.

（2053）*Potamogeton polygonifolius* Pour.

（2054）*Potamogeton nodosus* Poir.

513. *Zannichellia* L.

（2055）*Zannichellia palustris* L.

（2056）*Zannichellia palustris var.pedicellata* Wahlenb.et Rosem

LXXVI. Najadaceae

514. *Najas* L.

（2057）*Najas marina* L.

（2058）*Najas minor* All.

LXXVII. Juncaginaceae

515. *Triglochin* L.

（2059）*Triglochin palustre* L.

（2060）*Triglochin maritimum* L.

LXXVIII. Alismataceae

516. *Alisma* L.

（2061）*Alisma gramineum* Lej.

（2062）*Alisma lanceolatum* Wither.

（2063）*Alisma orientale* (Sam.)Juzepez

517. *Sagittaria* L.

（2064）*Sagittaria trifolia* L.

LXXIX. Butomaceae

518. *Butomus* L.

（2065）*Butomus umbellatus* L.

LXXX. Hydrocharitaceae

519. *Vallisneria* L.

（2066）*Vallisneria spiralis* L.

LXXXI. Gramineae

520. *Leersia* Soland.ex Sw.

（2067）*Leersia oryzoides* (L.)Sw.

521. *Phragmites* Adans.

（2068）*Phragmites australis* (Cav.) Trin.ex Steudel

522. *Aristida* L.

（2069）*Aristida heymannii* Regel

（2070）*Aristida pennata* Trin.

523. *Schismus* Beauv.

（2071）*Schismus arabicus* Nees

524. *Melica* L.

（2072）*Melica altissima* L.

（2073）*Melica nutans* L.

（2074）*Melica secunda* Regel

（2075）*Melica transsilvanica* Schur

525. *Glyceria* R.Br.

（2076）*Glyceria plicata* (Fries) Fries

526. *Catabrosa* Beauvois

（2077）*Catabrosa aquatica* (L.) Beauv.

527. *Festuca* L.

（2078）*Festuca gigantea* (L.) Vill.

（2079）*Festuca pratensis* Huds.

（2080）*Festuca arundinacea* Schreb.

（2081）*Festuca arundinacea subsp.orientalis* (Hack.) Tzvel.

（2082）*Festuca altaica* Trin.

（2083）*Festuca alatavica* (St.-Yves) Roshev.

（2084）*Festuca tristis* Kryl.et Ivanitzk.

（2085）*Festuca rubra* L.

（2086）*Festuca rubra subsp.arctica* (Hack.) Govr.

（2087）*Festuca brachyphylla* Schult.et Schult.

（2088）*Festuca coelestis* (St.-Yves) Krecz.et Bobr.

（2089）*Festuca amblyodes* Krecz.et Bobr.

（2090）*Festuca kryloviana* Reverd.

（2091）*Festuca ovina* L.

（2092）*Festuca ovina subsp.sphagnicola* (B.Keller) Tzvel.

（2093）*Festuca valesiaca* Gaud.

（2094）*Festuca valesiaca subsp.sulcata* (Hack.) Schinz et R.Keller.

（2095）*Festuca valesiaca subsp.pseudovina* (Hack.et Wiesb.)Hegi

528. *Leucopoa* Griseb.

（2096）*Leucopoa olgae* (Regel) Krecz.et Bobr.

529. *Poa* L.

（2097）*Poa bactriana* Roshev.

（2098）*Poa bulbosa* L.

（2099）*Poa bulbosa subsp.vivipara* (Koel.)Arcang.

（2100）*Poa sibirica* Roshev.

（2101）*Poa sibirica subsp.uralensis* Tzvel.

（2102）*Poa membranigluma* D.F.Cui

（2103）*Poa tibetica Munro ex* Stapf

（2104）*Poa lipski* Roshev.

（2105）*Poa lipski subsp.dschungarica* (Roshev.) Tzvel

（2106）*Poa calliopsis* Litv.ex Ovcz.

（2107）*Poa alpigena* (Blytt) Lindm.

（2108）*Poa florida* N.R.Cui

（2109）*Poa angustifolia* L.

（2110）*Poa angustifolia subsp.laxuispicula* D.F.Cui

（2111）*Poa pratensis* L.

（2112）*Poa tianschanica* (Regel) Hack.ex O.Fedtsch.

（2113）*Poa annua* L.

（2114）*Poa macroanthera* D.F.Cui

（2115）*Poa macroanthera subsp.meilitzyka* D.F.Cui

（2116）*Poa alpina* L.

（2117）*Poa supina* Schrad.

（2118）*Poa litwinowiana* Ovcz.

（2119）*Poa attenuata* Trin.

（2120）*Poa attenuata sudsp.botryoides* (Trin.ex Griseb.) Tzvel.

（2121）*Poa attenuata sudsp.argunensis*(Roshev.) Tzvel

（2122）*Poa major* D.F.Cui

（2123）*Poa nemoralis* L.

（2124）*Poa nemoralis subsp.korshunensis* (Golosk.) Tzvel.

（2125）*Poa nemoralis subsp.parca* N.R.Cui

（2126）*Poa krylovii* Reverd.

（2127）*Poa palustris* L.

（2128）*Poa urssulensis* Trin.

（2129）*Poa altaica* Trin.

（2130）*Poa versicolor subsp.relaxa* (Ovcz.) Tzvel.

（2131）*Poa versicolor subsp.stepposa* (Krgl.) Tzvel.

（2132）*Poa rangkulensis* Ovcz.et Czuk.

（2133）*Poa indattenuata* Keng

530. *Puccinellia* Parl.

（2134）*Puccinellia hauptiana* (Krecz.) Kitag.

（2135）*Puccinellia florida* D.F.Cui

（2136）*Puccinellia distans* (L.) Parl.

（2137）*Puccinellia tenuiflora* (Griseb.) Scribn.et Merr.

（2138）*Puccinellia schischkinii* Tzvel.

（2139）*Puccinellia roshevitsiana* (Schischk.) Krecz.ex Tzvel.

（2140）*Puccinellia microanthera* D.F.Cui

（2141）*Puccinellia nudiflora* Tzvel.

（2142）*Puccinellia pamirica* (Roshev.) Krecz.ex Roshev.

531. *Dactylis* L.

（2143）*Dactylis glomerata* L.

532. *Lolium* L.

（2144）*Lolium remotum* Schrank

（2145）*Lolium persicum* Boiss.et Hoh.

533. *Bromus* L.

（2146）*Bromus inermis* Leyss.

（2147）*Bromus benekenii* (Lange) Trimen

（2148）*Bromus tectorum* L.

（2149）*Bromus oxyodon* Schrenk

（2150）*Bromus sewerzowii* Regel

（2151）*Bromus squarrosus* L.

（2152）*Bromus japonicus* Thunb.

534. *Brachypodium* Beauv.

（2153）*Brachypodium sylvaticum* (Huds.) Beauv.

（2154）*Brachypodium pinnatum* (L.) Beauv.

535. *Aegilops* L.

（2155）*Aegilops tauschii* Coss.

536. *Triticum* L.

（2156）*Triticum petropavlovski* Udacz et Migusch.

（2157）*Triticum turanicum* Jakubz.

537. *Elytrigia* Desv.

（2158）*Elytrigia repens* (L.) Nevski

（2159）*Elytrigia repens subsp.longearistata* N.R.Cui

（2160）*Elytrigia ferganensis* (Drob.) Nevski

（2161）*Elytrigia aegilopoides* (Drob.)N.R.Cui

538. *Agropyron* Gaertner

（2162）*Agropyron cristatum* (L.)Beauv.

（2163）*Agropyron cristatum* (L.)Beauv.

（2164）*Agropyron pectinatum* (M.Bieb.) Beauv.

539. *Eremopyrum* (Ldb.)Jaub.et Spach

（2165）*Eremopyrum orientale* (L.) Jaub.et Spach

（2166）*Eremopyrum distans* (C.Koch)Nevski

（2167）*Eremopyrum buonapartis* (Spreng.) Nevski

（2168）*Eremopyrum triticeum* (Geartn.) Nevski

540. *Elymus* L.

（2169）*Elymus yilianus* S.L.Chen

（2170）*Elymus sibiricus* L.

（2171）*Elymus nutans* Griseb.

（2172）*Elymus dahuricus* Turcz. ex Griseb.

（2173）*Elymus excelsus* Turcz.ex Griseb.

（2174）*Elymus tangutorum* (Nevski) Hand.-Mazz.

（2175）*Elymus cylindricus* (Franch.) Honda

（2176）*Elymus alatavicus* (Drob.) A.Love

（2177）*Elymus batalinii* (Krash.) A.Love

（2178）*Elymus nevskii* Tzvel.

（2179）*Elymus mutabilis* (Drob.) Tzvel.

（2180）*Elymus mutabilis var.nemoralis* S.L.Chen ex D.F.Cui

（2181）*Elymus abolinii* (Drob.) Tzvel.

（2182）*Elymus abolinii var.divaricans* (Nevski) Tzvel.

（2183）*Elymus abolinii var.plurifloridus* D.F.Cui

（2184）*Elymus viridulus* (Keng) S.L.Chen

（2185）*Elymus praecaespitosus* (Nevski) Tzvel.

（2186）*Elymus sylvaticus* (Keng et S.L.Chen) S.L.Chen

（2187）*Elymus borealus* (Turcz.)D.F.Cui

（2188）*Elymus alashanicus* (Keng)S.L.Chen

（2189）*Elymus mangnicaespes* D.F.Cui

（2190）*Elymus sclerus* A.Love

（2191）*Elymus aristiglumis* (Keng) S.L.Chen

（2192）*Elymus kamojus* (Ohwi) S.L.Chen

（2193）*Elymus caninus* (L.) L.

（2194）*Elymus komarovii* (Nevski)Tzvel.

（2195）*Elymusc zilikensis* (Drob.) Tzvel.

（2196）*E1ymus platyphyllus* (Keng) A.Lőve.

（2197）*E1ymus kaschgaricus* D.F.Cui

（2198）*Elymus sinkiangensis* D.F.Cui

（2199）*Elymus curvatus* (Nevski) D.F.Cui

（2200）*Elymus gmelinii* (Ledeb.) Tzvel.

（2201）*Elymus glaberrimus* (Keng)S.L.Chen.

（2202）*Elymus glaberrimus var.breviaristus* S.L.Chen et D.F.Cui

（2203）*Elymus schrenkianus* (Fisch.et Mey.) Tzvel.

（2204）*Elymus pseudonutans* A.Love

（2205）*Elymus tschimuganicus* (Drob.) Tzvel.

（2206）*Elymus breviglumis* (Keng) A.Lőve

（2207）*Elymus altissimus* (Keng) A.Lőve

（2208）*Elymus confusus var.breviaristatus* (Keng) S.L.Chen

541. *Psathyrostachys* Nevski

（2209）*Psathyrostachys lanuginosa* (Trin.) Nevski

（2210）*Psathyrostachys kronenburgii* (Hack.) Nevski

（2211）*Psathyrostachys juncea* (Fisch.) Nevski

（2212）*Psathyrostachys juncea subsp.hyalantha* (Rupr.) Tzvel.

542. *Hordeum* L.

（2213）*Hordeum bogdanii* Wilensky

（2214）*Hordeum violaceum* Boiss.et Huet

（2215）*Hordeum roshevitzii* Bowd.

（2216）*Hordeum turkestanicum* Nevski

（2217）*Hordeum brevisubulatum* (Trin.) Link

（2218）*Hordeum brevisubulatum var.nevskianum* (Bowd.) Tzvel.

543. *Leymus* Hochst.

（2219）*Leymus ramosus* (Trin.) Tzvel.

（2220）*Leymus angustus* (Trin.) Pilger

（2221）*Leymus paboanus* (Claus) Pilger

（2222）*Leymus multicaulis* (Kar.et Kir.) Tzvel.

（2223）*Leymus chinensis* (Trin.) Tzvel.

（2224）*Leymus yiunensis* N.R.Cui et D.F.Cui

（2225）*Leymus karelinii* (Turcz.) Tzvel.

（2226）*Leymus angustus subsp.maeroantherus* D.F.Cui

（2227）*Leymus tianschanicus* (Drob.) Tzvel.

（2228）*Leymus ovatus* (Trin.) Tzvel.

（2229）*Leymus secalinus* (Georgi) Tzvel.

（2230）*Leymus secalinus subsp.pubescens* (O.Fedtsch.)Tzvel.

544. *Avena* L.

（2231）*Avena fatua* L.

（2232）*Avena fatua var.glabrata* Peterm.

（2233）*Avena meridionalis* (Malz.) Roshev.

545. *Helictotrichon* Bess.

（2234）*Helictotrichon pubescens* (Huds.) Pilger

（2235）*Helictotrichon hookeri* (Scribn.) Henr.

（2236）*Helictotrichon hookeri subsp.schellianum* (Hack.) Tzvel.

（2237）*Helictotrichon tibeticum* (Roshev.) Holub

（2238）*Helictotrichon mongolicum* (Roshev.) Henr.

（2239）*Helictotrichon tiabschanicum* (Roshev.) Henr.

（2240）*Helictotrichon hissaricum* (Roshev.) Henr.

（2241）*Helictotrichon altaicum* Tzvel.

546. *Trisetum* Pers.

（2242）*Trisetum sibiricum* Rupr.

（2243）*Trisetum altaicum* Roshev.

（2244）*Trisetum clarkei* (Hook.f.) R.R.Stewart

（2245）*Trisetum spicatum* (L.) Richt.

（2246）*Trisetum spicatum subsp.mongolicum* Hult.

（2247）*Trisetum spicatum subsp.virescens* (Regel) Tzvel.

547. *Koeleria* Peers.

（2248）*Koeleria altaica* (Domin) Kryl.

（2249）*Koeleria litvinowii* Domin

（2250）*Koeleria cristata* (L.) Pers.

548. *Deschampsia* Beauv.

（2251）*Deschampsia koelerioides* Regel

（2252）*Deschampsia caespitosa* (L.) Beauv.

（2253）*Deschampsia pamirica* Roshev.

549. *Hierochloe* R.Br.

（2254）*Hierochloe gladra* Trin.

（2255）*Hierochloe odorata* (L.) Beauv.

（2256）*Hierochloe odorata var.pubescens* Kryl.

550. *Anthoxanthum* L.

（2257）*Anthoxanthum odoratum subsp.alpinum* (A.et D.Love) B.Jones et Meld.

551. *Phalaris* L.

（2258）*Phalaris arundinacea* L.

552. *Phleum* L.

（2259）*Phleum paniculatum* Huds.

（2260）*Phleum alpinum* L.

（2261）*Phleum pratense* L.

（2262）*Phleum phleoides* (L.) Karst.

553. *Alopecurus* L.

（2263）*Alopecurus aequalis* Sobol.

（2264）*Alopecurus pratensis* L.

（2265）*Alopecurus arundinaceus* Poir.

554. *Calamagrostis* Adans.

（2266）*Calamagrostis arundinacea* (L.)Roth

（2267）*Calamagrostis purpurea* (Trin.) Trin.

（2268）*Calamagrostis tianschanica* Rupr.

（2269）*Calamagrostis neglecta* (Ehrh.) Gaertn.

（2270）*Calamagrostis macilenta* (Griseb.) Litv.

（2271）*Calamagrostis turkestanica* Hack.

（2272）*Calamagrostis macrolepis* Litv.

（2273）*Calamagrostis epigeios* (L.) Roth

（2274）*Calamagrostis tatarica* (Hook.f.) D.F.Cui

（2275）*Calamagrostis pseudophragmites* (Hall.f.) Koel.

（2276）*Calamagrostis pseudophragmites subsp.dubia* (Bunge)Tzvel.

555. *Agrostis* L.

（2277）*Agrostis sinkiangensis* Y.C.Yang

（2278）*Agrostis turkestanica* Drob.

（2279）*Agrostis gigantea* Roth

（2280）*Agrostis tenuis* Sibth.

（2281）*Agrostis stolonifera* L.

556. *Polypogon* Desf.

（2282）*Polypogon fugax* Nees ex Steund.

（2283）*Polypogon monspeliensis* (L.) Desf.

（2284）*Polypogon maritimus* Willd.

557. *Beckmannia* Host

（2285）*Beckmannia syzigachne* (Steud.)Fern.

558. *Piptatherum* Beauv.

（2286）*Piptatherum songaricum* (Trin.et Rupr.)Roshev

（2287）*Piptatherum songaricum subsp.tianshanicum* (Drob.et Vved.)Tzvel.

559. *Milium* L.

（2288）*Milium effusum* L.

560. *Stipa* L.

（2289）*Stipa bungeana* Trin.

（2290）*Stipa baicalensis* Roshev.

（2291）*Stipa capillata* L.

（2292）*Stipa sareptana* Beck.

（2293）*Stipa sareptana subsp.krylovii* (Roshev.) D.F.Cui

（2294）*Stipa tianschanica* Roshev.

（2295）*Stipa tianschanica subsp.gobica* (Roshev.) D.F.Cui

（2296）*Stipa consanguinea* Trin.et Rupr.

（2297）*Stipa glareosa* P.Smirn.

（2298）*Stipa caucasica* Schmalh.

（2399）*Stipa caucasica subsp.desertorum*(Roshev.)Tzvel

（2300）*Stipa richteriana* Kar.et Kir.

（2301）*Stipa breviflora* Griseb.

（2302）*Stipa orientalis* Trin.

（2303）*Stipa purpurea* Griseb.

（2304）*Stipa regeliana* Hack.

（2305）*Stipa subsessiliflora subsp.subsessiliflora* (Rupr.)Roshev.

（2306）*Stipa penicillata* Hand.-Mazz.

（2307）*Stipa* 1*essingiana* Trin.et Rupr.

（2308）*Stipa kirghsorum* P.Smirn.

（2309）*Stipa macroglossa* P.Smirn.

（2310）*Stips zalesskii* Wilensky

561. *Achnatherum* Beauv.

（2311）*Achnatherum splendens* (Trin.) Nevski

（2312）*Achnatherum caragana* (Tri.et Rupr.) Nevwski

（2313）*Achnatherum inebrians* (Hance) Keng

（2314）*Achnatherum sibiricum* (L.) Keng

562. *Ptilagrostis* Griseb.

（2315）*Ptilagrostis mongholica* (Turcz.ex Trin.) Griseb.

（2316）*Ptilagros tispelliotii* (Danguy) Grub.

（2317）*Ptilagrostis concinna* (Hook.f.) Roshev.

563. *Timouria* Roshev.

（2318）*Timouria saposhnikovii* Roshev.

564. *Stephanachne* Keng

（2319）*Stephanachne pappophorea* (Hack.) Keng

565. *Enneapogon* Desv.ex Beauv.

（2320）*Enneapogon borealis* (Griseb.) Honda

566. *Aeluropus* Trin.

（2321）*Aeluropus micrantherus* Tzvel.

（2322）*Aeluropus pungens* (Bieb.) C.Koch

（2323）*Aeluropus pilosus* (X.L.Yang)S.L.Chen et X.L.Yang

567. *Eragrostis* Wolf

（2324）*Eragrostis pilosa* (L.) Beauv.

（2325）*Eragrostis cilianemsis* (All.) Link.ex Vignolo-Lutati

（2326）*Eragrostis minor* Host

（2327）*Eragrostis suaveolens* A.Beck.ex Claus

（2328）*Eragrostis collina* Trin.

568. *Cleistogenes* Keng

（2329）*Cleistogenes songorica* (Roshev.) Ohwi.

（2330）*Cleistogenes squarrosa* (Trin.) Keng

569. *Tripogon* Roem.et Schult.

（2331）*Tripogon purpurascens* Duthie

570. *Chloris* Sw.

（2332）*Chloris virgata* Sw.

571. *Crypsis* Ait.

（2333）*Crypsis schoenoides* (L.) Lam.

（2334）*Crypsis aculeata* (L.) Ait.

572. *Cynodon* Rich.

（2335）*Cynodon dactylon* (L.) Pers.

573. *Panicum* L.

（2336）*Panicum miliaceum susp.ruderale* (Kitag.)Tzvel.

574. *Echinochloa* Beauv.

（2337）*Echinochloa colonum* (L.) Link

（2338）*Echinochloa crusgalli* (L.) Beauv.

（2339）*Echinochloa crusgalli var. mitis* (Pursh) Peterm.

575. *Digitaria* Hall.

（2340）*Digitaria ciliaris* (Retz.) Koel.

（2341）*Digitaria violascens* Link.

576. *Setaria* Beauv.

（2342）*Setaria glauca* (L.) Beauv.

（2343）*Setaria viridis* (L.) Beauv.

（2344）*Setaria viridis subsp.pycnocoma* (Steud.)Tzvel.

577. *Pennisetum* Rich.

（2345）*Pennisetum centrasiaticum* Tzvel.

578. *Arthraxon* Beauv.

（2346）*Arthraxon hispidus* (Thunb.) Makino

（2347）*Arthraxon hispidus subsp.centrasiaticus* (Griseb.) Tzvel.

579. *Bothriochloa* Kuntze

（2348）*Bothriochloa ischaemum* (L.) Keng

LXXXII. Cyperaceae

580. *Scirpus* L.

（2349）*Scirpus maritimus* L.

（2350）*Scirpus planiculmis* Fr.

（2351）*Scirpus strobilinus* Roxb.

（2352）*Scirpus tabernaemontani* Gmel.

（2353）*Scirpus lacustris* L.

（2354）*Scirpus litoralis* Schrad.

（2355）*Scirpus triqueter* L.

（2356）*Scirpus ehrenbergii* Bocklr.

（2357）*Scirpus supinus* L.

（2358）*Scirpus pumilus* Vahl

581. *Blysmus* Panz.

（2359）*Blysmus compressus* (L.) Panz.

（2360）*Blysmus sinocompressus* Tang et Wang

582. *Eleocharis* R.Br.

（2361）*Eleocharis meridionalis* Zinserl.

（2362）*Eleocharis mitracarpa* Steud.

（2363）*Eleocharis argyrilepis* Kier.

（2364）*Eleocharis valleculosa* Ohwi

（2365）*Eleocharis palustris* (L.)Roen.et Schult.

（2366）*Eleocharis intersita* Zinserl.

（2367）*Eleocharis uniglumis* (Link) Schult.

583. *Cyperus* L.

（2368）*Cyperus glomeratus* L.

（2369）*Cyperus iria* L.

（2370）*Cyperus fuscus* L.

（2371）*Cyperus difformis* L.

584. *Juncellus* (Griseb.) C.B.Clarke

（2372）*Juncellus serotinus* (Rottb.) C.B.Clarke

（2373）*Juncellus pannonicus* (Jacq.) C.B.Clarke

585. *Pycreus* Beauv.

（2374）*Pycreus sanguinolentus* (Vahl) Nees

586. *Kobresia* Willd.

（2375）*Kobresia humilis* (C.A.Mey.ex Trautv.) Serg.

（2376）*Kobresia smirnovii* Ivan.

（2377）*Kobresia capillifolia* (Decne.) C.B.Clarke

（2378）*Kobresia bellardii* (All.) Degl.

（2379）*Kobresia stenocarpa* (Kar.et Kir.) Steud.

（2380）*Kobresia royleana* (Nees) Boeck.

587. *Carex* L.

（2381）*Carex microglochin* Wahl.

（2382）*Carex atherodes* Spreng.

（2383）*Carex riparia* Curt.

（2384）*Carex rugulosa* Kuk.

（2385）*Carex melanostachy* M.Bieb.ex Willd.

（2386）*Carex songorica* Kar.et Kir.

（2387）*Carex pamirensis* Clarke ex B.Fedtsch.

（2388）*Carex acutiformis* Ehrh.

（2389）*Carex pseudocyperus* L.

（2390）*Carex dichroa* Freyn Freyn

（2391）*Carex rhynchophysa* C.A.Mey.

（2392）*Carex rostrata* Stokes

（2393）*Carex panicea* L.

（2394）*Carex diluta* Bieb.

（2395）*Carex serotina* Merat

（2396）*Carex alexeenkoana* Litv.

（2397）*Carex koshewnikowii* Litv.

（2398）*Carex aneurocarpa* V.Krecz.

（2399）*Carex titovii* V.Krecz.

（2400）*Carex alba* Scop.

（2401）*Carex ungurensis* Litv.

（2402）*Carex liparocarpos* Gaudin

（2403）*Carex turkestanica* Regel

（2404）*Carex minutiscabra* Kűk.ex.Krecz.

（2405）*Carex griffithii* Boott

（2406）*Carex tianschanica* Egor.

（2407）*Carex atrofusca* Schkuhr

（2408）*Carex stenocarpa* Turcz.ex V.Krecz.

（2409）*Carex regeliana* (Kuk.) Litv.

（2410）*Carex karoi* (Freyn) Freyn

（2411）*Carex melanantha* C.A.Mey.

（2412）*Carex hancockiana* Maxim.

（2413）*Carex aterrima* Hoppe

（2414）*Carex caucasia* Stev.

（2415）*Carex melananthiformis* Litv.

（2416）*Carex melanocephala* Turcz.

（2417）*Carex caespitosa* L.

（2418）*Carex orbicularis* Boott

（2419）*Carex bigelowii* Torr.ex Schwein.

（2420）*Carex polyphylla* Kar.et Kir.

（2421）*Carex pycnostachya* Kar.et Kir.

（2422）*Carex stenophylloides* V.Krecz.

（2423）*Carex stenophylla* Wahl.

（2424）*Carex pachystylis* J.Gay

（2425）*Carex subphysodes* M.Pop.ex V.Krecz.

（2426）*Carex subphysodes* M.Pop.ex V.Krecz.

（2427）*Carex pseudofoetida* Kuk.

（2428）*Carex enervis* C.A.Mey.

（2429）*Carex praecox* Schreb.

LXXXIII. Araceae

588. *Acorus* L.

（2430）*Acorus calamus* L.

LXXXIV. Lemnaceae

589. *Lemna* L.

（2431）*Lemna minor* L.

590. *Spirodela* Schleid.

（2432）*Spirodela polyrrhiza* (L.) Schleid.

LXXXV. Juncaceae

591. *Juncus* L.

（2433）*Juncus inflexus* L.

（2434）*Juncus sphaerocarpus* Nees ex Funk

（2435）*Juncus subglobosus* K.F.Wu

（2436）*Juncus bufonius* L.

（2437）*Juncus turkestanicus* V.Krecz.et Gontsch.

（2438）*Juncus compressua* Jacq.

（2439）*Juncus heptapotamicus* V.Krecz.et Gontsch.

（2440）*Juncus gerardii* Loisel.

（2441）*Juncus manasiensis* K.F.Wu

（2442）*Juncus atratus* Krock.

（2443）*Juncus articulatus* L.

（2444）*Juncus triglumis* L.

（2445）*Juncus thomsonii* Buchenau

（2446）*Juncus casteneus* Smith

592. *Luzula* DC.

（2447）*Luzula spicata* (L.) DC.

（2448）*Luzula confusa* Lindb.

（2449）*Luzula sibirica* V.Krecz.

（2450）*Luzula pallescens* (Whlb.) Sw.

LXXXVI. Liliaceae

593. *Eremurus* M.Bieb.

（2451）*Eremurus altaicus* (Pall.) Stev.

（2452）*Eremurus inderiensis* (M.Bieb.) Regel

（2453）*Eremurus anisopterus* (Kar.et Kir.) Regel

594. *Gagea* Salisb.

（2454）*Gagea sacculifer* Regel

（2455）*Gagea nigra* L.Z.Shue

（2456）*Gagea granulosa* Turcz

（2457）*Gagea filiformis* (Ledeb.) Kunth

（2458）*Gagea emarginata* Kar.et Kir.

（2459）*Gegea divaricata* Regel Act.Hort.

（2460）*Gagea fedtschenkoana* Pasch.

（2461）*Gagea jaeschkei* Pasch.

（2462）*Gagea bulbifera* (Pall.) Roem.et Schult.

（2463）*Gagea stepposa* L.Z.Shue

（2464）*Gagea albertii* Regel

（2465）*Gagea olgae* Regel

（2466）*Gegea subalpina* L.Z.Shun

（2467）*Gagea tenera* Pasch.

（2468）*Gagea ova* Stapf

595. *Lloydia* Salisb.

（2469）*Lloydia serotina* (L.) Rchb.

596. *Tulipa* L.

（2470）*Tulipa schrenkii* Regel

（2471）*Tulipa iliensis* Regel

（2472）*Tulipa tianschanica* Regel

（2473）*Tulipa sinkiangensis* Z.M.Mao

（2474）*Tulipa uniflora* (L.)Bess.ex Baker

（2475）*Tulipa patens* Agardh.ex Schult.

（2476）*Tulipa buhseana* Boiss.

（2477）*Tulipa dasystemon* (Regel) Regel

（2478）*Tulipa heterophylla* (Regel) Baker

（2479）*Tulipa heteropetala* Ledeb.

597. *Fritillaria* L.

（2480）*Fritillaria pallidiflora* Schrenk

（2481）*Fritillaria pallidiflora var.plena* X.J.Zheng.

（2482）*Fritillaria walujewii* Regel

（2483）*Fritillaria walujewii var.xinyansis* (Y.K.Yan et J.K.Wu) G.J.Liu

（2484）*Fritillaria walujewii var.plena* X.Z.Duan et X.J.Zheng

（2485）*Fritillaria walujewii var.shawanensis* X.Z.Duan et X.J.Zheng

（2486）*Fritillaria ferganesis* A.Los.

（2487）*Fritillaria karelinii* (Fisch.) Baker

598. *Allium* L.

（2488）*Allium teretifolium* Regel

（2489）*Allium korolkowii* Regel

（2490）*Allium deserticolum* M.Pop.

（2491）*Allium przewalskianum* Regel

（2492）*Allium lineare* L.

（2493）*Allium oreoprasum* Schrenk

（2494）*Allium ramosum* L.

（2495）*Allium senescens* L.

（2496）*A11ium strictum* Schrad.

（2497）*Allium polyrhizum* Turcz.ex Regel

（2498）*Allium mongolicum* Regel

（2499）*Allium caespitosum* Siev.ex Bong.et Mey.

（2500）*Allium bidentatum* Fisch.ex Prokh

（2501）*Allium nutans* L.

（2502）*Allium carolinianum* DC.

（2503）*Allium obiquum* L.

（2504）*Allium hymenorrhizum* Ledeb.

（2505）*Allium hymenorrhizum var.dentatum* J.M.Xu

（2506）*Allium kaschianum* Regel

（2507）*Allium globosum* M.Bieb.ex Redoute

（2508）*Allium setifolium* Schrenk

（2509）*Allium pallasii* Murr.

（2510）*A11ium subtilissimum* Ledeb.

（2511）*Allium petraeum* Kar.et Kir.

（2512）*Allium weschniakowii* Regel

（2513）*Allium semenovii* Regel

（2514）*Allium atrosanguineum* Kar.et Kir.

（2515）*Allium schoenoprasum* L.

（2516）*Allium altaicum* Pall.

（2517）*Allium galanthum* Kar.et Kir.

（2518）*Allium grisellum* J.M.Xu

（2519）*Allium glomeratum* Prokh.

（2520）*Allium coeruleum* Pall.

（2521）*Allium schoenoprasoides* Regel

（2522）*Allium platyspathum* Schrenk

（2523）*Allium sinkiangense* Wang et Y.C.Tang

（2524）*Allium decipiens* Fisch.ex Roem.et Schult.

（2525）*Allium fetisovii* Regel

（2526）*Allium caricoides* Regel

599. *Polygonatum* Mill.

（2527）*Polygonatum roseum* (Ledeb.) Kunth

600. *Asparagus* L.

（2528）*Asparagus persicus* Baker

（2529）*Asparagus neglectus* Kar.et Kir.

（2530）*Asparagus angulofractus* Iljin

（2531）*Asparagus officinalis* L.

LXXXVII. Amaryllidaceae

601. *Ixiolirion* (Fisch.) Herb.

（2532）*Ixiolirion tataricum* (Pall.) Herb.

（2533）*Ixiolirion songaricum* P.Yan

LXXXVIII. Iridaceae

602. *Crocus* L.

（2534）*Crocus alatavicus* Regel et Sem.

603. *Xiphium* Mill.

（2535）*Xiphium kolpakowskianum* (Regel) Baker

604. *Iris* L.

（2536）*Iris ensata* Thunb.

（2537）*Iris lactea* Pall.

（2538）*Iris lactea var.chinensis* (Fisch.) Koidz.

（2539）*Iris tenuifolia* Pall.

（2540）*Iris loczyi* Kanitz

（2541）*Iris songarica* Schrenk

（2542）*Iris ruthenica* Ker-Gawl.

（2543）*Iris ruthenica var.brevituba* Maxim.

（2544）*Iris ruthenica var.nana* Maxim.

（2545）*Iris ruthenica var. ruthenica f.leucantha* Y.T.Zhao

（2546）*Iris halophila* Pall.

（2547）*Iris halophila var.sogdiana* (Bge.) Grubov

（2548）*Iris curvifolia* Y.T.Zhao

（2549）*Iris bloudowii* Ledeb.

（2550）*Iris scariosa* Willd.ex Link.

（2551）*Iris goniocarpa* Baker

LXXXIX. Orchidaceae

605. *Neottia* Guett.

（2552）*Neottia camtschatea* (L.) Rchb.

606. *Corallorhiza* Gagnebin

（2553）*Corallorhiza trifida* Chatel.

607. *Listera* R.Br.

（2554）*Listera ovata* (L.) R.Br.

（2555）*Listera tianschanica* Rchb.

608. *Epipactis* Zinn.

（2556）*Epipactis helleborine* (L.) Crantz

（2557）*Epipactis palustris* (L.) Crantz

（2558）*Epipactis xanthophaea* Schltr.

609. *Goodyera* R.Br.

（2559）*Goodyera repens* (L.) R.Br.

610. *Coeloglossum* Hartm.

（2560）*Coeloglossum viride* (L.) Hartm.

611. *Platanthera* Rich.

（2561）*Platanthera minutiflora* Schitr

612. *Orchis* L.

（2562）*Orchis roborovskii* Maxim.

（2563）*Orchis latifolia* L.

（2564）*Orchis umbrosa* Kar.et Kir.

（2565）*Orchis cruenta* Muell.

（2566）*Orchis fuchsia* Druce

2. 2 Vertebrates Animal List of the Nominated Property

There are 550 species of vertebrates in Xinjiang Tianshan, including 102 species of mammals, 370 species of birds, 32 species of reptiles, six species of amphibians and 40 species of fishes.

2.2.1 PISCES

I. Acipenseriformes

1. Acipenseridae

（1）*Acipenser nudiventris*

II. Salmonoiformes

2. Salmonoidae

（2）*Salmo mykiss=S*（）*gairdneri*

III. Cypriniformes

3. Cyprinidae

（3）*Phoxinus brachyurus*

（4）*Abramis brama*

（5）*Rutilus rutilus*

（6）*Ctenopharyngodon idellus*

（7）*Leuciscus leuciscus*

（8）*Leuciscus idus*

（9）*Leuciscus merzbacheri*

（10）*Aspius aspius*

（11）*Hemiculter leucisculus*

（12）*Abbottina rivularis*

（13）*Pseudorabora parva*

（14）*Gobio gobio*

（15）*Cyprinus carpio*

（16）*Carassius auratus*

（17）*Hypophthalmichthys molitrix*

（18）*Rhodeus sinensis*

（19）*Barbus brachycephalus*

（20）*Schizothorax argentatus*

（21）*Schizothorax pseudaksaiensis*

（22）*Schizothorax eurystomus*

（23）*Diptychus machlatus*

（24）*Gymnodiptychus dybowskii*

4. Cobitidae

（25）*Barbatula microphthalma*

（26）*Barbatula labiata*

（27）*Triplophysadorsalis*

（28）*Triplophysastrauchii*

（29）*Triplophysa stoliczkae*

（30）*Triplophysaminuta*

（31）*Triplophysadorsonotatus*

（32）*Misgurnus bipartitus*

IV. Siluriformes

5. Siluridae

（33）*Silurus glanis*

V. Cyprinodontiformes

6. Oryziatidae

（34）*Oryzias latipes*

VI. Synbranchiformes

7. Synbranchidae

（35）*Monopterus albus*

VII. Perciformes

8. Percidae

（36）*Perca schrenki*

9. Eleotridae

（37）*Hypseleotris swinhonis*

10. Gobiidae

（38）*Gobiinae*

（39）*Ctenogobius cliffordpopei*

（40）*Ctenogobius brunneus*

2.2.2 AMPHIBIA

VIII. Caudata

11. Hynobiidae

（41）*Ranodon sibiricus*

IX. Anura

12. Bufonidae

（42）*Bufo raddei*

（43）*Bufo viridis*

13. Ranidae

（44）*Rana chensinensis*

（45）*Rana asiatica*

（46）*Rana ridibunda*

2.2.3 REPTILIA

X. Testudinata

14. Testudinidae

（47）*Testudo horsfieldi*

XI. Squamata

15. Gekkonidae

（48）*Alsophylax pipiens*

（49）*Terotoscincus scincus*

16. Agamidae

（50）*Laudakia stoliczkana*

（51）*Phrynocephalus albolineatus*

（52）*Phrynocephalus axillaries*

（53）*Phrynocephalus forsythii*

（54）*Phrynocephalus grumgrizimailoi*

（55）*Phrynocephalus guttatus*

（56）*Phrynocephalus helioscopus*

（57）*Phrynocephalus mystaceus*

（58）*Phrynocephalus nasatus*

（59）*Phrynocephalus versicolor*

（60）*Trapelus sanguinolentus*

17. Lacertidae

（61）*Eremias arguta*

（62）*Eremias grammica*

（63）*Eremias multiocellata*

（64）*Eremias velox*

（65）*Eremias vermiculata*

（66）*Lacerta agilis*

18. Scincidae

（67）*Asymblepharus alaicus*

XII. Serpentes

19. Boidae

（68）*Eryx miliaris*

（69）*Eryx orentalis-xinjiangensis*

（70）*Eryx tataricus*

20. Colubridae

（71）*Coluber ravergieri*

（72）*Coluber spinalis*

（73）*Elaphe dione*

（74）*Natrix natrix*

（75）*Natrix tessellate*

（76）*Psammophis lineolatus*

21. Viperidae

（77）*Gloydius intermedius*

（78）*Vipera ursinii*

2.2.4 AVES

XIII. Gaviiformes

22. Gaviidae

（79）*Gavia arctica*

XIV. Codicipediformes

23. Podicipedidae

（80）*Podiceps/Tachybaptus/ruficolis*

（81）*Podiceps auritus*

（82）*Podiceps nigricolli(caspicus)*

（83）*Podiceps cristatus*

（84）*Podiceps grisegena*

XV. Pelecaniformes

24. Pelecanidae

（85）*Pelecanus onocrotalus*

（86）*Pelecanus philippenlis*

25. Phalacrocoracidae

（87）*Phalacrocorax carbo*

XVI. Ciconiiformes

26. Ardeidae

（88）*Ardea cinerea*

（89）*Egretta alba*

（90）*Nycticorax nycticorax*

（91）*Botaurus stellaris*

（92）*Ixobrychus minutes*

27. Ciconidae

（93）*Ciconia ciconia*

（94）*Ciconia nigra*

28. Ciconiidae

（95）*Platalea leucorodia*

XVII. Phoenicopteriformes

29. Phoenicopteridae

（96）*Phoenicopterus rubber*

XVIII. Anseriformes

30. Anatidae

（97）*Anser cygnoides*

（98）*Anser fabalis*

（99）*Anser albifrons*

（100）*Anser anser*

（101）*Anser indicus*

（102）*Cygnus cygnus*

（103）*Cygnus columbianus*

（104）*Cygnus olor*

（105）*Tadorna ferruginea*

（106）*Tadorna tadorna*

（107）*Anas acuta*

（108）*Anas crecca*

（109）*Anas platyrhynchos*

（110）*Anas strepera*

（111）*Anas penelope*

（112）*Anas querquedula*

（113）*Anas clypeata*
（114）*Marmaronetta(Anas)angustirostris*
（115）*Netta rufina*
（116）*Aythya ferina*
（117）*Aythya nyroca*
（118）*Aythya baeri*
（119）*Aythya fuligula*
（120）*Melanitta fusca*
（121）*Bucephala clangula*
（122）*Oxyura leucocephala*
（123）*Mergus albellus*
（124）*Mergus serrator*
（125）*Mergus merganser*

XIX. Falconiformes

31. Accipitridae

（126）*Pandion haliaetus*
（127）*Pernis ptilorhyncus*
（128）*Pernis apivorus*
（129）*Milvus korschun(migrans)*
（130）*Accipiter gentiles*
（131）*Accipiter badius*
（132）*Accipiter nisus*(Linnaeus.
（133）*Accipiter virgatus*
（134）*Circus cyaneus*
（135）*Circus macrourus*
（136）*Circus aeruginosus*
（137）*Circus pygargus*
（138）*Buteo rufinus*
（139）*Buteo hemilasius*
（140）*Buteo buteo*
（141）*Buteo lagopus*
（142）*Aquila chrysaetos*
（143）*Aquila heliaca*
（144）*Aquila rapax*
（145）*Aquila clanga*
（146）*Aquila pennatus*(pennata)
（147）*Haliaeetus leucoryphus*

（148）*Haliaeetus albicilla*

（149）*Circaetus ferox*

（150）*Aegypius monachus*

（151）*Gyps himalayensis*

（152）*Gypaegus barbatus*

32. Falconidae

（153）*Falco cherrug*

（154）*Falco altaicus*

（155）*Falco rusticolus*

（156）*Falco peregrinus*

（157）*Falco pelegrinoides*

（158）*Falco subbuteo*

（159）*Falco columbarius*

（160）*Falco vespertinus*

（161）*Falco amurensis*

（162）*Falco naumanni*

（163）*Falco tinnunculus*

XX. Galliformes

33. Tetraonides

（164）*Lururus (Tetrao)tetrix*

34. Phasianidae

（165）*Tetraogallus himalayensis*

（166）*Alectoris chukar*

（167）*Perdix perdix*

（168）*Perdix dauuricae*

（169）*Coturnix coturnix*

（170）*Phasianus colchicus*

XXI. Gruiformes

35. Gruidae

（171）*Grus grus*

（172）*Grus leucogeranus*

（173）*Anthropoides virgo*

36. Rallidae

（174）*Crex crex*

（175）*Porzana parva*

（176）*Porzana pusilla*

（177）*Porzana porzana*

（178）*Gallinula chloropus*

（179）*Fulica atra*

37. Otidae

（180）*Otis(Tetrax)tetrax*

（181）*Otis tarda*

（182）*Otis undulate/Chlamydotis undulata*

XXII. Charadriiformes

38. Haematopodidae

（183）*Haematopus ostralegus*

39. Charadriidae

（184）*Vanellus vanellus*

（185）*Pluvialis squatarola*

（186）*Pluvialis dominuca*

（187）*Charadrius dubius*

（188）*Charadrius alexandrinus*

（189）*Charadrius mongolus*

（190）*Charadrius leschenaultii*

（191）*Charadrius asiaticus*

（192）*Charadrius morinellus*

40. Scolopacidae

（193）*Numenius phaeopus*

（194）*Numenius arquata*

（195）*Limosa limosa*

（196）*Limosa lapponica*

（197）*Tringa erythropus*

（198）*Tringa tetanus*

（199）*Tringa stagnatilis*

（200）*Tringa nebularia*

（201）*Tringa ochropus*

（202）*Tringa glareola*

（203）*Tringa hypoleucos*

（204）*Xenus cinereus*

（205）*Gallinago solitaria*

（206）*Gallinago stenuro*

（207）*Gallinago gallinago*

（208）*Scolopax rusticola*

（209）*Lymnocryptes minimus*

（210）*Calidris temminckii*

（211）*Calidris alpina*

（212）*Calidris ferruginea*

（213）*Crocethia alba*

（214）*Limicola falcinellus*

（215）*Philomachus pugnax*

（216）*Phalaropus lobatus*

（217）*Phalaropus fulicarius*

41. Recurvirostridae

（218）*Ibidorhyncha struthersii*

（219）*Himantopus himantopus*

（220）*Recurvirostra avosetta*

42. Burhinidae

（221）*Burhinus oedicnemus*

43. Glareolidae

（222）*Glareola pratincola*

（223）*Glareola maldivarum*

XXIII. Lariformes

44. Laridae

（224）*Larus argentatus*

（225）*Larus ichthyactus*

（226）*Larus ridibundus*

（227）*Larus brunnicephalus*

（228）*Larus minutus*

（229）*Chlidonias hybrid*

（230）*Chlidonias leucoptera*

（231）*Chlidonias nige*

（232）*Gelochelidon nilotica*

（233）*Hydroprogne caspia(tschegrava)*

（234）*Sterna hirundo*

（235）*Sterna albifrons*

XXIV. Columbiformes

45. Pteroclidae

（236）*Syrrhaptes paradoxox*

（237）*Pterocles orientalis*

46. Columbidae

（238）*Columba rupestris*

（239）*Columba livia*

（240）*Columba oenas*

（241）*Columba eversmanni*

（242）*Columba palumbus*

（243）*Streptopelia turtur*

（244）*Streptopelia orientalis*

（245）*Streptopelia decaocto*

（246）*Streptopelia senegalensis*

XXV. Cuculiformes

47. Cuculidae

（247）*Cuculus canorus*

XXVI. Strigiformes

48. Strigidae

（248）*Otus brucei*

（249）*Otus scops*

（250）*Bubo bubo*

（251）*Nyctea scandiaca*

（252）*Surnia ulula*

（253）*Athene noctua*

（254）*Strix nebulosa*

（255）*Strix uralensis*

（256）*Asio otus*

（257）*Asio flammeus*

（258）*Aegolius funereus*

XXVII. Caprimulgiformes

49. Caprimulgidae

（259）*Caprimulgus europaeus*

XXVIII. Apodiformes

50. Apodidae

（260）*Apus apus*

XXIX. Coraciiformes

51. Alcedinidae

（261）*Alcede atthis*

52. Meropidae

（262）*Merops apiaster*

53. Coraciidae

（263）*Coracias garrulus*

54. Upupidae

（264）*Upupa epops*

XXX. Piciformes

55. Picidae

（265）*Jynx torquilla*

（266）*Picoides(Dendrocopes)major*

（267）*Pocoides(Dendrocopes)leucopterus*

（268）*Pocoides(Dendrocopos)leucotos*

（269）*Picodes tridactylus*

XXXI. Passeriformes

56. Alaudidae

（270）*Melanocorypha capandra*

（271）*Melanocorypha bimaculata*

（272）*Melanocorpyha leucoplera*

（273）*Melanocopyha yeltoniensis*(Forster)

（274）*Calandrella cinerea*

（275）*Calandrella acutirostris*

（276）*Calandrella rufescens*

（277）*Galerida cristata*

（278）*Alauda arvensis*

（279）*Eremophila alpestris*

57. Hirundinidae

（280）*Riparia riparia*

（281）*Ptyonoprogne(Hirundo)rupestris*

（282）*Hirundo rustica*

（283）*Hirundo daurica*

（284）*Delichon urbica*

58. Motacillidae

（285）*Anthus novaeseelandiae*(richardi)

（286）*Anthus campestris*

（287）*Anthus trivialis*

（288）*Anthus hodgsoni*

（289）*Anthus pratensis*

（290）*Anthus cervinus*

（291）*Anthus spinoletta*

（292）*Motacilla flava*

（293）*Motacilla citreola*

（294）*Motacilla cinerea*

（295）*Motacilla alba*

59. Bombycillidae

（296）*Bombycilla garrulous*

60. Cinclidae

（297）*Cinclus cinclus*

（298）*Cinclus pallasii*

61. Troglodytidae

（299）*Troglodytes troglodytes*

62. Prunellidae

（300）*Prunella collaris*

（301）*Prunella himalayana*

（302）*Prunella fulvescene*

（303）*Prunella atrogularis*

63. Muscicapidae

Turdinae

（304）*Luscinia akahige*

（305）*Luscinia megarhynchos*

（306）*Luscinia svecic*

（307）*Luscinia pectoralis*

（308）*Erithacus rubecula*

（309）*Phoenicurus phoenicurus*

（310）*Phoenicurus erythronotus*

（311）*Phoenicurus caeruleocephalus*

（312）*Phoenicurus ochruros*

（313）*Phoenicurus frontalis*

（314）*Phoenicurus eryhrogaster*

（315）*Rhyacomis fuliginosus*
（316）*Saxicola insignis*
（317）*Saxicola torquata*
（318） *Oenanthe isabellina*
（319） *Oenanthe oenanthe*
（320） *Oenanthe deserti*
（321） *Oenanthe hispanica*
（322） *Oenanthe picata*
（323）*Monticola saxatilis*
（324）*Monticola solitaries*
（325）*Zoothera dauma*
（326）*Turdus merulu*
（327）*Turdus obscurus=T.pallidus obscures*
（328）*Turdus ruficollis*
（329）*Turdus naumanni*
（330）*Turdus pilaris*
（331）*Turdus philomelos*
（332）*Turdus viscivorus*

Sylviinae

（333）*Cettia cetti*
（334）*Locustella certhola*
（335）*Locustella naevia*
（336）*Locustella lanceolata*
（337）*Locustella luscinioides*
（338）*Acrocephalus arundinaceus*
（339）*Acrocephalus agricola*
（340）*Acrocephalus schoenobaenus*
（341）*Acrocephalus dumetorum*
（342）*Hippolais caligata*
（343）*Hippolais rama=H.caligata rama*
（344）*Hippolais pallid*
（345）*Sylvia nisoria*
（346）*Sylvia communis*
（347）*Sylvia curruca*
（348）*Sylvia minuta*
（349）*Sylvia namana*
（350）*Phylloscopus collybita*

（351）*Phylloscopus sindianus=P.collybita sindianus*

（352）*Phylloscopus affinis*

（353）*Phylloscopus subaffinis*

（354）*Phylloscopus griseolus*

（355）*Phylloscopus fuscatus*

（356）*Phylloscopus inornatus*

（357）*Phylloscopus trochiloides*

（358）*Phylloscopus sibilatrix*

（359）*Regulus regulus*

Muscicapinae

（360）*Ficedula parva*

（361）*Muscicapa striata*

（362）*Panurus biarmicus*

（363）*Rhopophilus pekinensis*

64. Certhiidae

（364）*Remiz pendulinus*

（365）*Remiz coronatus=R.pendulinus coronatus*

65. Paridae

（366）*Aegithalos caudatus*

（367）*Parus major*

（368）*Parus bokharensis*

（369）*Parus cyanus*

（370）*Parus rubidiventris*

（371）*Parus palustris*

（372）*Parus montanus*

66. Sittidae

（373）*Sitta europaea*

（374）*Tichodroma muraria*

67. Certhiidae

（375）*Certhia familiaris*

68. Oriolidae

（376）*Oriolus oriolus*

69. Laniidae

（377）*Lanius isabellinus*

（378）*Lanius collurio*

（379）*Lanius minor*

（380）*Lanius excubitor*

70. Corvidae

（381）*Pica pica*

（382）*Podoces hendersoni*

（383）*Podoces biddulphi*

（384）*Pseudopodoces humilis*

（385）*Nucifraga caryocatactes*

（386）*Pyrrhocorax pyrrhocorax*

（387）*Pyrrhocorax graculus*

（388）*Corvus frugilegus*

（389）*Corvus monedula*

（390）*Corvus dauuricus=C.monedula dauuricus*

（391）*Corvus corone*

（392）*Corvus carax*

71. Sthrnidae

（393）*Sturnus roseus*

（394）*Sturnus vulgaris*

（395）*Acridotheres tristis*

72. Ploceidae

（396）*Passer ammodendri*

（397）*Passer domesticus*

（398）*Passer hispaniolensis*

（399）*Pelronia pelronia*

（400）*Montifringilla nivalis*

（401）*Montifringilla adamsi*

（402）*Montifringilla blanfordi*

73. Fringillidae/Passeridae

（403）*Fringilla coelebs*

（404）*Fringilla montifringilla*

（405）*Leucosticte nemoricola*

（406）*Leucosticte brandti*

（407）*Leucosticte sillemi*

（408）*Carpodacus erythrinus*

（409）*Carpodacus synoicus*

（410）*Carpodacus rhodochlamys*

（411）*Carpodacus rubicilla*

（412）*Loxia curvirostra*

（413）*Carduelis chloris*
（414）*Craduelis spinus*
（415）*Carduelis thibetanus*
（416）*Carduelis carduelis*
（417）*Carduelis sinica*
（418）*Carduelis flammea*
（419）*Carduelis hornemanni*
（420）*Carduelis flavirostris*
（421）*Carduelis cannabina*
（422）*Serinus pusillus*
（423）*Pyrrhula griseiventris*
（424）*Pyrrhula pyrrhula*
（425）*Coccothraustes coccothraustes*
（426）*Mycerobas carnipes*
（427）*Rhodopechys obsolete*
（428）*Rhodopechys sanguine*
（429）*Rhodopechys githaginea*
（430）*Uragus sibiricus*
（431）*Emberiza calandra*
（432）*Emberiza leucocephala*
（433）*Emberiza melanocephala*
（434）*Emberiza bruniceps*
（435）*Emberiza rutila*
（436）*Emberiza aureola*
（437）*Emberiza citrinella*
（438）*Emberiza hortulana*
（439）*Emberiza buchanani*
（440）*Emberiza cia*
（441）*Emberiza cioides*
（442）*Emberiza rustica*
（443）*Emberiza pusilla*
（444）*Emberiaz variabilis*
（445）*Emberiza yessoensis*
（446）*Emberiza pallasi*
（447）*Emberiza schoeniclus*
（448）*Calcarius lapponicus*

2.2.5 MAMMALIA

XXXII. Insecttvora

74. Erinaceidae

（449）*Hemiechinus auritus*

75. Soricidae

（450）*Sorex asper*

（451）*Sorex minutus*

（452）*Sorex caecutiens*

（453）*Sorex araneus*

（454）*Sorex tibetanus*

（455）*Neomys fodiens*

（456）*Crocidura leucodon*

（457）*Crocidura suaveolens*

XXXIII. Chiroptera

76. Vespertilionidae

（458）*Myotis blythi*

（459）*Myotis mystacinus*

（460）*Plecotus auritus*

（461）*Nyctalus noctula*

（462）*Barbastella leucomelas*

（463）*Pipistrellus savii*

（464）*Eptesicus nilssoni*

（465）*Eptesicus serotinus*

（466）*Vespertilio murinus*

XXXIV. Carnivora

77. Caninidae

（467）*Canis lupus*

（468）*Vulpes corsac*

（469）*Vulpes vulpes*

78. Ursidae

（470）*Ursus arctos isabellinus*

79. Mustelidae

（471）*Mustelinae*

（472）*Martes foina*

（473）*Mustela eversmanni*

（474）*Mustela erminea*

（475）*Mustela altaica*

（476）*Mustela niminea*

（477）*Vormela peregusna*

（478）*Lutra lutra*

（479）*Meles meles tianschanensis*

80. Felidae

（480）*Uncia(Panthera)uncial*

（481）*Lynx lynx*

（482）*Felis manul*

（483）*Felis silvestris ornata*

XXXV. Perissodactyla

81. Equidae

（484）*Equus przewalskii*

（485）*Equus hemionus*

XXXVI. Artiodactyla

82. Suidae

（486）*Sus scrofa*

83. Moschidae

（487）*Moschus chrysogaster*

84. Cervidae

（488）*Cervus elephus songaricus*

（489）*Capreolus capreolus*

85. Bovidae

（490）*Ovis ammon*

①*O.a.seiresis*

②*O.a.littledalei*

③*O.a.karelini*

④*O.a.darwini*

（491）*Capra sibirica(ibex)*

（492）*Gazella sabgutturosa sairensis*

XXXVII. Lagomorpha

86. Leporidae

（493）*Lepus capensis*

（494）*Lepus timidus*

87. Ochotonidae

（495）*Ochotona pallasi*

（496）*Ochotona rutila*

（497）*Ochotona macrotis*

（498）*Ochotona roylei*

（499）*Ochotona iliensis*

XXXVIII. Rodintia

88. Gliridae

（500）*Dryomys nitedula*

89. Sciuridae

（501）*Sciurus vulgaris exalbidus*

（502）*Marmota bobak*

（503）*Spermophilus relictus*

（504）*Spermophilus erythrogenys*

（505）*Spermophilus major*

90. Cricetidae

（506）*Cricetus cricetus*

（507）*Phodopus sungorus*

（508）*Cricetulus eversmanni*

（509）*Cricetulus longicaudatus*

（510）*Cricetulus migratorius*

（511）*Myospalax myospalax*

（512）*Meriones tamariscinus*

（513）*Meriones libycus*

（514）*Meriones meridianus*

（515）*Meriones chengi*

（516）*Rhombomys opimus*

（517）*Ondatra zibethica*

（518）*Arvicola terrestris*

（519）*Ellobius talpinus*

（520）*Clethrionomys frater*

（521）*Clethrionomys centralis*

（522）*Alticola strelzowi*

（523）*Alticola roylei*

（524）*Alticola argentatus*

（525）*Lagurus lagurus*

（526）*Lagurus luteus*

（527）*Microtus gragalis*

（528）*Microtus agrestis*

（529）*Microtus socialis*

（530）*Microtus arvalis*

（531）*Microtus ilaeus*

91. Dipodidae

（532）*Sicista tianschanica*

（533）*Sicista sp*

（534）*Euchoreutes naso*

（535）*Cardiocranius paradoxus*

（536）*Salpingotus kozlovi*

（537）*Salpingotus crassicauda*

（538）*Allactaga elater*

（539）*Allactaga bullata*

（540）*Allactaga sibirica*

（541）*Allactaga major*

（542）*Pygeretmus pumilio*

（543）*Dipus sagitta*

（544）*Stylodipus(Scirtopoda)telum*

92. Muridae

（545）*Rattus norvegicus*

（546）*Rattus flavipectus*

（547）*Mus musculus*

（548）*Micromys minutes*

（549）*Apodemus sylvaticus*

（550）*Apodemus agrarius*

2.3 Rare and Endangered Plants of the Nominated Property

2.3.1 The Tomur Nominated Site

There are 13 species of rare and endangered wild plants in the nominated Tomur, accounting for 11.82% of the total number in Xinjiang Tianshan.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)	Xinjiang Provincial Key Protected Wild Plants List (2007)
1	*Rhodiola pamiro-alaica*	EN		
2	*Ikonnikovia kaufmanniana*	EN		
3	*Tulipa sinkiangensis*	EN		I
4	*Neottia camtschatea*		II	
5	*Corallorhiza trifida Chatel*		II	
6	*Listera ovata*		II	
7	*Epipactis helleborine*		II	
8	*Goodyera repens*		II	
9	*Coeloglossum viride*		II	
10	*Platanthera minutiflora*		II	
11	*Orchis 1atifolia*		II	
12	*Orchis umbrosa*		II	
13	*Orchis cruenta*		II	

2.3.2 The Kalajun-Kuerdening Nominated Site

There are 54 species of rare and endangered wild plants in the nominated Kalajun-Kuerdening, accounting for 49.10% of the total number in Xinjiang Tianshan.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)	Xinjiang Provincial Key Protected Wild Plants List (2007)
1	*Botrychium lunaria*			I
2	*Polypodium vulgare*			I
3	*Picea schrenkiana*	LC		

4	*Juniperus sibirica*			II
5	*Juniperus sabina*	LC		II
6	*Juniperus pseudosabina*	LC		
7	*Ephedra intermedia.*			I
8	*Ephedra glauca*			I
9	*Ephedra regeliana*			I
10	*Ephedra monosperma*			I
11	*Ephedra fedtschenkoae*			I
12	*Juglans regia*	NT		I
13	*Betula tianschanica*	EN		I
14	*Paeonia anomala*			I
15	*Roemeria refracta*			II
16	*Rhodiola rosea*			I
17	*Rhodiola telephioides*			II
18	*Rhodiola kirilowii.*			II
19	*Crataegus songorica*			II
20	*Sorbus tianschanica*	LC		
21	*Malus sieversii*	VU		I
22	*Rosa platyacantha*			II
23	*Armeniaca vulgaris*	EN		I
24	*Padus avium*			II
25	*Glycyrrhiza aspera*			I
26	*Glycyrrhiza uralensis*			I
27	*Glycyrrhiza glabra*			I
28	*Dictamnus angustifolius*			II
29	*Acer semenovii*			I
30	*Rhamnus songorica*			II
31	*Helianthemum soongoricum*			I
32	*Arctous alpinus*			II
33	*Ikonnikovia kaufmanniana*			
34	*Fraxinus sogdiana*	NT		I
35	*Centaurium pulchellum*	LC		

36	*Myosotis alpestris*	NT		
37	*Apocynum venetum*			I
38	*Arnebia tschimganica*			I
39	*Arnebia euchroma*			I
40	*Tulipa sinkiangensis*	EN		I
41	*Fritillaria pallidiflora*			I
42	*Fritillaria walujewii*			I
43	*Fritillaria walujewii var.plena*			I
44	*Fritillaria karelinii*			I
45	*Neottia camtschatea*		II	
46	*Corallorhiza trifida*		II	
47	*Listera ovata*		II	
48	*Epipactis helleborine*		II	
49	*Goodyera repens*		II	
50	*Coeloglossum viride*		II	
51	*Platanthera minutiflora*		II	
52	*Orchis latifolia*		II	
53	*Orchis umbrosa*		II	
54	*Orchis cruenta*		II	

2.3.3 The Nominated Bayinbuluke Site

There are 3 species of rare and endangered wild plants in the nominated Bayinbuluke, accounting for 2.73% of the total number in Xinjiang Tianshan.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)	Xinjiang Provincial Key Protected Wild Plants List (2007)
1	*Polypodium vulgare*			I
2	*Picea schrenkiana*	LC		
3	*Larix sibirica*	LC		
4	*Juniperus sabina*	LC		II
5	*Juniperus pseudosabina*	LC		

6	*Ephedra intermedia.*			I
7	*Ephedra glauca*			I
8	*Ephedra distachya*			I
9	*Ephedra regeliana*			I
10	*Ephedra equisetina*			I
11	*Betula tianschanica*	EN		I
12	*Haloxyon persicum*			I
13	*Haloxylon ammodendron*			I
14	*Leontice incerta*			II
15	*Rhodiola rosea*			I
16	*Rhodiola kirilowii.*			II
17	*Sorbus tianschanica*	LC		
18	*Rosa platyacantha*			II
19	*Glycyrrhiza aspera*			I
20	*Glycyrrhiza uralensis*			I
21	*Dictamnus angustifolius*			II
22	*Chrozophora sabulos*			II
23	*Cynomori songaricum*			I
24	*Myosotis alpestris*	NT		
25	*Apocynum venetum*			I
26	*Arnebia euchroma*			I
27	*Cistanche deserticola*	CR	II	I
28	*Cistanche salsa*			I
29	*Cistanche tubulosa*			I
30	*Saussurea involucrata*			II
31	*Alisma lanceolatum*			II
32	*Tulipa sinkiangensis*	EN		I
33	*Fritillaria walujewii*			I
34	*Neottia camtschatea*		II	
35	*Corallorhiza trifida*		II	
36	*Epipactis helleborine*		II	
37	*Goodyera repens*		II	

38	*Coeloglossum viride*		II	
39	*Orchis roborovskii*		II	
40	*Orchis latifolia*		II	
41	*Orchis umbrosa*		II	

2.3.3 The Bogda Nominated

There are 41 species of rare and endangered wild plants in the nominated Bogda, accounting for 32.27% of the total number in Xinjiang Tianshan.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)
1	*Polypodium vulgare*		
2	*Picea schrenkiana*	LC	
3	*Larix sibirica*	LC	
4	*Juniperus sabina*	LC	
5	*Juniperus pseudosabina*	LC	
6	*Ephedra intermedia.*		
7	*Ephedra glauca*		
8	*Ephedra distachya*		
9	*Ephedra regeliana*		
10	*Ephedra equisetina*		
11	*Betula tianschanica*	EN	
12	*Haloxyon persicum*		
13	*Haloxylon ammodendron*		
14	*Leontice incerta*		
15	*Rhodiola rosea*		
16	*Rhodiola kirilowii.*		
17	*Sorbus tianschanica*	LC	
18	*Rosa platyacantha*		
19	*Glycyrrhiza aspera*		

20	*Glycyrrhiza uralensis*		
21	*Dictamnus angustifolius*		
22	*Chrozophora sabulos*		
23	*Cynomori songaricum*		
24	*Myosotis alpestris*	NT	
25	*Apocynum venetum*		
26	*Arnebia euchroma*		
27	*Cistanche deserticola*	CR	II
28	*Cistanche salsa*		
29	*Cistanche tubulosa*		
30	*Saussurea involucrata*		
31	*Alisma lanceolatum*		
32	*Tulipa sinkiangensis*	EN	
33	*Fritillaria walujewii*		
34	*Neottia camtschatea*		II
35	*Corallorhiza trifida*		II
36	*Epipactis helleborine*		II
37	*Goodyera repens*		II
38	*Coeloglossum viride*		II
39	*Orchis roborovskii*		II
40	*Orchis latifolia*		II
41	*Orchis umbrosa*		II

2.4 Rare and Endangered Animal in the Nominated Property

2.4.1 The Nominated Tomur Site

There are 89 species of rare and endangered wild vertebrates in the nominated Tomur, including 26 kinds of mammals, 59 kinds of birds, one kind of reptile, 2 kinds of amphibians and one kind of fish.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)	China Species Red List (2004)	National Key Protected Wild Animals List (1988)
1	*Perca schrenki*	DD			
2	*Rana asiatica*	LC			
3	*Rana chensinensis*	LC		VU	
4	*Vipera ursinii*	VU	I		
5	*Phylloscopus trochiloides*	LC			
6	*Monticola saxatilis*	LC			
7	*Motacilla alba*	LC			
8	*Ardea cinerea*	LC			
9	*Accipiter gentiles*				II
10	*Turdus ruficollis*	LC			
11	*Carduelis cannabina*	LC			
12	*Cuculus canorus*	LC			
13	*Carpodacus rubicilla*	LC			
14	*Upupa epops*	LC			
15	*Galerida cristata*	LC			
16	*Leucosticte brandti*	LC			
17	*Tetraogallus himalayensis*	LC			
18	*Prunella himalayana*	LC			
19	*Cinclus cinclus*	LC			
20	*Parus montanus*	LC			
21	*Phoenicurus erythronotus*	LC			
22	*Carduelis carduelis*	LC			
23	*Falco tinnunculus*	LC			

24	*Pyrrhocorax pyrrhocorax*	LC			
25	*Gypaegus barbatus*			VU	I
26	*Turdus viscivorus*	LC			
27	*Ibidorhyncha struthersii*	LC			
28	*Phylloscopus inornatus*	LC			
29	*Pyrrhocorax graculus*	LC			
30	*Carduelis flavirostris*	LC			
31	*Sylvia communis*	LC			
32	*Motacilla cinerea*	LC			
33	*Emberiza buchanani*	LC			
34	*Parus cyanus*	LC			
35	*Passer domesticus*	LC			
36	*Hirundo rustica*	LC			
37	*Eremophila alpestris*	LC			
38	*Aquila chrysaetos*	LC		VU	II
39	*Serinus pusillus*	LC			
40	*Falco cherrug*	VU			
41	*Leucosticte nemoricola*	LC			
42	*Anthus trivialis*	LC			
43	*Delichon urbica*	LC			
44	*Oenanthe deserti*	LC			
45	*Rhodopechys githaginea*	LC			
46	*Oenanthe isabellina*	LC			
47	*Streptopelia orientalis*	LC			
48	*Alectoris chukar*	LC			
49	*Anthus spinoletta*	LC			
50	*Oenanthe oenanthe*	LC			
51	*Corvus frugilegus*	LC			
52	*Aegypius monachus*	NT		VU	II
53	*Pica pica*	LC			
54	*Corvus corone*	LC			
55	*Nucifraga caryocatactes*	LC			
56	*Certhia familiaris*	LC			

57	*Columba rupestris*	LC			
58	*Falco subbuteo*	LC			
59	*Columba livia*	LC			
60	*Phoenicurus ochruros*	LC			
61	*Sturnus vulgaris*	LC			
62	*Buteo rufinus*	LC		R	II
63	*Athene noctua*	LC			
64	*Capra sibirica*	LC			
65	*Crocidura suaveolens*	LC			
66	*Lepus capensis*	LC			
67	*Marmota bobak*	LC			
68	*Lagurus lagurus*	LC			
69	*Vulpes vulpes*	LC			
70	*Ochotona macrotis*	LC			
71	*Hemiechinus auritus*	LC			
72	*Cricetulus migratorius*	LC			
73	*Clethrionomys centralis*	LC			
74	*Canis lupus*	LC	II		
75	*Capreolus capreolus*	LC			
76	*Ovis ammon*	NT	II		
77	*Microtus arvalis*	LC			
78	*Lynx lynx*	LC			
79	*Martes foina*	LC			
80	*Spermophilus relictus*	LC			
81	*Sorex asper*	LC			
82	*Plecotus auritus*	LC			
83	*Mustela altaica*	NT			
84	*Mus musculus*	LC			
85	*Sorex minutus*	LC			
86	*Panthera uncia*	EN	I		
87	*Ellobius talpinus*	LC			
88	*Felis silvestris*	LC			
89	*Sus scrofa*	LC			

2.4.2 The Nominated Kalajun-Kuerdening Site

There are 148 species of rare and endangered wild vertebrates in the nominated Kalajun-Kuerdening, including 42 kinds of mammals, 98 kinds of birds, 2 kinds of reptile, 3 kinds of amphibians and 3 kinds of fish.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)	China Species Red List (2004)	National Key Protected Wild Animals List (1988)
1	*Cyprinus carpio*	VU			
2	*Acipenser nudiventris*	CR			
3	*Perca schrenki*	DD			
4	*Ranodon sibiricus*	EN			
5	*Rana chensinensis*	LC			
6	*Rana asiatica*	LC			
7	*Testudo horsfieldii*			CR	I
8	*Vipera ursinii*	VU	I		
9	*Podiceps auritus*	LC			II
10	*Pelecanus onocrotalus*	LC		NI	II
11	*Ixobrychus minutes*				II
12	*Ciconia nigra*	LC	II	EN	I
13	*Anser fabalis*	LC			II
14	*Tadorna ferruginea*	LC			
15	*Anas acuta*	LC			
16	*Anas platyrhynchos*	LC			
17	*Mergus merganser*	LC			
18	*Pandion haliaetus*	LC			
19	*Accipiter gentiles*				II
20	*Accipiter badius*	LC		R	II
21	*Accipiter nisus*	LC			II
22	*Circus cyaneus*	LC			II
23	*Circus aeruginosus*	LC			II
24	*Buteo rufinus*	LC		R	II
25	*Buteo hemilasius*	LC			II
26	*Buteo buteo*	LC			II

27	*Buteo lagopus*	LC			II
28	*Aquila heliaca*	VU	I	VU	I
29	*Aquila rapax*	LC		R	II
30	*Aquila clanga*	VU		R	II
31	*Gyps himalayensis*	LC		R	II
32	*Gypaegus barbatus*			VU	I
33	*Falco cherrug*	VU		R	II
34	*Falco peregrinus*	LC	I	R	II
35	*Falco subbuteo*	LC			II
36	*Falco columbarius*	LC			II
37	*Falco tinnunculus*	LC			II
38	*Tetraogallus himalayensis*	LC			II
39	*Alectoris chukar*	LC			
40	*Phasianus colchicus*	LC			
41	*Gallinula chloropus*	LC			
42	*Gallinago solitaria*	LC			
43	*Scolopax rusticola*	LC			
44	*Sterna hirundo*	LC			
45	*Columba rupestris*	LC			
46	*Columba livia*	LC			
47	*Columba oenas*	LC			
48	*Columba palumbus*	LC			II
49	*Streptopelia orientalis*	LC			
50	*Cuculus canorus*	LC			
51	*Otus brucei*	LC			II
52	*Bubo bubo*	LC		R	II
53	*Athene noctua*	LC			II
54	*Asio otus*	LC			II
55	*Asio flammeus*	LC			II
56	*Aegolius funereus*	LC		NI	II
57	*Merops apiaster*	LC			
58	*Coracias garrulus*	NT			
59	*Galerida cristata*	LC			

60	*Anthus trivialis*	LC			
61	*Motacilla flava*	LC			
62	*citreola*	LC			
63	*Motacilla cinerea*	LC			
64	*Cinclus cinclus*	LC			
65	*Troglodytes troglodytes*	LC			
66	*Prunella atrogula*	LC			
67	*Luscinia megarhynchos*	LC			
68	*Phoenicurus erythronotus*	LC			
69	*Phoenicurus caeruleocephalus*	LC			
70	*Phoenicurus ochruros*	LC			
71	*Saxicola torquata*	LC			
72	*Oenanthe isabellina*	LC			
73	*Turdus ruficollis*	LC			
74	*Turdus viscivorus*	LC			
75	*Acrocephalus arundinaceus*	LC			
76	*Sylvia communis*	LC			
77	*Phylloscopus collybita*	LC			
78	*Phylloscopus inornatus*	LC			
79	*Regulus regulus*	LC			
80	*Parus major*	LC			
81	*Parus cyanus*	LC			
82	*Parus montanus*	LC			
83	*Tichodroma muraria*	LC			
84	*Certhia familiaris*	LC			
85	*Oriolus oriolus*	LC			
86	*Lanius collurio*	LC			
87	*Lanius minor*	LC			
88	*Pica pica*	LC			
89	*Nucifraga caryocatactes*	LC			
90	*Pyrrhocorax pyrrhocorax*	LC			
91	*Corvus monedula*	LC			
92	*Corvus corone*	LC			

93	*Sturnus roseus*	LC			
94	*Sturnus vulgaris*	LC			
95	*Acridotheres tristis*	LC			
96	*Passer domesticus*	LC			
97	*Fringilla coelebs*	LC			
98	*Fringilla montifringilla*	LC			
99	*Carpodacus erythrinus*	LC			
100	*rhodochlamys*	LC			
101	*Carduelis carduelis*	LC			
102	*Carduelis flavirostris*	LC			
103	*Carduelis cannabina*	LC			
104	*Serinus pusillus*	LC			
105	*Uragus sibiricus*	LC			
106	*Emberiza rustica*	LC			
107	*Hemiechinus auritus*	LC			
108	*Sorex minutus*	LC			
109	*Crocidura leucodon*	LC			
110	*Crocidura suaveolens*	LC			
111	*Nyctalus noctula*	LC			
112	*Eptesicus serotinus*	LC			
113	*Canis lupus*	LC	II	VU	
114	*Ursus arctos*			EN	II
115	*Vulpes corsac*	LC			
116	*Vulpes vulpes*	LC			
117	*Martes foina*	LC		VU	II
118	*Mustela erminea*	LC			
119	*Mustela altaica*	NT			
120	*Vormela peregusna*	VU		R	
121	*Lutra lutra*	NT	I	VU	II
122	*Panthera uncia*	EN	I	EN	I
123	*Lynx lynx*	LC		VU	II
124	*Felis manul*			VU	II
125	*Sus scrofa*	LC			

126	*Cervus elaphus songaricus*			EN	I
127	*Capreolus capreolus*	LC			
128	*Ovis ammon*	NT	II		
129	*Capra sibirica*	LC		EN	II
130	*Lepus capensis*	LC			
131	*Ochotona roylei*	LC			
132	*Ochotona iliensis*	EN			
133	*Marmota bobak*	LC			
134	*Spermophilus relictus*	LC			
135	*Cricetulus longicaudatus*	LC			
136	*Cricetulus migratorius*	LC			
137	*Meriones meridianus*	LC			
138	*Arvicola terrestris*	LC			
139	*Ellobius talpinus*	LC			
140	*Clethrionomys centralis*	LC			
141	*Alticola argentatus*	LC			
142	*Lagurus lagurus*	LC			
143	*Microtus ilaeus*	LC			
144	*Allactaga elater*	LC			
145	*Pygeretmus pumilio*	LC			
146	*Dipus sagitta*	LC			
147	*Mus musculus*	LC			
148	*Apodemus sylvaticus*	LC			

2.4.3 The Nominated Bayinbuluke Site

There are 110 species of rare and endangered wild vertebrates in the nominated Bayinbuluke, including 12 kinds of mammals, 97 kinds of birds and one kind fish.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)	China Species Red List (2004)	National Key Protected Wild Animals List (1988)
1	*Leuciscus merzbacheri*			VU	
2	*Cyprinus carpio*	VU			
3	*Podiceps cristatus*	LC			

4	*Ardea cinerea*	LC			
5	*Ciconia nigra*	LC	II	EN	I
6	*Anser anser*	LC			
7	*Tadorna ferruginea*	LC			
8	*Anas platyrhynchos*	LC			
9	*Anas strepera*	LC			
10	*Anas clypeata*	LC			
11	*Netta rufina*	LC			
12	*Aythya nyroca*	NT			
13	*Accipiter nisus*	LC			II
14	*Circus aeruginosus*	LC			II
15	*Buteo rufinus*	LC		R	II
16	*Buteo hemilasius*	LC			II
17	*Haliaeetus leucoryphus*	VU		VU	I
18	*Aegypius monachus*	NT		VU	II
19	*Gypaegus barbatus*			VU	I
20	*Falco subbuteo*	LC			II
21	*Falco columbarius*	LC			II
22	*Falco naumanni*	VU			II
23	*Falco tinnunculus*	LC			II
24	*Alectoris chukar*	LC			
25	*Fulica atra*	LC			
26	*Vanellus vanellus*	LC			
27	*Pluvialis squatarola*	LC			
28	*Charadrius dubius*	LC			
29	*Charadrius leschenaultii*	LC			
30	*Tringa ochropus*	LC			
31	*Himantopus himantopus*	LC			
32	*Recurvirostra avosetta*	LC			
33	*Glareola pratincola*	LC			
34	*Sterna hirundo*	LC			
35	*Columba rupestris*	LC			
36	*Columba livia*	LC			

37	*Streptopelia turtur*	LC			
38	*Streptopelia orientalis*	LC			
39	*Cuculus canorus*	LC			
40	*Athene noctua*	LC			II
41	*Asio otus*	LC			II
42	*Caprimulgus europaeus*	LC			
43	*Apus apus*	LC			
44	*Upupa epops*	LC			
45	*Calandrella acutirostris*	LC			
46	*Galerida cristata*	LC			
47	*Alauda arvensis*	LC			
48	*Eremophila alpestris*	LC			
49	*Delichon urbica*	LC			
50	*Anthus campestris*	LC			
51	*Anthus trivialis*	LC			
52	*Anthus spinoletta*	LC			
53	*Motacilla flava*	LC			
54	*Motacilla citreola*	LC			
55	*Motacilla cinerea*	LC			
56	*Motacilla alba*	LC			
57	*Cinclus cinclus*	LC			
58	*Cinclus pallasii*	LC			
59	*Prunella collaris*	LC			
60	*Prunella himalayana*	LC			
61	*Prunella atrogularis*	LC			
62	*Luscinia megarhynchos*	LC			
63	*Phoenicurus phoenicurus*	LC			
64	*Phoenicurus erythronotus*	LC			
65	*Phoenicurus ochruros*	LC			
66	*Oenanthe isabellina*	LC			
67	*Oenanthe oenanthe*	LC			
68	*Monticola saxatilis*	LC			
69	*Turdus ruficollis*	LC			

70	*Turdus viscivorus*	LC			
71	*Cettia cetti*	LC			
72	*Sylvia nisoria*	LC			
73	*Sylvia communis*	LC			
74	*Phylloscopus subaffinis*	LC			
75	*Phylloscopus inornatus*	LC			
76	*Phylloscopus trochiloides*	LC			
77	*Regulus regulus*	LC			
78	*Muscicapa striata*	LC			
79	*Parus cyanus*	LC			
80	*Parus palustris*	LC			
81	*Certhia familiaris*	LC			
82	*Lanius collurio*	LC			
83	*Lanius excubitor*	LC			
84	*Pica pica*	LC			
85	*Nucifraga caryocatactes*	LC			
86	*Pyrrhocorax pyrrhocorax*	LC			
87	*Pyrrhocorax graculus*	LC			
88	*Corvus monedula*	LC			
89	*Corvus corone*	LC			
90	*Sturnus vulgaris*	LC			
91	*Passer domesticus*	LC			
92	*Montifringilla blanfordi*	LC			
93	*Leucosticte brandti*	LC			
94	*Carpodacus erythrinus*	LC			
95	*Carpodacus rhodochlamys*	LC			
96	*Loxia curvirostra*	LC			
97	*Carduelis carduelis*	LC			
98	*Carduelis flavirostris*	LC			
99	*Carduelis cannabina*	LC			
100	*Serinus pusillus*	LC			
101	*Coccothraustes coccothraustes*	LC			
102	*githaginea*	LC			

103	*Emberiza bruniceps*	LC			
104	*Emberiza hortulana*	LC			
105	*Emberiza buchanani*	LC			
106	*Emberiza schoeniclus*	LC			
107	*Sorex araneus*	LC			
108	*Canis lupus*	LC	II	VU	
109	*Vulpes vulpes*	LC			
110	*foina*	LC		VU	II
111	*Mustela erminea*	LC			
112	*Lutra lutra*	NT	I	VU	II
113	*Panthera uncia*	EN	I	EN	I
114	*Lynx lynx*	LC		VU	II
115	*Felis manul*			VU	II
116	*Sus scrofa*	LC			
117	*Cervus elaphus songaricus*			EN	I
118	*Capreolus capreolus*	LC			
119	*Ovis ammon*	NT	II		
120	*Capra sibirica and Capra ibex*	LC		EN	II
121	*Lepus capensis*	LC			
122	*Dryomys nitedula*	LC		VU	
123	*Cricetulus migratorius*	LC			
124	*Meriones tamariscinus*	LC			
125	*Ellobius talpinus*	LC			
126	*Clethrionomys frater*	LC			
127	*Alticola argentatus*	LC			
128	*Lagurus lagurus*	LC			
129	*Microtus socialis*	LC			
130	*Allactaga sibirica*	LC			
131	*Mus musculus*	LC			

2.4.4 The Nominated Bogda Site

There are 131 species of rare and endangered wild vertebrates in the nominated Bogda, including 25 kinds of mammals, 104 kinds of bird and 2 kinds of fish.

No.	Species Name	Red List of IUCN (2010)	CITES (2010)	China Species Red List (2004)	National Key Protected Wild Animals List (1988)
M-1	*Sorex araneus*	LC			
M-2	*Canis lupus*	LC	II	VU	
M-3	*Vulpes vulpes*	LC			
M-4	*Martes foina*	LC		VU	II
M-5	*Mustela erminea*	LC			
M-6	*Lutra lutra*	NT	I	VU	II
M-7	*Panthera uncia*	EN	I	EN	I
M-8	*Lynx lynx*	LC		VU	II
M-9	*Felis manul*			VU	II
M-10	*Sus scrofa*	LC			
M-11	*Cervus elaphus songaricus*			EN	I
M-12	*Capreolus capreolus*	LC			
M-13	*Ovis ammon*	NT	II		
M-14	*Capra sibirica* □*Capra ibex*	LC		EN	II
M-15	*Lepus capensis*	LC			
M-16	*Dryomys nitedula*	LC		VU	
M-17	*Cricetulus migratorius*	LC			
M-18	*Meriones tamariscinus*	LC			
M-19	*Ellobius talpinus*	LC			
M-20	*Clethrionomys frater*	LC			
M-21	*Alticola argentatus*	LC			
M-22	*Lagurus lagurus*	LC			
M-23	*Microtus socialis*	LC			
M-24	*Allactaga sibirica*	LC			

M-25	*Mus musculus*	LC			
B-25	*Pluvialis squatarola*	LC			
B-26	*Charadrius dubius*	LC			
B-27	*Charadrius leschenaultii*	LC			
B-28	*Tringa ochropus*	LC			
B-29	*Himantopus himantopus*	LC			
B-30	*Recurvirostra avosetta*	LC			
B-31	*Glareola pratincola*	LC			
B-32	*Sterna hirundo*	LC			
B-33	*Columba rupestris*	LC			
B-34	*Columba livia*	LC			
B-35	*Streptopelia turtur*	LC			
B-36	*Streptopelia orientalis*	LC			
B-37	*Cuculus canorus*	LC			
B-38	*Athene noctua*	LC			II
B-39	*Asio otus*	LC			II
B-40	*Caprimulgus europaeus*	LC			
B-41	*Apus apus*	LC			
B-42	*Upupa epops*	LC			
B-43	*Calandrella acutirostris*	LC			
B-44	*Galerida cristata*	LC			
B-45	*Alauda arvensis*	LC			
B-46	*Eremophila alpestris*	LC			
B-47	*Delichon urbica*	LC			
B-48	*Anthus campestris*	LC			
B-49	*Anthus trivialis*	LC			
B-50	*Anthus spinoletta*	LC			
B-51	*Motacilla flava*	LC			
B-52	*Motacilla citreola*	LC			
B-53	*Motacilla cinerea*	LC			

B-54	*Motacilla alba*	LC			
B-55	*Cinclus cinclus*	LC			
B-56	*Cinclus pallasii*	LC			
B-57	*Prunella collaris*	LC			
B-58	*Prunella himalayana*	LC			
B-59	*Prunella atrogularis*	LC			
B-60	*Luscinia megarhynchos*	LC			
B-61	*Phoenicurus phoenicurus*	LC			
B-62	*Phoenicurus erythronotus*	LC			
B-63	*Phoenicurus ochruros*	LC			
B-64	*Oenanthe isabellina*	LC			
B-65	*Oenanthe oenanthe*	LC			
B-66	*Monticola saxatilis*	LC			
B-67	*Turdus ruficollis*	LC			
B-68	*Turdus viscivorus*	LC			
B-69	*Cettia cetti*	LC			
B-70	*Sylvia nisoria*	LC			
B-71	*Sylvia communis*	LC			
B-72	*Phylloscopus subaffinis*	LC			
B-73	*Phylloscopus inornatus*	LC			
B-74	*Phylloscopus trochiloides*	LC			
B-75	*Regulus regulus*	LC			
B-76	*Muscicapa striata*	LC			
B-77	*Parus cyanus*	LC			
B-78	*Parus palustris*	LC			
B-79	*Certhia familiaris*	LC			
B-80	*Lanius collurio*	LC			
B-81	*Lanius excubitor*	LC			
B-82	*Pica pica*	LC			
B-83	*Nucifraga caryocatactes*	LC			

B-84	*Pyrrhocorax pyrrhocorax*	LC			
B-85	*Pyrrhocorax graculus*	LC			
B-86	*Corvus monedula*	LC			
B-87	*Corvus corone*	LC			
B-88	*Sturnus vulgaris*	LC			
B-89	*Passer domesticus*	LC			
B-90	*Montifringilla blanfordi*	LC			
B-91	*Leucosticte brandti*	LC			
B-92	*Carpodacus erythrinus*	LC			
B-93	*Carpodacus rhodochlamys*	LC			
B-94	*Loxia curvirostra*	LC			
B-95	*Carduelis carduelis*	LC			
B-96	*Carduelis flavirostris*	LC			
B-97	*Carduelis cannabina*	LC			
B-98	*Serinus pusillus*	LC			
B-99	*Coccothraustes coccothraustes*	LC			
B-100	*Rhodopechys githaginea*	LC			
B-101	*Emberiza bruniceps*	LC			
B-102	*Emberiza hortulana*	LC			
B-103	*Emberiza buchanani*	LC			
B-104	*Emberiza schoeniclus*	LC			
F-1	*Leuciscus merzbacheri*			VU	
F-2	*Cyprinus carpio*	VU			

2.5 Endemic Plant Species in the Nominated Property

2.5.1 The Nominated Tomur Site

There are 26 species of endemic plants in the nominated Tomur, accounting for 22.03 % of the total endemic plants in Xinjiang Tianshan.

No.	Species
1	*Calligonum roborovskii* A.Los
2	*Salsola junatovii* Botsch
3	*Delphinium tianshanicum* W.T.Wang
4	*Delphinium winklerianum* Huth
5	*Arabidopsis tuemurica* K.C.Kuan et Z.X.An
6	*Neotorularia rosulfolia* (K.C.Kuan et Z.X.An) Z.X.An
7	*Stenocoelium popovii* V.Vinogr.et Fedoronczuk
8	*Eriocycla peliotii* (Boiss.) Wolff
9	*Onosma apiculatum* Riedl
10	*Eritrichium sinomicrocarpum* W.T.Wang
11	*Nepeta virgata* C.Y.Wu et Hesuan
12	*Linaria vulgaris* Mill.
13	*Doronicum tianshanicum* Z.X.An
14	*Jurinea flaccida* Shih
15	*Saussurea pulviniformis* Winkl
16	*Alfredia fetissowii* Iljin
17	*Serratula rugosa* Iljin
18	*Poa membranigluma* D.F.Cui
19	*Poa major* D.F.Cui
20	*Puccinellia microanthera* D.F.Cui
21	*Elymus sylvaticus*(Keng.et S.L.Chen)S.L.Chen
22	*Tulipa sinkiangensis* Z.M.Mao
23	*Elymus sinkiangensis* D.F.Cui
24	*Phlomis chinghoensis* C.Y.Wu
25	*Hexinia polydichotoma* (Ostenf.) H.L.Yang
26	*Juncus subglobosus* K.F.Wu

2.5.2 The Nominated Kalajun-Kuerdening Site

There are 38 species of endemic plants in the nominated Kalajun-Kuerdening, accounting for 32.20 % of the total endemic plants in Xinjiang Tianshan.

No.	Species
1	*Salix pyrolifolia* Ledeb
2	*Delphinium wentsaii* Y.Z.Zhao
3	*Delphinium mollifolium* W.T.Wang
4	*Delphinium elliptico-ovatum* W.T.Wang
5	*Delphinium winklerianum* Huth
6	*Delphinium tianshanicum* W.T.Wang
7	*Brassica xinjiangensis* Y.C.Lan et T.Y.Cheo
8	*Erysimum eseptatum* Z.X.An
9	*Stenocoelium popovii* V.Vinogr.et Fedoronczuk
10	*Onosma apiculatum* Riedl
11	*Nepeta virgata* C.Y.Wu et Hesuan
12	*Physochlaina capitata* Kuang et A.M.Lu
13	*Linaria vulgaris* Mill.
14	*Pedicularis myriophylla* Pall
15	*Seriphidium borotalense*(Poljak.)Ling et Y.R.Linng
16	*Doronicum tianshanicum* Z.X.An
17	*Echinops sylvicola* Shih
18	*Jurinea flaccida* Shih
19	*Jurinea scapiformis* Shih
20	*Saussurea pulviniformis* Winkl
21	*Saussurea alberti* Rgl.et Winkl
22	*Saussurea canescens* Winkl
23	*Saussurea lomatolepis* Lipsch
24	*Alfredia fetissowii* Iljin
25	*Serratula rugosa* Iljin
26	*Centaurea dschungarica* Shih

27	*Taraxacum xinyuanicum* D.T.Zhai et Z.X.An
28	*Crepis pseudonaniforma* Shih
29	*Poa florida* N.R.Cui
30	*Poa major* D.F.Cui
31	*Puccinellia microanthera* D.F.Cui
32	*Elymus viridulus* (Keng) S.L.Chen
33	*Elymus sylvaticus*(Keng.et S.L.Chen)S.L.Chen
34	*Elymus sinkiangensis* D.F.Cui
35	*Agrostis sinkiangensis* Y.C.Yang
36	*Gagea stepposa* L
37	*Iris curvifolia* Y.T.Zhao
38	*Tulipa sinkiangensis* Z.M.Mao

2.5.3 The Nominated Bayinbuluke Site

There are 17 species of endemic plants in the nominated Bayinbuluke, accounting for 14.41 % of the total endemic plants in Xinjiang Tianshan.

No.	Species
1	*Asplenium tianshanicum* Ching
2	*Delphinium tianshanicum* W.T.Wang
3	*Erysimum brevifolium* Z.X.An
4	*Camelina microcarpa* Andz
5	*Oxytropis bogdoschanica* Jurtz
6	*Ferula fukangensis* K.M.Shen
7	*Lappula ramulosa* C.J.Wang et X.D.Wang
8	*Lappula heteromorpha* C.J.Wang
9	*Scutellaria orthotricha* C.Y.Wu et H.W.Li
10	*Lagochilus lanatonodus* C.Y.Wu et Hsuan
11	*Pedicularis myriophylla* Pall
12	*Galatella bogidaica* Y.Wei et Z.X.An
13	*Saussurea pulviniformis* Winkl
14	*Saussurea canescens* Winkl

15	*Seriphidium borotalense*(Poljak.)Ling et Y.R.Linng
16	*Doronicum tianshanicum* Z.X.An
17	*Ligularia tianshanica* C.Y.Yang et S.L.Keng
18	*Serratula rugosa* Iljin
19	*Puccinellia florida* D.F.Cui
20	*Elymus sylvaticus*(Keng.et S.L.Chen)S.L.Chen
21	*E1ymus platyphyllus*(Keng)A.Love
22	*Elymus viridulus*(Keng)S.L.Chen
23	*E1ymus sinkiangensis* D.F.Cui
24	*E1ymus glaberrimus*(Keng)S.L.Chen
25	*Gagea nigra* L.Z.Shue
26	*Gagea stepposa* L
27	*Tulipa sinkiangensis* Z.M.Mao

2.5.4 The Nominated Bogda Site

There are 27 species of endemic plants in the nominated Bogda, accounting for 22.88% of the total endemic plants in Xinjiang Tianshan.

No.	Species
1	*Asplenium tianshanicum* Ching
2	*Delphinium tianshanicum* W.T.Wang
3	*Erysimum brevifolium* Z.X.An
4	*Camelina microcarpa* Andz
5	*Oxytropis bogdoschanica* Jurtz
6	*Ferula fukangensis* K.M.Shen
7	*Lappula ramulosa* C.J.Wang et X.D.Wang
8	*Lappula heteromorpha* C.J.Wang
9	*Scutellaria orthotricha* C.Y.Wu et H.W.Li
10	*Lagochilus lanatonodus* C.Y.Wu et Hsuan
11	*Pedicularis myriophylla* Pall
12	*Galatella bogidaica* Y.Wei et Z.X.An
13	*Saussurea pulviniformis* Winkl
14	*Saussurea canescens* Winkl

15	*Seriphidium borotalense*(Poljak.)Ling et Y.R.Linng
16	*Doronicum tianshanicum* Z.X.An
17	*Ligularia tianshanica* C.Y.Yang et S.L.Keng
18	*Serratula rugosa* Iljin
19	*Puccinellia florida* D.F.Cui
20	*Elymus sylvaticus*(Keng.et S.L.Chen)S.L.Chen
21	*E1ymus platyphyllus*(Keng)A.Love
22	*Elymus viridulus*(Keng)S.L.Chen
23	*E1ymus sinkiangensis* D.F.Cui
24	*E1ymus glaberrimus*(Keng)S.L.Chen
25	*Gagea nigra* L.Z.Shue
26	*Gagea stepposa* L
27	*Tulipa sinkiangensis* Z.M.Mao

2.6 Endemic Animal Species in the Nominated Property

2.6.1 The Nominated Tomur Site

There are 12 species or subspecies of endemic vertebrated in the nominated Tomur, including 6 species of mammals, 2 species of birds and 4 species of fishes.

No.	Species
F—1	*Gymnodiptychus dybowskii*
F—2	*Triplophysas*
F—3	*Schizothorax biddulphi*
F—4	*Aspiorhynchus laticeps*
B—1	*Circaetus heptneri tianshanicus*
B—2	*Bubo bubo hemachalana*
M—1	*Sorex asper*
M—2	*Clethrionomys frater*
M—3	*Ursus arctos isabellinus*
M—4	*Cervus elaphus tianshanicus* （=*songaricus*）
M—5	*Ovis ammon karelini*
M—6	*Capra ibex alaiana*

2.6.2 The Nominated Kalajun-Kuerdening Site

There are 46 species or subspecies of endemic vertebrated in the nominated Kalajun-Kuerdening, including 24 species of mammals, 14 species of birds, three speces of reptiles, one species of amphibian and four species of fishes.

No.	Species
F—1	*Gymnodiptychus dybowskii*
F—2	*Schizothorax pseudaksaiensis*
F—3	*Triplophysas*
F—4	*Perca schrenki*

A—1	*Ranodon sibiricus*
R—1	*Testudo horsfieldi*
R—2	*Terotoscincus scincus*
R—3	*Asymblepharus alaicus*
B—1	Circaetus heptneri tianshanicus
B—2	*Alectoris chukar dzungaria*
B—3	*Columba rupestris turkestanica*
B—4	*Columba palumbus casiotis*
B—5	*Bubo bubo hemachalana*
B—6	*Surnia ulula tianschanica*
B—7	*Picodes tridactylus tianschanicus*
B—8	*Motacilla flava melanogrisea*
B—9	*Troglodytes troglodytes tianschanicus*
B—10	*Sylvia communis rubicola*
B—11	*Parus bokharensis iliensis*
B—12	*Parus cyanus tianschanicus*
B—13	*Certhia familiaris tianschanica*
B—14	*Leucosticte brandti pamirensis*
M—1	*Sorex asper*
M—2	*Crocidura suaveolens ilensis*
M—3	*Ursus arctos isabellinus*
M—4	*Meles meles tianschanensis*
M—5	*Cervus elaphus tianshanicus* （=*songaricus*）
M—6	*Ovis ammon karelini*
M—7	*Capra sibirica alaiana*
M—8	*Ochotona iliensis*
M—9	*Dryomys nitedula angelus*
M—10	*Marmota bobak centralis*
M—11	*Spermophilus undulates stramineus*
M—12	*Spermophilus relictus*
M—13	*Spermophilus relictus nilkaensis*

M—14	*Meriones meridianus penicilliger*
M—15	*Ellobius talpinus coenosus*
M—16	*Clethrionomys frater*
M—17	*Alticola roylei leucurus*
M—18	*Microtus gragalis tianschanicus*
M—19	*Microtus oeconomus.montiumcaelestinum*
M—20	*Microtus ilaeus*
M—21	*Sicista tianschanica*
M—22	*Pygeretmus pumilio aralensis*
M—23	*Apodemus sylvaticus tscherga*
M—24	*Microtus kirgisorum*

2.6.3 The Nominated Bayinbuluke Site

There are 10 species or subspecies of endemic vertebrated in the nominated Bayinbuluke, including two species of mammals, five species of birds and three species of fishes.

No.	Species
M-1	*Meles meles tianschanensis*
M-2	*Microtus gragalis tianschanicus*
B-1	*Luscinia svecica saturatior*
B-2	*Phoenicurus ochruros phoinicuroides*
B-3	*Pelronia pelronia intermedia*
B-4	*Montifringilla nivalis alpicola*
B-5	*Leucosticte nemoricola altaica*
F-1	*Gymnodiptychus dybowskii*
F-2	*Triplophysas strauchii*
F-3	*Schizothorax biddulphi*

2.6.4 The Nominated Bogda Site

There are 56 species or subspecies of endemic vertebrated in the nominated Bogda, including 16 species of mammals, 38 species of birds and two species of fishes.

No.	Species
M—1	*Ursus arctos isabellinus*
M—2	*Mustela erminea ferghanae*
M—3	*Meles meles tianschanensis*
M—4	*Sus scrofa nigripes*
M—5	*Cervus elephus songaricus*
M—6	*Capreolus capreolus pygargus*
M—7	*Ovis ammon littledalei*
M—8	*Capra sibirica alaiana*
M—9	*Dryomys nitedula angelus*
M—10	*Cricetulus migratorius caesius*
M—11	*Ellobius talpinus coenosus*
M—12	*Lagurus lagurus altorum*
M—13	*Microtus oeconomus montiumcaelestinum*
M—14	*Microtus socialis bogdoensis*
M—15	*Allactaga sibirica altorum*
M—16	*Apodemus sylvaticus tscherga*
B—1	*Falco columbarius*
B—2	*Columba rupestris turkestanica*
B—3	*Columba livia neglecta*
B—4	*Cuculus canorus subtelephonus*
B—5	*Athene noctua orientalis*
B—6	*Picodes tridactylus tianschanicus*
B—7	*Alauda arvensis dulcivor*
B—8	*Eremophila alpestris albigula*
B—9	*Riparia riparia diluta*
B—10	*Cinclus cinclus leucogaster*

B—11	*Prunella collaris rufilata*
B—12	*Prunella atrogularis huttoni*
B—13	*Luscinia megarhynchos hafisi*
B—14	*Phoenicurus ochruros phoinicuroides*
B—15	*Turdus merulu intermedea*
B—16	*Turdus viscivorus bonapartei*
B—17	*Cettia cetti albiventris*
B—18	*Sylvia nisoria merzbacheri*
B—19	*Sylvia communis rubicola*
B—20	*Phylloscopus inornatus humei*
B—21	*Phylloscopus trochiloides viridanus*
B—22	*Regulus regulus tristis*
B—23	*Remiz pendulinus stoliczkae*
B—24	*Certhia familiaris tianschanica*
B—25	*Pica pica bactriana*
B—26	*Nucifraga caryocatactes rothschildi*
B—27	*Corvus corone sharpii*
B—28	*Passer domesticus bactrianus*
B—29	*Passer montanus dilutus*
B—30	*Pelronia pelronia intermedia*
B—31	*Montifringilla nivalis alpicola*
B—32	*Carpodacus synoicus stolizkae*
B—33	*Loxia curvirostra tianschanica*
B—34	*Carduelis carduelis parapanisi*
B—35	*Carduelis flavirostris korejivi*
B—36	*Carduelis cannabina bella*
B—37	*Emberiza buchanani neobscura*
B—38	*Emberiza godlewskii decolorata*
F—1	*Gymnodiptychus dybowskii*
F—2	*Triplophysas strauchii*

2.7 Glacier List of the Nominated Property

Xinjiang Tianshan is the centre for modern glaciers in the Tianshan Mountains, There are 870 glaciers totally, with an area of 2,848.959 km^2 and an ice volume of 481.9132 km^3.

2.7.1 Glacier List of the Nominated Tomur Site

There are 670 modern glaciers in the nominated Tomur, with an area of 2,707.54 km^2 and an ice volume of 473.8287 km^3.

No.	Name	Coordinates	Area（km^2）	Length（km）	Hightest Altitude（m）	End of the Glacier Tongue（m）	Glacier Type	Snowline Height（m）	Ice Storage（km^3）	Conservation Condition	Record Time
5X046K Xiatahe(river) Number of Glaciers 71 Area(km^2): 111.9 Ice Storage(km^3): 6.6573											
1		42°21.58'N，80°48.01'E	1.76	1.6	4600	3450	640010		0.0915	Intact	1980
2		42°22.09'N，80°48.48'E	0.08	0.1	4000	3800	700210		0.0009	Intact	1980
3		42°22.50'N，80°48.16'E	0.66	1.3	4240	3400	640110		0.0238	Intact	1980
4	Tulasu Glacier	42°21.09'N，80°46.37'E	9.05	4.8	5401	3160	530110	3900	0.8326	Intact	1980
5		42°22.47'N，80°46.18'E	0.73	1.5	4340	3500	640210		0.0270	Intact	1980
6		42°22.77'N，80°45.89'E	0.16	0.6	4042	3700	700210		0.0024	Intact	1980
7		42°23.90'N，80°45.71'E	1.11	1.6	4379	3840	640110		0.0488	Intact	1980
8		42°24.43'N，80°46.37'E	0.33	1.1	4098	3760	650210		0.0069	Intact	1980
9		42°25.68'N，80°48.52'E	0.13	0.6	4000	3680	750210		0.0018	Intact	1980
10		42°25.90'N，80°49.03'E	0.12	0.5	3900	3560	750210		0.0016	Intact	1980

11		42°26.51'N，80°49.03'E	0.12	0.4	4100	3700	700210		0.0016	Intact	1980
12		42°26.54'N，80°48.70'E	0.13	0.4	4020	3620	750210		0.0018	Intact	1980
13		42°25.62'N，80°48.63'E	0.26	0.6	4000	3700	650210		0.0049	Intact	1980
14		42°24.49'N，80°46.99'E	8.01	3.6	4379	3480	640110	3820	0.7049	Intact	1980
15		42°25.89'N，80°46.48'E	0.67	1.4	4100	3620	640110		0.0241	Intact	1980
16		42°26.42'N，80°46.48'E	0.15	0.9	3860	3520	750210		0.0023	Intact	1980
17		42°25.03'N，80°44.65'E	5.36	5.0	4379	3060	530110		0.4172	Intact	1980
18		42°27.49'N，80°42.98'E	0.60	0.9	4092	3300	640210		0.0204	Intact	1980
19		42°23.90'N，80°43.67'E	1.06	1.1	4200	3480	640210		0.0456	Intact	1980
20		42°23.55'N，80°42.98'E	0.10	0.4	3800	3580	750210		0.0012	Intact	1980
21		42°24.33'N，80°44.46'E	3.37	3.0	4320	3580	640110		0.2191	Intact	1980
22		42°23.68'N，80°45.20'E	0.14	0.4	4217	4000	750210		0.0020	Intact	1980
23		42°22.76'N，80°45.67'E	0.11	0.3	3980	3780	700210		0.0014	Intact	1980
24		42°22.33'N，80°45.31'E	1.41	1.1	4319	3400	640210		0.0677	Intact	1980
25		42°20.99'N，80°44.54'E	9.29	5.8	5432	3060	630110	3870	0.8640	Intact	1980
26		42°21.36'N，80°42.87'E	6.62	3.0	5432	3280	640110		0.5428	Intact	1980
27		42°21.21'N，80°41.41'E	4.59	3.8	5138	3100	640110		0.3351	Intact	1980
28		42°21.30'N，80°40.28'E	3.13	2.8	4840	3160	640110		0.2003	Intact	1980
29		42°21.25'N，80°37.55'E	16.87	6.2	5667	4000	640210	3800	0.5736	Intact	1980
30		42°23.49'N，80°38.32'E	2.40	2.8	4220	3380	640110		0.1392	Intact	1980
31		42°24.44'N，80°39.08'E	0.70	0.8	4390	3760	640210		0.0252	Intact	1980
32		42°24.92'N，80°38.90'E	1.51	2.6	4529	3420	530110		0.0740	Intact	1980
33		42°25.46'N，80°39.41'E	0.06	0.4	4529	4280	700210		0.0006	Intact	1980

34		42°25.85'N，80°39.37'E	0.83	1.2	4529	3660	640110		0.0324	Intact	1980
35		42°26.27'N，80°39.88'E	0.24	0.4	4168	3840	650210		0.0043	Intact	1980
36		42°26.49'N，80°40.12'E	0.03	0.1	4040	3920	700210		0.0002	Intact	1980
37		42°26.41'N，80°39.63'E	1.02	1.6	4168	3440	640110		0.0428	Intact	1980
38		42°25.73'N， 80°38.79'E	2.23	3.0	4529	3390	530110	2900	0.1249	Intact	1980
39		42°26.33'N， 80°38.24'E	0.13	0.3	4080	3900	700210		0.0018	Intact	1980
40		42°27.03'N， 80°38.23'E	0.97	2.2	3900	3440	600110		0.0398	Intact	1980
41		42°28.24'N， 80°38.24'E	0.18	0.9	4000	3660	750210		0.0029	Intact	1980
42		42°27.54'N， 80°37.70'E	2.56	2.0	4287	3500	640100		0.1590	Intact	1980
43		42°27.89'N， 80°35.48'E	2.66	1.2	4288	3600	640100		0.	Intact	1980
44		42°27.03'N， 80°38.23'E	0.52	0.9	4194	3580	640210		0.0166	Intact	1980
45		42°28.03'N， 80°34.95'E	0.44	0.6	4044	3580	640210		0.0132	Intact	1980
46		42°28.46'N， 80°34.53'E	0.97	1.0	4100	3580	640100		0.0398	Intact	1980
47		42°28.86'N， 80°35.00'E	0.08	0.2	4053	3840	700210		0.0009	Intact	1980
48		42°29.00'N， 80°35.08'E	0.10	0.4	4053	3660	750210		0.0012	Intact	1980
49		42°29.08'N， 80°34.83'E	0.32	0.6	4053	3520	640210		0.0083	Intact	1980
50		42°28.86'N， 80°34.20'E	0.81	0.9	4140	3500	640210		0.0316	Intact	1980
51		42°29.68'N， 80°33.12'E	4.85	2.3	4300	3520	640110		0.3589	Intact	1980
52		42°30.35'N， 80°34.63'E	1.87	1.2	4220	3520	640110		0.0991	Intact	1980
53		42°30.70'N， 80°35.05'E	0.30	0.4	3900	3540	650210		0.0060	Intact	1980
54		42°30.81'N， 80°34.74'E	0.20	0.6	3920	3540	750210		0.0034	Intact	1980
55		42°30.73'N，80°33.59'E	0.30	0.9	4240	3640	640110		0.0598	Intact	1980
56		42°31.80'N，80°33.63'E	1.53	1.0	4160	3620	640110		0.0175	Intact	1980

57		42°31.54'N，80°34.83'E	0.35	0.2	3920	3640	653210		0.0074	Intact	1980
58		42°31.78'N，80°35.38'E	0.18	0.4	3920	3400	750210		0.0029	Intact	1980
59		42°31.94'N，80°35.57'E	0.03	0.2	3620	3400	700210		0.0002	Intact	1980
60		42°31.80'N，80°33.63'E	1.53	1.0	4160	3620	640110		0.0175	Intact	1980
61		42°31.54'N，80°34.83'E	0.35	0.2	3920	3640	653210		0.0074	Intact	1980
62		42°31.78'N，80°35.38'E	0.18	0.4	3920	3400	750210		0.0029	Intact	1980
63		42°31.94'N，80°35.57'E	0.03	0.2	3620	3400	700210		0.0002	Intact	1980
64		42°31.89'N，80°35.20'E	0.17	0.4	3920	3440	750210		0.0026	Intact	1980
65		42°31.57'N，80°34.21'E	1.72	2.2	4280	3340	640120		0.0877	Intact	1980
66		42°32.00'N，80°33.52'E	2.38	1.7	4268	3320	640110		0.1380	Intact	1980
67		42°32.38'N，80°32.50'E	0.22	0.4	3835	3500	650210		0.0037	Intact	1980
68		42°32.73'N，80°31.86'E	0.30	0.2	3869	3600	650210		0.0060	Intact	1980
69		42°33.00'N，80°31.84'E	0.09	0.2	3800	3640	700210		0.0011	Intact	1980
70		42°32.56'N，80°31.55'E	0.38	0.3	3859	3620	653210		0.0084	Intact	1980
71		42°32. 83'N，80°30.75'E	0.06	0.2	3800	3660	700210		0.0006	Intact	1980
725X046L. Kayinte Muzate Number of Glaciers: 152 Area(km^2):224.1 Ice Storage(km^3): 20.0966											
1		42°33.40'N，80°30.74'E	0.09	0.7	3840	3580	750210		0.0011	Intact	1980
2		42°33.16'N，80°30.65'E	0.20	0.9	3860	3480	750210		0.0034	Intact	1980
3		42°33.02'N，80°30.31'E	0.05	0.3	3620	3440	700210		0.0005	Intact	1980
4		42°32.94'N，80°30.56'E	0.21	0.6	3840	3480	750210		0.0036	Intact	1980
5		42°32.54'N，80°30.71'E	0.03	0.2	3800	3640	750210		0.0002	Intact	1980
6		42°32.48'N，80°30.60'E	0.03	0.2	3800	3600	750210		0. 0002	Intact	1980
7		42°32.32'N，80°31.15'E	0.32	0.3	3800	3580	653210		0.0067	Intact	1980

8		42°30.89'N，80°32.93'E	2.95	2.8	4379	3440	640110		0.1892	Intact	1980
9		42°31.11'N，80°32.18'E	1.06	2.1	4379	3460	640110		0.0456	Intact	1980
10		42°31.51'N，80°32.00'E	0.10	0.4	3700	3580	750210		0.0012	Intact	1980
11		42°30.94'N，80°31.33'E	0.47	0.4	3960	3520	640210		0.0446	Intact	1980
12		42°31.03'N，80°30.56'E	0.06	0.2	3720	3480	750210		0.0006	Intact	1980
13		42°30.92'N，80°31.00'E	0.20	0.4	3960	3420	750210		0.0034	Intact	1980
14		42°30.67'N，80°31.62'E	0.05	0.8	3900	3640	700210		0.0005	Intact	1980
15		42°30.53'N，80°31.80'E	0.07	0.6	4379	3620	700210		0.0007	Intact	1980
16		42°30.38'N，80°32.39'E	0.97	1.3	4379	3600	640010		0.0398	Intact	1980
17		42°29.95'N，80°31.62'E	0.03	0.2	3900	3720	700210		0.0002	Intact	1980
18		42°29.95'N，80°32.39'E	0.37	0.4	4200	3720	640210		0.0104	Intact	1980
19		42°29.49'N，80°32.41'E	0.17	0.4	4140	3820	753210		0.0026	Intact	1980
20		42°28.80'N，80°33.55'E	0.15	0.4	4160	4000	750210		0.0023	Intact	1980
21		42°28.70'N，80°33.77'E	0.20	0.4	4160	4000	750210		0.0034	Intact	1980
22		42°28.49'N，80°34.24'E	0.11	0.3	4080	3840	750210		0.0014	Intact	1980
23		42°38.21'N，80°34.57'E	0.20	0.3	4044	3740	640210		0.0044	Intact	1980
24		42°27.95'N，80°34.68'E	0.12	0.5	4044	3620	750210		0.0016	Intact	1980
25		42°27.76'N，80°35.11'E	0.33	0.6	4194	3620	640210		0.0089	Intact	1980
26		42°27.49'N，80°35.44'E	0.24	0.4	4202	3700	640210		0.0055	Intact	1980
27		42°27.27'N，80°35.62'E	0.15	0.4	4202	3780	750210		0.0023	Intact	1980
28		42°26.79'N，80°37.04'E	1.10	0.5	4287	3820	640110		0.0473	Intact	1980
29		42°26.08'N，80°37.73'E	3.07	1.6	4287	3720	640110		0.1934	Intact	1980
30		42°25.19'N，80°37.92'E	2.88	2.1	4375	3640	640110		0.1786	Intact	1980

31		42°24.19'N，80°37.81'E	7.00	3.2	4390	3345	640110		0.5880	Intact	1980
32		42°23.84'N，80°36.24'E	4.57	1.8	4351	3420	303210		0.3336	Intact	1980
33		42°22.55'N，80°35.59'E	4.44	2.0	4241	3540	640110		0.3179	Intact	1980
34		42°22.33'N，80°33.11'E	10.91	5.2	4956	3610	640110	3920	1.0692	Intact	1980
35		42°23.28'N，80°32.82'E	0.86	0.6	4275	3840	640210		0.0344	Intact	1980
36		42°23.76'N，80°32.60'E	0.69	0.6	4275	3820	640210		0.0248	Intact	1980
37		42°24.92'N，80°33.33'E	0.83	0.6	4383	3920	640110		0.0324	Intact	1980
38		42°25.46'N，80°32.89'E	2.97	1.6	4383	3600	640110		0.1841	Intact	1980
39		42°24.65'N，80°31.73'E	2.81	2.4	4383	3500	640110		0.1714	Intact	1980
40		42°24.90'N，80°30.89'E	0.04	0.2	3960	3800	700210		0.0003	Intact	1980
41		42°25.14'N，80°30.38'E	0.17	0.5	4129	3860	750210		0.0026	Intact	1980
42		42°25.35'N，80°30.12'E	0.22	0.3	4129	3760	650210		0.0037	Intact	1980
43		42°25.62'N，80°29.69'E	0.31	0.4	4160	3840	640210		0.0081	Intact	1980
44		42°25.88'N，80°30.25'E	0.06	0.2	3940	3840	700210		0.0006	Intact	1980
45		42°25.95'N，80°30.34'E	0.04	0.2	3960	3820	750210		0.0003	Intact	1980
46		42°25.95'N，80°29.80'E	0.43	0.6	4060	3780	640210		0.0129	Intact	1980
47		42°26.89'N，80°30.45'E	0.04	0.2	3840	3640	700210		0.0003	Intact	1980
48		42°27.06'N，80°30.45'E	0.09	0.3	3840	3660	750210		0.0011	Intact	1980
49		42°26.97'N，80°30.38'E	0.05	0.1	3840	3700	700210		0.0005	Intact	1980
50		42°26.08'N，80°29.54'E	0.36	1.2	4213	3700	640110		0.0097	Intact	1980
51		42°26.14'N，80°29.28'E	0.32	0.8	4213	3680	640210		0.0083	Intact	1980
52		42°26.11'N，80°29.07'E	0.20	0.6	4213	3780	750210		0.0034	Intact	1980
53		42°26.06'N，80°28.41'E	1.01	0.8	4153	3670	640110		0.0424	Intact	1980

54		42°26.79'N，80°27.68'E	0.36	0.4	4152	3820	640210		0.0101	Intact	1980
55		42°27.54'N，80°27.93'E	0.66	0.4	4180	3780	640210		0.0238	Intact	1980
56		42°27.89'N，80°29.10'E	0.07	0.2	4094	3800	700210		0.0007	Intact	1980
57		42°28.11'N，80°29.38'E	0.06	0.2	4080	3840	700210		0.0006	Intact	1980
58		42°27.95'N，80°28.92'E	0.11	0.2	3900	3500	700210		0.0014	Intact	1980
59		42°28.81'N，80°27.86'E	1.08	1.4	4116	3640	640110		0.0464	Intact	1980
60		42°28.84'N，80°28.34'E	0.13	0.4	3860	3640	700210		0.0018	Intact	1980
61		42°29.22'N，80°28.85'E	0.07	0.2	3807	3640	700210		0.0007	Intact	1980
62		42°29.05'N，80°28.52'E	0.20	0.2	3807	3520	750210		0.0034	Intact	1980
63		42°28.00'N，80°27.02'E	0.60	0.3	4116	3650	640210		0.0204	Intact	1980
64		42°28.92'N，80°27.09'E	0.29	0.2	3880	3660	680210		0.0058	Intact	1980
65		42°29.27'N，80°27.28'E	0.03	0.2	3750	3660	700210		0.0002	Intact	1980
66		42°29.22'N，80°26.40'E	1.12	0.6	4080	3620	680210		0.0381	Intact	1980
67		42°30.19'N，80°26.84'E	0.29	0.3	3958	3580	650210		0.0058	Intact	1980
68		42°30.54'N，80°27.24'E	0.20	0.6	3820	3600	750210		0.0034	Intact	1980
69		42°30.81'N，80°27.68'E	0.09	0.2	3711	3620	700210		0.0011	Intact	1980
70		42°31.03'N，80°27.64'E	0.22	0.4	3711	3420	650210		0.0037	Intact	1980
71		42°30.78'N，80°27.63'E	0.51	0.2	3711	3400	680210		0.0128	Intact	1980
72		42°30.54'N，80°26.88'E	0.65	0.8	3880	3380	640110		0.0228	Intact	1980
73		42°30.32'N，80°26.57'E	0.41	0.8	3958	3420	640210		0.0119	Intact	1980
74		42°29.73'N，80°25.93'E	1.86	1.6	4236	3520	640110		0.0986	Intact	1980
75		42°30.03'N，80°25.34'E	0.39	0.6	3973	3520	640210		0.0113	Intact	1980
76		42°30.57'N，80°25.27'E	0.16	0.2	3965	3660	700210		0.0024	Intact	1980

77		42°29.95'N，80°25.38'E	0.52	1.6	3973	3520	680210		0.0135	Intact	1980
78		42°29.57'N，80°25.09'E	0.26	0.8	4236	3580	650210		0.0049	Intact	1980
79		42°29.43'N，80°25.43'E	0.21	0.2	4236	3900	650210		0.0036	Intact	1980
80		42°27.76'N，80°27.46'E	0.03	0.1	4116	4000	700210		0.0002	Intact	1980
81		42°27.57'N，80°27.61'E	0.03	0.1	4060	3980	700210		0.0002	Intact	1980
82		42°27.30'N，80°27.68'E	0.04	0.1	4140	4000	700210		0. 0003	Intact	1980
83		42°26.84'N，80°27.28'E	0.47	1.0	4040	3640	640210		0.0146	Intact	1980
84		42°27.22'N，80°26.44'E	0.06	0.2	4016	3800	700210		0.0006	Intact	1980
85		42°27.13'N，80°26.22'E	0.10	0.2	4016	3900	700210		0.0012	Intact	1980
86		42°27.19'N，80°25.49'E	0.54	0.6	4102	3660	640210		0.0178	Intact	1980
87		42°27.62'N，80°24.72'E	0.66	1.3	4102	3480	640110		0.0238	Intact	1980
88		42°27.46'N，80°23.30'E	0.64	0.6	4014	3600	640210		0.0224	Intact	1980
89		42°27.30'N，80°23.08'E	0.12	0.5	3980	3760	750210		0.0016	Intact	1980
90		42°27.33'N，80°22.93'E	0.08	0.2	3987	3760	750210		0.0009	Intact	1980
91		42°27.33'N，80°22.84'E	0.06	0.2	3987	3800	750210		0.0006	Intact	1980
92		42°27.55'N，80°22.88'E	0.07	0.1	3987	3920	700210		0.0007	Intact	1980
93		42°26.98'N，80°25.82'E	0.36	0.9	4102	3840	680210		0.0079	Intact	1980
94		42°25.57'N，80°29.72'E	0.11	0.4	4200	3900	700210		0.0014	Intact	1980
95		42°25.44'N，80°29.94'E	0.11	0.1	4129	3920	700210		0.0014	Intact	1980
96		42°25.03'N，80°30.27'E	0.11	0.2	4129	3900	750210		0.0014	Intact	1980
97		42°24.95'N，80°30.28'E	0.08	0.2	4060	3820	750210		0.0009	Intact	1980
98		42°24.57'N，80°30.88'E	0.22	0.5	4000	3740	650210		0.0037	Intact	1980
99		42°24.52'N，80°30.68'E	0.09	0.2	3960	3700	700210		0.0011	Intact	1980

100		42°23.43'N，80°31.91'E	6.05	5.0	4383	3540	630110	3920	0.4840	Intact	1980
101		42°22.13'N，80°29.69'E	16.83	7.2	4360	3580	630110	3860	1.9018	Intact	1980
102		42°23.78'N，80°27.75'E	2.61	2.0	4289	3440	640110		0.1566	Intact	1980
103		42°22.00'N，80°27.10'E	0.04	0.1	3840	3600	700210		0.0003	Intact	1980
104		42°22.32'N，80°27.46'E	1.24	1.2	4280	3640	640110		0.0058	Intact	1980
105		42°21.40'N，80°26.84'E	3.46	3.6	4326	3600	630110		0.2284	Intact	1980
106		42°22.54'N，80°25.23'E	0.57	0.9	4060	3660	640210		0.0194	Intact	1980
107		42°21.89'N，80°25.64'E	0.40	0.6	4280	3690	640210		0.0116	Intact	1980
108		42°21.38'N，80°25.96'E	0.63	1.2	4277	3640	640110		0. 0221	Intact	1980
109		42°21.13'N，80°26.29'E	0.10	0.2	4277	4080	700210		0.0012	Intact	1980
110		42°21.46'N，80°27.79'E	0.15	0.4	4326	3960	750210		0.0023	Intact	1980
111		42°21.59'N，80°28.01'E	0.23	0.4	4326	4100	650210		0.0041	Intact	1980
112		42°22.00'N，80°28.37'E	0.87	1.3	4298	3840	640110		0.0348	Intact	1980
113		42°19.65'N，80°31.31'E	44.32	14.0	5397	3300	630110		6.8696	Intact	1980
114		42°18.78'N，80°28.19'E	9.17	5.6	5312	3180	630110		0.8436	Intact	1980
115		42°18.43'N，80°25.64'E	11.46	5.6	5347	2960	630110		1.1345	Intact	1980
116		42°18.73'N，80°23.99'E	4.60	5.2	5347	3200	630110		0.3358	Intact	1980
117		42°19.43'N，80°23.30'E	0.77	1.6	4240	3600	600210		0.0239	Intact	1980
118		42°19.22'N，80°22.21'E	0.08	0.4	4224	3940	700210		0.0009	Intact	1980
119		42°19.35'N，80°22.02'E	0.12	0.3	4224	4000	750210		0.0016	Intact	1980
120		42°19.51'N，80°21.69'E	0.15	0.2	4180	3900	750210		0.0023	Intact	1980
121		42°20.66'N，80°22.10'E	0. 69	1.4	4160	3540	640110		0.0248	Intact	1980
122		42°21.30'N，80°21.88'E	0.60	1.2	3860	3360	640210		0.0204	Intact	1980

123		42°21.62'N，80°21.48'E	0.17	0.3	4140	3800	750210		0.0026	Intact	1980
124		42°21.67'N，80°21.33'E	0.02	0.1	4060	4000	700210		0.0001	Intact	1980
125		42°19.81'N，80°21.18'E	1.01	1.7	4180	3650	640110		0.0424	Intact	1980
126		42°20.08'N，80°20.45'E	0.26	0.7	4127	3800	650210		0.0049	Intact	1980
127		42°20.22'N，80°22.23'E	0.19	0.5	4127	3770	650210		0.0030	Intact	1980
128		42°20.05'N，80°20.09'E	0.06	0.3	4127	3900	700210		0.0006	Intact	1980
129		42°19.96'N，80°20.34'E	0.13	0.2	4127	3960	700210		0.0018	Intact	1980
130		42°18.46'N，80°19.61'E	18.97	4.6	5256	3320	640110		2.2195	Intact	1980
131		42°19.86'N，80°16.55'E	0.45	1.3	4330	3960	640210		0.0140	Intact	1980
132		42°19.89'N，80°17.75'E	1.06	1.6	4234	3740	640110		0.0456	Intact	1980
133		42°20.13'N，80°16.84'E	5.70	3.5	4460	3800	640110		0.4446	Intact	1980
134		42°20.70'N，80°15.20'E	1.63	2.1	4460	3780	640110		0.0815	Intact	1980
135		42°21.17'N，80°15.45'E	0.42	0.8	4060	3840	640110		0.0126	Intact	1980
136		42°21.24'N，80°16.11'E	0.23	0.8	3940	3760	650210		0.0041	Intact	1980
137		42°21.86'N，80°15.96'E	2.29	3.1	4361	3720	630110		0.1305	Intact	1980
138		42°22.02'N，80°17.17'E	1.08	1.9	4361	3880	640110		0.0464	Intact	1980
139		42°22.16'N，80°17.97'E	0.22	0.7	4240	3800	650210		0.0037	Intact	1980
140		42°22.35'N，80°17.68'E	0.69	1.2	4439	3820	640210		0.0248	Intact	1980
141		42°22.75'N，80°17.64'E	0.03	0.1	4355	4180	700210		0.0002	Intact	1980
142		42°22.97'N，80°17.93'E	0.25	0.9	4355	4020	650210		0.0045	Intact	1980
143		42°23.46'N，80°19.36'E	0.09	0.5	4100	3860	700210		0.0011	Intact	1980
144		42°23.51'N，80°18.63'E	2.71	2.7	4355	3600	640110		0.1626	Intact	1980
145		42°22.38'N，80°16.40'E	3.79	1.6	4447	3600	640110	3800	0.2577	Intact	1980

146		42°22.89'N，80°14.94'E	0.31	0.8	4447	3970	650210		0.0062	Intact	1980
147		42°23.67'N，80°13.39'E	1.71	1.5	4329	3620	640110		0. 0872	Intact	1980
148		42°23.81'N，80°14.40'E	1.33	1.5	4329	3820	640110		0.0625	Intact	1980
149		42°24.86'N，80°13.78'E	2.29	1.7	4378	3760	640110		0.1305	Intact	1980
150		42°25.78'N，80°14.12'E	2.15	1.5	4378	3580	640110		0.1204	Intact	1980
151		42°26.33'N，80°13.96'E	0.72	0.7	4299	3720	640210		0.0266	Intact	1980
152		42°28.43'N，80°15.92'E	0.76	1.0	4197	3680	640210		0.0289	Intact	1980
5X0646M. Nalinguolehe(river) Number of Glacier: 1 Area(km^2): 0.66 Ice Storage (km^3): 0.0238											
1		42°29.86'N，80°17.21'E	0.66	0.7	4280	3580	640210		0.0238	Intact	1980
5Y681A. Kuleke Daliya Number of Glacier: 56 Area(km^2): 141.49 Ice Storage(km^3): 13.6135											
1		41°52.24'N，80°47.63'E	0.39	0.5	4360	4100	650210		0.009	Intact	1983
2		41°52.56'N，80°47.99'E	0.54	0.6	4450	4100	640210		0.0178	Intact	1983
3		41°53.08'N，80°48.49'E	3.50	1.3	4550	3800	640110		0.2310	Intact	1983
4		41°53.18'N，80°49.97'E	0.13	0.4	4360	4180	750210		0.0018	Intact	1983
5		41°53.73'N，80°49.47'E	4.82	1.8	4547	3720	640010		0.3567	Intact	1983
6		41°54.24'N，80°48.53'E	0.21	0.5	4550	4350	750210		0.0036	Intact	1983
7		41°56.03'N，80°47.95'E	22.05	9.5	5080	3000	502110	4500	2.7122	Intact	1983
8		41°57.14'N，80°49.68'E	1.43	2.3	4728	3830	640010		0.0686	Intact	1983
9		41°57.70'N，80°49.486'E	4.09	5.2	5080	3830	530110	4400	0.2863	Intact	1983
10		41°58.06'N，80°49.34'E	0.09	0.3	4300	4120	750210		0.0011	Intact	1983
11		41°58.70'N，80°48.89'E	0.12	0.3	4950	4800	750210		0.0016	Intact	1983
12		41°59.42'N，80°49.57'E	0.25	0.7	4500	3900	750210		0.0045	Intact	1983
13		41°59.08'N，80°48.56'E	5.68	3.4	4950	3530	630110		0.4430	Intact	1983

14		42°00.20'N，80°48.53'E	0.42	0.8	4502	3920	650210		0.0097	Intact	1983
15		42°00.54'N，80°49.49'E	0.28	0.5	4350	3900	650210		0.0053	Intact	1983
16		42°00.20'N，80°49.13'E	0.77	0.7	4502	3900	640210		0.0293	Intact	1983
17		41°59.18'N，80°47.73'E	1.59	1.0	4950	3900	640210		0.0795	Intact	1983
18		41°59.74'N，80°46.60'E	0.50	0.9	4660	3900	640210		0.0160	Intact	1983
19		41°58.58'N，80°46.58'E	7.79	4.8	5080	3360	630110		0.6996	Intact	1983
20		41°58.19'N，80°45.62'E	0.18	0.3	4690	4230	780210		0.0029	Intact	1983
21		41°57.54'N，80°45.28'E	4.60	5.8	4987	4260	520110	4350	0.3358	Intact	1983
22		41°58.16'N，80°44.52'E	0.11	0.5	4620	4050	700210		0.0014	Intact	1983
23		41°56.69'N，80°44.88'E	0.56	0.8	4987	4360	640210		0.0185	Intact	1983
24		41°56.69'N，80°44.59'E	0.11	0.7	5297	4260	700210		0.0014	Intact	1983
25		41°58.00'N，80°44.09'E	0.31	0.9	4750	3780	650210		0.0062	Intact	1983
26	Shuirike Glacier	41°55.41'N，80°44.50'E	20.66	8.1	4410	3460	520110	4300	2.4999	Intact	1983
27		41°58.33'N，80°41.63'E	7.87	4.2	5297	3440	640110		0.6847	Intact	1983
28		41°59.73'N，80°41.33'E	0.57	1.3	4750	4280	640210		0.0194	Intact	1983
29		41°59.99'N，80°42.25'E	0.13	0.9	4410	4000	750210		0.0018	Intact	1983
30		42°00.21'N，80°42.21'E	0.22	0.8	4260	3820	750210		0.0037	Intact	1983
31		42°00.43'N，80°39.81'E	18.17	7.5	5297	3220	520110	4200	2.1077	Intact	1983
32		42°01.71'N，80°81.03'E	0.52	0.8	4886	4170	640210		0.0166	Intact	1983
33		42°01.71'N，80°42.25'E	1.02	0.7	4711	4020	600210		0.0347	Intact	1983
34		42°02.03'N，80°43.42'E	0.57	1.1	4819	4110	640210		0.0194	Intact	1983
35		42°00.13'N，80°44.05'E	0.26	0.9	4819	4300	750210		0.0049	Intact	1983
36		42°02.06'N，80°44.70'E	0.22	1.0	4260	3900	750210		0.0037	Intact	1983

37		42°02.59'N，80°44.84'E	0.31	0.7	4462	4150	650210		0.0062	Intact	1983
38		42°02.74'N，80°45.13'E	0.1	0.4	4450	4150	750210		0.0012	Intact	1983
39		42°02.82'N，80°44.82'E	0.32	1.1	4462	3800	650210		0.0067	Intact	1983
40		42°02.66'N，80°44.21'E	2.03	2.3	4819	3720	640110		0.1096	Intact	1983
41		42°03.00'N，80°43.87'E	0.2	1.0	4338	3780	750210		0.0034	Intact	1983
42		42°02.05'N，80°43.06'E	0.26	0.9	4819	4000	750210		0.0049	Intact	1983
43		42°02.04'N，80°42.52'E	0.59	1.3	4630	3640	650210		0.0159	Intact	1983
44		42°01.97'N，80°41.87'E	0.23	1.0	4711	3900	750210		0.0041	Intact	1983
45		42°01.92'N，80°41.13'E	0.71	1.1	4886	3800	600210		0.0206	Intact	1983
46		42°01.93'N，80°40.30'E	0.47	0.8	4886	4190	650210		0.0113	Intact	1983
47		42°01.63'N，80°39.05'E	0.30	0.8	5238	4210	650210		0.0060	Intact	1983
48	Kekeqi Glacier	42°03.32'N，80°36.11'E	0.74	11.2	6124	3250	520110	4200	2.5095	Intact	1983
49		42°04.79'N，80°37.50'E	0.09	0.3	5515	5220	700210		0.0011	Intact	1983
50		42°04.43'N，80°38.27'E	0.11	0.6	5280	4900	700210		0.0014	Intact	1983
51		42°04.43'N，80°38.27'E	1.74	1.9	5504	4220	640110		0.0905	Intact	1983
52		42°03.83'N，80°39.50'E	0.18	0.5	4800	4540	750210		0.0029	Intact	1983
53		42°03.76'N，80°39.65'E	1.23	2.3	5410	3860	640110		0.0554	Intact	1983
54		42°04.08'N，80°40.19'E	0.23	1.0	5000	4160	750210		0.0041	Intact	1983
55		42°03.86'N，80°40.98'E	0.14	1.1	4900	3930	750210		0.0020	Intact	1983
56		42°04.46'N，80°43.33'E	0.62	0.7	4320	3880	600210		0.0174	Intact	1983
5Y681B. Tugebieliqi Daliya Number of Glacier: 45 Area(km^2): 358.47 Ice Storage(km^3): 92.6232											
1		42°04.78'N，80°43.33'E	0.98	1.7	4380	3740	640210		0.0412	Intact	1983
2		42°05.02'N，80°42.44'E	1.49	2.0	4490	3600	640110		0.0730	Intact	1983

3		42°05.11'N，80°41.60'E	3.33	2.1	4600	3360	640110		0.2165	Intact	1983
4		42°05.16'N，80°39.41'E	1.80	2.8	5504	3490	530110		0.0936	Intact	1983
5		42°05.75'N，80°39.32'E	0.28	0.9	4739	3860	750210		0.0053	Intact	1983
6		42°05.27'N，80°37.75'E	6.16	4.1	5515	3410	620110	4200	0.4928	Intact	1983
7		42°06.47'N，80°37.27'E	1.38	0.7	4963	3920	650210		0.0469	Intact	1983
8		42°07.03'N，80°37.81'E	0.17	0.6	4450	4000	750210		0.0026	Intact	1983
9		42°06.96'N，80°37.41'E	0.55	1.5	4599	3920	650210		0.0143	Intact	1983
10		42°07.03'N，80°37.08'E	0.32	1.2	4580	3910	650210		0.0067	Intact	1983
11		42°06.52'N，80°36.94'E	1.09	0.8	4903	4150	650210		0.0371	Intact	1983
12		42°04.87'N，80°35.75'E	8.93	11.5	6124	3300	530210	4100	0.8126	Intact	1983
13		42°05.31'N，80°34.51'E	0.29	0.4	5026	4660	700210		0.0058	Intact	1983
14		42°06.81'N，80°34.64'E	0.91	0.6	4410	3710	640110		0.0364	Intact	1983
15		42°05.06'N，80°33.95'E	0.84	0.9	5026	4260	600210		0.0269	Intact	1983
16	Tugebieliqi Glacier	42°08.54'N，80°20.97'E	273.21	36.1	6934	2680	510110	4200	0.0290	Intact	1983
17		42°05.00'N，80°31.18'E	2.0	1.6	4910	4280	303110		0.1080	Intact	1983
18		42°05.68'N，80°30.17'E	4.05	5.9	5250	3500	530210		0.2835	Intact	1983
19		42°06.87'N，80°30.20'E	0.06	0.5	4680	4480	700210		0.0006	Intact	1983
20		42°07.03'N，80°29.96'E	1.0	2.0	4800	3650	630210		0.0420	Intact	1983
21		42°07.42'N，80°29.38'E	0.25	0.5	4738	4220	750210		0.0045	Intact	1983
22		42°07.42'N，80°29.06'E	0.17	0.6	4700	4270	700210		0.0026	Intact	1983
23		42°07.06'N，80°28.66'E	0.21	0.7	4200	3760	750210		0.0036	Intact	1983
24		42°05.81'N，80°28.13'E	0.41	0.8	5159	4690	650210		0.0094	Intact	1983
25		42°06.44'N，80°23.04'E	0.20	1.1	6150	5750	700210		0.0034	Intact	1983

26		42°05.98'N，80°22.97'E	0.17	0.9	6461	6100	750210		0.0026	Intact	1983
27		42°05.60'N，80°22.61'E	0.20	0.7	6461	5900	700210		0.0034	Intact	1983
28		42°07.25'N，80°22.07'E	0.49	0.9	5020	4220	650210		0.0123	Intact	1983
29		42°10.76'N，80°19.64'E	0.09	0.3	5527	5380	700210		0.0011	Intact	1983
30		42°10.78'N，80°19.78'E	0.38	0.6	5601	5020	650210		0.0084	Intact	1983
31		42°10.51'N，80°22.26'E	0.85	1.9	5353	4220	600210		0.0272	Intact	1983
32		42°10.35'N，80°22.48'E	0.36	0.7	5040	4540	650210		0.0079	Intact	1983
33		42°10.84'N，80°22.73'E	0.63	1.1	5350	4350	600210		0.0176	Intact	1983
34		42°10.65'N，80°24.68'E	0.24	0.4	5115	4720	750210		0.0043	Intact	1983
35		42°11.21'N，80°25.02'E	1.46	1.9	5950	4360	640210		0.0701	Intact	1983
36		42°10.27'N，80°28.70'E	0.38	0.2	5264	4880	680210		0.0084	Intact	1983
37		42°10.38'N，80°28.84'E	0.45	0.3	5260	4650	650210		0.0108	Intact	1983
38		42°11.13'N，80°33.10'E	0.68	0.4	5618	4320	650210		0.0197	Intact	1983
39		42°09.78'N，80°33.05'E	0.21	0.2	5289	5050	780210		0.0036	Intact	1983
40		42°09.62'N，80°32.30'E	0.20	0.7	4943	4500	700210		0.0034	Intact	1983
41		42°09.41'N，80°32.55'E	0.02	0.3	4620	4440	700210		0.0001	Intact	1983
42		42°09.24'N，80°32.84'E	0.20	1.1	4730	4030	750210		0.0034	Intact	1983
43		42°10. 03'N，80°32.23'E	0.14	0.1	5618	5140	780210		0.0020	Intact	1983
44		42°09.78'N，80°35.03'E	0.58	1.0	5313	4600	650210		0.0157	Intact	1983
45		42°10.13'N，80°38.09'E	0.18	0.9	4942	4630	700210		0.0029	Intact	1983
5Y681C. Kalajiaolehe(river) Number of Glacier: 29 Area(km^2): 242.61 Ice Storage(km3): 49.5761											
1		42°10.30'N，80°38.30'E	0.15	0.4	4942	4600	700210		0.0023	Intact	1983
2		42°10.26'N，80°39.16'E	0.29	0.2	5149	4850	700210		0.0058	Intact	1983

3		42°10.30'N，80°39.23'E	0.33	0.5	5149	4700	650210		0.0069	Intact	1983
4		42°10.89'N，80°39.41'E	5.77	4.5	5149	3380	620110		0.4558	Intact	1983
5		42°11.84'N，80°40.02'E	3.09	3.3	5053	3480	620110		0.1947	Intact	1983
6		42°12.32'N，80°40.53'E	1.47	2.7	5053	3400	630110	4200	0.0706	Intact	1983
7		42°12.73'N，80°40.74'E	1.18	2.3	4835	3663	620110		0.0531	Intact	1983
8		42°12.56'N，80°38.73'E	14.08	6.4	5981	3160	640110		1.4925	Intact	1983
9		42°13.64'N，80°37.61'E	7.86	5.1	5981	3080	640110		0.6838	Intact	1983
10	Wukuer Glacier	42°15.79'N，80°22.77'E	184.95	32.4	6245	2790	510110	4240	44.9429	Intact	1983
11		42°14.95'N，80°34.36'E	0.35	1.3	4635	3640	650210		0.0074	Intact	1983
12		42°14.87'N，80°34.96'E	0.08	1.9	4635	3900	700210		0.0009	Intact	1983
13		42°14.76'N，80°34.85'E	0.11	1.0	4650	3780	700210		0.0014	Intact	1983
14		42°14.44'N，80°35.32'E	1.41	2.2	4672	3750	640110		0.0677	Intact	1983
15		42°15.00'N，80°32.37'E	0.33	1.5	4956	3660	650210		0.0009	Intact	1983
16		42°14.52'N，80°31.61'E	0.24	0.5	4478	3980	700210		0.0043	Intact	1983
17		42°14.46'N，80°30.71'E	0.28	0.5	4381	3900	700210		0.0029	Intact	1983
18		42°16.92'N，80°22.55'E	0.16	0.5	4888	4480	700210		0.0024	Intact	1983
19		42°16.98'N，80°22.77'E	0.16	0.7	4888	4360	750210		0.0024	Intact	1983
20		42°16.76'N，80°24.50'E	0.24	0.7	4972	4400	750210		0.0043	Intact	1983
21		42°16.44'N，80°25.71'E	0.13	0.7	4923	4420	750210		0.0018	Intact	1983
22		42°16.87'N，80°26.90'E	0.89	2.6	5212	4080	640210		0.0356	Intact	1983
23		42°17.19'N，80°27.72'E	2.68	3.7	5312	3700	530110		0.1608	Intact	1983
24		42°17.54'N，80°34.24'E	0.13	1.2	4866	4100	750210		0.0018	Intact	1983
25		42°18.19'N，80°34.78'E	1.53	1.7	5397	4250	640210		0.0750	Intact	1983

26		42°18.54'N，80°35.68'E	2.20	2.5	5397	4140	640110		0.1232	Intact	1983
27		42°18.22'N，80°36.65'E	0.69	2.0	5242	4380	640210		0.0248	Intact	1983
28		42°18.18'N，80°37.77'E	11.37	8.2	5667	3320	530010		1.1256	Intact	1983
29		42°17.38'N，80°39.68'E	0.56	0.9	4869	4180	640210		0.0185	Intact	1983
5Y673A. Akeqihe(river) Number of Glacier: 3 Area(km^2): 0.42 Ice Storage(km^3): 0.0061											
1		41°40.54'N，79°17.14'E	0.15	0.5	3900	3540	700210		0.0023	Intact	1983
2		41°42.45'N，79°15.21'E	0.14	0.3	4240	4100	700210		0.0020	Intact	1983
3		41°43.28'N，79°15.07'E	0.13	0.3	4400	4200	750210		0.0018	Intact	1983
5Y673 K. Hantegelihe(river) Number of Glacier: 1 Area(km^2): 392.84 Ice Storage(km^3): 149.2792											
1	South Yinuoleqieke Glacier	42°07.72'N，80°07.11'E	392.84	63.5	7434	2900	510112		149.2792	Intact	1983
5Y673 O. Hantengelihe(river) Number of Glacier: 22 Area(km^2): 22.04 Ice Storage(km^3): 0.9363											
1		41°49.24'N，79°36.64'E	0.32	0.2	5361	3900	650210		0.0067	Intact	1983
2		41°49.49'N，79°37.65'E	0.40	0.4	5361	3900	650210		0.0092	Intact	1983
3		41°49.76'N，79°38.07'E	0.96	1.2	5300	3600	640110		0.0394	Intact	1983
4		41°49.86'N，79°38.61'E	1.16	1.0	5000	4000	640110		0.0510	Intact	1983
5		41°50.03'N，79°39.26'E	0.92	1.6	5000	4400	640210		0.0304	Intact	1983
6		41°50.51'N，79°39.48'E	1.12	1.3	5000	3800	640210		0.0493	Intact	1983
7		41°51.38'N，79°39.33'E	1.72	2.1	5252	4200	640110		0.0877	Intact	1983
8		41°51.97'N，79°41.06'E	1.36	0.9	5101	4200	640210		0.0639	Intact	1983
9		41°52.13'N，79°41.07'E	1.48	1.2	5117	4100	640110		0.0725	Intact	1983
10		41°52.24'N，79°42.02'E	0.88	1.4	5041	4400	640110		0.0352	Intact	1983
11		41°52.13'N，79°42.52'E	1.4	2.4	5041	3800	530110	4300	0.0672	Intact	1983

12		41°52.13'N，79°43.17'E	1.56	1.9	4900	4200	630110		0.0764	Intact	1983
13		41°52.51'N，79°44.19'E	0.68	0.4	5000	4800	600210		0.0197	Intact	1983
14		41°52.19'N，79°47.09'E	1.32	1.7	4300	4000	640210		0.0620	Intact	1983
15		41°51.65'N，79°47.09'E	1.00	1.2	4100	3800	640210		0.0420	Intact	1983
16		41°51.16'N，79°47.09'E	0.52	0.8	4900	42000	650210		0.0135	Intact	1983
17		41°50.73'N，79°74.01'E	1.20	1.2	4771	3800	640110		0.0540	Intact	1983
18		41°50.41'N，79°46.43'E	0.64	1.2	4550	4000	640210		0.0224	Intact	1983
19		41°50.30'N，79°45.86'E	0.48	0.4	4000	3800	600210		0.0120	Intact	1983
20		41°59.05'N，79°45.28'E	0.44	1.1	4755	4000	650210		0.0106	Intact	1983
21		41°48.57'N，79°47.13'E	1.00	1.6	4755	3800	640210		0.0420	Intact	1983
22		41°46.68'N，79°42.67'E	1.48	1.7	4650	3800	640210		0.0725	Intact	1983
5Y673 P. Hantengelihe(river) Number of Glacier: 98 Aera(km^2): 531.74 Ice Storage(km^3): 117.8058											
1		41°47.70'N，79°44.12'E	0.68	0.6	4238	3400	640210		0.0245	Intact	1983
2		41°48.03'N，79°45.13'E	1.44	1.7	4800	3400	640110		0.0691	Intact	1983
3		41°48.30'N，79°45.57'E	0.88	1.4	4700	4200	640210		0.0352	Intact	1983
4		41°48.62'N，79°45.71'E	0.60	1.0	4755	3800	640210		0.0204	Intact	1983
5		41°49.00'N，79°45.57'E	0.40	1.0	4700	4400	650210		0.0092	Intact	1983
6		41°50.41'N，79°47.30'E	0.64	0.8	4771	4200	640210		0.0224	Intact	1983
7		41°50.08'N，79°47.96'E	0.40	0.4	4500	4200	650210		0.0092	Intact	1983
8		41°49.49'N，79°48.90'E	0.48	1.0	4600	3800	650210		0.0120	Intact	1983
9		41°49.09'N，79°48.73'E	0.21	0.8	4380	4100	780210		0.0036	Intact	1983
10		41°49.36'N，79°48.13'E	1.63	2.1	4700	3650	640110		0.0815	Intact	1983
11		41°50.93'N，79°47.58'E	1.32	1.6	4966	3900	640110		0.0620	Intact	1983

12	Ayilangsu Glacier	41°55.75'N，79°51.76'E	45.91	16.5	5550	3300	530110		7.1620	Intact	1983
13		41°53.47'N，79°48.84'E	0.15	0.8	4340	3980	750210		0.0023	Intact	1983
14		41°54.44'N，79°49.53'E	0.13	0.7	4420	4140	750210		0.0018	Intact	1983
15		41°54.92'N，79°49.34'E	0.30	1.0	4964	4480	650210		0.0060	Intact	1983
16		41°52.13'N，79°50.85'E	0.50	1.2	5014	4190	650210		0.0125	Intact	1983
17		41°51.94'N，79°51.69'E	0.34	1.2	5014	4400	750210		0.0071	Intact	1983
18		41°51.88'N，79°51.69'E	3.31	2.6	5101	3980	640110		0.2152	Intact	1983
19		41°51.00'N，79°51.39'E	0.15	0.6	4785	4480	750210		0.0023	Intact	1983
20		41°50.67'N，79°51.11'E	0.24	0.3	4529	4180	650210		0.0043	Intact	1983
21		41°50.07'N，79°51.18'E	0.09	0.4	4529	4380	750210		0.0011	Intact	1983
22		41°50.13'N，79°51.56'E	0.04	0.1	4471	4380	700210		0.0003	Intact	1983
23		41°50.67'N，79°51.72'E	2.32	1.6	4788	3680	640110		0.1322	Intact	1983
24		41°51.00'N，79°52.60'E	0.13	0.7	4520	4080	750210		0.0018	Intact	1983
25		41°51.56'N，79°52.66'E	1.49	1.8	5101	3980	640210		0.0730	Intact	1983
26		41°51.78'N，79°53.02'E	0.16	1.2	4800	4280	700210		0.0074	Intact	1983
27		41°52.46'N，79°52.53'E	5.51	2.7	5452	3980	640110		0.4243	Intact	1983
28		41°52.67'N，79°54.12'E	0.65	0.9	4900	4420	640210		0.0228	Intact	1983
29		41°52.68'N，79°54.72'E	0.69	1.0	4800	4220	640210		0.0248	Intact	1983
30		41°52.84'N，79°55.32'E	0.23	0.8	4640	4420	750210		0.0041	Intact	1983
31		41°53.00'N，79°55.57'E	0.63	1.2	4640	4380	640210		0.0221	Intact	1983
32		41°53.60'N，79°54.12'E	0.61	0.9	4480	4180	620110		0.0214	Intact	1983
33		41°54.56'N，79°54.60'E	30.28	7.2	5557	3920	620110	4500	4.1484	Intact	1983
34		41°55.73'N，79°56.20'E	0.27	0.5	4700	4380	750210		0.0051	Intact	1983

35		41°55.95'N，79°56.49'E	0.68	1.5	4882	4480	650210		0.0197	Intact	1983
36		41°55.96'N，79°56.81'E	0.70	1.0	4850	4380	640210	4350	0.0252	Intact	1983
37	Tomur Glacier	41°55.17'N，80°00.20'E	337.85	41.5	7434	2780	515122		99.3279	Intact	1983
38		41°58.24'N，79°56.38'E	0.33	106	4787	4480	650210		0.0069	Intact	1983
39		41°01.35'N，79°56.46'E	0.21	0.5	5680	5300	700210		0.0036	Intact	1983
40		41°59.36'N，79°58.51'E	0.89	1.5	4752	4280	600210		0.0294	Intact	1983
41		41°58.71'N，79°58.33'E	0.10	0.6	4920	4340	750210		0.0012	Intact	1983
42		41°57.91'N，80°01.70'E	0.60	1.2	5120	4500	640210		0.0204	Intact	1983
43		41°58.68'N，80°01.57'E	2.99	3.2	5845	4800	640110		0.18884	Intact	1983
44		41°58.73'N，80°02.55'E	0.56	1.5	5590	4280	640210		0.0185	Intact	1983
45		41°01.67'N，80°04.12'E	1.55	0.9	6712	5980	600210		0.0527	Intact	1983
46		41°58.14'N，80°05.66'E	0.24	0.4	5930	5680	650210		0.0043	Intact	1983
47		41°57.87'N，80°05.51'E	0.64	1.0	5930	4880	640210		0.0224	Intact	1983
48		41°57.51'N，80°05.95'E	1.73	1.4	5900	4960	700210		0.0882	Intact	1983
49		41°56.73'N，80°06.17'E	0.34	1.1	5666	4880	640110		0.0071	Intact	1983
50		41°56.61'N，80°06.09'E	0.14	0.3	5780	5180	750210		0.0020	Intact	1983
51		41°55.771'N，80°06.15'E	0.82	0.6	5892	5180	780210		0.0254	Intact	1983
52		41°54.96'N，80°02.14'E	0.08	0.5	4638	4600	700210		0.0009	Intact	1983
53		41°54.57'N，80°03.01'E	2.63	3.4	5300	4040	640110		0.1578	Intact	1983
54		41°53.85'N，80°02.97'E	3.95	3.8	4712	4042	640110		0.2726	Intact	1983
55		41°55.03'N，80°06.97'E	0.10	0.4	5600	5400	700210		0.0012	Intact	1983
56		41°52.40'N，80°00.10'E	0.91	0.7	4800	4180	640210		0.0364	Intact	1983
57		41°52.35'N，79°59.56'E	0.51	1.3	4970	4180	650210		0.0128	Intact	1983

58		41°51.54'N，79°58.36'E	0.10	0.6	4700	4300	750210		0.0012	Intact	1983
59		41°51.41'N，79°58.37'E	0.13	0.6	4700	4280	750210		0.0018	Intact	1983
60		41°50.27'N，79°55.91'E	0.33	0.8	4829	3980	650210		0.0069	Intact	1983
61		41°49.70'N，79°55.73'E	0.76	1.1	4829	4180	640210		0.0289	Intact	1983
62		41°49.44'N，79°55.37'E	0.11	0.6	4400	4100	750210		0.0014	Intact	1983
63		41°49.73'N，79°56.24'E	1.38	0.9	4829	4220	640110		0.0649	Intact	1983
64		41°49.00'N，79°58.17'E	5.84	2.8	5392	4080	640110		0.4614	Intact	1983
65		41°48.36'N，79°57.75'E	0.15	1.0	5175	4700	700210		0.0023	Intact	1983
66		41°47.22'N，79°54.83'E	1.84	3.0	5986	3720	600210		0.0626	Intact	1983
67		41°46.26'N，79°53.82'E	0.39	1.0	5300	4300	650210		0.0090	Intact	1983
68		41°46.11'N，79°52.95'E	2.15	1.9	4895	3600	600210		0.0731	Intact	1983
69		41°45.65'N，79°53.42'E	1.07	1.3	5160	4580	640210		0.0460	Intact	1983
70		41°45.15'N，79°53.55'E	0.18	0.4	4832	4580	750210		0.0029	Intact	1983
71		41°45.93'N，79°53.73'E	0.28	0.4	5240	4600	680210		0.0053	Intact	1983
72	Qingbingtan Glacier	41°45.51'N，79°54.43'E	5.23	7.4	5986	3560	530100	4400	0.3975	Intact	1983
73		41°46.90'N，79°55.95'E	1.71	1.2	5986	4780	640110		0.0872	Intact	1983
74	Bingtan Glacier	41°44.64'N，79°56.61'E	8.98	7.5	5600	3680	530110	4300	0.8172	Intact	1983
75		41°48.96'N，79°57.25'E	0.30	1.3	5100	4380	650210		0.0060	Intact	1983
76		41°45.34'N，79°57.57'E	0.93	1.3	4802	4280	650210		0.0307	Intact	1983
77	Qiongkuermu Glacier	41°45.16'N，79°58.81'E	9.63	8.5	5680	3900	520110	4400	0.9052	Intact	1983
78		41°42.98'N，79°58.04'E	0.89	1.2	4580	4060	640110		0.0365	Intact	1983
79		41°42.57'N，80°00.88'E	2.02	1.6	4580	4040	640110		0.1091	Intact	1983

80		41°42.59'N，79°56.49'E	1.21	1.7	4440	3900	640110		0.0545	Intact	1983
81		41°42.39'N，79°55.78'E	0.89	1.0	4400	3880	640110		0.0356	Intact	1983
82		41°42.24'N，79°55.08'E	0.78	1.0	4255	4000	650210		0.0242	Intact	1983
83		41°42.19'N，79°54.48'E	0.17	0.6	4147	3780	750210		0.0026	Intact	1983
84		41°43.38'N，80°02.33'E	0.30	1.2	4060	3420	650210		0.0060	Intact	1983
85		41°43.40'N，80°01.73'E	0.92	2.4	4508	3400	530110		0.0377	Intact	1983
86		41°43.49'N，80°01.00'E	2.23	3.2	4660	3540	530110		0.1249	Intact	1983
87		41°43.62'N，80°00.39'E	1.03	1.0	4640	4100	640210		0.0433	Intact	1983
88		41°43.19'N，79°59.59'E	4.55	2.2	4660	4000	630110		0.3322	Intact	1983
89		41°46.85'N，79°58.57'E	0.08	0.4	4980	4700	750210		0.0009	Intact	1983
90		41°46.66'N，79°59.05'E	0.09	0.3	5160	4800	750210		0.0011	Intact	1983
91		41°46.62'N，79°59.77'E	0.06	0.3	5295	5080	750210		0.0006	Intact	1983
92		41°46.06'N，79°59.48'E	0.34	0.5	4860	4480	650210		0.0071	Intact	1983
93		41°46.16'N，79°59.56'E	0.21	0.5	4420	4140	700210		0.0036	Intact	1983
94	Keker Glacier	41°46.07'N，80°00.46'E	5.70	6.6	5296	3680	530100	4540	0.4446	Intact	1983
95		41°45.23'N，80°00.37'E	0.15	0.5	4460	4080	700210		0.0023	Intact	1983
96	Kekewulong Glacier	41°46.04'N，80°01.81'E	6.60	4.7	5200	3360	630110	4400	0.5412	Intact	1983
97		41°45.79'N，80°02.75'E	0.25	0.7	4840	4400	650210		0.0045	Intact	1983
98		41°43.70'N，80°03.49'E	0.39	1.7	4120	3280	600110		0.0113	Intact	1983
5Y674A. Kagemoxisuhe(river), etc. Number of Glacier: 33 Area(km^2): 124.34 Ice Storage(km^3): 18.9634											
1		41°43.92'N，80°04.95'E	0.13	1.0	4140	3660	750210		0.0018	Intact	1983
2		41°44.84'N，80°03.72'E	1.72	3.6	4880	3840	530110		0.0877	Intact	1983

3		41°45.01'N，80°04.56'E	1.56	2.3	4728	3880	530110		0.0764	Intact	1983
4		41°45.56'N，80°05.04'E	0.05	0.2	4734	4640	750210		0.0005	Intact	1983
5	Keqierkabaxi Glacier	41°48.77'N，80°10.20'E	83.56	26.0	6040	3060	520110	4350	15.7928	Intact	1983
6		41°45.66'N，80°05.11'E	0.07	0.3	4734	4600	750210		0.0007	Intact	1983
7		41°45.53'N，80°04.40'E	0.19	0.2	4728	4540	750210		0.0030	Intact	1983
8		41°45.61'N，80°03.46'E	0.14	0.5	4880	4500	750210		0.0020	Intact	1983
9		41°45.75'N，80°03.14'E	0.21	0.3	4840	4600	750210		0.0036	Intact	1983
10		41°47.29'N，80°05.70'E	0.75	0.8	5147	4400	650210		0.0225	Intact	1983
11		41°48.72'N，80°09.24'E	0.22	0.3	5253	4800	650210		0.0037	Intact	1983
12		41°46.92'N，80°11.10'E	0.12	0.2	5055	4900	780210		0.0016	Intact	1983
13		41°45.75'N，80°10.41'E	6.24	0.2	5256	3460	530110	4120	0.5054	Intact	1983
14	Xitalege Glacier	41°47.53'N，80°13.08'E	14.77	8.2	5478	3432	530110	4350	1.5952	Intact	1983
15		41°47.56'N，80°13.11'E	0.09	0.3	4960	4700	750210		0.0011	Intact	1983
16		41°46.64'N，80°14.06'E	0.09	0.2	4600	4440	700210		0.0011	Intact	1983
17		41°46.28'N，80°14.32'E	0.16	0.3	4600	4440	750210		0.0024	Intact	1983
18		41°45.42'N，80°14.46'E	0.15	0.3	4660	4420	750210		0.0023	Intact	1983
19		41°45.31'N，80°14.69'E	0.20	0.5	4640	4280	750210		0.0034	Intact	1983
20		41°45.61'N，80°14.70'E	0.30	0.3	4660	4280	680210		0.0060	Intact	1983
21		41°47.84'N，80°13.71'E	0.18	0.4	4962	4600	750210		0.0029	Intact	1983
22		41°48.13'N，80°13.56'E	0.08	0.2	4908	4700	700210		0.0009	Intact	1983
23	Paheluke Glacier	41°47.58'N，80°14.67'E	6.51	7.4	5058	3516	530110	4260	0.5338	Intact	1983
24		41°47.34'N，80°16.00'E	0.35	0.8	4867	4300	650210		0.0074	Intact	1983

25		41°47.03'N，80°16.09'E	0.37	1.5	4867	4120	650210		0.0081	Intact	1983
26		41°47.04'N，80°16.27'E	0.25	1.2	4867	4120	750210		0.0045	Intact	1983
27	Sukalake Glacier	41°46.94'N，80°17.20'E	2.60	3.5	4867	3560	530110	4200	0.1560	Intact	1983
28		41°46.50'N，80°18.11'E	0.62	1.0	4608	3934	650210		0.0174	Intact	1983
29		41°45.71'N，80°18.31'E	0.08	0.5	3980	3600	750210		0.0009	Intact	1983
30		41°46.27'N，80°18.62'E	0.15	0.5	4608	4220	750210		0.0023	Intact	1983
31		41°45. 85'N，80°18.83'E	0.38	0.7	4100	3620	650210		0.0084	Intact	1983
32		41°46.79'N，80°18.54'E	1.98	2.8	4846	4060	640110		0.1069	Intact	1983
33		41°43.89'N，80°21.38'E	0.07	0.4	3220	3080	750210		0.0007	Intact	1983
5Y674 B. Qiongteliansuhe(river)			**Number of Glacier: 54**			**Area(km^2): 231.94**		**Ice Storage(km^3): 42.8654**			
1		41°45.25'N，80°21.29'E	1.18	2.1	4333	3320	640210		0.0531	Intact	1983
2		41°44.90'N，80°21.76'E	0.27	0.4	3560	3300	650210		0.0051	Intact	1983
3		41°46.46'N，80°22.16'E	0.08	0.3	4020	3880	700210		0.0009	Intact	1983
4		41°46.53'N，80°23.63'E	0.79	1.3	4256	3520	640110		0.0300	Intact	1983
5		41°46.77'N，80°21.19'E	0.29	1.0	4140	3680	650210		0.0058	Intact	1983
6		41°46.69'N，80°20.18'E	5.05	3.2	4505	3580	640110		0.3788	Intact	1983
7		41°47.63'N，80°20.50'E	1.74	2.0	4518	3540	640110		0.0905	Intact	1983
8		41°47.87'N，80°20.96'E	0.33	2.1	4412	3780	650210		0.0069	Intact	1983
9		41°48.09'N，80°21.25'E	0.74	1.8	4380	3340	640110		0.0274	Intact	1983
10		41°48.19'N，80°20.32'E	0.64	1.1	4519	3700	640110		0.0224	Intact	1983
11		41°47.76'N，80°19.61'E	1.57	2.4	4519	3700	640110		0.0785	Intact	1983
12		41°47.40'N，80°19.01'E	2.54	2.8	4581	3681	630110		0.1499	Intact	1983
13		41°48.18'N，80°18.37'E	0.23	1.5	4420	3520	650210		0.0041	Intact	1983

14		41°47.60'N，80°18.06'E	1.40	2.3	4847	3500	630110		0.0672	Intact	1983
15		41°47.72'N，80°17.37'E	0.21	0.5	4751	4200	700210		0.0036	Intact	1983
16	Shayinieba Glacier	41°49.54'N，80°13.23'E	14.07	10.7	6049	3300	520110	4240	1.4914	Intact	1983
17		41°47.89'N，80°15.37'E	1.04	1.3	4750	3834	640110		0.0447	Intact	1983
18		41°48.12'N，80°14.86'E	0.18	0.7	4440	4000	750210		0.0029	Intact	1983
19		41°48.30'N，80°12.98'E	0.12	0.2	5069	4800	700210		0.0016	Intact	1983
20		41°49.08'N，80°12.18'E	0.65	0.5	5307	4680	650210		0.0182	Intact	1983
21		41°50.46'N，80°13.62'E	1.66	2.4	5438	4220	640210		0.0847	Intact	1983
22		41°50.67'N，80°14.38'E	0.43	1.1	5145	4444	650210		0.0103	Intact	1983
23		41°50. 49'N，80°14.72'E	0.29	1.4	5020	4270	650210		0.0058	Intact	1983
24		41°50. 53'N，80°15.77'E	3.90	4.8	5283	3900	530110		0.2691	Intact	1983
25		41°51.05'N，80°18.13'E	2.19	3.4	4400	3180	630110		0.1226	Intact	1983
26		41°51.08'N，80°16.79'E	3.20	4.5	4580	3180	530110		0.2048	Intact	1983
27		41°52.10'N，80°16.27'E	0.66	0.8	5398	4940	530110		0.0238	Intact	1983
28	Qiongtelian Glacier	41°56.95'N，80°08.41'E	165.38	23.8	7434	3080	515112	4300	38.8643	Intact	1983
29		41°52.65'N，80°09.09'E	0.45	1.2	6040	5280	650210		0.0108	Intact	1983
30		41°52.97'N，80°08.09'E	2.23	1.3	6000	4660	680210		0.0758	Intact	1983
31		41°55.20'N，80°10.38'E	0.63	1.7	4660	4060	650210		0.0176	Intact	1983
32		41°57.61'N，80°13.27'E	0.23	0.3	5711	5300	750210		0.0041	Intact	1983
33		41°56.75'N，80°13.57'E	1.96	2.5	5619	4420	680210		0.0666	Intact	1983
34		41°56.34'N，80°15.46'E	1.19	0.8	5138	4600	300110		0.0536	Intact	1983
35		41°55.19'N，80°16.28'E	0.38	0.5	5025	4700	650210		0.0084	Intact	1983
36		41°56.41'N，80°15.81'E	0.44	0.6	4880	4500	650210		0.0106	Intact	1983

37		41°57.60'N，80°13.66'E	2.05	0.8	5760	4320	680210		0.0697	Intact	1983
38		41°58.22'N，80°15.93'E	0.72	1.0	6876	5720	650210		0.0216	Intact	1983
39		42°04.06'N，80°17.66'E	1.49	0.7	6876	5800	680210		0.0507	Intact	1983
40		42°03.55'N，80°18.03'E	0.12	0.4	5760	5180	700210		0.0016	Intact	1983
41		41°58.15'N，80°20.18'E	0.40	1.3	5571	4520	650210		0.0092	Intact	1983
42		41°57.93'N，80°20.62'E	0.27	0.8	5520	4580	750210		0.0051	Intact	1983
43		41°57.19'N，80°20.93'E	1.36	2.3	5124	4280	630110		0.0639	Intact	1983
44		41°58.79'N，80°21.16'E	2.13	4.0	5312	3960	530110	4480	0.1172	Intact	1983
45		41°56.03'N，80°20.72'E	0.07	0.4	5046	4680	700210		0.0007	Intact	1983
46		41°54.87'N，80°20.75'E	2.18	0.6	5234	4700	750210		0.0029	Intact	1983
47		41°54.73'N，80°21.05'E	0.10	0.2	5234	5000	750210		0.0012	Intact	1983
48		41°54.68'N，80°21.45'E	0.53	2.8	5363	3880	600110		0.0175	Intact	1983
49		41°54.14'N，80°22.01'E	2.13	4.6	5363	3900	530110		0.1172	Intact	1983
50		41°53.75'N，80°21.95'E	0.09	0.2	5000	4880	700210		0.0011	Intact	1983
51		41°53.75'N，80°22.21'E	0.19	0.4	5028	4780	750210		0.0030	Intact	1983
52		41°52.69'N，80°24.42'E	0.44	0.6	4720	4040	650210		0.0106	Intact	1983
53		41°51.35'N，80°24.16'E	0.11	0.2	4720	4460	700210		0.0014	Intact	1983
54		41°50.89'N，80°24.61'E	1.22	1.2	4827	4120	640210		0.0549	Intact	1983
5Y674C. Keqiketieliekesuhe(river) Number of Glacier: 46 Aere(km^2): 184.89 Ice Storage(km^3): 26.9418											
1		41°49.63'N，80°26.39'E	1.03	2.1	4400	3600	640110		0.0433	Intact	1983
2		41°50.18'N，80°25.85'E	0.59	1.9	4100	3500	640110		0.0201	Intact	1983
3		41°50.43'N，80°25.26'E	0.35	1.1	4677	4000	650210		0.0074	Intact	1983
4		41°50.67'N，80°25.33'E	0.40	1.0	4677	4000	640210		0.0116	Intact	1983

5		41°50.98'N，80°25.24'E	0.93	1.7	4826	3950	640110		0.0381	Intact	1983
6		41°51.26'N，80°25.42'E	0.14	0.9	4640	4000	750210		0.0020	Intact	1983
7		41°51.46'N，80°24.80'E	1.65	2.2	4827	3560	640210		0.0842	Intact	1983
8		41°52.71'N，80°24.88'E	0.58	1.4	4750	3820	640210		0.0197	Intact	1983
9		41°54.48'N，80°22.97'E	3.58	6.0	5285	3580	530110		0.2399	Intact	1983
10		41°54.68'N，80°24.38'E	0.93	3.4	4800	3500	600110		0.0381	Intact	1983
11		41°55.25'N，80°23.73'E	2.72	3.3	4900	3790	535110		0.1659	Intact	1983
12		41°56.47'N，80°22.57'E	4.39	5.4	5312	3690	530110		0.3161	Intact	1983
13	Kqiketielieksu Glacier	42°01.92'N，80°22.20'E	99.61	17.9	6640	3850	515110	4200	19.9220	Intact	1983
14		42°00.00'N，80°24.89'E	0.28	1.0	4980	4420	650210		0.0053	Intact	1983
15		42°01.30'N，80°29.54'E	3.24	2.0	6388	5000	640110		0.0274	Intact	1983
16		41°59.32'N，80°28.32'E	0.08	0.4	5450	5050	700110		0.0009	Intact	1983
17		41°58.95'N，80°26.68'E	0.95	2.1	4330	3850	640110		0.0390	Intact	1983
18		41°57.61'N，80°26.46'E	0.14	0.5	4840	4380	750210		0.0020	Intact	1983
19		41°57.14'N，80°27.11'E	1.00	1.5	4520	3800	640110		0.0420	Intact	1983
20		41°57.85'N，80°27.77'E	0.25	0.8	4540	4230	750210		0.0045	Intact	1983
21		41°58.83'N，80°28.84'E	0.22	0.8	4560	4100	750210		0.0037	Intact	1983
22		41°58.25'N，80°30.08'E	28.60	12.0	6588	3700	520110	4270	3.8324	Intact	1983
23		41°58.78'N，80°31.88'E	1.63	1.9	5604	4000	640110		0.0815	Intact	1983
24		41°58.21'N，80°31.69'E	1.08	1.6	5300	4070	640110		0.0464	Intact	1983
25		41°57.88'N，80°31.88'E	1.10	2.5	5010	4080	640110		0.0473	Intact	1983
26		41°56.95'N，80°30.82'E	0.09	0.4	4752	4580	750210		0.0011	Intact	1983
27		41°56.81'N，80°30.86'E	0.14	0.6	4750	4600	750210		0.0020	Intact	1983

28		41°55.87'N，80°29.50'E	0.53	1.7	4420	4140	640110		0.0175	Intact	1983
29		41°55.65'N，80°29.16'E	0.57	1.2	4403	4090	640110		0.0194	Intact	1983
30		41°55.60'N，80°28.62'E	0.12	0.7	4403	4150	750210		0.0016	Intact	1983
31		41°55.44'N，80°28.77'E	0.25	1.0	4403	4050	650210		0.0045	Intact	1983
32		41°55.36'N，80°29.08'E	0.27	1.4	4550	4100	650210		0.0051	Intact	1983
33		41°55.49'N，80°39.43'E	1.82	1.6	4580	4100	600210		0.0619	Intact	1983
34		41°54.73'N，80°31.86'E	2.57	2.8	5180	3960	640110		0.1516	Intact	1983
35		41°53.97'N，80°31.54'E	2.60	2.7	5096	4060	640110		0.1560	Intact	1983
36		41°53.90'N，80°30.16'E	1.76	1.8	4521	4100	600210		0.0598	Intact	1983
37		41°52.94'N，80°31.36'E	5.81	7.6	5027	3960	530110	4440	0.4590	Intact	1983
38		41°52.49'N，80°30.57'E	0.23	0.4	4943	4620	700210		0.0041	Intact	1983
39		41°51.80'N，80°31.44'E	1.33	0.8	4943	4440	600210		0.0452	Intact	1983
40		41°51.00'N，80°31.83'E	2.96	2.1	4902	3940	530110		0.1835	Intact	1983
41		41°50.73'N，80°31.35'E	0.21	0.3	4692	4440	750210		0.0036	Intact	1983
42		41°50.76'N，80°30.71'E	0.24	0.7	4580	4200	650210		0.0043	Intact	1983
43		41°50.30'N，80°31.40'E	1.36	2.1	4692	4040	640110	4280	0.0639	Intact	1983
44		41°49.57'N，80°31.30'E	0.58	0.7	4548	4130	640210		0.0197	Intact	1983
45		41°49.23'N，80°31.33'E	0.25	0.4	4548	4200	700210		0.0045	Intact	1983
46		41°49.93'N，80°32.41'E	5.73	1.8	4903	3720	640110		0.4527	Intact	1983
5Y674D. Aoqike Number of Glacier: 1 Aera(km^2): 3.36 Ice Storage(km^3): 0.2184											
1		41°49.64'N，80°34.25'E	3.36	2.0	4900	3860	640110		0.2184	Intact	1983
5Y674E. Kejike Kuziwayineng Daieryasi Number of Glacier: 18 Aera(km^2): 61.77 Ice Storage(km^3): 6.6443											
1		41°49.08'N，80°35.84'E	0.22	0.6	4430	4100	650210		0.0037	Intact	1983

2		41°49.48'N，80°36.34'E	1.09	3.0	4308	3720	640110		0.0469	Intact	1983
3		41°49.59'N，80°35.57'E	1.31	2.4	4308	3680	630110		0.0603	Intact	1983
4		41°49.93'N，80°34.84'E	0.39	1.4	4864	3820	650210		0.0090	Intact	1983
5		41°50.43'N，80°33.56'E	7.5	5.3	4903	3470	530110	4220	0.6450	Intact	1983
6		41°51.51'N，80°33.73'E	0.30	0.7	4691	4280	650210		0.0060	Intact	1983
7		41°51.88'N，80°34.16'E	3.86	4.6	4901	3740	630110	4120	0.2625	Intact	1983
8		41°52.19'N，80°34.99'E	0.14	0.6	4230	3900	700210		0.0020	Intact	1983
9		41°52.37'N，80°34.61'E	0.68	1.4	4350	3900	640210		0.0245	Intact	1983
10		41°53.08'N，80°34.88'E	0.29	1.0	4020	3740	650210		0.0058	Intact	1983
11		41°52.48'N，80°32.93'E	5.17	3.5	4901	3880	530110	4280	0.3929	Intact	1983
12		41°53.10'N，80°33.42'E	0.58	0.9	4671	4050	640210		0.0197	Intact	1983
13		41°53.51'N，80°32.93'E	3.89	2.8	4850	3930	640110	4250	0.2684	Intact	1983
14		41°54.14'N，80°32.44'E	0.22	0.4	5096	4580	750210		0.0037	Intact	1983
15	Keqike Kuziwayi Glacier	41°56.61'N，80°33.87'E	33.76	9.0	5714	3320	510110	4180	4.7939	Intact	1983
16		41°55.16'N，80°36.39'E	1.66	2.0	5168	4580	640110		0.0847	Intact	1983
17		41°54.40'N，80°37.08'E	0.38	0.6	4840	4380	650210		0.0084	Intact	1983
18		41°52.43'N，80°37.70'E	0.33	0.3	4502	3880	680110		0.0069	Intact	1983
5Y674F. Qiongkuziwa Yineng Daieryasi Number of Glacier: 40 Aera(km^2): 133.53 Ice Storage(km^3): 17.8342											
1		41°53.34'N，80°37.12'E	0.56	0.5	4502	3900	680210		0.0146	Intact	1983
2		41°54.14'N，80°37.71'E	0.38	1.4	4600	3700	650210		0.0084	Intact	1983
3		41°53.44'N，80°37.57'E	0.20	0.4	4850	4500	750210		0.0034	Intact	1983
4		41°54.79'N，80°37.10'E	1.17	2.0	5168	4000	630110		0.0515	Intact	1983

5	Qiongkuziwayi Glacier	42°00.49'N，80°35.40'E	73.63	21.0	6588	2860	520110	4200	13.4007	Intact	1983
6		41°56.44'N，80°38.26'E	0.14	0.7	4420	3900	750210		0.0020	Intact	1983
7		41°57.34'N，80°37.24'E	0.17	0.4	4759	4400	750210		0.0026	Intact	1983
8		41°58.42'N，80°35.91'E	0.05	0.2	4530	4420	700210		0.0005	Intact	1983
9		41°58.51'N，80°36.23'E	0.11	0.2	4415	4060	750210		0.0014	Intact	1983
10		41°58.62'N，80°36.27'E	0.08	0.2	4415	4150	700210		0.0009	Intact	1983
11		42°00.16'N，80°37.18'E	1.27	1.5	5512	4380	650210		0.0584	Intact	1983
12		41°59.95'N，80°37.61'E	0.51	0.6	5136	4320	650210		0.0128	Intact	1983
13		41°59.92'N，80°38.29'E	0.40	1.5	5222	4320	650210		0.0092	Intact	1983
14		41°59.46'N，80°39.09'E	0.33	1.0	5297	4180	650210		0.0069	Intact	1983
15		41°58.72'N，80°39.88'E	1.22	2.0	5068	3670	640110		0.0549	Intact	1983
16		41°58.37'N，80°39.83'E	0.10	0.2	4830	4400	700210		0.0012	Intact	1983
17		41°58.39'N，80°40.47'E	0.85	1.5	5068	4100	640210		0.0332	Intact	1983
18		41°57.92'N，80°46.60'E	0.88	1.1	5146	4150	640210		0.0352	Intact	1983
19		41°57.26'N，80°40.57'E	1.37	2.5	5146	3520	630110		0.0644	Intact	1983
20		41°56.52'N，80°40.62'E	0.50	0.8	4488	3850	650210		0.0125	Intact	1983
21		41°56.92'N，80°41.28'E	5.60	3.4	5146	3820	525010	4280	0.4368	Intact	1983
22		41°55.00'N，80°42.71'E	11.36	5.3	4900	3680	520110	4250	1.1246	Intact	1983
23		41°54.71'N，80°41.52'E	1.27	2.3	4530	3340	530110		0.0584	Intact	1983
24		41°54.33'N，80°41.27'E	0.17	0.3	4200	3990	700210		0.026	Intact	1983
25		41°53.79'N，80°41.83'E	1.33	1.6	4564	3900	640110		0.0625	Intact	1983
26		41°53.29'N，80°42.21'E	2.17	2.4	4656	3840	640110		0.1215	Intact	1983

27		41°52.91'N，80°41.96'E	0.31	0.6	4290	3900			0.0062	Intact	1983
28		41°52.89'N，80°42.57'E	1.08	0.8	4605	3880	640110		0.0464	Intact	1983
29		41°52.39'N，80°42.15'E	0.14	0.2	4400	4020	700210		0.0020	Intact	1983
30		41°52.30'N，80°42.47'E	1.51	1.9	4605	3780	640110		0.0740	Intact	1983
31		41°52.12'N，80°44.10'E	1.02	0.8	4482	3640	640210		0.0428	Intact	1983
32		41°51.63'N，80°44.16'E	1.53	1.2	4159	3580	640210		0.0745	Intact	1983
33		41°50.90'N，80°44.70'E	0.21	0.3	4159	3820	700210		0.0036	Intact	1983
34		41°51.43'N，80°44.95'E	0.27	0.4	4159	3920	680210		0.0051	Intact	1983
35		41°52.00'N，80°44.86'E	0.57	1.3	4338	3760	650210		0.0154	Intact	1983
36		41°53.20'N，80°43.94'E	8.31	3.6	4868	3860	620110		0.7396	Intact	1983
37		41°54.30'N，80°45.06'E	0.04	0.2	4794	4700	700210		0.0003	Intact	1983
38		41°53.52'N，80°45.42'E	0.18	0.4	4520	4280	750210		0.0029	Intact	1983
39		41°53.55'N，80°46.88'E	12.21	5.3	4800	3560	630110		1.2332	Intact	1983
40		41°52.16'N，80°47.34'E	0.34	0.5	4180	3960	650210		0.0071	Intact	1983

2.7.2 Glacier List of the Nominated Kalajun-Kuerdening Site

There are 46 modern glaciers in the nominated Kalajun-Kuerdening, with an area of 22.509 km^2 and an ice volume of 0.937 km^3.

No.	Name	Coordinates	Area (km^2)	Length (km)	Hightest Altitude (m)	End of the Glacier Tongue (m)	Glacier Type	Snowline Height (m)	Ice Storage (km^3)	Conservation Condition	Record Time
5X044 J. Wulekenjiergalanghe(river), etc. Number of Glacier: 20 Area(km^2): 9.43 Ice Storage(km^3): 0.402											
1		42°59.64'N,83°12.11'E	0.43	1.2	3838	3640	653210		0.0103	Intact	1983
2		42°59.44'N，83°11.06'E	0.11	0.4	3700	3480	753210		0.0014	Intact	1983
3		42°59.43'N，83°10.70'E	0.16	0.6	3780	3460	750210		0.0024	Intact	1983
4		42°59.51'N，83°10.23'E	0.13	0.6	3680	3460	753210		0.0018	Intact	1983
5		42°58.72'N，83°09.23'E	1.04	1.6	3918	3480	640110		0.0447	Intact	1983
6		43°00.13'N，83°06.10'E	0.41	1.0	3600	3440	650210		0.0094	Intact	1983
7		43°01.83'N，83°06.03'E	0.18	0.6	3500	3280	750210		0.0029	Intact	1983
8		43°01.19'N，83°05.21'E	0.18	0.6	3607	3320	750210		0.0029	Intact	1983
9		42°58.00'N，83°55.77'E	0.08	0.3	3600	3500	700210		0.0009	Intact	1983
10		42°58.57'N，83°54.14'E	0.06	0.3	3859	3500	750210		0.0006	Intact	1983
11		42°58.24'N，83°53.96'E	0.10	0.5	3840	3600	750210		0.0012	Intact	1983
12		42°57.95'N，83°53.48'E	0.11	0.6	3760	3460	750210		0.0014	Intact	1983
13		42°57.88'N，83°53.17'E	0.12	0.4	3620	3420	640110		0.0016	Intact	1983
14		42°57.54'N，83°52.37'E	1.45	1.8	4037	3400	630110	3660	0.0696	Intact	1983

15		42°57.92'N，83°51.05'E	2.95	3.7	4000	3400	700210	3720	0.1829	Intact	1983
16		42°58.58'N，83°52.07'E	0.1	0.6	3700	3400	750210		0.0012	Intact	1983
17		42°58.94'N，83°52.15'E	0.11	0.6	3600	3340	750210		0.0014	Intact	1983
18		42°58.68'N，83°51.34'E	0.42	1.1	3900	3400	640210		0.0126	Intact	1983
19		42°58.23'N，83°50.02'E	1.16	2.4	4000	3440	640110	3660	0.0510	Intact	1983
20		42°58.58'N，83°49.04'E	0.13	0.4	3700	3520	750210		0.0018	Intact	1983
5X045 B. Kuerdaihe(river) Number of Glacier: 26 Area(km^2): 13.079 Ice Storage(km^3): 0.535											
1		42°53.59'N，83°27.30'E	0.08	0.3	3720	3490	750210	3760	0.0009	Intact	1983
2		42°52.51'N，83°28.95'E	0.30	0.6	3955	3580	650210		0.0060	Intact	1983
3		42°52.45'N，83°28.43'E	0.12	0.4	3820	3580	750210		0.0016	Intact	1983
4		42°52.29'N，83°29.31'E	0.15	0.4	4020	3900	750210		0.0023	Intact	1983
5		42°51.72'N，83°30.27'E	0.09	0.4	4080	3920	700210		0.0011	Intact	1983
6		42°51.21'N，83°30.49'E	0.18	0.6	4080	3840	750210		0.0029	Intact	1983
7		42°50.88'N，83°30.12'E	2.6	2.5	4103	3520	643110		0.1560	Intact	1983
8		42°50.88'N，83°28.87'E	0.52	1.2	4000	3540	640210		0.0166	Intact	1983
9		42°50.94'N，83°28.07'E	0.239	0.6	3840	3500	650210		0.0041	Intact	1983
10		42°50.72'N，83°27.55'E	0.62	1.2	3920	3500	640210		0.0217	Intact	1983
11		42°50.877'N，83°26.60'E	1.69	1.6	4183	3500	640110	3700	0.0862	Intact	1983
12		42°51.21'N，83°25.87'E	0.74	1.2	4128	3560	643210		0.0274	Intact	1983
13		42°51.41'N，83°25.14'E	0.63	1.0	4020	3500	640210		0.0221	Intact	1983
14		42°52.13'N，83°24.92'E	0.35	0.6	3910	3570	650210		0.0074	Intact	1983
15		42°52.59'N，83°25.28'E	0.12	0.4	3620	3420	750210		0.0016	Intact	1983

16		42°52.83'N，83°24.90'E	0.16	0.6	3700	3460	750210		0.0024	Intact	1983
17		42°54.62'N，83°24.40'E	0.14	0.4	3800	3400	750210		0.0020	Intact	1983
18		42°53.27'N，83°27.26'E	0.17	0.5	3700	3400	750210		0.0026	Intact	1983
19		42°52.56'N，83°24.70'E	0.36	1.0	3680	3420	620210		0.0079	Intact	1983
20		42°52.53'N，83°24.33'E	0.16	0.16	3660	3400	750210		0.0024	Intact	1983
21		42°52.13'N，83°24.48'E	0.17	0.17	3910	3580	750210		0.0026	Intact	1983
22		42°51.04'N，83°23.86'E	1.66	1.66	4100	3460	643110		0.0847	Intact	1983
23		42°50.99'N，83°22.79'E	1.38	1.38	4127	3500	640110		0.0649	Intact	1983
24		42°51.56'N，83°22.28'E	0.29	0.29	3780	3500	650210		0.0058	Intact	1983
25		42°52.31'N，83°21.98'E	0.08	0.08	3600	3460	700210		0.0009	Intact	1983
26		42°52.61'N，83°20.52'E	0.08	0.08	3620	3420	750210		0.0009	Intact	1983

2.7.3 Glacier List of the Nominated Bogda Site

There are 154 modern glaciers in the nominated Bogda, with an area of 118.91 km^2 and an ice volume of 7.1457 km^3.

No.	Name	Coordinates	Area (km^2)	Length (km)	Hightest Altitude (m)	End of the Glacier Tongue (m)	Glacier Type	Snowline Height (m)	Ice Storage (km^3)	Conservation Condition	Record Time
5Y725 A. Huangshanhe(river) Number of Glacier: 5 Area(km^2): 0.98 Ice Storage(km^3): 0.0249											
1		43°51.35'N，88°35.57'E	0.05	0.4	3920	3600	700210		0.0005	Intact	1983
2		43°51.31'N，88°35.47'E	0.07	0.5	4000	3600	700210		0.0007	Intact	1983
3		43°51.35'N，88°35.24'E	0.12	0.5	4000	3660	700210		0.0016	Intact	1983
4		43°51.09'N，88°34.46'E	0.16	0.5	3880	3600	700210		0.0024	Intact	1983
5		43°51.35'N，88°35.57'E	0.58	0.8	4150	3560	640210		0.0197	Intact	1983
5Y725 B. Baiyanghe(river) Number of Glacier: 15 Area(km^2): 21.14 Ice Storage(km^3): 1.5501											
1		43°49.19'N，88°29.67'E	1.16	1.6	4240	3530	640210	3760	0.0510	Intact	1983
2		43°48.08'N，88°29.44'E	0.13	0.7	4220	3720	700210		0.0018	Intact	1983
3		43°47.95'N，88°29.33'E	0.16	0.6	4200	3720	700210		0.0024	Intact	1983
4		43°47.76'N，88°28.11'E	0.2	0.2	3910	3790	700210		0.0003	Intact	1983
5		43°47.70'N，88°27.48'E	0.23	0.9	4360	3800	650210		0.0041	Intact	1983
6		43°48.19'N，88°27.22'E	3.16	3.0	4360	3540	640110	3900	0.2022	Intact	1983
7		43°46.54'N，88°25.22'E	0.45	1.0	5280	4610	640110		0.0140	Intact	1983

8		43°47.70'N，88°25.61'E	3.32	3.5	4060	3310	620110	3690	0.2158	Intact	1983
9		43°47.43'N，88°24.07'E	1.21	2.6	4900	3640	640210	3890	0.0545	Intact	1983
10		43°47.78'N，88°22.74'E	10.27	7.4	5445	3330	525012	3860	0.9859	Intact	1983
11		43°49.95'N，88°24.48'E	0.23	1.0	4000	3640	650210		0.0041	Intact	1983
12		43°50.19'N，88°24.19'E	0.18	1.0	4200	3800	750210		0.0029	Intact	1983
13		43°50.82'N，88°25.26'E	0.12	0.6	4101	3900	700210		0.0016	Intact	1983
14		43°50.82'N，88°24.93'E	0.36	0.7	4101	3800	650210		0.0079	Intact	1983
15		43°50.57'N，88°24.22'E	0.12	0.4	3960	3760	750210		0.0016	Intact	1983
5Y725C. Ganhezigou Number of Glacier: 13 Area(km^2): 7.60 Ice Storage(km^3): 0.3203											
1		43°50.04'N，88°23.81'E	0.27	0.8	4270	3700	653210		0.0051	Intact	1983
2		43°49.66'N，88°23.78'E	0.14	0.7	4200	4000	750210		0.0020	Intact	1983
3		43°49.30'N，88°29.33'E	0.16	0.6	4200	3720	640110	3750	0.0653	Intact	1983
4		43°50.12'N，88°21.89'E	0.45	1.0	4160	3560	650210		0.0108	Intact	1983
5		43°49.78'N，88°21.07'E	2.58	2.9	4240	3640	620112	3790	0.1522	Intact	1983
6		43°51.35'N，88°21.31'E	0.26	0.7	4000	3700	650210		0.0049	Intact	1983
7		43°49.97'N，88°20.24'E	0.69	1.1	4070	3540	643210		0.0248	Intact	1983
8		43°50.01'N，88°25.61'E	0.06	0.5	4020	3660	700210		0.0006	Intact	1983
9		43°50.03'N，88°19.26'E	0.76	1.5	4010	3620	640210		0.0289	Intact	1983
10		43°51.20'N，88°19.33'E	0.03	0.3	3920	3850	700210		0.0002	Intact	1983
11		43°51.42'N，88°19.19'E	0.50	1.0	3970	3600	640110		0.0160	Intact	1983

12		43°51.84'N，88°18.63'E	0.38	0.8	3900	3530	653210		0.0084	Intact	1983
13		43°51.99'N，88°18.19'E	0.09	0.4	3850	3650	700210		0.0011	Intact	1983
5Y725D. Sigonghe(river) Number of Glacier: 8 Area(km^2): 7.46 Ice Storage(km^3): 0.4307											
1		43°51.76'N，88°18.22'E	0.08	0.5	3860	3830	700210		0.0000	Intact	1983
2		43°51.14'N，88°18.70'E	0.39	0.5	3940	3620	653210		0.0090	Intact	1983
3		43°49.81'N，88°19.63'E	0.09	0.2	4060	3920	700210		0.0011	Intact	1983
4		43°48.92'N，88°20.65'E	2.96	3.2	4350	3600	640110	3880	0.1835	Intact	1983
5		43°47.96'N，88°20.12'E	3.47	4.3	5445	3620	520110	3850	0.2290	Intact	1983
6		43°48.85'N，88°17.78'E	0.17	0.6	4030	3840	750210		0.0026	Intact	1983
7		43°49.73'N，88°17.07'E	0.10	0.4	3860	3700	700210		0.0026	Intact	1983
8		43°49.73'N，88°16.81'E	0.20	0.7	3900	3490	750210		0.0034	Intact	1983
5Y725E. Sangonghe(river) Number of Glacier: 24 Area(km^2): 10.10 Ice Storage(km^3): 0.4045											
1		43°50.42'N，88°16.19'E	0.12	0.6	3860	3520	750210		0.0016	Intact	1983
2		43°48.95'N，88°17.41'E	0.58	1.2	4032	3640	640210	3750	0.0197	Intact	1983
3		43°47.51'N，88°16.26'E	0.52	0.9	3970	3670	640110		0.0166	Intact	1983
4		43°48.03'N，88°15.78'E	0.30	0.7	3920	3580	650210		0.0060	Intact	1983
5		43°48.51'N，88°14.19'E	0.28	0.5	4005	3560	640210		0.0070	Intact	1983
6		43°48.77'N，88°14.78'E	0.08	0.4	4000	3720	700210		0.0009	Intact	1983
7		43°48.81'N，88°14.59'E	0.19	0.6	4000	3600	750210		0.0030	Intact	1983
8		43°47.73'N，88°15.81'E	0.09	0.5	3960	3830	700210		0.0011	Intact	1983

9		43°47.46'N，88°15.48'E	0.38	0.9	4020	3640	640210		0.0106	Intact	1983
10		43°47.19'N，88°15.33'E	0.18	0.6	3950	3780	750210		0.0029	Intact	1983
11		43°47.16'N，88°14.89'E	0.36	0.9	3923	3550	640210		0.0101	Intact	1983
12		43°46.05'N，88°15.96'E	1.03	1.8	4400	3540	640110	3990	0.0433	Intact	1983
13		43°45.43'N，88°15.19'E	3.02	3.2	4420	3410	620110	3770	0.1903	Intact	1983
14		43°45.70'N，88°14.22'E	0.23	0.7	4220	3680	650210		0.0041	Intact	1983
15		43°45.43'N，88°13.98'E	0.05	0.4	4200	3890	700210		0.0005	Intact	1983
16		43°45.49'N，88°13.59'E	0.21	0.9	4020	3530	650210		0.0036	Intact	1983
17		43°45.22'N，88°13.57'E	0.29	1.1	4100	3520	650210		0.0058	Intact	1983
18		43°44.84'N，88°13.11'E	1.03	2.1	4320	3470	530110	3710	0.0433	Intact	1983
19		43°44.84'N，88°12.52'E	0.05	0.3	4200	3920	700210		0.0005	Intact	1983
20		43°44.89'N，88°12.30'E	0.05	0.2	4200	4010	750210		0.0005	Intact	1983
21		43°45.64'N，88°12.22'E	0.09	0.5	3880	3620	703210		0.0011	Intact	1983
22		43°45.08'N，88°11.91'E	0.16	0.8	3900	3500	750210		0.0024	Intact	1983
23		43°45.14'N，88°10.56'E	0.04	0.4	3780	3510	750210		0.0006	Intact	1983
24		43°44.74'N，88°10.33'E	0.77	1.4	4320	3590	640210	3820	0.0293	Intact	1983
5Y725F. Huangshanhe(river)		**Number of Glacier: 4**			**Area(km^2): 0.70**		**Ice Storage(km^3): 0.0176**				
1		43°44.68'N，88°09.78'E	0.18	0.6	3960	3600	750210		0.0029	Intact	1983
2		43°44.54'N，88°09.30'E	0.46	1.1	4080	3520	640110		0.0143	Intact	1983
3		43°44.41'N，88°09.00'E	0.03	0.2	4000	3700	780210		0.0002	Intact	1983

4		43°44.27'N，88°08.70'E	0.03	0.3	4000	3700	700210		0.0002	Intact	1983
5Y812A. Baiyanghe(river) Number of Glacier: 15 Area(km^2): 2.77 Ice Storage(km^3): 0.0672											
1		43°44.21'N，88°06.84'E	0.21	0.7	3960	3640	650210		0.0036	Intact	1983
2		43°44.21'N，88°09.40'E	0.13	0.8	4189	3740	700210		0.0018	Intact	1983
3		43°44.45'N，88°09.85'E	0.03	0.3	3960	3820	700210		0.0002	Intact	1983
4		43°44.43'N，88°10.10'E	0.02	0.2	3920	3860	700210		0.0001	Intact	1983
5		43°44.37'N，88°10.40'E	0.03	0.3	4140	3960	700210		0.0002	Intact	1983
6		43°44.31'N，88°10.81'E	0.03	0.4	4327	4080	700210		0.0002	Intact	1983
7		43°44.31'N，88°11.00'E	0.09	0.6	4327	3940	700210		0.0011	Intact	1983
8		43°44.43'N，88°11.14'E	0.06	0.5	4200	3910	700210		0.0006	Intact	1983
9		43°44.67'N，88°11.03'E	0.42	0.9	4327	3740	640218		0.0126	Intact	1983
10		43°44.48'N，88°12.57'E	0.37	1.2	4300	3800	640110	3900	0.0104	Intact	1983
11		43°44.64'N，88°13.63'E	0.54	1.5	4410	3790	640210		0.0178	Intact	1983
12		43°44.67'N，88°14.74'E	0.36	1.1	4400	3800	640110		0.0101	Intact	1983
13		43°43.08'N，88°15.15'E	0.06	0.4	4320	4000	700210		0.0006	Intact	1983
14		43°42.94'N，88°14.82'E	0.32	0.9	4300	3740	650210		0.0067	Intact	1983
15		43°42.73'N，88°14.56'E	0.10	0.5	4300	3980	700210		0.0012	Intact	1983
5Y812B. Gubanbigedaguole Number of Glacier: 25 Area(km^2): 17.12 Ice Storage(km^3): 0.9630											
1		43°44.02'N，88°15.59'E	0.09	0.8	4160	3640	700210		0.0011	Intact	1983
2		43°44.10'N，88°15.33'E	0.38	1.1	4200	3760	640210		0.0106	Intact	1983

3		43°44.62'N，88°15.41'E	0.20	0.8	4300	3800	750210		0.0034	Intact	1983
4		43°44.99'N，88°15.33'E	0.27	1.0	4395	3680	650210		0.0051	Intact	1983
5		43°45.32'N，88°15.59'E	0.22	0.8	4200	3780	650210		0.0037	Intact	1983
6		43°45.59'N，88°16.30'E	0.83	1.7	4400	3590	640210		0.0324	Intact	1983
7		43°45.83'N，88°16.51'E	0.18	0.8	4300	3800	750210		0.0029	Intact	1983
8		43°46.51'N，88°16.88'E	0.19	0.8	3900	3480	754210		0.0030	Intact	1983
9		43°46.53'N，88°16.42'E	1.15	1.8	4400	3540	640110		0.0506	Intact	1983
10		43°47.51'N，88°16.30'E	0.32	0.8	3950	3670	640210		0.0083	Intact	1983
11		43°47.43'N，88°19.43'E	7.47	6.0	5213	3540	640110	3920	0.6242	Intact	1983
12		43°46.10'N，88°18.55'E	0.52	1.6	4700	3720	640210		0.0166	Intact	1983
13		43°45.99'N，88°19.22'E	0.48	1.2	4900	3960	650210		0.0120	Intact	1983
14		43°45.48'N，88°19.63'E	0.05	0.3	4400	4220	700210		0.0005	Intact	1983
15		43°45.37'N，88°20.37'E	1.46	2.5	4620	3600	630111	3940	0.0701	Intact	1983
16		43°46.37'N，88°20.26'E	0.20	0.6	5120	4680	750210		0.0034	Intact	1983
17		43°46.10'N，88°20.44'E	0.10	0.5	5020	4600	700210		0.0012	Intact	1983
18		43°45.97'N，88°20.96'E	0.31	0.8	5180	4600	650210		0.0062	Intact	1983
19		43°44.78'N，88°21.11'E	0.10	0.5	4240	3940	700210		0.0012	Intact	1983
20		43°44.26'N，88°21.18'E	0.23	0.5	4397	3980	650210		0.0041	Intact	1983
21		43°44.26'N，88°20.66'E	0.55	0.9	4200	3720	640210		0.0182	Intact	1983
22		43°43.78'N，88°19.96'E	0.97	1.9	4520	3580	630112	3800	0.0398	Intact	1983

23		43°43.27'N，88°19.48'E	0.67	1.3	4520	3780	640210		0.0241	Intact	1983
24		43°42.94'N，88°19.29'E	0.10	0.7	4380	3920	700210		0.0012	Intact	1983
25		43°42.81'N，88°19.18'E	0.08	0.5	4320	4000	700210		0.0009	Intact	1983
5Y813 A. Dihanjilege Number of Glacier: 10 Area(km^2): 3.13 Ice Storage(km^3): 0.0886											
1		43°05.03'N，87°29.12'E	0.08	0.5	4220	3900	703210		0.0009	Intact	1983
2		43°04.98'N，87°28.61'E	0.61	0.8	4317	3770	643210		0.0214	Intact	1983
3		43°05.61'N，87°27.98'E	0.32	0.6	4140	3640	643210		0.0067	Intact	1983
4		43°05.58'N，87°27.44'E	0.56	0.6	4220	3720	640210		0.0185	Intact	1983
5		43°05.84'N，87°26.85'E	0.34	1.0	4131	3560	653210		0.0071	Intact	1983
6		43°05.49'N，87°26.45'E	0.43	1.2	4164	3500	643212		0.0129	Intact	1983
7		43°05.43'N，87°26.05'E	0.17	0.7	4040	3590	750210		0.0026	Intact	1983
8		43°05.43'N，87°25.63'E	0.54	1.5	4020	3550	630112	3860	0.0178	Intact	1983
9		43°05.94'N，87°25.04'E	0.05	0.3	4150	3920	703210		0.0005	Intact	1983
10		43°06.02'N，87°24.94'E	0.03	0.2	4150	3900	700210		0.0002	Intact	1983
5Y813B. Heigouhe(river) Number of Glacier: 21 Area(km^2): 21.56 Ice Storage(km^3): 1.2084											
1		43°43.07'N，88°19.96'E	0.12	0.4	4540	4240	703210		0.0016	Intact	1983
2		43°42.94'N，88°20.33'E	0.46	1.3	4520	3860	643110		0.0143	Intact	1983
3		43°43.29'N，88°21.11'E	0.61	1.0	4440	3800	645210		0.0214	Intact	1983
4		43°43.62'N，88°21.55'E	1.04	1.4	4215	3650	640110		0.0447	Intact	1983
5		43°44.43'N，88°21.62'E	0.52	1.1	4397	3640	640210		0.0166	Intact	1983

6		43°45.51'N，88°21.73'E	0.15	0.7	4200	3780	700210		0.0023	Intact	1983
7		43°45.49'N，88°22.07'E	0.03	0.3	3880	3740	700210		0.0002	Intact	1983
8		43°46.26'N，88°22.40'E	5.61	7.1	5445	3380	520112		0.4376	Intact	1983
9		43°45.80'N，88°23.33'E	0.08	0.6	4647	4060	700210		0.0009	Intact	1983
10		43°45.54'N，88°23.51'E	0.16	1.0	4642	4000	750210		0.0024	Intact	1983
11		43°45.70'N，88°24.30'E	2.03	4.1	5000	3730	530112	4020	0.1096	Intact	1983
12		43°45.02'N，88°24.82'E	1.18	1.5	4442	3870	640110		0.0531	Intact	1983
13		43°44.38'N，88°24.36'E	1.50	1.2	4420	3770	640112		0.0735	Intact	1983
14		43°43.86'N，88°24.51'E	0.69	1.3	4480	3940	640112		0.0248	Intact	1983
15		43°43.32'N，88°24.44'E	0.92	0.7	4308	3800	640210		0.0377	Intact	1983
16		43°44.08'N，88°25.25'E	0.63	1.4	4480	3720	640112		0.0221	Intact	1983
17		43°45.43'N，88°26.29'E	4.17	3.2	5220	3670	630112	3960	0.2919	Intact	1983
18		43°44.48'N，88°26.84'E	0.23	0.8	4340	3850	650210		0.0041	Intact	1983
19		43°44.18'N，88°27.77'E	0.97	1.1	4568	3820	640210		0.0398	Intact	1983
20		43°43.78'N，88°27.89'E	0.40	0.9	4300	3900	650210		0.0092	Intact	1983
21		43°43.64'N，88°28.21'E	0.06	0.2	4280	4100	700210		0.0006	Intact	1983
5Y813C. Aksuhe(river) Number of Glacier: 14 Area(km^2): 26.35 Ice Storage(km^3): 2.0722											
1		43°43.24'N，88°29.13'E	0.63	1.0	4160	3550	643210		0.0221	Intact	1983
2		43°43.59'N，88°28.59'E	0.34	1.1	4299	3700	650210		0.0071	Intact	1983
3		43°43.83'N，88°28.48'E	0.61	1.4	4280	3600	640210		0.0214	Intact	1983

4		43°44.24'N，88°28.45'E	0.04	0.4	4300	4100	700210		0.0003	Intact	1983
5		43°44.81'N，88°28.74'E	0.88	1.9	4440	3520	640110	3720	0.0352	Intact	1983
6		43°45.13'N，88°27.98'E	2.30	3.3	4512	3560	620110	3870	0.1311	Intact	1983
7		43°45.35'N，88°27.42'E	0.19	0.8	4180	3840	700210		0.0030	Intact	1983
8		43°45.87'N，88°28.34'E	0.07	0.3	4100	3880	700210		0.0007	Intact	1983
9		43°46.02'N，88°30.11'E	0.72	1.6	4200	3580	640110		0.0266	Intact	1983
10		43°46.43'N，88°27.71'E	10.21	6.4	4900	3390	523112	3870	0.9802	Intact	1983
11		43°47.49'N，88°29.96'E	0.22	0.4	3920	3720	650210		0.0037	Intact	1983
12		43°48.24'N，88°29.97'E	1.62	2.8	4220	3640	600110		0.0810	Intact	1983
13		43°48.91'N，88°29.95'E	0.09	0.2	4200	4120	700210		0.0011	Intact	1983
14		43°50.39'N，88°31.63'E	8.43	2.1	4345	3680	300110		0.7587	Intact	1983

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Appendix 5

Image Inventory and Photograph and Audiovisual Authorization Form

Ministry of Housing and Urban-Rural
Development of the People's Republic of China
2012.1

Contents

1. Slide /4

2. Photograph /8

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Image Inventory and Photograph and Audiovisual Authorization Form

1.Slide

Id. No	Format (slide/ print/ video)	Caption	Date of Image	Photographer/ Director of the Material	Copyright owner	Contact details of copyright owner	Nonexclusive cession of rights
1	slide	Glacier on north slope of Tomur	2011	Fan Shucai	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	**Address:** 462#, Zhongshan Road, Urumqi, Xinjiang Uygur Autonomous Region, P.R. China **Zip Code:** 830002 **Tel:** +86-991-2823769 **Fax:** +86-991-2824237 **E-mail:** xjjstcjc@sina.com	Use authorized
2		Peaks on north slope of Tomur	2011	Fan Shucai			Use authorized
3		Glacier in the Kalajun component	2010	Yang Zhaoping			Use authorized
4		Glacier in the Kuerdening component	2010	Yang Zhaoping			Use authorized
5		Glacier in the Bogda component	2008	Sun Guofu			Use authorized
6		Valley glacier of Aksu River in the Bogda component	2008	Sun Guofu			Use authorized
7		Wetland in the Bayinbuluke component	2010	Yang Zhaoping			Use authorized
8		Red beds and warm temperate desert on south slope of Tomur peak	2010	Yang Zhaoping			Use authorized
9		Red beds in the Tomur component - 'Mountainous City'	2011	Yang Zhaoping			Use authorized
10		Salt dome in the Tomur component	2011	Yang Zhaoping			
11		Altitudinal zones on north slope of Xinjiang Tianshan	2011	Fan Shucai			Use authorized

Id. No	Format (slide/ print/ video)	Caption	Date of Image	Photographer/ Director of the Material	Copyright owner	Contact details of copyright owner	Nonexclusive cession of rights
12	slide	Altitudinal zones on south slope of Xinjiang Tianshan	2010	Yang Zhaoping	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	**Address:** 462#, Zhongshan Road, Urumqi, Xinjiang Uygur Autonomous Region, P.R. China **Zip Code:** 830002 **Tel:** +86-991-2823769 **Fax:** +86-991-2824237 **E-mail:** xjjstcjc@sina.com	Use authorized
13		Glacier - forest - meadow on North Slope of the Tomur component	2010	Yang Zhaoping			Use authorized
14		Mountain spring and wetland in the Tomur component	2011	Yang Zhaoping			Use authorized
15		Forest and steppe in the Kalajun component	2010	Ma Qin			Use authorized
16		Floral meadow in the Kalajun component	2011	Ma Qin			Use authorized
17		Forest and meadow on planation of the Kalajun component	2010	Yang Zhaoping			Use authorized
18		Subalpine *Juniperus sabina* Shrub in the Kuerdening component	2010	Yang Zhaoping			Use authorized
19		Forest and meadow in the Kuerdening component	2010	Yang Zhaoping			Use authorized
20		Pure forests of Picea schrenkiana in the Kuerdening component	2010	Ma Qin			Use authorized
21		River-valley broadleaved forest in the Kuerdening component	2011	Ma Qin			Use authorized
22		Alpine wetland in the Bayinbuluke component	2010	Yang Zhaoping			Use authorized
23		Wetland in the Bayinbuluke component	2010	Yang Zhaoping			Use authorized

Id. No	Format (slide/ print/ video)	Caption	Date of Image	Photographer/ Director of the Material	Copyright owner	Contact details of copyright owner	Nonexclusive cession of rights
24	slide	Wetland and meadow in the Bogda component	2008	Sun Guofu	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	**Address:** 462#, Zhongshan Road,Urumqi, Xinjiang Uygur Autonomous Region, P.R. China **Zip Code:** 830002 **Tel:** +86-991-2823769 **Fax:** +86-991-2824237 **E-mail:** xjjstcjc@sina.com	Use authorized
25		Montane meadow in the Bogda component	2011	Yang Zhaoping			Use authorized
26		Snow Leopard in the Tomur component	2010	Fan Shucai			Use authorized
27		Argali sheep in the Tomur component	2010	Yang Weikang			
28		Rosy starling in the Kalajun component	2009	Ma Ming			Use authorized
29		Demoiselle crane and common crane in the Kuerdening component	2011	Fan Shucai			Use authorized
30		Argali sheep in the Bayinbuluke component	2011	Abudureheman			Use authorized
31		Whooper swan in the Bayinbuluke component	2011	Abudureheman			Use authorized
32		*Saussurea involucrata* in the Bogda component	2008	Lin Xinfeng			Use authorized
33		Ibex in the Bogda component	2009	Abulimiti			Use authorized
34		Red deer in the Bogda component	2008	Feng Gang			Use authorized
35		*Syrrhaptes paradoxus* in the Bogda component	2009	Yang Weikang			Use authorized
36		Red beds in the Tomur component—'Castle'	2010	Yang Zhaoping			Use authorized
37		Red beds in Tomur canyon—'Source of Life'	2010	Yang Zhaoping			Use authorized

Id. No	Format (slide/ print/ video)	Caption	Date of Image	Photographer/ Director of the Material	Copyright owner	Contact details of copyright owner	Nonexclusive cession of rights
38	slide	Floral forest in the Kalajun component	2010	Yang Zhaoping	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	**Address:** 462#, Zhongshan Road, Urumqi, Xinjiang Uygur Autonomous Region, P.R. China **Zip Code:** 830002 **Tel:** +86-991-2823769 **Fax:** +86-991-2824237 **E-mail:** xjjstcjc@sina.com	Use authorized
39		Papaver pavoninum in the Kalajun component	2010	Ma Qin			Use authorized
40		Mountain coniferous forest in the Kuerdening component	2011	Ma Qin			Use authorized
41		Mountain landscape in the Kuerdening component	2010	Yang Zhaoping			Use authorized
42		Mountain deciduous broad-leaved forest in the Kuerdening component	2010	Yang Zhaoping			Use authorized
43		Wild fruit forest in the Kuerdening component	2011	Ma Qin			Use authorized
44		Meanders and wetland in the Bayinbuluke component	2010	Yang Zhaoping			Use authorized
45		Mid-river island in the Bayinbuluke component	2010	Yang Zhaoping			Use authorized
46		Meanders in the Bayinbuluke component	2010	Yang Zhaoping			Use authorized
47		Whooper swan in the Bayinbuluke component	2011	Fan Shucai			Use authorized
48		Autumn scene of Baiyanggou in the Bogda component	2008	Lin Xinfeng			Use authorized
49		Small waterfall of Tianchi Lake in the Bogda component	2008	Lin Xinfeng			Use authorized
50		Winter of Tianchi Lake in the Bogda component	2008	Lin Xinfeng			Use authorized

2.Photograph

Id. No	Format (slide/ print/ video)	Caption	Date of Image	Photographer/ Director of the Material	Copyright owner	Contact details of copyright owner	Nonexclusive cession of rights
1	Print & electronic image	Topography of Tianshan Mountains	2008	Zhou Kefa	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	**Address:** 462#, Zhongshan Road, Urumqi, Xinjiang Uygur Autonomous Region, P.R. China **Zip Code:** 830002 **Tel:** +86-991-2823769 **Fax:** +86-991-2824237 **E-mail:** xjjstcjc@sina.com	Use authorized
2		North slope of Tianshan Mountains in Xinjiang	2011	Fan Shucai			Use authorized
3		South slope of Tianshan Mountains in Xinjiang	2011	Fan Shucai			Use authorized
4		Tomur Peak	2011	Fan Shucai			Use authorized
5		Tarim Desert	2009	Fan Shucai			Use authorized
6		Junggar Desert	2009	Fan Shucai			Use authorized
7		North slope of Tomur Peak	2011	Xue Yanbao			Use authorized
8		Glacier in Middle Tianshan Mountains	2011	Fan Shucai			Use authorized
9		Glacier in Bogda	2009	Ma Qin			Use authorized
10		Lake of Tianshan Mountains in Xinjiang	2010	Fan Shucai			Use authorized
11		River of Tianshan Mountains in Xinjiang	2009	Li Xiang			Use authorized
12		Alpine meadow of Xinjiang Tianshan	2011	Fan Shucai			Use authorized

Id. No	Format (slide/ print/ video)	Caption	Date of Image	Photographer/ Director of the Material	Copyright owner	Contact details of copyright owner	Nonexclusive cession of rights
13	Print & electronic image	Montane conifer forest of Xinjiang Tian-shan	2010	Fan Shucai	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	**Address:** 462#, Zhongshan Road, Urumqi, Xinjiang Uygur Autonomous Region, P.R. China **Zip Code:** 830002 **Tel:** +86-991-2823769 **Fax:** +86-991-2824237 **E-mail:** xjjstcjc@sina.com	Use authorized
14		Red stratum landform of Xinjiang Tian-shan	2010	Fan Shucai			Use authorized
15		The Tomur component	2011	Yang Zhaoping			Use authorized
16		Snow peak and glacier of Tomur	2008	Hao Pei			Use authorized
17		Red stratum landscape of Tomur	2010	Fan Shucai			Use authorized
18		The Kalajun component	2010	Yang Zhaoping			Use authorized
19		Subalpine meadow of Kalajun	2010	Ma Qin			Use authorized
20		The Kuerdening component	2010	Fan Shucai			Use authorized
21		Wild fruit forest of Kuerdening	2011	Ma Qin			Use authorized
22		The Bayinbuluke component	2011	Fan Shucai			Use authorized
23		Meanders of Kaidu River	2009	Sangbu			Use authorized
24		Wetland in Bayinbuluke	2009	Sangbu			Use authorized
25		Swan Lake	2009	Sangbu			Use authorized
26		The Bogda component	2009	Sangbu			Use authorized
27		Bogda peak	2009	Wang Chun-liang			Use authorized

Id. No	Format (slide/ print/ video)	Caption	Date of Image	Photographer/ Director of the Material	Copyright owner	Contact details of copyright owner	Nonexclusive cession of rights
28	Print & electronic image	Glacier in Bogda	2010	Wang Chunliang	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	**Address:** 462#, Zhongshan Road, Urumqi, Xinjiang Uygur Autonomous Region, P.R. China **Zip Code:** 830002 **Tel:** +86-991-2823769 **Fax:** +86-991-2824237 **E-mail:** xjjstcjc@sina.com	Use authorized
29		Tianshan Tianchi Lake	2010	Ma Qin			Use authorized
30		Ice-snow zone	2009	Wang Chunliang			Use authorized
31		Sparse vegetation on alpine in Bogda	2010	Ma Qin			Use authorized
32		Alpine Wetland in Bayinbuluke	2009	Sangbu			Use authorized
33		Mountain meadow	2010	Fan Shucai			Use authorized
34		Mountain steppe	2010	Fan Shucai			Use authorized
35		Coniferous and Broad-leaved Mixed Forest	2010	Fan Shucai			Use authorized
36		Deciduous Broad-leaved Forest	2010	Fan Shucai			Use authorized
37		Argali Sheep	2009	Zhao Junan			Use authorized
38		Snow Leopard	2009	Fan Shucai			Use authorized
39		Ibex	2009	Mahemuti			Use authorized
40		Red Deer	2010	Mahemuti			Use authorized
41		Eurasian Lynx	2011	Mahemuti			Use authorized

Id. No	Format (slide/ print/ video)	Caption	Date of Image	Photographer/ Director of the Material	Copyright owner	Contact details of copyright owner	Nonexclusive cession of rights
42	Print & electronic image	Wolf	2011	Mahemuti	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	**Address:** 462#, Zhongshan Road, Urumqi, Xinjiang Uygur Autonomous Region, P.R. China **Zip Code:** 830002 **Tel:** +86-991-2823769 **Fax:** +86-991-2824237 **E-mail:** xjjstcjc@sina.com	Use authorized
43		Demoiselle Crane and Common Crane	2011	Fan Shucai			Use authorized
44		*Papaver pavonium*	2010	Hou Yiguo			Use authorized
45		Red stratum landform in Tomur	2011	Yang Zhaoping			Use authorized
46		Meadow with flowers in Kalajun	2010	Fan Shucai			Use authorized
47		*Picea Shrenkiana* Forest in Kuerdening	2010	Fan Shucai			Use authorized
48		Wild fruit forests in Kuerdening	2009	Abulikem			Use authorized
49		Meanders and Wetlands in Bayinbuluke	2010	Hao Pei			Use authorized
50		Alpine lake in Bogda	2010	Li Xueliang			Use authorized

3.Video

Id. No	Format (slide/ print/ video)	Caption	Date of Image	Photographer/ Director of the Material	Copyright owner	Contact details of copyright owner	Nonexclusive cession of rights
1	Video (25min.)	Xinjiang Tianshan	2011	Zhao Guanghui	Leading Group for Application of WNH of Xinjiang Uygur Autonomous Region	**Address:** 462#, Zhongshan Road, Urumqi, Xinjiang Uygur Autonomous Region, P.R. China **Zip Code:** 830002 **Tel:** +86-991-2823769 **Fax:** +86-991-2824237 **E-mail:** xjjstcjc@sina.com	Use authorized

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Appendix 9

Excerpts of Relevant Laws and Regulations

Ministry of Housing and Urban-Rural
Development of the People's Republic of China
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1.2 Forest Law of the People's Republic of China (Excerpt) 004
1.3 Law of the People's Republic of China on Wildlife Protection (Excerpt) 005
1.4 Law of the People's Republic of China on Environmental Protection (Excerpt) 006
1.5 Law of the People's Republic of China on Cultural Relics Protection (Excerpt) 006
1.6 Law of the People's Republic of China on Land Administration (Excerpt) 007
1.7 Law of the People's Republic of China on Water and Soil Conservation (Excerpt) 007
1.8 Law of the People's Republic of China on Mineral Resources (Excerpt) 008
1.9 Water Law of the People's Republic of China (Excerpt) 009
1.10 Regulations of the People's Republic of China Concerning Parks 009
1.11 Regulation of the People's Republic of China on Nature Reserves 020
1.12 Regulation of the People's Republic of China on the Implementation of Forestry (Excerpt) 031
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3. Regulations of Xinjiang on Nature Reserves /041

4. Regulation on the Management of Tomur Peak Nature Reserve /046

5. Regulation on the Management of Tianshan Tianchi Park /049

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6.2 Protection of Local Pledges 057

1. Relevant Laws and Regulations

1.1 Constitution of the People's Republic of China (Excerpt)

Revised in accordance with Amendment to the Constitution adopted at the 2nd Meeting of the Standing Committee of the Tenth National People's Congress on March 14, 2004.

Article 9 The state ensures the rational use of natural resources and protects rare animals and plants. Appropriation or damaging of natural resources by any organization or individual by whatever means is prohibited

Article 22 The state protects sites of scenic and historical interest, valuable cultural monuments and relics and other significant items of China's historical and cultural heritage.

Article 26 The state protects and improves the environment in which people live and the ecological environment. It prevents and controls pollution and other public hazards. The state organizes and encourages afforestation and the protection of forests.

1.2 Forest Law of the People's Republic of China (Excerpt)

Adopted at the 2nd Meeting of the Standing Committee of the Ninth National People's Congress on April 29, 1998, promulgated by Order No. 3 of the President of the People's Republic of China, and effective on the date of promulgation.

Article 19 The local people's government at various levels shall organize competent authorities to establish a forest protection organization to take charge of the work of forest protection; add forest protection facilities and enhance forest protection in light of actual needs; and urge grass-roots organizations with forests and in forest districts to conclude forest protection covenants, mobilize the masses to protect forests, delimit forest protection responsibility zones, and provide full-time or part-time forest protection personnel.

Article 21 The local people's government at various levels shall make earnest efforts to do well in the prevention and fighting of forest fires

Article 23 Land reclamation at the expense of deforestation, rock quarrying, sand quarrying, soil extracting and other activities resulting in deforestation shall be forbidden.

Article 24 The competent forestry authorities under the State Council and the people's government at the provincial, autonomous region or directly-administered municipality level shall delimit natural protection areas to strengthen protection and administration in typical forest ecology areas in different natural terrain, forest districts where precious animals and plants grow and breed, natural tropical rain forest districts and other natural forest districts with special protection value.

Article 25 Hunting and catching of wild animals under state protection in forest regions are prohibited; where hunting and catching are necessitated for special requirements, they shall be handled pursuant to relevant state provisions.

1.3 Law of the People's Republic of China on Wildlife Protection (Excerpt)

Adopted at the Fourth Session of the Standing Committee of the Seventh National People's Congress and promulgated by Order No. 9 of the President of the People's Republic of China on November 8, 1988, and effective as of March 1, 1989.

Article 6 The governments at various levels shall strengthen the administration of wildlife resources and formulate plans and measures for the protection, development and rational utilization of wildlife resources.

Article 8 The State shall protect wildlife and the environment for its survival, and shall prohibit the illegal hunting, catching or destruction of wildlife by any unit or individual.

Article 9 The State shall give special protection to the species of wildlife which are rare or near extinction. The wildlife under special state protection shall consist of two classes: wildlife under first-class protection and wildlife under second-class protection. Lists or revised lists of wildlife under special state protection shall be drawn up by the department of wildlife administration under the State Council and announced after being submitted to and approved by the State Council.

Article 10 The department of wildlife administration under the State Council and governments of provinces, autonomous regions and municipalities directly under the Central Government shall, in the main districts and water areas where wildlife under special state or local protection lives and breeds, designate nature reserves and strengthen the protection and administration of wildlife under special state or local protection and the environment for its survival.

1.4 Law of the People's Republic of China on Environmental Protection (Excerpt)

Adopted at the 11th Session of the Standing Committee of the Seventh National People's Congress on December 26, 1989, promulgated by Order No. 22 of the President of the People's Republic of China on December 26, 1989 and effective on the date of promulgation.

Article 17 The people's governments at various levels shall take measures to protect regions representing various types of natural ecological systems, regions with a natural distribution of rare and endangered wild animals and plants, regions where major sources of water are conserved, geological structures of major scientific and cultural value, famous regions where karst caves and fossil deposits are distributed, traces of glaciers, volcanoes and hot springs, traces of human history, and ancient and precious trees. Damage to the above shall be strictly forbidden.

Article 18 Within the scenic spots or historic sites, nature reserves and other zones that need special protection, as designated by the State Council, the relevant competent department under the State Council, and the people's governments of provinces, autonomous regions and municipalities directly under the Central Government, no industrial production installations that cause environmental pollution shall be built; other installations to be built in these areas must not exceed the prescribed standards for the discharge of pollutants. If the installations that have been built discharge more pollutants than are specified by the prescribed discharge standards, such pollution shall be eliminated or controlled within a prescribed period of time.

Article 19 Measures must be taken to protect the ecological environment while natural resources are being developed or utilized.

Article 23 In urban and rural construction, vegetation, waters and the natural landscape shall be protected and attention paid to the construction of gardens, green land and historic sites and scenic spots in the cities in the light of the special features of the local natural environment.

1.5 Law of the People's Republic of China on Cultural Relics Protection (Excerpt)

Adopted at the 30th Session of the Standing Committee of the Ninth National People's Congress on October 28, 2002

Article 9 People's governments at various levels shall attach importance to the protection of cultural relics and correctly handle the relations between economic and social development and the protection of cultural relics so as to ensure safety of the cultural relics.

Article 17 No construction of additional projects or such operations as blasting, drilling and digging may be conducted within the area of protection for a historical and cultural site.

Article 18 On the basis of the actual needs for the protection of cultural relics and with the approval of the people's government of the relevant province, autonomous region, or municipality directly under the Central Government, a certain area for control of construction may be delimited around a site protected for its historical and cultural value, and such an area shall be announced.

Article 19 No facilities that pollute the sites protected for their historical and cultural value or their environment may be put up within the area of protection for these sites or the area for control of construction, and no activities that may adversely affect the safety and environment of these sites may be conducted. Where there are already facilities that pollute the sites and their environment, they shall be brought under control within a specified time limit.

1.6 Law of the People's Republic of China on Land Administration (Excerpt)

The second revision in accordance with the Decision of the Standing Committee of the National People's Congress on Revising the Land Administration Law of the People's Republic of China adopted at the 11th session of the Standing Committee of the Tenth National People's Congress on August 28, 2004.

Article 3 To cherish and give a rational use to the land as well as to give protection to the cultivated land is seen as a basic principle of land use in the country. The people's governments at all levels should make an overall plan for the use of land to strictly administer, protect and develop land resources and stop any illegal occupation of land.

Article 4 The State is to place strict control on the uses of land.

Article 24 People's governments at all levels shall strengthen the administration of plans for land use and exercise control of land for construction purposes.

Article 31 The State protects the cultivated land and strictly controls the conversion of cultivated land into non-cultivated land.

Article 36 It is forbidden to build kilns, graves or houses on cultivated land or to dig sand, collect stones, do mining and carry soil away from cultivated land.

1.7 Law of the People's Republic of China on Water and Soil Conservation (Excerpt)

Adopted at the 20th Session of the Standing Committee of the Seventh National People's Congress on June 29, 1991, promulgated by Order No. 49 of the President of the People's Republic of China on June 29, 1991 and effective as of June 29, 1991.

Article 20 The local people's governments at various levels shall take measures to strengthen the control over such production activities as mining, earth removal, sand-digging and quarrying, so as to prevent soil erosion.

Article 22 In a water-eroded region, by taking a small river basin comprising the natural ravines and flanking hill slopes as a unit, a comprehensive system for the prevention and control of soil erosion shall be set up on the basis of overall planning and comprehensive rehabilitation.

1.8 Law of the People's Republic of China on Mineral Resources (Excerpt)

Decision on the Mineral Resources Law of the People's Republic of China adopted at the 21st session of the standing committee of the eighth National People's congress on August 29, 1996.

Article 20 Unless approved by the competent departments authorized by the State Council, no-one may mine mineral resources in the following places:

(1) within delimited areas of haven, airports and national defence projects or installations;

(2) within a certain distance from important industrial districts, large-scale water conservancy works or municipal engineering installations of cities and towns;

(3) within certain limits on both sides of railways and important highways;

(4) within certain limits on both sides of important rivers and embankments;

(5) nature reserves and important scenic spots designated by the State, major sites of immovable historical relics and places of historical interest and scenic beauty that are under State protection; and

(6) other areas where mineral mining is prohibited by the State.

Article 22 If, in the course of mineral exploration or mining, rare geological phenomena or ancient cultural remains of significant scientific and cultural value are discovered, they shall be protected and reported immediately to the relevant departments.

Article 23 Regional geological surveys shall be carried out in accordance with the unified State plan. Reports on regional geological surveys and the appended maps and other data shall be examined for acceptance in accordance with State regulations and then provided to relevant departments for use.

1.9 Water Law of the People's Republic of China (Excerpt)

Adopted at the 29th Session of the Standing Committee of the Ninth National People's Congress on August 29, 2002

Article 5 The state shall protect water resources and adopt effective measures to preserve natural flora, plant trees and grow grass, conserve water sources, control water and soil losses and improve the ecological environment.

Article 37 It is prohibited to abandon or pile in any river, lake, reservoir, or canal objects that block the passage of floodwater. Planting trees or growing crops of a long-stalk variety that may block the passage of floodwater is also prohibited.

1.10 Regulations of the People's Republic of China Concerning Parks

Decree of the State Council of the People's Republic of China No. 474
The Regulations on National Parks, adopted at the 149 Session of the State Council Standing Committee, is hereby promulgated and shall come into force as of Dec., 1, 2006.
Premier Wen Jiabao

Chapter 1 General Provisions

Article 1 The Regulations on National Parks (hereinafter referred to as Regulations) are hereby formulated for the purpose of enhancing the management of national parks for effective protection and reasonable exploitation of the resources of national parks..

Article 2 The Regulations are applicable to the set-up, planning, protection, exploitation and management of national parks.

National parks mentioned herein refers to zones where sightseeing, or scientific or cultural activities are conducted for viewing, cultural or scientific value, concentrated natural and human landscapes, and beautiful environment.

Article 3 The State adopts for national parks the principle of scientific planning, uniform management, strict protection and sustainable exploitation.

Article 4 Governments at the county level and above of the places where national parks lie are responsible for their protection and exploitations.

Article 5 The competent agency of construction of the State Council takes charge of the supervision and administration of national parks in the whole country. Other related agencies of the State Council are responsible for relevant supervision and administration of national parks in light of the duties assigned to them by the State Council.

The construction governing sectors of the people's governments of provinces and autonomous regions and the national parks governing sectors of municipalities directly under the State Council are responsible for the supervision and administration of the national parks within their territories. Other related sectors of the people's governments of provinces, autonomous regions and municipalities directly under the State Council are responsible for relevant supervision and administration work in conformance with the duties assigned to them.

Article 6 Every unit or individual has the obligation to protect the resources of national parks and is authorized to stop and report the acts that damage such resources.

Chapter 2 Establishment of National Parks

Article 7 The establishment of national parks shall be undertaken for the protection and reasonable exploitation of their resources.
The newly established national parks shall not be superimposed on or overlap nature reserves; and should there be such superimposition or intersection, harmony shall be achieved between the planning for national parks and that for nature reserves.

Article 8 National parks are in national and provincial categories.
National parks at the national level can be established upon application for natural and human landscapes that can reflect the process of natural evolution and major historical and cultural development processes, maintain the natural status or the original historical landscapes, and have national significance; and national parks at the provincial level can be established upon application for those with regional significance.

Article 9 Documents including the following information shall be submitted for the establishment of national parks:

(1) The basic status of the resources of the national park under application;

(2) The range of the national park under application and of the core zones;

(3) The nature and protection targets of the national park under application;

(4) The sightseeing conditions of the national park under application;

(5) The contents and results of negotiation with the holders of ownership and use right of natural resources, such as land and forests, and property like houses in the national park under application.

Article 10 For the establishment of a national park at the national level, the people's government of a province, autonomous region or municipality directly under the State Council shall submit the application. The competent agency of construction of the State Council is to hold conferences for review with the governing environment protection agency, governing forestry agency and governing cultural relics agency of the State Council before submitting review opinions to the State Council for approval and publication.

For the establishment of a national park at the provincial level, the county people's government submits the application. The construction governing sector of the people's government of the province or autonomous region, or the national parks governing sector of the people's government of the municipality directly under the State Council is to hold conferences for review with other relevant sectors before submitting the review opinions to the people's government of the province, autonomous region or municipality directly under the State Council for approval and publication.

Article 11 The legitimate rights and interests of the holders of ownership or use right of the natural resources of national parks, such as land and forests, and property like houses are under legal protection.
Before applying for the establishment of national parks, the people's government shall have full consultation with the holders of ownership and use right of natural resources, such as land and forests, and property like houses in the national parks under application.

Compensation shall be given according to law should there be losses incurred to the holders of ownership and use right of natural resources of national parks, such as land and forests, and property like houses.

Chapter 3 Planning

Article 12 The planning for national parks has two categories: general planning and detailed planning.

Article 13 The formulation of general planning for national parks shall embody the demand for harmonious coexistence of human beings and nature, coordinated regional development and all-round social economic development, stick to the principle of giving priority to protection and subserving development to protection, and give prominence to natural peculiarities, cultural manifestations and local features:

The general planning for national parks shall comprise the following contents,

(1) evaluation of scenery resources;

(2) protection measures for ecological resources, arrangement for major construction projects and the intensity of development and exploitation;

(3) functional structure and space composition of national parks;

(4) areas that allow no development and that allow limited development;

(5) number of tourists permitted;

(6) relevant special planning.

Article 14 The formulation of general planning for a national park shall be completed within two years following the date when the national park is established. The duration of a general plan is twenty years.

Article 15 The detailed planning for national parks shall be formulated in accordance with the different requirements for core zones and other zones so as to determine the location, arrangement and scale for construction projects of infrastructure, tourist facilities, cultural facilities, etc., and make clear the area of construction land and conditions for planning and design.

The detailed planning for national parks shall be formulated in conformance with the general planning.

Article 16 The planning for national parks at the national level shall be formulated by the competent agency of construction of the provincial or autonomous region people's government or by the national parks governing agency of the government of the municipality directly under the State Council.

The planning for national parks at the provincial level shall be formulated by the county-level people's government.

Article 17 The planning for national parks shall be undertaken by competent organizations selected via fair competition by such means of as public bidding.

The planning for national parks shall conform to the approved range, nature and protection targets

as required by relevant laws, regulations and technical standards.

Article 18 When planning for national parks, efforts shall be made to refer widely to the opinions of relevant sectors, the public and experts; and if necessary, hearings shall be held.

The materials of national parks planning shall comprise the opinions of all walks of life as well as information about the adoption of these opinions and the reasons for failure to adopt some or all of them if this occurs.

Article 19 The general planning for national parks at the national level shall be submitted to the State Council for approval after being examined by the people's government of provinces, autonomous regions or municipalities directly under the State Council.

The detailed planning for national parks at the national level shall be submitted to the competent agency of construction of the State Council for approval by the competent agency of construction of the provincial or autonomous region people's government, or the national parks governing agency of the people's government of municipalities directly under the State Council.

Article 20 The general planning for national parks at the provincial level shall be submitted to the people's government of provinces, autonomous regions and municipalities directly under the State Council for approval and be filed at the competent agency of construction of the State Council.

The detailed planning for national parks at the provincial level shall be submitted for approval to the competent agency of construction of the provincial or autonomous region people's government or to the national parks governing agency of the people's government of municipalities directly under the State Council.

Article 21 The planning for national parks shall be published after being approved and be made available to the public, and every organization or individual is entitled to read it.

Units and individuals in the national parks shall submit themselves to the approved planning and relevant management.

No construction activities may be conducted in national parks before the planning for national parks has been approved.

Article 22 No approved planning for national parks may be randomly modified. Should it be necessary to modify the general planning for the area, nature, protection targets, protection measures for ecological resources, arrangement of major construction projects, the intensity

of development and exploitation as well as the functional structure, space composition and the number of allowed tourists, an application shall be submitted to the original approving organ for approval. The modification of other contents shall be filed with the original approving organ.

Where the detailed planning for national parks needs to be modified, an application shall be submitted to the original approving organ for approval.

Compensation shall be made according to law for the property losses that are incurred to citizens, legal persons or other organizations when the government or government agencies modify the planning for national parks.

Article 23 Two years before the term of the general planning for national parks expires, the responsible organ shall organize experts to appraise the planning for a decision on whether a new plan is necessary. The previous plan remains in force until the new plan is approved.

Chapter 4 Protection

Article 24 The landscapes and natural environment of national parks shall, in compliance with the principle of sustainable development, be put under strict protection from any damage or random modification.

The administrative agencies of national parks shall establish and perfect various management systems for the protection of resources.

The residents and tourists in national parks shall protect the scenery, waters, vegetation, wild animals and various facilities.

Article 25 The administrative agency of national parks shall investigate and identify the major landscapes and formulate corresponding protection measures.

Article 26 None of the following activities is allowed:

(1) Activities that damage landscapes, vegetation, terrain and landforms, such as cuts into mountains, quarries, mines, waste disposal, building tombs and erecting gravestones;

(2) Building facilities for the storage of objects that are explosive, flammable, radioactive, poisonous and caustic;

(3) Graffiti;

(4) Litter.

Article 27 The following activities that violate the planning for national parks are forbidden: the establishment of various development zones in national parks and building hotels, rest houses, training centers, nursing homes and other constructions that have no bearing on the protection of national parks resources in core zones.

Such buildings that exist shall be removed according to the plan.

Article 28 As for other construction activities that are not listed in Articles 26, 27, application procedures shall required under relevant laws and regulations for the approval of the administrative agencies of national parks.

The location schemes for major construction projects like cable cars and ropeway projects in national parks at the national level shall be submitted to the competent agency of construction of the State Council for approval.

Article 29 The following activities in national parks shall be approved beforehand by relevant governing sectors under relevant laws and regulations after the examination of the national parks administrative agencies:

(1) setting up and posting business advertisements;

(2) hosting large-scale entertainment activities;

(3) conducting activities that alter the natural status of water resources and the aquatic environment;

(4) holding other activities that may influence the environment and landscapes.

Article 30 The construction projects in national parks shall comply with the planning for national parks and be kept in harmony with the landscape. No damage to the landscape, pollution and obstruction to sightseeing are allowed. Schemes shall be prepared to prevent pollution and preserve the soil, surrounding scenery, water bodies, vegetation, wild animal resources, terrain and landforms with effective measures.

Article 31 The State is to establish a management information system for national parks to monitor the implementation of planning for national parks and resource protection.

The administrative agencies of national parks at the national level shall submit to the competent

agency of construction of the State Council reports on the planning implementation and protection of natural resources like land and forests. The competent agency of construction of the State Council shall copy and send in time such reports to relevant agencies of the State Council.

Chapter 5 Exploitation and Management

Article 32 The administrative agencies of national parks shall protect traditional ethnic, folk culture, organize healthy, meaningful sightseeing, cultural entertainment activities, and spread historical, cultural and scientific knowledge in light of the characteristics of the national parks under its management.

Article 33 The administrative agencies of national parks shall reasonably exploit resources, and improve traffic, service facilities and sightseeing conditions.

The administrative agencies of national parks shall set sign boards, road markers, safety reminders, etc. in the national parks.

Article 34 The management of religious sites in national parks shall follow the relevant State provisions on the management of religious sites.

Relevant State laws and regulations shall be applied to the protection, exploitation and management of natural resources, protection of cultural relics and the management of nature reserves in national parks.

Article 35 The competent agency of construction of the State Council shall monitor, check and appraise the planning implementation and resources protection of national parks. The problems that are found shall be rectified and solved in time.

Article 36 The administrative agencies of national parks shall establish and perfect safety guarantee systems to enhance safety management and guarantee safety in sightseeing, and submit business units in the national parks to the supervision and checks of relevant sectors under laws and regulations.

Reception of tourists exceeding the stipulated maximum number and organizing sightseeing activities in zones lacking safety guarantee are forbidden.

Article 37 The admission tickets for national parks are sold by the administrative agencies. The prices shall be prescribed under relevant laws and regulations on prices.

Operators of traffic and services shall be selected by the administrative agencies via such means

of fair competition as public bidding under relevant laws and regulations as well as the planning for national parks.

Business operators shall pay for the exploitation of the resources of national parks.

Article 38 The income from admission tickets and fees collected for the exploitation of resources shall be managed in a system different from that of expenses.

The income from admission tickets and fees collected for the exploitation of resources shall be utilized for the protection and management of resources as well as compensation for the holders of ownership and use rights of property in the national parks. The specific management methods are to be stipulated by the financial agency and price administration of the State Council, with the participation of the competent agency of construction of the State Council.

Article 39 The administrative agencies of national parks are not allowed to do profit-oriented business, and to entrust administrative functions such as planning, management and supervision to enterprises or individuals.

No employee of the administrative agencies of national parks is allowed to take part-time jobs in the enterprises in national parks.

Chapter 6 Legal Liabilities

Article 40 For the following acts that violate the Regulations, the administrative agencies of national parks will order the actors to terminate the offence, restore the places to the original status or clear up, confiscate illegal income and impose a fine of RMB 500, 000-1, 000, 000 Yuan:

(1) conduct such activities as cutting into mountains, quarrying and mining that damages landscapes, vegetation, terrain and landforms in national parks;

(2) build facilities for the storage of objects that are explosive, flammable, radioactive, poisonous and caustic in national parks;

(3) build hotels, rest houses, training centers, nursing homes as well as constructions that have no bearing on the protection of the resources of national parks.

As for local people's governments at the county level and above and their superior agencies that approve the activities in paragraph (1), the person directly in charge and other responsible persons shall be punished by de-grading or dismissal from post, or subject to criminal liabilities should there be criminal offenses.

Article 41 As for constructions that are not forbidden in national parks but violate the Regulations, the administrative agencies are to order the actors to terminate and clean up the construction in a specified time, and impose a fine of RMB 20, 000-50, 000 Yuan on individuals or RMB 200, 000-500, 000 Yuan on units should no approval have been obtained from the administrative agencies.

Article 42 For the location scheme of a construction project such as cable car and ropeway projects built in violation of the Regulations in national parks at the national level, the relevant sector of the local people's government at the county level or above should issue approval opinions on the location. Punishment shall be imposed on the person directly in charge and other relevant responsible persons if the location scheme is not approved by the competent agency of construction of the State Council. Where criminal offences occur, criminal liabilities shall be imposed.

Article 43 As for individuals that, in violation of the Regulations, damage landscapes, vegetation, terrain and landforms by opening up wasteland, building tombs and erecting gravestones, etc., the administrative agencies of national parks are to order the actors to stop the offences, restore the places to the original status or take up other remedy measures, confiscate illegal income, and impose a fine of RMB 1, 000-10, 000 Yuan.

Article 44 For the acts of scoring or bedaubing scenes or facilities, or littering in national parks that violate the Regulations, the administrative agencies of national parks may order the actors to restore the places to the original status or adopt other remedy measures, coupled with a fine of RMB 50 Yuan; for the acts of intentionally damaging cultural relics, key points of interest and historic sites by scoring, bedaubing or other means. Punishment shall be imposed according to the Law on Punishment in Public Security Management. Criminal punishment shall be imposed should there be criminal offences.

Article 45 For the following activities conducted in national parks in which the organizers fail to abide by the Regulations and to apply to the administrative agencies of national parks, the administrative agencies may order the organizers to stop the offences, restore the places to the original status in a specified time or take up other remedial measures, confiscate the illegal income, and impose a fine of RMB 50, 000-100, 000 Yuan; and the fine may be RMB 100, 000-200, 000 Yuan should there be serious circumstances:

(1) set up or post business advertisements;

(2) organize large-scale entertainment activities;

(3) hold activities that alter the natural status of water resources or the water environment;

(4) conduct other activities that affect the environment and landscapes.

Article 46 Where construction units, in violation of the Regulations, damage the surrounding scenery, waters, vegetation, resources of wild animals, terrain and landforms, the administrative agencies of national parks may order the construction units to stop the offences, restore the places to the original status, or take up other remedial measures, coupled with a fine of RMB 20, 000-100, 000 Yuan. For those that fail to restore the places to the original status or take up other remedial measures, the administrative agencies may order the construction units to suspend their construction.

Article 47 When the competent agency of construction of the State Council, local people's government at the county level and above or its superior sector has the following activities violating the Regulations, punishment shall be imposed on the person directly in charge and other responsible persons, and a criminal penalty shall be imposed should there be criminal offences:

(1) set up various development zones in national parks in violation of the planning;

(2) fail to complete the formulation of general planning for national parks in two years since the setting-up of the national parks;

(3) fail to select a correspondingly competent unit for the formulation of planning for national parks;

(4) approve construction activities in national parks before the planning for the national parks is approved;

(5) randomly modify the planning for national parks;

(6) other acts that fail to carry out the supervisory, management duties according to law.

Article 48 Where the administrative agencies of national parks have the following acts violating the Regulations, the local people's government at the county level that has set up the administrative agencies may issue an order for rectification, and punish the person directly in charge and other responsible persons by degrading or dismissal from their post if there are serious circumstances. Criminal punishment shall be imposed should there be criminal offences:

(1) receive tourists exceeding the specified maximum number or conduct sightseeing activities in zones without a safety guarantee;

(2) fail to set up sign boards, road markers or safety reminders;

(3) organize profit-oriented business activities;

(4) entrust the administrative functions of planning, management and supervision to enterprises or individuals;

(5) allow their employees to take part-time jobs in the enterprises in the national parks;

(6) consent upon examination to construction activities that violate the planning for national parks;

(7) fail to investigate and punish offences after they are found out.

Article 49 As for the offences in Articles 40.1, 41, 43, 44, 45 and 46, further punishment will not be imposed by the administrative agencies of national parks when relevant sectors have punished the offenders according to relevant laws and regulations.

Article 50 For the offences in Articles 40.1, 41, 43, 44, 45 and 46, relevant units or individuals shall be subject to civil liabilities where the property of the State, public units or individuals is damaged.

Article 51 When an order issued under the Regulations for clearing up construction, works or other facilities in a specified time, the units or individuals involved shall immediately stop the construction acts and clear them up by themselves. As for those that continue the construction work, the organ that has made the decision on the clearing-up has the authority to stop them. When there is an objection to the decision, a lawsuit may be filed in the people's court within fifteen days upon receiving the decision. When the units or individuals involved do not turn to the court while failing to clear up the problem by themselves, the decision-making organs may apply to the people's court for a coercive enforcement with the offenders bearing the cost.

Chapter 7 Accessory Articles

Article 52 The Regulations are to come into force as of Dec., 1, 2006. The Provisional Regulations on the Management of National Parks is abolished on the same day.

1.11 Regulation of the People's Republic of China on Nature Reserves

(Adopted at the 24th Executive Meeting of the State Council on September 2, 1994, promulgated by Decree No. 167 of the State Council of the People's Republic of China on October 9, 1994,

and effective as of December 1, 1994).

Chapter I General Provisions

Article 1 The Regulations are formulated with a view to strengthening the construction and management of nature reserves and to protect the natural environment and resources.

Article 2 For the purpose of the Regulations, nature reserves refer to such areas, on land, inland water bodies, or marine districts, which represent various types of natural ecological systems, or with a natural concentrated distribution of rare and endangered wild animal or plant species, or where natural traces or other protected objects being of special significance are situated, and so delimited for special protection and administration according to relevant laws.

Article 3 Establishment and management of nature reserves within the territory of the People's Republic of China or the other sea areas under the jurisdiction of the People's Republic of China must comply with the Regulations.

Article 4 The state shall practice the economic and technological policies and measures favorable to the development of nature reserves, and incorporate the development planning of nature reserves into the national economic and social development plans.

Article 5 The local economic construction, the production activities and everyday life of local residents shall be properly considered when the nature reserves are established and managed.

Article 6 Nature reserves administrative agencies and their competent administrative departments may accept grants from both internal and external organizations and individuals for the establishment and management of nature reserves.

Article 7 The people's governments at or above the county level shall strengthen leadership for the work concerning nature reserves.

All units and individuals shall have the obligation to protect the natural environment and resources within nature reserves and have the right to report on or file charges against units or individuals who have destroyed or seized the nature reserves.

Article 8 The state shall practice a system which combines integrated management with separate departmental management for the management of nature reserves.

The competent department of environmental protection administration under the State Council is responsible for the integrated management of the nature reserves throughout the country.

The competent departments of forestry, agriculture, geology and mineral resources, water conservancy, and marine affairs and other departments concerned are responsible for relevant nature reserves under their jurisdiction.

The people's governments of provinces, autonomous regions and municipalities directly under the central government shall decide, according to the specific condition of the locality, on the establishment and the responsibilities of the administrative departments of nature reserves in the people's governments at or above the county level.

Article 9 The people's governments at various levels shall give awards to units or individuals who have made outstanding contributions to the establishment and management of nature reserves and the related scientific research.

Chapter II The Establishment of Nature Reserves

Article 10 In the areas which meet one of the following requirements, a nature reserve shall be established:

(1) typical physiographic areas with representative natural ecosystems, and those similar areas where the natural ecosystems have been damaged to some extent, but can be restored through proper protection;

(2) areas with a natural concentrated distribution of rare and endangered wild animal or plant species;

(3) those areas which are of special protection value, such as marine and coastal areas, islands, wetland, internal water bodies, forests, grassland and deserts;

(4) natural remains which are of scientific or cultural value, such as geological structures, famous karst caves, fossil distribution areas, glaciers, volcanoes, and hot springs;

(5) other natural regions requiring special protection by the approval of the State Council or the people's governments of provinces, autonomous regions or municipalities directly under the central government.

Article 11 The nature reserves are divided into national nature reserves and local nature reserves.

National nature reserves are of typical significance in or out of the country, and have major international influence in science, or are of special value for scientific research.

Local nature reserves are those other than the national ones which are representative and significant for scientific research. Local nature reserves may be managed by local governments at different levels. The specific measures shall be formulated by the competent department of nature reserves under the State Council or by the people's governments of provinces, autonomous regions or municipalities directly under the central government according to their specific conditions, and shall be submitted to the competent department of environmental protection administration under the State Council for the record.

Article 12 The establishment of a national nature reserve requires an application from the people's government of the province, autonomous region or municipality directly under the central government where the proposed nature reserve is located or by the competent department of nature reserves under the State Council. After the appraisal by the National Nature Reserves Appraisal Committee, the competent department of environmental protection administration under the State Council shall coordinate with relevant departments to provide appraisal comments on the application and then submit it to the State Council for approval.

The establishment of a local nature reserve requires an application from the people's government of the county, autonomous county, municipality or autonomous prefecture where the proposed natural reserve is located, or from the competent department of nature reserves in the people's government of the relevant province, autonomous region or municipality directly under the central government. After the appraisal by the local nature reserves appraisal committee, the competent department of environmental protection administration in the people's government of the province, autonomous region or municipality directly under the central government shall coordinate with relevant departments to provide appraisal comments on the application and then submit it to the people's government of the province, autonomous region or the municipality directly under the central government for approval and, meanwhile, submit it to the competent department of environmental protection administration under the State Council and the relevant competent administrative department of nature reserves under the State Council for the record.

The establishment of a nature reserve involving more than two administrative divisions requires an application from the people's government of the relevant regions after their consultation. Then the application goes through the same procedures described in the preceding two paragraphs.

The establishment of maritime nature reserves must be approved by the State Council.

Article 13 In applying for the establishment of nature reserves, it is necessary to complete the nature reserve establishment report according to the relevant regulations of the state.

Article 14 The area and boundary of nature reserves shall be determined by the people's government responsible for the approval of their establishment. The boundaries of nature reserves shall be indicated and announced to the public. The determination of the range and boundaries of nature reserves shall give consideration to the integrity and suitability of the protected object as well as the needs of local economic construction and the production activities and the everyday lives of local residents.

Article 15 The cancellation of nature reserves or any change or adjustment made in its property, area or boundaries shall be approved by the people's government responsible for the approval of the establishment of the nature reserves.

No units or individuals shall move the landmarks of nature reserves without authorization.

Article 16 Nature reserves shall be named in the following ways:

National nature reserves: Name of the location + "National Nature Reserve". Local nature reserves: Name of the location + "Local Nature Reserve".

If a nature reserve has its own special protected object, the name of the object may be added after the name of the location.

Article 17 The competent department of environmental protection administration under the State Council shall, together with the competent administrative department of nature reserves under the State Council, formulate programs for the development of national nature reserves based upon the detailed investigation and evaluation of the natural environment and resources of the whole country. After the overall balancing by the competent planning department under the State Council, these programs shall be submitted to the State Council for final approval and implementation.

The nature reserve administrative agencies or competent administrative department of a particular nature reserve shall draw up the construction plans for nature reserves, which shall be included in the national, local or departmental investment plans according to certain stipulated procedures, and organize their implementation.

Article 18 Nature reserves may be divided into three parts: the core area, buffer zone and experimental zone.

The intact natural ecosystems and the areas where the rare and endangered animals or plants are concentrated within the nature reserve shall be included in the core area which no units or individuals are allowed to enter. Scientific research activities are generally prohibited in the core

area except for those approved according to Article 27 of the Regulations.

A certain amount of area surrounding the core area may be designated as the buffer zone, where only scientific observations and other research activities are allowed.

The area surrounding the buffer zone may be designated as the experimental zone, which may be entered for various activities such as scientific experiment, educational practice, visit and investigation, tourism, and the domestication and breeding of rare and endangered wild animal or plant species.

If the people's government responsible for the approval of the establishment of the nature reserves thinks it necessary, a certain amount of area surrounding the nature reserve may be designated as the outer protection area.

Chapter III Management of Nature Reserves

Article 19 The competent department of environmental protection administration under the State Council shall organize relevant administrative departments of nature reserves under the State Council to formulate national technical regulations and standards for the management of nature reserves.

The relevant competent administrative departments of nature reserves under the State Council shall, within the field of division of work, formulate the technical regulations on the management of various types of nature reserves, and submit them to the competent department of environmental protection administration under the State Council for the record.

Article 20 The competent departments of environmental protection administration in the people's governments at or above the county level shall have the right to supervise and inspect the management of all the nature reserves within their administrative division. The relevant competent administrative departments of nature reserves in the people's government at or above the county level shall have the right to supervise and inspect the management of the nature reserves they are responsible for. The units subject to inspection shall truthfully report the situation to them and provide them with the necessary information. The inspectors shall keep confidential technological know-how and business secrets of the units inspected.

Article 21 The competent administrative departments of the nature reserves of the people's governments of provinces, autonomous regions and municipalities directly under the central government or the competent administrative department of nature reserves under the State Council shall be responsible for the management of the national nature reserves. The competent administrative department of nature reserves in the people's governments at or above the

county level shall be responsible for the management of the local nature reserves within their administrative divisions.

The relevant competent administrative departments of nature reserves shall set up a special administrative agency in each nature reserve and provide specialized technical staff who shall be responsible for the management of the nature reserves.

Article 22 The major functions of administrative agencies of nature reserves shall be as follows:

(1) to implement relevant laws, regulations, guidelines and policies formulated by the state on nature conservation;

(2) to formulate various management regulations so as to exert unified management on the nature reserves;

(3) to investigate into the natural resources and set up necessary records accordingly and organize environmental monitoring in order to protect the natural environment and resources in the nature reserves;

(4) to organize or assist relevant departments to undertake scientific research on the nature reserves;

(5) to carry out education and public programs on nature conservation;

(6) to organize activities such as visiting and sightseeing tours in the nature reserves on the presupposition that the natural environment and resources of the nature reserve shall not be affected by such activities.

Article 23 The expenses needed for the management of the nature reserves shall be arranged by the people's government at or above the county level of the region where the nature reserves are located. The state shall subsidize the management of national nature reserves appropriately.

Article 24 The public security agency of the region where the nature reserves are located may, according to the necessity, set up a representative office within the nature reserves to maintain public order in the areas.

Article 25 The units, residents inside the nature reserves and the personnel allowed to enter into the nature reserves shall comply with various regulations of administration, and subject themselves to the management of the administrative agency of the nature reserves.

Article 26 In nature reserves, such activities as felling, grazing, hunting, fishing, gathering medicinal herbs, reclamation, burning, mining, stone quarrying and sand dredging etc., shall be prohibited unless it is otherwise provided for by relevant laws and regulations.

Article 27 Nobody shall be allowed to enter the core area of nature reserves.

Where scientific observations and investigations are necessary for scientific research, the unit concerned shall submit applications and activity plans to the administrative agency of the nature reserves in advance, to be approved by the competent administrative department of nature reserves in the people's government at or above the provincial level. The entrance into the core area of national nature reserves shall be approved by the competent administrative department of nature reserves under the State Council.

For residents living in the core area of the nature reserve who are necessitated to move out, the local people's government shall see to the proper settlement for them.

Article 28 Tourism, production and trading activities are prohibited in the buffer zone of nature reserves. In the buffer zone of nature reserves, non-destructive activities such as scientific research, educational practice and specimen collection for teaching or scientific research, applications and activity plans shall be submitted to the administrative agency of the nature reserves in advance, and be approved by the same agency.

All units and individuals who participate in such activities described in the preceding paragraph shall submit a copy of the report of the activity result to the administrative agency of the nature reserves.

Article 29 With respect to the visiting and sightseeing tourist activities in the experimental zone of national nature reserves, the administrative agency of the nature reserves shall put forward the activity program. After it is reviewed by the competent administrative department of nature reserves of the people's government of the province, autonomous region or the municipality directly under the central government, the program shall be submitted to the competent administrative department of nature reserves under the State Council for final approval. With respect to the visiting and sightseeing tourist activities in the experimental zone of local nature reserves, the administrative agency of the nature reserve shall put forward the activity program, and submit it to the competent administrative department of nature reserves of the people's government of the province, autonomous region or the municipality directly under the central government for final approval. Visiting and sightseeing tourist activities in nature reserves shall be conducted according to the approved activity program. The management of such activities shall be strengthened. All units and individuals who enter the nature reserves for visiting or sightseeing tours shall submit themselves to the management of the administrative agency of

nature reserves.

Visiting and sightseeing tourist projects that violate the protection guidelines of nature reserves shall be prohibited.

Article 30 Where there are no divisions within the nature reserves, that nature reserves shall be managed in accordance with the stipulation concerning the core area or buffer zone in the Regulations.

Article 31 In cases when foreigners wish to enter a local nature reserve, the host unit shall apply in advance for approval by the competent administrative department of nature reserves of the people's government of the province, autonomous region or the municipality directly under the central government. In the case of national nature reserves, the host unit shall apply for approval by the competent administrative department of nature reserves under the State Council.

All foreigners who enter nature reserves shall abide by the relevant laws, regulations and rules concerning nature reserves.

Article 32 No production installations shall be built in the core area and buffer zone of nature reserves. In the experimental zone, no production installations that cause environmental pollution or do damage to the natural resources or landscapes shall be built. Other installations to be built in these areas must not exceed the discharge of pollutants prescribed by national or local discharge standards. If the installations that have been built discharge more pollutants than are specified by the national or local discharge standards in the experimental zone of nature reserves, such pollution shall be eliminated or controlled within a prescribed period of time. Remedial measures to the damage caused shall be adopted.

The projects constructed in the outer protection zone of nature reserves must not affect the environmental quality inside the nature reserves. If damage has been done, the relevant units shall be ordered to eliminate and control the pollution within a prescribed period of time.

The decision to eliminate and control pollution within a prescribed period of time shall be made by the agencies specified by relevant laws and regulations.

Any enterprise or institution receiving such an order shall complete its tasks of eliminating and controlling pollution on time.

Article 33 If any accident or accidental event takes place, the unit or individual that has caused, or is likely to cause any damage to the nature reserves must adopt immediate remedial measures, and inform the units or residents that are likely to be affected by the accident, and report to

the administrative agency of the nature reserves, the competent department of environmental protection administration in the locality and that of the nature reserves to accept necessary investigation and possible disciplinary actions.

Chapter IV Legal Liability

Article 34 Any unit or individual who has violated the Regulations in one of the following manners shall be ordered by the administrative agency of the nature reserves to correct their mistakes, and a fine between RMB 100 to 5, 000, according to the circumstances of the case, may be imposed:

(1) moving or doing damage to the landmarks of nature reserves without approval;

(2) entering the nature reserves without approval, or failing to meet the requirements of the administrative agency while in the nature reserves;

(3) carrying out scientific research, educational practice and specimen collection in the buffer zone of nature reserves with the approval by the relevant department but failing to submit a copy of the report of their activity results to the administrative agency of the nature reserves.

Article 35 Any unit or individual who has violated the Regulations in felling, grazing, hunting, fishing, gathering medicinal herbs, reclamation, burning, mining, stone quarrying and sand dredging etc., shall be punished according to relevant laws, administrative regulations and rules. Besides, the competent administrative department of nature reserves in the people's government at or above the county level or its authorized administrative agencies of the nature reserves may confiscate the violators' illegal gains, order the violators to stop illegal actions, and to restore the original state or adopt other remedial measures within a prescribed period of time. A fine between RMB 300 to 10, 000 shall be imposed on whoever has caused damage to the nature reserves, .

Article 36 The administrative agencies of the nature reserves which violate the Regulations, refusing to be supervised and inspected by the competent departments of the environmental protection administration or the competent administrative department of nature reserves, or failing to provide truthful information during the inspection, shall be fined between RMB 300 to 3, 000 by the competent department of environmental protection administration or the competent administrative department of nature reserves in the people's government at or above the county level.

Article 37 Any administrative agency of the nature reserves which violates the Regulations by one of the following acts shall be ordered to correct their mistakes within a prescribed period of time by the competent administrative department of nature reserves in the people's government

at or above the county level. Whoever is directly responsible for such violations shall be given disciplinary sanctions by the agency to which he belongs or by the organ at the higher level:

(1) taking visitors and sightseeing tours in nature reserves without approval;

(2) setting up visits and tourist projects against the general guidelines of the conservation of nature reserves;

(3) taking visit and sightseeing tours that fail to accord with the approved activity plans.

Article 38 Whoever violates the Regulations by causing damage to the nature reserves, shall be ordered to pay reparations for the loss by the competent administrative department of nature reserves in the people's government at or above the county level.

Article 39 Whoever hinders the work of the administrative staff of the nature reserves shall be punished by the public security organ in accordance with Regulations of the People's Republic of China on Administrative Penalties for Public Security. If the circumstances are serious enough to constitute a crime, they shall be prosecuted for criminal responsibility according to law.

Article 40 If a violation of the Regulations causes serious pollution or destructive accidents to the nature reserves, leading to the grave consequences of heavy losses of public or private property, or human casualties, and resulting in a criminal offense, the person in charge directly responsible and other person directly responsible for the violation shall be investigated for criminal responsibility according to law.

Article 41 Any person conducting management of nature reserves who abuses their power, neglects their duty or engages in malpractice for personal gains, shall, when a crime is constituted, be investigated for criminal responsibility according to law, or when the circumstances are not serious enough to constitute a crime, be given disciplinary sanctions by the unit to which they belong or the competent higher authorities.

Chapter V Supplementary Provisions

Article 42 The competent administrative departments of nature reserves under the State Council may, in accordance with the Regulations, formulate the administrative rules for different types of nature reserves.

Article 43 The people's governments of provinces, autonomous regions and municipalities directly under the central government may, in accordance with the Regulations, formulate the implementation measures.

Article 44 The Regulations shall enter into force on December 1, 1994.

1.12 Regulation of the People's Republic of China on the Implementation of Forestry (Excerpt)

Promulgated by Decree No. 278 of the State Council on January 29, 2000
Premier Zhu Rongji

Article 19 The competent forestry authority of the people's government at or above the county level shall, according to the investigation and monitoring of the targeted object by the forest disease and pest damage monitoring and forecasting center, periodically release long-term, mid-term and short-term forest disease and pest damage forecasts, and give timely preventive suggestions. The forest operator shall use variety to create a mixed forest, carry out scientific afforestation and improve the ability to prevent forest disease and pest damages. When forest disease and pest damage occurs, relevant departments and forest operators shall take timely integrated control measures to treat and eliminate the damages. When serious forest disease and pest damage occurs, the local people's government shall take emergency eliminate-and-treat measures to prevent spreading and eliminate damages.

Article 21 It is prohibited to destroy the forest for bringing it under cultivation or collecting seed, or violate rules of operation to tap resin, dig bamboo shoots, extract stumps, debark or over lop.

1.13 Regulation of the People's Republic of China on Wild Plants Protection (Excerpt)

Promulgated by Decree No. 204 of the State Council of the People's Republic of China on September 30, 1996 and effective as of the January 1, 1997
Premier Li Peng

Article 7 All units and individuals shall have the duty to protect wild plant resources and have the right to inform the authorities of or file charges against acts of seizure or damaging of wild plants or the environment for their survival.

Article 9 The state shall protect wild plants and the environment for their survival. All units and individuals shall be forbidden to collect wild plants illegally or damage the environment for their survival.

Article 15 The department of wild plants administration shall regularly carry out surveys of resources of wild plants under special state and local protection and keep records of them.

Article 18 The sale or purchase of wild plants under first-class state protection shall be prohibited.

1.14 Regulation of the People's Republic of China on the Implementation of Terrestrial Wildlife Protection (Excerpt)

Approved by the State Council on February 12, 1992 and promulgated by the Ministry of Forestry on March 1, 1992

Article 8 Any damage to the living and breeding areas or the living conditions of wildlife under special protection by the State or local authorities by any unit or individual shall be prohibited.

1.15 Provisions on Geological Relics (Excerpt)

Article 7 The following geological relics should be protected, including:

(1) typical stratotype sections, sections reflecting fossils groups, formations sections of lithological character and facies, and typical geological formation sections and traces, which are of great scientific research values for ascertaining geological history.

(2) fossils and fossil localities about ancient human, ancient vertebrates, invertebrates, microfossils, old-age trees and historical remains of ancient creatures, which are of great scientific and culture research value for understanding geological evolution and creatures.

(3) Geological landscapes such as karst, Danxia, loess, Yadan, granite peaks, quartz peaks, volcanoes, icebergs, aerolites, singing sands and seacoasts etc., which have great scientific and appreciation values.

(4) rocks, minerals, boulders and their localities, which have special scientific and appreciation values.

(5) hot springs, mineral springs, marks of underground water which are of special medical or scientific value, and waterfalls, lakes and springs which are of special geological significance.

Article 17 No units or individuals shall quarry, get soil, mine, graze animals, cut trees and do other activities which are harmful to the protected objects. It is forbidden to collect samples and fossils without permission of the reserve management agencies.

Article 18 Workshop and other structures that have nothing to do with geological relic protection are not allowed to be built inside reserves. Some infrastructure already constructed which might pollute or damage geological relics should be moved out in a specified period.

2. Regulations Concerning the Protection of the Nominated World Natural Heritage Property of XinjiangTianshan

Chapter 1 General Principles

Article 1 Based on the relevant laws and regulations and taking the current situation of Xinjiang into account, this law is formulated in order to strengthen the protection and management of the nominated properties in the Tianshan Mountains.

Article 2 These Regulations are applicable to the protection and management of the nominated properties in the Tianshan Mountains.

Protection and management of nature reserves, cultural relics and park in the nominated properties of the Tianshan Mountains should abide by the relevant laws and regulations.

Article 3 Nominated properties in the Tianshan Mountains mentioned in these regulations refer to the specially protected sites which are added to the World Heritage List after application and recognition according to the process set by the state.

Article 4 The principles of unified planning, managing according to law, strict protection and sustainable utilization should be abided by in the protection and management of the nominated properties in the Tianshan Mountains; and relationships between economic development and the indigenous production and life should be handled properly.

Article 5 A management system characterized by unified leadership of government, responsibility of the competent government authority and involvement of the relevant functional departments will be implemented in the nominated properties in the Tianshan Mountains.

Protection and management of nominated properties of the Tianshan Mountains are under the unified leadership of the People's government of Xinjiang Uygur Autonomous Region. The departments of housing and urban-rural development will be responsible for the specific work.

The regulatory authorities of the nominated properties of the Tianshan Mountains set by the people's governments of the prefectures, cities and counties and the dispatched administrative agencies will be responsible for the protection and management works and will be under the leadership and monitoring of the regulatory authorities of higher levels.

Relevant departments of the governments above the county level for environmental protection,

forestry, agriculture, livestock, land and resources, culture, heritage, tourism and so on, in accordance with their respective duties, will be responsible for the related work of natural heritage conservation and management.

Article 6 By principle and to simplify performance, local people's governments above the county level where the sites are located can authorize or entrust managing organs of nominated properties to apply the relevant administrative licensing and penalties.

Article 7 The managing organs of nominated properties of the Tianshan Mountains should perform the following functions:

(1) Promote, conform to and implement relevant laws, regulations, guidelines and policies about the protection of natural heritage.

(2) Establish management systems concerning the protection of nominated properties of the Tianshan Mountains and be responsible for the drawing up, organization and implementation of the Tianshan natural heritage protection plan;

(3) Be responsible for the survey, registration, monitoring, assessment and reporting of the state of conservation of the mentioned nominated properties;

(4) Organize research, science dissemination and educational activities regarding natural heritage.

(5) Establish a dynamic monitoring system, and stop and punish unlawful practices within the nominated properties.

Article 8 Funding of protection and management should be taken into the financial budget management and the financial administration department of Xinjiang Uygur Autonomous Region should give regulations and assistance in accordance with actual situation.

Local people's governments above the county level have special funding for the protection of the mentioned sites raised by government investment, social donations, contributions from international organizations and so on, which will be used for conservation of the nominated properties.

Article 9 Local people's governments above the county level and the regulatory organs should strengthen popular science dissemination, promotion and education of the sites; and enhance the cognition of the public for the natural heritage's value; and improve the consciousness of the need for protection.

Article 10 Any entity or individual shall have the right to protect nominated properties of the Tianshan Mountains and to stop and report any acts committed that destroy the sites.

Any entity or individual that has made outstanding achievements in protecting the nominated properties of the Tianshan Mountains should be recognized by awards by the local peoples' governments above the county level and the regulatory organs of the sites.

Chapter 2 The Protected Area and Conservation Plan

Article 11 The range of nominated properties shall be set by the principle of fully reflecting the natural heritage values, and the effective protection and display of natural heritage. Ecological protected areas, natural landscape protection areas, natural relics protection areas, historical sites protection areas and other functional areas should be designated within representative areas of natural ecosystems, areas of concentration of endangered species, areas of geological structure of great scientific and cultural value, fossil distribution areas, glaciers sites and other natural heritage areas or historical sites. Within functional areas, parts where construction is prohibited, parts where construction is restricted and exhibition parts should be clearly defined.

Buffer zones should be designated in the important landscape heritage areas close to the edge of the nominated properties of the Tianshan Mountains, and the functional areas important to the nominated properties of the Tianshan Mountains and their protection. Management bodies of Tianshan nominated properties should set boundary markers around the nominated properties and buffer zones.

Article 12 People's governments above the county level shall organize relevant departments to make surveys, screening, classification and evaluation of the sites, and create documentation.

Article 13 Planning of the sites includes overall planning, area planning and detailed planning and the design and approval should abide by the following provisions:

(1) Overall planning should be included in the urban system planning of Xinjiang as a whole, and it should be established by the regulatory organs of the nominated properties of the Tianshan Mountains, agreed by the people's government of Xinjiang and approved by the state council.

(2) Area planning should be included into the urban system planning at the prefecture level and city level and it should be established by the people's government of prefectures , cities or the designated administrative agencies where nominated properties are located, and then it should be reported to and approved by the people's government of Xinjiang.

(3) Detailed planning should be established by the local people's governments and the designated

administrative agencies and reported to housing and urban-rural development departments for approval.

The protection planning of the nominated properties of the Tianshan Mountains should be in accordance with the urban and rural planning, general land use planning, tourism development planning and other relevant planning.

Article 14 The departments organizing the establishment of the protection plans of the sites should select the appropriate qualified units to make the plans through calling for bids, seeking submissions and other ways respecting the spirit of fair play.

Protection plans concerning the nominated properties of the Tianshan Mountains should comply with the standards and norms of planning and design of the State and Xinjiang Uygur Autonomous Region, and follow the procedures specified in urban planning laws and regulations to get extensive solicitation of opinions from experts and the public, and reasons for adoption and other opinions should be attached in the materials sent to be reviewed and approved.

Article 15 This plan should be made public after being approved and any unit or individual should be able to get access to the plan.

Project construction, tourism development and production and operation in the natural heritage site of the Tianshan Mountains should comply with this plan.

The practices mentioned in the preceding clause cannot be conducted without approval.

Article 16 In accordance with the urban planning laws and regulations, departments establishing the protection plan of nominated properties of the Tianshan Mountains should organize relevant departments and experts to evaluate the implementation of the plan regularly and submit the evaluating report to the committee of the national people's congress of the same level and to the original approving department.

Article 17 No unauthorized changes will be made to the protection plans once approved; Plans can be revise according to the limits of authority and process listed in urban planning laws and regulations in any of the following situations:

(1) When the nominated properties, the buffer zones and functional areas should be adjusted;

(2) When the urban plans and overall land using plans of a higher level get revised;

(3) When key projects get approved by the state council or Xinjiang Uygur Autonomous Region;

(4) When the protection measures, limits of development and utilization, and the capacity for tourists should be adjusted after evaluation;

(5) Other circumstances provided by laws and regulations.

Chapter 3 Protection, Utilization and Management

Article 18 The following practices are forbidden in the sites:

(1) Quarrying, mining, logging, hunting, reclamation, building tombs and tombstones and so on which damage the landscape, vegetation and landforms and affect the natural state of mountains and water;

(2) Practices which will affect the integrity and authenticity of natural heritage resources or project construction, sightseeing development, production and operation which will affect wildlife movement and their habitats;

(3) Practices introducing exotic species and their products and carrying out domestication and breeding of wild animals and plants which will bring adverse effects on natural ecosystems;

(4) Any other act prohibited by law or administrative regulations.

Article 19 In the construction prohibited part of the nominated properties in the Tianshan Mountains, no construction activities are permitted except for necessary research, monitoring and security facilities. In the construction restricted part, natural heritage protection facilities can be built. In the display part, public service facilities and management facilities relevant to sightseeing and entertainment can be built.

Article 20 Construction of buildings, structures and other facilities in the nominated properties of the Tianshan Mountains must be approved by the regulatory authorities where the sites are located and go through the approval formalities according to relevant laws and regulations. Detailed plans of the sites have clarified the places for construction, the layout and scale, and applications for permission for new construction projects are not permitted.

Article 21 Sightseeing, culture and entertainment activities in nominated properties of the Tianshan Mountains shall comply with the protection and management regulations.

Scientific research, outdoor advertising and other activities in the nominated properties of the Tianshan Mountains shall be approved by the local management authority where the site is located. Large-

scale performances and film shooting shall be subject to regional examination and approval authority of the nominated properties of the Tianshan Mountains plan and ecological protection scheme shall be submitted. An ecological protection scheme should include utilizing conditions, scope, duration, protection issues, restoration obligations, performance bonds and so on.

Article 22 Development, construction, production, management and other activities in buffer zones in nominated properties of the Tianshan Mountains shall ensure that the natural heritage value is not adversely affected due to human activities and the development and construction.

Article 23 Protection and management of nominated properties of the Tianshan Mountains should take into account indigenous production and living needs. Regulatory authorities established by people's governments of the counties (cities) where the sites are located should guide and help indigenous people to adopt ways of production and life which will benefit the natural heritage protection and, preferably, involve indigenous people in natural heritage protection, maintenance and so on. The prefecture, city and county governments, and the designated administrative agency should develop compensation and resettlement programs and arrange indigenous production and life properly when the indigenous people must move out of the sites in accordance with planning.

Article 24 It is prohibited to sell or transfer the natural heritage resources of the Tianshan Mountains under any name or by any means in disguise. Approved by the regional people's government, the prefecture, city and county governments, and the dispatched administrative agencies can adopt franchise operating methods and select investors.

Regulatory authorities can adopt franchise operating methods and select operators for transportation, catering, accommodation, shopping, shows, entertainment and so on; and priority of operation should be given to the collective organization of natural heritage or the indigenous people in the same area.

Article 25 Regulating authorities should stipulate the duration of visit and the tourists bearing capacity, set warning marks in the fire area and hazardous location, strengthen the management of transporting and entertaining facilities such as cable car, cableway, tour boat and so on, and eliminate all kinds of hidden dangers

Article 26 The local regulatory authorities where the sites are located should report to the regional regulatory authority the natural ecosystems, habitats of endangered and endemic species, and natural relics with ecological imbalance or under threats which require human intervention in the sites to organize experts to conduct hearings and draw a program before implementation.

The local regulatory authorities where the sites are located should immediately take rescue

measures and report to the regional regulating authority in a timely fashion when the natural heritages of the Tianshan Mountains suffers from sudden natural disasters.

Chapter 4 Duties

Article 27 If the relevant administrative organs of the sites acts in violation of these regulations as follows, they will be informed and ordered to rectify the situation by the people's governments above the county level according to the management authority and procedures. The person directly in charge and other persons directly responsible shall be given sanctions in serious cases.

(1) The organs who will not organize the establishment, design, approval, modification or publishing of the protection plans of the heritage sites of Tianshan Mountains;

(2) The organs who do not have qualified units of an appropriate level to establish the protection plans;

(3) The organs that permit various types of tourism developments and construction activities prior to approval of the protection plans for the nominated properties in the Tianshan Mountains;

(4) The organs that approve activities prohibited by this regulation;

(5) The organs that sell or transfer natural heritage resources of the Tianshan Mountains in a disguised way.

Article 28 The people' government establishing the regulatory authorities of the nominated properties of the Tianshan Mountains will charge the authorities and their staff when they carry on any of the following practices in violation of these regulations. The person directly in charge and other persons directly responsible shall be given sanctions in serious cases.

(1) Person who will not do the duties of protection and management;

(2) Person who approve constructions and other activities in violation of the protection plans;

(3) Person who practice fraud or corruption during franchise granting for the operation of the natural heritage resources of the Tianshan Mountains;

(4) Persons who will not prevent discovered illegal behavior in a timely fashion and give punishment.

Article 29 Any of the following practices in violation of the listed provisions should be stopped.

Restoration or dismantling in a limited time should be undertaken, and a fine above 100, 000 Yuan and below 1, 000, 000 Yuan may concurrently be imposed in serious cases with a fine of above 5, 000 Yuan and below 30, 000 Yuan in minor cases:

(1) Practices of quarrying, mining and so on which can damage the landscape, vegetation and landforms and affect the natural state of mountains and water;

(2) Practices which will affect the integrity and authenticity of natural heritage resources or construction, sightseeing development, production and operation which will affect wildlife movement and their habitats;

(3) Practices introducing exotic species and their products and carrying out domestication and breeding of wild animals and plants which will bring adverse effects on natural ecosystems;

(4) Practices of construction in the areas where construction is banned, except for essential research, monitoring and security facilities.

Article 30 Practices such as logging, hunting, reclamation, building tombs and tombstones and so on which will damage the landscape, vegetation and topography, and change mountains and waters should be stopped. Restoration or other remedial measures should be undertaken, the illegal gains should be confiscated and a fine of above 1, 000 Yuan and below 10, 000 Yuan may concurrently be imposed.

Article 31 Practices such as scientific research, outdoor adverting, large-scale performing or film shooting and so on which are in violation of the provisions should be stopped. Restoration or other remedial measures should be taken, illegal gains should be confiscated and a fine of above 100, 000 Yuan and below 200, 000 Yuan may concurrently be imposed.

Article 32 Penalties provided in these regulations will be given and enforced by the regulatory authorities according to relevant laws and regulations. If other relevant departments have done this, there is no need for the regulatory authorities to do it for a second time.

Article 33 Other practices violating the provisions of these Regulations shall be handled in accordance with the provisions of other relevant laws and legislation.

Chapter 5 Supplementary Articles

Article 34 The present Regulations comes into force on the day of release.

3. Regulations of Xinjiang on Nature Reserves

The Standing Committee of the People's Congress of Xinjiang Uygur Autonomous Region (Adopted at the 28th Session of the Standing Committee of the 6th People's Congress of Uygur Autonomous Region on September 5th, 1987)

Article 1 The present Regulations are formulated in accordance with the relevant laws and regulations of the People's Republic of China and based on the actual circumstances of Xinjiang Uygur Autonomous Region. They are formulated to establish and manage nature reserves (hereinafter referred to as protected areas) well, to protect typical ecosystems and precious natural resources, to explore ways of rationally using natural resources and to promote economic development and scientific and cultural development.

Article 2 Land, mineral resources, water, forests, grasslands, wildlife and all other natural resources within the protected areas, regardless of ownership, shall be protected, managed and utilized in accordance with the regulations.

Article 3 Management of the protected areas shall focus on protection and a policy that combines protection, construction and utilization shall be implemented.

Article 4 Management agencies shall be established to implement management of the protected areas. Management agencies shall be co-administrated by the competent departments of the protected areas and the local people's government.

Article 5 All the units and individuals have obligations to protect natural resources, and to assist and support the management of the protected areas. They also have the rights to stop, report and prosecute illegal acts in the protected areas.

Article 6 The government department that is designated by Xinjiang Uygur Autonomous Region People's government is responsible for the integrated management of all protected areas, and the main responsibilities are as follows:

(1) Inspection and monitoring of the implementation of national guidelines, policies and laws on protected areas, as well as this Regulation;

(2) Preparation of work plan for all the protected areas in cooperation with concerned departments;

(3) Preparation of relevant provisions for the management of all the protected areas in cooperation with concerned departments;

(4) Responsibility for the establishment and vetting of relevant reports on protected areas;

(5) Organizing and coordinating the management departments of protected areas.

Article 7 According to the scope of their respective duties as designated by the autonomous region people's government, departments concerned such as provincial forestry, agriculture, animal husbandry, water conservancy, geology and mineral resources, environmental protection and urban construction department shall manage different types of protected areas.

Article 8 Establishment of provincial protected areas shall be proposed by the provincial competent authorities and, after the verification process by departments that are responsible for overall management of protected areas, then submitted to the provincial people's government for approval. Establishment of county or city level protected areas shall be proposed respectively by the corresponding people's government and then submitted to the provincial people's government for approval.

To establish protected areas, it is necessary to consultant the local government of the region where the protected areas are located.
If the nature, scope, authority or rank of protected areas is changed significantly, the above-mentioned specified procedure shall be followed. If the provincial protected areas are expected to be upgraded to national protected areas, it shall be submitted to the State Council for approval.

Article 9 In accordance with relevant national laws, policies and provisions of this Regulation, management agencies of protected areas are responsible for protecting the natural resources and natural environment; they are responsible for controlling the growth and decline of natural resources and preventing damage of natural resources; they are responsible for making rules that all scientific research, teaching, tourism, production and business activities in protected areas shall comply with and they are responsible for supervising the implementation of these rules; they are responsible for carrying out necessary scientific research.

Article 10 According to state regulations and actual demand, police stations can be set up in protected areas and police ombudsmen can be allocated. Their main obligations are as follows: they shall cooperate with management departments of protected areas to protect natural resources and other property in protected areas, keep order and peace in protected areas, and investigate and punish cases of damage to protected areas according to laws and regulations. The police stations and police ombudsmen are under the dual leadership of local public security organs and the

management department of the protected area.

Article 11 If units and individuals want to enter protected areas, it is shall be approved by the management agencies of protected areas.

Units and individuals that are authorized to enter protected areas shall abide by the rules and regulations and accept the unified management by the management department of protected areas. Activities including felling trees unlawfully, hunting, fishing, gathering, mining and quarrying are prohibited in protected areas, and activities that can damage the landscape or natural resources in protected areas shall be strictly prohibited.

Article 12 The original units and residents stationed in protected areas shall participate in the conservation and construction of protected areas. Their production and living activities shall comply with the rules and regulations of protected areas. The management agencies of protected areas shall take care of their interests.

As for, If the production and living activities of the units and residents in protected areas cause damage to the natural environment of protected areas, they have the obligation to take active measures to restore the natural environment.

Article 13 New units or residents are not allowed to move into protected areas without approval of the people's government that establishes protected areas.

Article 14 Water conservancy projects, constructional engineering and construction of other facilities as well as production and living activities near protected areas shall not harm the natural environment of protected areas.

Management agencies of the protected area shall give reasonable compensation for economic losses of units and residents within or in the vicinity of protected areas which are caused by construction in protected areas.

Article 15 If research institutions, teaching units and concerned departments want to conduct scientific research, scientific investigation and teaching practice activities in protected areas, they must be approved by competent authorities of protected areas and submit the plan of activities to the competent authorities. These activities shall be under unified arrangement of the management agencies of the protected area. The above-mentioned activities shall be beneficial to natural resources and environmental protection. Activities of collecting specimens shall be controlled. Collecting specimens of national protected animals and plants shall meet the approval procedures of the concerned regulations and rules.

Article 16 Units and individuals, who enter protected areas for scientific research, scientific investigation, teaching practice, collecting specimens, mountaineering, tourism and other activities, shall pay management fees and compensation costs for resources to the management departments of protected areas. The amount charged shall be decided by the autonomous region people's government.

The above-mentioned management fees and compensation cost shall be used for management and protection of protected areas and shall not be used for other purposes.

Article 17 Protected areas which are fit for tourism or mountain climbing can set aside a certain area of the protected areas for tourism and mountain climbing activities, which shall be approved by the people's governments that have established the protected areas. The management department of protected areas shall specify the travel and mountain-climbing routes as well as management system. All the units and individuals that enter protected areas for sightseeing and travel shall comply with the management system of the protected area and obey the management arrangements of the agencies of the protected area.

Article 18 Arrangements for foreigners` access to protected areas for scientific research, investigation, mountain-climbing, traveling, photographing, video and other activities shall be approved by provincial competent authorities of protected areas. All these activities shall go through the formalities in accordance with the provisions of state foreign affairs activities.

Article 19 Units and individuals that have made remarkable achievements in the protection and construction of protected areas as well as in the rational use of natural resources shall be given awards by the competent authorities in charge of the protected areas.

Article 20 As for the units and individuals who violate this Regulation and conduct one of the following activities, small offences shall be criticized or require education by management agencies of the protected areas; for serious offences or failure to change after criticism and education, warning or fines shall be given by management agencies of protected areas or the local people`s government; activities that result in losses should result in compensation orders; for activities that constitute a crime, the criminal responsibility shall be investigated by judicial organs according to law as follows:

(1) Any unit or individual who enters the protected area without authorization:

(2) Units and individuals outside protected areas who enter the protected area for felling trees, hunting, fishing, gathering, mining, quarrying and other activities without authorization, causing damage to the landscape and natural resources in protected areas;

(3) Native units and residents in protected areas whose activities are in non-compliance with

rules and regulations of protected areas, resulting in destruction of natural resources in protected areas;

(4) Units and individuals who damage protection facilities and scientific experimental facilities of protected areas;

(5) Management agency staff of protected areas and other personnel who collect specimens in protected areas and seed sources and sell them or provide them to others without authorization;

(6) Units and individuals that hinder the managers of protected areas in their work, do not listen to, discourage or assault managers of protected area.

Article 21 The Provincial people`s government can formulate specific implementation measures according to this Regulation. The local people's government of the region where protected areas are located can formulate specific measures to protect natural resources according to this Regulation and the above-mentioned implementation measures.

Article 22 These Regulations shall enter into force on the day of promulgation.

4. Regulation on the Management of Tomur Peak Nature Reserve

The Tomur Nature Reserve is an alpine landscape comprehensive protected area. There are glaciers and precious wildlife resources in this area, which are valuable natural and historical heritage. To protect and develop these resources as well as carry out scientific research, enrich people's lives and develop foreign affairs, tourism and other industries, according to Article IX of the Constitution of the RPC, "The State guarantees the use and management of natural resources, protects rare animals and plants", and the Xinjiang 108 Notice (1975), Tomur Nature Reserve Regulations are formulated as follows:

Article 1 The natural environment and natural resources means: atmosphere, glaciers, rivers, land, minerals, mountains, forests, grassland, wildlife, wild plants, monuments, scenic spots, residential areas and others items in this region.

Article 2 Logging, hunting, planting, mining, excavation, digging medicine, collecting and military exercises and other activities that may affect the growth and reproduction of the plants and animals are strictly forbidden in core protected areas, referring to The Big and Small Tieran ditch as well as other ditches and tributaries located within Tahelak Mountain. The region about 2000km2 surrounding the core protected area is a general protected area including the front part of Latuogou Mountain, above the Tumuxiukemazha, Bayili, the Big Kuzibayi, the Small Kuzibayi and Pochengzi.

Article 3 All site selection, surveying, construction and production of any enterprise and institution, must be reported to the superior nature conservation departments for examination and approval to proceed.

Article 4 The core protected area should be strengthened by the control of hunting guns and equipment. Any unit or individual without the permission of the management department shall not be allowed taking hunting guns and equipment into the protected area. Managers have rights to confiscate offenders' hunting guns and equipment or their hunting products; otherwise, the offenders may be fined or processed by Department of Justice in serious cases.

Article 5 Since grassland resources are major source of production and living for the herdsman, they are allowed to graze in this area as long as all regulations are observed and the original status is well maintained. Besides those herdsmen, individuals shall not trespass in protected areas for production.

Article 6 Scientific research, teaching, internship, travel, photography, hiking, making films or

television shows, summer camps and other activities of any unit or individual must apply for entrance approval. Foreigners should get permission from the Ministry of Forestry, tourists from other provinces or regions should get permission of Xinjiang Forestry Sector, local people get the permission from the local forestry department.

Article 7 Any activates that are allowed to proceed in this area must pay specified fees to the Reserve Management Station.

Article 8 Tomur Nature Reserve is a multi-disciplinary research base, it is opened to any unit or individual who intends to invest in the protected area's construction and tourism, after signing a contract, and benefits will be divided proportionally. Scientific research and intern activities are both warmly welcomed.

Article 9 If ithere is a need to hunt animals, for example for scientific research, teaching, domestication or exhibition, the State policies and regulations concerning protecting the precious animal should be followed:

First-class protection animals need the permission of the Ministry of Forestry: Mustang, Wild Camel, Yak, High-Nose Antelope, Red-Crowned Crane, Black-Necked Crane, Black Stork.

Second class protection animals need the permission of the Xinjiang Forestry Department and put on file.: Snow Leopard, Argali, Green Sheep, Ibex, Red Deer, Beaver, Sable, Lynx, Swan, Rabbit, Blue Sheep.

Third class protection animals need the permission of the local Forestry Department and put on file: Black Grouse, Stone Marten, Pelicans, Hazel Chicken, Thunderbird, Saoxue, Swan eggs, Frozen Chickens, Snowshoe hare, Jade Sea Eagle, Golden Eagle, Yi Fox, .

Article 10 Foreign trade and commerce departments shall not purchase State-level protected animals and their products.

Article 11 Citizens have the right to monitor, report and prosecute any activities that destroy the natural environment of the flora and fauna. Appropriate recognition and reward will be given to citizens who inform against these activities.

Article 12 Units and individuals who have made outstanding contributions to protecting the natural environment and wildlife will be given recognition and awards.

Article 13 Any unit or individual violating regulations and relevant orders have to accept criticism, education, fines, confiscation of hunting guns and equipment or hunting trophies and, in

serious cases, will be charged.

Article 14 Foreigners who enter this protected area should follow this regulation and other relevant regulations

Article 15 The management station duties are: to vigorously implement the laws and regulations on nature protection; enhance the protection of natural resources, and resolutely prevent the hunting of wildlife; to carry out resource surveys and support artificial breeding in a planned way; to renew and restore the natural forest, and effectively improve the management of the protected area.

The regulation should be implemented from May 1st, 1985.

5. Regulation on the Management of Tianshan Tianchi Park

The Standing Committee of the People's Congress of Changji Hui Autonomous Prefecture of Xinjiang Uygur Autonomous Region (Adopted at the 4th Session of the Standing Committee of the 13th People's Congress of Changji Hui Autonomous Prefecture on February 6th, 2010)

Chapter 1 General Provisions

Article 1 According to the Law of the Peoples`s Republic of China on Regional National Autonomy, *Regulations of the People's Republic of China Concerning Parks* by the State Council and relevant laws and regulations and according to the actual conditions of the Tianshan Tianchi National Park, this Regulation is formulated for the purpose of strengthening management of the Tianshan Tianchi National Park, effectively protecting and rationally utilizing the resources of the park and promoting scientific development of Tianchi Park.

Article 2 The establishment, planning, protection, utilization, monitoring and management of park shall be in conformity with this Regulation.

Article 3 The scope of Tianchi National Park is defined in the Landscape Planning of Tianshan Tianchi which was approved by the State Council.

Article 4 Principles of scientific planning, unified management, strict protection and sustainable use are followed in the Tianchi National Park.

Article 5 The People's Government of Fukang county is responsible for the protection and management of Tianchi National Park.

The People's Government of Fukang county has established Tianshan Tianchi Administrative commission in the Tianchi National Park which is the agency administered by the People`s Government of Fukang county. Tianshan Tianchi Administrative commission is specifically responsible for the protection and utilization as well as unified management of Tianchi National Park.

According to their respective duties, relevant competent authorities of Fukang county should cooperate with Tianchi Administrative commission on the protection and management of the Tianshan Tianchi National Park.

Article 6 Tianshan Tianchi Administrative commission shall perform the following duties:

(1) Protection and management of scenic resources and the natural environment according to the laws;

(2) Organization and implementation of Landscape Planning of Tianshan Tianchi and Detailed Planning ; formulation and implementation of aspecific protection and management system;

(3) Construction, maintenance and management of infrastructure and other public facilities in the Tianchi National Park, improvement of the tour conditions, maintaining normal tour order and providing high-quality services for tourists;

(4) Study, exploration and propagandizing of the natural resources, human landscape, and the regional cultural and scientific value of the Tianchi National Park;

(5) Supervision and management of units and individuals who are engaged in tourism, construction and operation activities in the Tianchi National Park;

(6) Other functions entrusted by the People's Government of Fukang county or other concerned competent authorities;

Article 7 All units and individuals have the obligation to protect the scenic resources, as well as the right to stop and report activities that cause damage to scenic resources.

Units and individuals who have made outstanding achievements in the protection and management of the Tianchi National Park shall be given awards by the People's Government of Fukang county or Tianchi Administrative commission.

Article 8 The People's Government of Fukang county shall organize concerned competent authorities and cooperate with the Tianchi Administrative commission to enforce the laws jointly, and promptly investigate and deal with violations in the Tianchi National Park according to laws.

The power of administrative penalty in the Tianchi National Park by concerned competent authorities can be exercised by the Tianchi Administrative commission.

Chapter 2 Planning and Construction

Article 9 The protection, construction, utilization and management of the Tianchi National Park shall be based on the Landscape Planning of Tianshan Tianchi which was approved by the State Council and the Detailed Plan which was drawn up according to the Landscape Planning of Tianshan Tianchi.

Article 10 The approved Landscape Planning of Tianshan Tianchi and the Detailed Plan shall not be altered without authorization. If it is really necessary to modify the scope of the park, the nature of the park, conservation objectives and protection measures for ecological resource and so on in the Master Plan, the modification shall be submitted for approval according to law.

Article 11 The People's Government of Fukang county shall guide and urge the Tianchi Administrative commission to implement the Master Plan and Detailed Plan, and shall coordinate major issues during the implementation of the plans.

Units and individuals in the Tianchi National Park shall consciously abide by the Master Plan and Detailed Plan, and shall comply with the planning and management.

Article 12 Construction activities in the Tianchi National Park shall comply with the relevant laws and regulations and be consistent with the Master Plan and the Detailed Plan. All the construction activities shall receive examination and approval by the Tianchi Administrative commission according to laws and shall be authorized by concerned competent departments.

Article 13 As for construction, expansion and renovation of buildings or structures in the Tianchi National Park, the body mass, appearance of structure, height and color shall be in harmony with the surrounding landscape, and cannot cause any damage to the natural and cultural landscape.

Article 14 Units in charge of construction in the Tianchi National Park shall construct anything according to the approved plan. Effective measures shall be taken to protect trees, vegetation, water and landforms and no pollution or damage shall be caused. As soon as construction is completed, the construction site shall be promptly cleared with afforestation and restoration of the original environment.

Article 15 The Tianchi Administrative commission shall strengthen the infrastructure of roads, communication facilities, water facilities, drainages, electricity, heating and other facilities, and shall improve the traffic conditions, service facilities and tour conditions.

Chapter 3 Protection and Utilization

Article 16 The People's Government of Fukang county shall organize the Tianchi Administrative commission and other concerned departments to formulate and implement special programs, including resource protection, tourism development, ecological succession and so on in the Tianchi National Park, and strictly protect water, forests and vegetation, wildlife and the landscape and natural environment.

Article 17 The Tianchi Administrative commission shall explore and inventory the natural

landscape, including old trees, wildlife, landforms, mountain rocks, springs and lakes and other natural landscape features, and cultural landscape elements, such as monuments, cultural relics and historic sites, gardens and other cultural features. It shall establish and improve the management system for scenic resources and the natural environment.

Article 18 The Tianchi Administrative commission shall guarantee the ecological landscape water supply, strictly control the elevation of the water surface of Tianchi, prevent water pollution and ensure sustainable development of the water resources of Tianchi.

Article 19 The Tianchi Administrative commission shall enhance the protection, construction and rational utilization of the grassland in the Tianchi National Park, which shall be based on specific projects.

The contracting operators of the grassland in the Tianchi National Park shall rationally utilize the grassland and the total stockings shall not exceed the verified grazing capacity; the contracting operators shall take measures to keep balance between the total stockings and grazing capacity.

Article 20 The Tianchi Administrative commission shall strengthen the cultivation and management of the forests in the Tianchi National Park according to laws and trees should not be felled without authorization; it shall implement afforestation through tree-planting and prevention of pests and diseases and conserve the forests, vegetation and species` growth conditions.

Article 21 The Tianchi Administrative commission shall gradually remove the buildings that are irrelevant to the protection of scenic resources within the Tianchi National Park, which shall be based on specific projects.

Article 22 The Tianchi Administrative commission shall establish and improve the record system. The committee shall carry out investigations and surveys on the history and development, resources, scope and boundaries, infrastructure, tourism operators and other conditions, which should form documents, files and data to be properly preserved.

Article 23 The operators of tourism, transportation, commerce and other services in the Tianchi National Park shall be determined through fair competition such as calling for bids, which shall be implemented by the Tianchi Administrative commission according to relevant laws, regulations, Landscape Planning of Tianshan Tianchi and the Detailed Plan. The Tianchi Administrative commission shall sign contracts with the operators and they shall determine each others' rights and obligations according to laws.

Units and individuals, who conduct business in the Tianchi National Park, shall pay compensation for the utilization of scenic resources. The standard of compensation for the utilization of scenic

resources shall be in accordance with provisions of the autonomous region.

Article 24 The Tianchi Administrative commission is responsible for the sale of tickets providing entrance to the Tianchi National Park.

As for ticket sales and compensation fees paid for the utilization of scenic resources, the income and expenditure shall be managed through different departments. All the revenues shall be used for the protection and management of The Tianchi National Park according to laws.

Article 25 Acts that are prohibited in the Tianchi National Park are as follows:

(1) Excavating mountains, quarrying, sand and earth cutting, mining, land reclamation, building tombs tombstones and other acts that can cause damage to the landscape, infrastructure, vegetation and landforms;

(2) Constructing facilities that are used for storage of explosive, flammable, radioactive, toxic and corrosive materials;

(3) Discharging and pouring out pollutants such as waste water and sludge into the water, or washing vessels or vehicles in the water;

(4) Felling trees, hunting wild animals and excavating wild herbs;

(5) Carving, engraving or scribbling on the facilities or scenic resources;

(6) Littering;

(7) Making a fire, smoking or using fireworks in the park;

(8) Burning incense or candles outside the designated place;

(9) Selling goods or providing services to tourists in a forceful or deceptive way;

(10) Establishing snacks and vendor stalls or expanding businesses without authorization;

(11) Misuse of tickets;

(12) Causing damage to the landscape and facilities and other acts that cause public disorder.

Article 26 The following activities in the Tianchi National Park shall be examined and verified

by the Tianchi Administrative commission and be submitted to concerned competent authorities for approval according to relevant laws and regulations:

(1) Changing the natural state of water resources or the water environment;

(2) Holding large-scale recreational activities and other activities;

(3) Setting and posting commercial advertisements;

(4) Producing films, television shows and commercials, etc.;

(5) Engaging in catering, transportation and other business activities;

(6) Carrying out scientific experiments, teaching practice, specimen collection and other activities;

(7) Mountaineering expeditions in the advantageous location;

(8) Other activities that impact the landscape and ecological system.

Article 27 Units and individuals entering into the Tianchi National Park shall take good care of scenic resources and public facilities, and shall maintain environmental health and public order.

Chapter 4 Supervision and Administration

Article 28 The Tianchi Administrative commission shall establish and improve the safety and security system, strengthen safety management and guarantee the safety of visitors. The commission shall develop contingency plans to respond to emergencies, and shall keep, safeguard and conduct supervision and management over the park.

Article 29 The Tianchi Administrative commission shall set up a standard logo and signs in the park and set safety, service and security warning signs around dangerous positions. The commission shall regularly carry out inspections and maintenance upon the transportation and sightseeing facilities.

Article 30 The Tianchi Administrative commission shall take special measures against fire and lightening jointly with relevant departments, improve fire prevention organizations and perfect fire-proofing facilities.

Article 31 The Tianchi Administrative commission shall strengthen the supervision and

management of public health and food safety in the park, set the necessary service facilities for health care, detection and quarantine and guarantee the public health and food safety in the park.

The Tianchi Administrative commission shall carry out safe disposal of sewage in the park, timely remove and transport construction and solid waste and maintain a good environment in the Tianchi National Park.

Article 32 The Tianchi Administrative commission shall designate commercial networks jointly with concerned departments according to the Landscape Planning of Tianshan Tianchi and the Detailed Plan.

Operators shall do business in accordance with laws and the business scope should be within the region of commercial networks that are designated by the committee.

Article 33 Vehicles that enter the park shall be steered on specified routes and be parked in designated locations, and overloading and speeding are prohibited.

Chapter 5 Legal Responsibility

Article 34 Anybody who contravenes the provisions of Article 5 shall be punished by the Tianchi Administrative commission according to law:

(1) Anyone who contravenes the 7th term or the 8th term of Article 5 shall be ordered to make corrections by the Tianchi Administrative commission and fines may be imposed from 200 yuan to 2, 000 yuan.

(2) Anyone who contravenes the 9th term or the 10th term of Article 5 shall be ordered to make corrections and the illegal incomes shall be confiscated by the Tianchi Administrative commission, with fines imposed from 200 yuan to 2, 000 yuan.

(3) Anyone who contravenes the 11th term of Article 5 shall be ordered to take a replacement ticket and fines may be be imposed of 1-3 times the price of the ticket.

(4) Anyone who contravenes the 1st-6th terms or the 20th term of Article 5 shall be dealt with according to the *Famous Scenery Spots Protection Regulation* by the State Council and concerned laws and regulations.

Article 35 Anybody who contravenes the provisions of Article 6 shall be punished by the Tianchi Administrative commission according to law:

(1) Anyone who contravenes the 4th term or the 5th term of Article 6 shall be ordered to make corrections and the illegal incomes shall be confiscated by the Tianchi Administrative commission, with fines imposed from 500 yuan to 3, 000 yuan.

(2) Anyone who contravenes the 6th term or the 7th term of Article 6 shall be ordered to make corrections by the Tianchi Administrative commission and fines may be imposed from 100 yuan to 1, 000 yuan.

(3) Anyone who contravenes the 1st-3rd terms or the 8th term of Article 6s hall be dealt with according to the *Regulations of the People's Republic of China Concerning Parks* by the State Council and concerned laws and regulations.

Article 36 Anyone who contravenes Article 33 shall be ordered to make corrections by the Tianchi Administrative commission, and if he refuses to make corrections, fines will be imposed from 50 yuan to 200 yuan.

Article 37 As for the administrative staffs of the Tianchi Administrative commission who are involved in abuse, dereliction of duty, corruption of authority or corruption, if the circumstances are not material enough to constitute a crime, administrative sanctions shall be imposed by the committee or the superior competent department; if the case constitutes a crime, the criminal responsibility shall be investigated according to law.

Article 38 Anybody who disobeys the provisions of this Regulation and infringes the public, collective or individual property, the concerned units or individuals shall bear civil liability; in the case when public security administrative punishment is merited, the punishment shall be given in accordance with the *Regulations on Administrative Penalties for Public Security*; if the case constitutes a crime, the criminal responsibility shall be investigated according to law.

Article 39 As for other violations of the provisions of this Regulation that should be penalized, punishment should be given by concerned competent authorities according to laws and regulations.

Chapter 6 Supplementary Provisions

Article 40 The *Regulation* should be implemented from May 1st, 2010.

6. Local Rules or Regulations in the Nominated Property of Xinjiang Tianshan

6.1 Conservation Tradition of Original Inhabitants

In the customs and cultures of local nomadic people and in their religious beliefs, nature is respected; the mountain forests and grasslands, and lakes and water resources are all protected. Nature includes gods that cannot be offended and, to ensure their own survival, nature is treasured and the environment is protected. For example, the traditional nomadic life of transhumance prevents overuse and degradation of the grasslands. During the transhumance, the temporarily inhabited locations are restored. Water is regarded as the source of all living things and it is considered that gods live in the water, so the water cannot be polluted: activities that can contaminate water such as hand-washing and doing laundry in the rivers and lakes have been prohibited. All these things are the embodiment of the environmental awareness of the original inhabitants.

6.2 Protection of Local Pledges

The long history and the original nomadic culture have resulted in the creation of the unique human landscape in the nominated property. In their nomadic daily lives, civil society groups have been in harmony with nature and agreed on the protection of the environment, such as in the creation of local rules or regulations:

(1) grass cannot be cut, flowers cannot be stepped on;

(2) grass cannot be pulled, hay cannot be burned;

(3) living trees cannot be cut down, tree branches cannot be folded during fruit picking;

(4) pregnant animals cannot be hunted, cubs cannot be killed;

(5) dirty water cannot be poured into the river, waste must be buried.

World Heritage Nomination

Natural Heritage·China

Xinjiang Tianshan

Appendix 10

Selected Publications on Xinjiang Tianshan

Ministry of Housing and Urban-Rural
Development of the People's Republic of China
2012.1

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The Fist Part: Full Text

Natural Heritage Value of Xinjiang Tianshan and Global Comparative Analysis

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Abstract: Xinjiang Tianshan is a serial natural property that has been nominated for World Heritage status. This paper presents a systematic comprehensive and comparative analysis of the heritage resources of Xinjiang Tianshan according to World Heritage criteria. The biological, ecological and aesthetic values of Xinjiang Tianshan, which are of global importance, are documented. It is concluded that Xinjiang Tianshan meets World Heritage criteria (vii) and (ix). Xinjiang Tianshan is compared with other mountain World Heritage sites, other mountains in Central Asia, the Tianshan Mountains outside of China and the protected areas of the Tianshan Mountains on the Tentative List of World Heritage sites to provide an objective basis for the application of Xinjiang Tianshan for World Heritage Status.

Key Words: Xinjiang Tianshan, heritage characteristics, heritage values, comparative analysis

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1. Introduction

Natural World Heritage is recognized globally as the pinnacle among natural protected areas in view of aesthetics, geo-science and bio-ecology and it is a preferred destination for the inter-continental travel and international tourists. As of 2011, there were 180 natural and 27 mixed World Heritage sites inscribed on the World Heritage List. The Tianshan Mountains lie in the hinterland of Eurasia and have the potential to be inscribed on the natural World Heritage List

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in the future (IUCN, 2004). However, as yet, there is no natural World Heritage site in this large area.

UNESCO defined aesthetic, geological, ecological and biological characteristics as four criteria for the evaluation of natural World Heritage nominations (UNESCO, 1972). CHEN Fubin *et al.* (2002) analyzed the world heritage value of panda habitat according to its biodiversity and as the important habitat for rare and endangered species. CAO Likun *et al.* (2003) examined the natural World Heritage values of the Three Parallel Rivers of Yunnan Protected Areas, considering their contribution to the understanding of the earth's evolution, important geological processes and natural landscapes. SONG Feng *et al.* (2009) discriminated several concepts under the principle of Integrity in the context of World Heritage, including integrity, trans-boundary properties, serial properties and property extension. XIONG Kangning *et al.* (2008), following a global comparative analysis of the natural heritage values of different kinds of South China Karst according to criterion viii, argued the outstanding global values of South China Karst. YANG Zhaoping *et al.* (2010) carried out a global comparative analysis of the aesthetic, ecological and biological values of Kanas natural heritage, based on which the criteria that Kanas natural heritage met was defined, arguing that Kanas meets natural World Heritage criteria. Thus, there are precedents to research of the type that is presented here.

2. Introduction to the study area and research methods

2.1 General introduction to the study area

The Tianshan mountain system is one of the seven large mountain systems in the world. The Tianshan mountain ranges extend across China, Kazakhstan, Kyrgyzstan and Uzbekistan, from the Xingxingxia Gobi desert in Hami of China in the east, to the Kyzyl-Kum Desert in Uzbekistan in the west. The east-west extension of the system is 2, 500 km. The average width of the mountains from north to south is 250~350 km, with the widest point more than 800 km. The Tianshan Mountains are surrounded by six deserts on three sides, including the Gurbantunggut Desert, the Atyrau Desert, the Moyinkumu Desert, the Karakum Desert, the Kyzyl-Kum Desert and the world's second largest mobile desert, the Taklamakan Desert. The Tianshan Mountains are the largest mountain ranges in the arid temperate zone.

The Tianshan Mountians are composed of a series of mountain ranges and inter-montane basins. According to zonal distribution, the mountain ranges can be divided into the East Tianshan Mountains in China and the West Tianshan Mountains in neighboring countries. Longitudinally, there are the South Tianshan Mountains, the Mid Tianshan Mountains and the North Tianshan Mountains. The length of the mountain ranges within China is 1, 760 km, accounting for more than two thirds of the total length. The mountain ranges within China are sublime and the average

elevation is over 4, 000 m (HU Ruji, 2004). The nominated property of Xinjiang Tianshan is made up of Tomur, Bogda, Bayinbluk and Karajun-Kuerdening, which are respectively located in the South Tianshan Mountains, the North Tianshan Mountains, the Uldus Basin which is the most typical down-faulted basin of the Tianshan as well as the Yili valley which is westward open (Fig.1). The nominated property covers unique geological and landform features, typical arid mountain ecosystems and peculiar landscapes features, thus, has great potential for successful application for natural World Heritage status. Such an application was initiated in 2009.

Fig.1 Distribution of protected areas in the Tianshan Mountains on the Tentative List of World Heritage sites*
*Data sources：http://whc.unesco.org/ , http://unep-wcmc.org/

2.2 Research methods

(1) Field investigation. After over 2 years' field investigation throughout the nominated property, in addition of historical data, the number of animal and plant species, vegetation types, rare and endanger species and natural landscape types have been studied with a comprehensive statistics result.

(2) Comprehensive analysis. The ecosystems, the vertical natural zones, biodiversity, and the natural landscapes and natural heritage features of the Xinjiang Tianshan were analyzed systematically.

(3) Geographical comparison. A comparative analysis was undertaken with other mountain World Heritage sites, other mountains in Central Asia, the Tianshan Mountains outside of China and the protected areas of the Tianshan Mountains on the Tentative List of World Heritage sites leading to the conclusion that the natural heritage values of the Xinjiang Tianshan are irreplaceable.

3. Features of Xinjiang Tianshan

3.1 Biological and ecological features

Xinjiang Tianshan is located in the biogeographic province of Pamir-Tianshan Highlands according to the Udvardy biogeographic regionalization (M D. F. Udvardy, 1975). It is a typical representative of the *Mountains of Central Asia*, one of Conservation International's (CI) 34 Global Biodiversity Hotspots, and the Centres of Plant Biodiversity defined by IUCN/WWF. Xinjiang Tianshan is also an important part of the *Middle Asian Montane Steppe and Woodlands* ecoregion of WWF Global 200 ecoregions, which typically represents *Tianshan montane conifer forests, Tianshan montane steppe and meadows,* and *Tianshan foothill arid steppe*. Besides, it is an important bird breeding ground in the *Taklimakan Desert Conservation Area,* which is among the 218 local bird sanctuary (EBAs) recognized by bird conservation organizations (BIC). The main ecological and biological features are as follows:

(1) Typical mountain ecosystem in the world's temperate arid zone

Xinjiang Tianshan is the only huge mountain range surrounded by two deserts in the world, that is, Two Deserts Embracing One Large Mountain. The special geographical pattern of one mountain surrounded by two deserts on the north and south, the geographical location giving rise to an inland, dry continental climate, and the mountain-basin topography make Xinjiang Tianshan unique among the world's mountain ecosystems. There are many glaciers and rivers in Xinjiang Tianshan, which constitute a huge water source in the desert areas and provided plentiful water resources for the development and evolution of mountain ecosystems. Xinjiang Tianshan covers 5 climate zones, including the warm temperate zone, temperate zone, cold temperate zone, frigid zone and permanent snow zone of extremely high mountain, and 4 different zones according to annual the precipitation; these are the wet, semi-wet, semi-arid and arid zones. Various combinations of heat and water have resulted in the development of diverse vegetation and abundant biological groups, eventually resulting in the formation of various mountain ecosystems in the desert areas. Xinjiang Tianshan includes 7 first level habitats of IUCN/SSC, mainly including forest, grassland, shrubby lands and wetlands, which can be divided into 22 second level habitats. There are 9 vegetation types in Xinjiang Tianshan, which can be subdivided into 25 vegetation sub-types and 82 groups, forming the most abundant area of diversity in the world's temperate arid region.

(2) Integrated mountain vertical natural zones

There are typical integrated montane vertical natural zones in Xinjiang Tianshan, and the nominated properties of Tomur and Bogda typically represent the vertical natural zones of the

warm-temperate arid region and that of the temperate mountains. The height difference of Tomur nominated property is about 6, 000 m, from 1, 450 m at the bottom to 7, 443 m on the top, in a horizontal distance of only 70 km. This area has an ice and permanent snow zone, alpine cushion vegetation belt, alpine meadow belt, sub-alpine meadow belt, montane steppe belt, temperate desert grassland belt and warm temperate desert zone from top to bottom (Climbing Scientific Expedition Team of Chinese Academy of Sciences, 1985) (Fig.2). In Bogda nominated property, the horizontal distance from the ice and permanent snow belt to the edge of desert belt is only 80 km, while the vertical difference is nearly 5, 000 m. The site includes an ice and permanent snow belt, alpine cushion vegetation belt, alpine meadow belt, sub-alpine meadow belt, montane forest belt and montane desert zone (Fig.3).

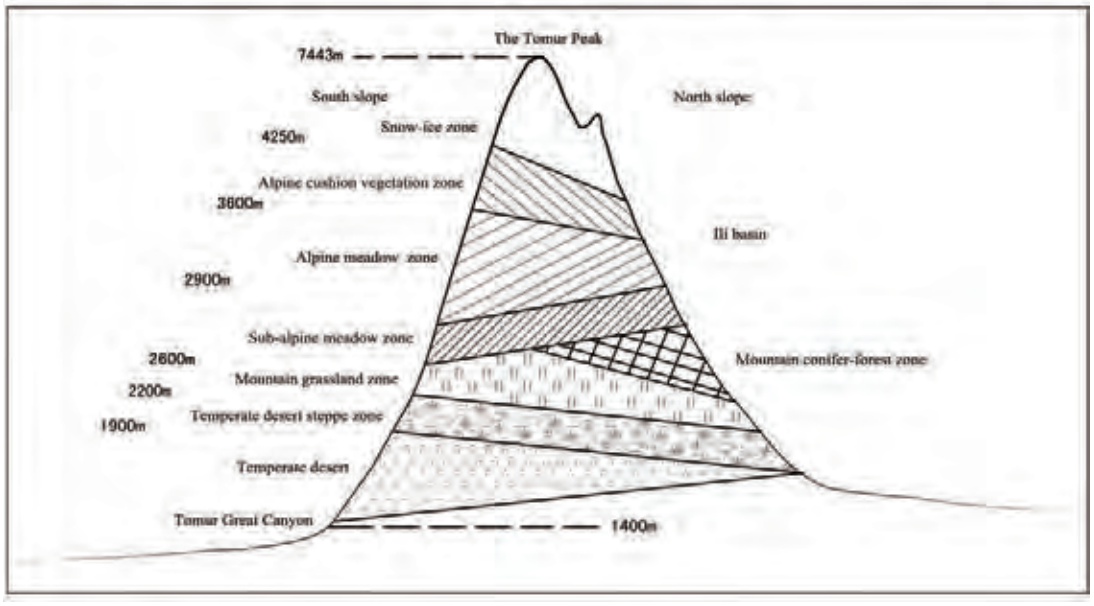

Fig.2 Vertical natural zones of the nominated site of Tomur

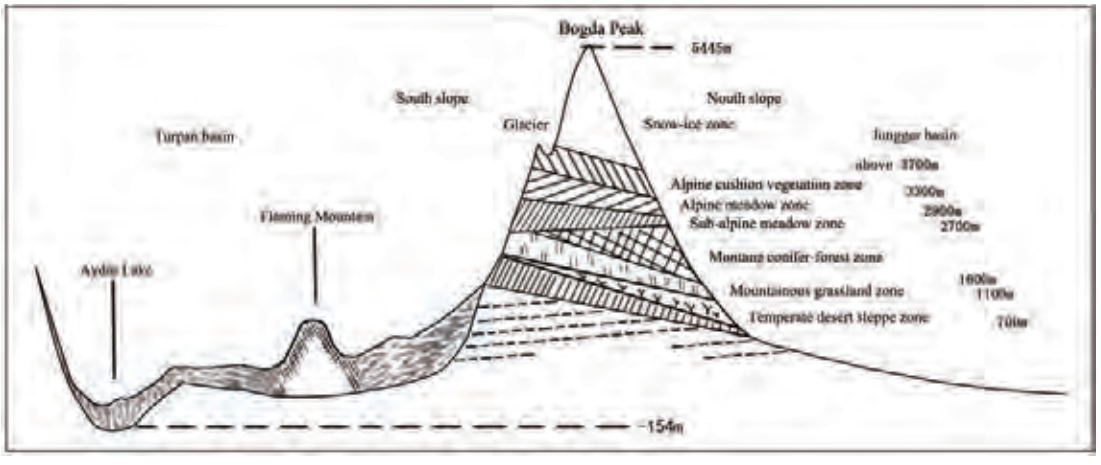

Fig.3 Vertical natural zones of the nominated site of Bogda

(3) Abundant biodiversity

Xinjiang Tianshan is an eco-region with relatively abundant species in the Pamir-Tianshan Highlands of the Udvardy Biogeographic Province. There are 106 families, 635 genera and 2, 622 species of wild vascular plants, and 36 orders, 90 families, 276 genera and 550 species of wild vertebrates, including 102 species of mammals, 370 species of birds, 32 species of reptiles, 6 species of amphibians and 40 species of fishes. There are 118 species of plants endemic to the Tianshan Mountains in the nominated property, accounting for 4.5% of the total wild vascular plants in the nominated property, and 65 species of animals endemic to the Tianshan Mountains, accounting for 11.82% of the total wild vertebrates.

(4) Important habitat for rare and endangered species

Xinjiang Tianshan was an important biological refuge in the hinterland of Eurasia during the Quaternary Ice Age. It hosts 110 species of rare and endangered wild plants. Of them, 18 species are on the IUCN Red List of Threatened Species (2010), and 16 species are protected under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 2010). There are about 430 species of rare and endangered wild animals, of which 414 are on the IUCN Red List of Threatened Species (2010) and 10 on the List of Appendix I, and 5 on the List of Appendix II of CITES (2010).

3.2 Natural landscape features

Xinjiang Tianshan is the most typical representative of integrated montane landscapes in the world's arid desert region. The outstanding landscapes include snow peaks and glaciers, rivers and meanders, alpine lakes and colorful meadows, forests and steppe, wetlands, red canyons and desert and Gobi. The main features of these landscapes are as follows:

(1) Magnificent size

Xinjiang Tianshan extends across 1, 760 m from east to west with a vertical difference of 7, 597 m. From Tomur Peak (7, 443 m) in the west part of the mountains to Bogda Peak (5, 445 m) in the east, a grand and graceful skyline is constituted, which lies in the expansive desert and forms one of the iconic landscapes of China. Xinjiang Tianshan is famous as *Mountains in the Paradise* in Chinese. The magnificent scale of its natural landscapes can be compared with any other great mountains in the world.

(2) Numerous landscape monomer

There are numerous types of landscape monomer of high quality in Xinjiang Tianshan. Around the Tomur-Khan Tengiri mountain knot, there is concentration of majestic high peaks and grand glaciers. The Tomur Great Canyon boasts various typical landscape including steep and precipitous cliffs and other profiling which looks like old castle and labyrinth, joss and towers and fleet of sailing boats. The animal-shaped landscape in the Tomur Great Canyon is vivid and changeable going with your eyesight, which forms hundreds of groups of natural wonders and fully represents the beauty of red-layered canyon. There are groups of small and large lakes spotted throughout the Bayinbluk wetland with rivers winding through the lakes, which shows the graceful shape of the lakes and rivers. In Karajun, forests and meadows grow alternating with one another and the picturesque landscape fully reflects the beautiful colors of the flowery grassland.

(3) Variety of types

There are abundant landscape resources in Xinjiang Tianshan, covering snow peaks, glaciers, meadows, forests, steppes, rivers and lakes, red canyons and also expansive Gobi and vast deserts, which form globally distinctive landscape patterns. This is the unique all over the world.

(4) Abundant combinations

Xinjiang Tianshan possesses intact vertical vegetation belts on a large scale, including glaciers and snow peaks, alpine meadows, sub-alpine meadows, cypress brush, spruce forests, mixed conifer and broadleaved forests, wild fruit forests, valley forests, brush and desert grassland which together form the perfect landscape combination. The landscape are obviously different on a medium scale, with snow peaks and canyon, meadows and forests, forests and steppes, grasslands and brush, brush and desert interspersed, giving rise to a mix colors with white snow peaks and glaciers, colorful meadows, green forests and red canyons, forming an intricate mosaic of many hues. The distribution of forests and meadows depending on micro-relief and, seasonal changes and meteorological phenomena enrich the views. A wide variety of landscapes' combination is present on a small scale, which forms an elegant and exquisite picture. Such a rich assemblage and combination of nature is scarce in other places in the world, making Xinjiang Tianshan one of the symbolic landscapes of China.

(5) Strong contrasts

Because of the orientation of the mountains and the direction of the monsoon, the north slope of Xinjiang Tianshan is relatively wet and the south slope is relatively dry. The landscapes on the north and south slope are completely different; for example, the forests on the north slope of Xinjiang Tianshan appear as belts, while on the south slope they are distributed as plots. Besides,

the landscapes western and eastern parts are obviously different. The Yili valley in the west is the wettest region in the Tianshan Mountains, with a lower forest line of 1, 100 m, whereas the forest line in the east rises to more than 2, 000m. The relief of Xinjiang Tianshan is more than 4, 000 m, and complete vertical montane natural landscape belts have formed. The landscapes on the north slope of Xinjiang Tianshan are elegant, while that on the south slope is desert; the climate in the west part is wet, while that in the east part is dry. The large difference between the geographical features of the cold high mountains and hot deserts forms globally peculiar integrated montane natural beauty in the world's arid region.

4. Natural heritage values

Xinjiang Tianshan is a composite of unique physical geographical features and outstanding natural environment of the Tinashan Mountains, including geological features and landforms, biodiversity, biological evolution and natural landscapes. The nominated property represents the values of aesthetics, biology and ecology of the temperate arid mountains.

4.1 Aesthetic values

Xinjiang Tianshan shows the most typical montane integrated landscapes in the world's arid regions as it is in the hinterland of Central Asia, far away from the oceans and surrounded by expensive deserts. Trending in an east-west direction, the Tianshan Mountains lie to the south of Guerbantonggute Desert and on the north of Taklimakan Desert, forming a unique natural landscape with one mountain system surrounded by two huge deserts. From Tomur Peak (7, 443 m) in the west to Bogda peak (5, 445 m) in the east, Xinjiang Tianshan forms a graceful skyline in the Central Asia deserts. The natural landscape of Xinjiang Tianshan are featured by numerous number of landscape monomer of high quality, various types of landscape, changeable and abundant combination and strong contrast between different types of landscape. The beauty of Xinjiang Tianshan not only lies in its abundant landscape elements, like grand snow peaks, elegant forests and meadows, clear rivers and lakes, and grand red canyons, but also in the unique landscapes and natural beauty resulting from its special location in the expansive deserts. The huge contrast of the desert rocks on the south slope and the verdant forests and meadows is impressive, as few places in the world combine this kind of huge difference so markedly, such as extreme hot and cold, dry and wet, desert and greenery, the grand and the graceful. The Tianshan Mountains are not only the mountains that reach above the sky in China and Central Asia, but also provide a green passage for Silk Road. Since ancient times, many myths and legends, poems and songs, and music and drawings have shown people's great admiration for the Tianshan Mountains. Up to now, Xinjiang Tianshan is still one of the most iconic landscapes in China.

4.2 Biological and ecological values

Xinjiang Tianshan is the outstanding representative of the spatial distribution and evolutionary laws of montane ecosystems, and the ecological and physiological processes of the evolution and development of biological populations in the Pamir-Tianshan Highlands, as defined by Udvardy.

As the typical representative, Xinjiang Tianshan shows the integrated properties of huge mountain ecosystems in the world's temperate arid region, encompassing intact mountain vertical natural belts in a temperate arid region. It is an outstanding representative of montane ecosystems globally, including glacier, rivers and lakes, forests, steppe, oases and deserts, which present the processes of formation of vertical natural belts in warm temperate and temperate arid mountains and fault valleys inside the Tianshan Mountains. Furthermore, Xinjiang Tianshan exhibits the distribution of features and principles of evolution of montane biodiversity in the temperate arid region under the effects of the spatial variability of water resources and heat according to elevation, slope and aspect of the mountains.

The modern biota, geographical elements and the phenotype and physiological features of Xinjiang Tianshan typically represent the ecological processes of climate change from hot and wet to warm and wet and, finally, to cold and dry because of the mountain uplift, glacial retreat and the westwards shrinkage of the ancient Mediterranean sea. It also outstandingly represents the evolutionary processes of the vegetation from tropical forests to sub-tropical forests and, finally, grasslands and, even more outstandingly, it represents the evolutionary biological processes by which the original warm and wet biota were replaced by modern dry Mediterranean biota.

5. Comparative analysis of the heritage values

5.1 Contrast with mountain World Heritage sites

As to mountain World Heritage sites elsewhere, Xinjiang Tianshan is a huge mountain heritage system and other small mount World Heritage sites cannot compare with it. Among large mountain World Heritage sites on the World Heritage List, Xinjiang Tianshan lies in the temperate dry desert zone in the hinterland of Eurasia, which is completely different from mountains that lie in a frigid, sub-tropical or tropical region when considering their general physical geographical features, biodiversity, ecosystems and natural landscapes and, thus, it is incomparable. Xinjiang Tianshan meets criteria (vii) and (ix) according to the criteria of World Heritage, and is incomparable with mountain World Heritage sites that have been nominated based on other criteria. After primary selection, there are 18 mountain World Heritage sites that can compared with Xinjiang Tianshan (Table 1).

Compared with these 18 mountain World Heritage sites, Xinjiang Tianshan has the largest

vertical difference, and is the only property with temperate desert at the base. Xinjiang Tianshan has intact montane vertical natural belts and abundant landscape resources, combining unique physical geographical features that display the huge differences of mountains in the temperate arid region; for example, desert landscape on the south slope and verdant forested landscapes on the north slope, wet landscapes in the west part and dry landscapes in the east, and cold high mountains and hot desert, which is globally distinctive and exclusive in the world.

According to Udvardy's Biogeographical Provinces, Xinjiang Tianshan is in the biogeographical province of Pamir-Tianshan Highlands of the Palaearctic. The biogeographical provinces represent different ecological process and biodiversity features, which are irreplaceable and cannot be compared one with another. Besides, the unique ecosystem developed in Xinjiang Tianshan, dominated by conifer forests, montane forests in the Tianshan Mountains and dry grasslands in the piedmont of the Tianshan Mountains, is irreplaceable.

Table 1 Eighteen mountain World Heritage sites compared with Xinjiang Tianshan

No.	Property	Criteria met	Main aesthetic and biological and ecological features
1	Los Glaciares	(vii)(viii)	The beauty of this property is outstanding, with mountains overlapping each other and glaciers and lakes distributed randomly among them. The Argentina Lake is also located in this area with a length of 160 km.
2	Nahanni National Park	(vii)(viii)	The national park lies in the drainage area of the Nahanni River. There are canyons, waterfalls and unique limestone caves and many other special geological landforms.
3	Canadian Rocky Mountain Parks	(vii)(viii)	In the parks, rugged mountain peaks, glacial fields, glaciers, alpine meadows, lakes, waterfalls, expansive karst caves and deep valleys are interlaced.
4	Kluane/Wrangell-St Elias/ Glacier Bay/Tatshenshini-Alsek	vii)(viii) (ix)(x)	The park shows extraordinarily wonderful natural landscapes and unique natural beauty, and it covers the largest area of non-polar glaciers in the world, including over 350 valley glaciers and about wave glaciers. This region is the most active area of earthquakes in North America.
5	Waterton Glacier International Peace Park	(vii)(ix)	The two parks present grand natural landscapes, which cover the watershed dividing three oceans. This region is the transition area of montane and steppe communities, and also plays an important part in the mingling of the gene pool in the south and north parts of the Rocky Mountains. The region is an important passage for transnational migration of wildlife and genes.
6	Nanda Devi & Valley of Flowers National Parks	(vii)(x)	The Valley of Flowers National Park lies in a valley of the Himalayan Mountains with unique landscapes, alpine meadows with many kinds of flowers and the original mountain landscapes complement each other. Nanda Devi National Park is maintained well and is an important habitat for some rare and endangered mammals.

7	Sagarmatha National Park	(vii)	Various mountains, glacial rivers and valleys are distributed throughout the area and Everest is the dominant peak (8, 848 m).
8	Virgin Komi Forests	(vii)(ix)	Virgin Komi Forests lies in the permafrost region in the Ural Mountains. With an area of 3, 280, 000 hectares, it is the largest area of virgin forests in Europe. The region provides information for the effects of the natural development of taiga forests on biodiversity.
9	Lake Baikal	(vii)(viii) (ix)(x)	Lake Baikal is the oldest and deepest lake in the world. The lake itself and the basin where the lake is located are both extremely beautiful. Geological movements of Lake Baikal still occur. Besides, Lake Baikal has outstanding abundant biodiversity.
10	Golden Mountains of Altai	(x)	The Altai region is an important centre of biodiversity, where many rare and endemic species have been nurtured.
11	Western Caucasus	(ix)(x)	Since the last glaciation, ecological succession in the region has resulted in abundant biodiversity.
12	Jungfrau-Aletsch-Bietschhorn	(vii) (viii)(ix)	The grand view of the North Wall of Jungfrau, Monch and Eiger are impressive in the north of the High Alps, while mountains, river valleys and two glaciers constitute the natural beauty of the south part of the High Alps. In the alpine and subalpine regions, the diverse ecosystems have not suffered from human occupation, and great examples of the affects of global climate change can be found in this area.
13	Yellowstone National Park	(vii)(viii) (ix)(x)	The uniqueness of the Yellowstone National Park lies in the fact that it covers the largest hot springs, grand canyon, waterfalls, and large-scale wildlife communities, and is a huge intact ecosystem in the temperate zone in the Northern Hemisphere.
14	Grand Canyon National Park	(vii)(viii) (ix)(x)	The park is famous for its spectacular grand canyon, a twisting many-coloured gorge. Typical natural landscapes include plateau, plain, desert, volcanic hills, magma, streams, waterfalls and the famous White River. Because of the different depths carved by rivers, various ecological environments have developed at different heights, which represent five kinds of ecosystems in the seven ecological cycles in North America.
15	Olympic National Park	(vii)(ix)	The Park is composed of temperate rainforest, alpine meadow and snow peaks lying along the ocean. Inside the park, there is the largest temperate rainforest in the world. The various topographical landforms from coast to glaciers, and various vegetation belts affected by rich precipitation, form one of the most important habitats for diverse species along the Pacific Ocean. Rainforests along the coast are the most verdant and may have the largest biomass world-wide.
16	Great Smoky Mountains National Park	(vii)(viii) (ix)(x)	Natural landscapes of this park are unique. Mountains are wreathed by mists that spread over virgin forests. Furthermore, the park is one of the distribution regions of Tertiary relic plants, and its relative large area makes it an outstanding example of the evolution of biota in such an ecosystem.

17	Three Parallel Rivers of Yunnan Protected Areas	(vii)(viii) (ix)(x)	Valleys are the main landscape in this region, and high mountains separate them, of which Mili Xueshan, Baimang Xueshan and Haba Xueshan present the grandest views. Under the combined effects of geology, climate and topography, the region has been experiencing distinct ecological processes, which provide favorable condition for the evolution of high biodiversity and benefit the development of temperate biological communities in the Palearctic Realm.
18	Uvs Nuur Basin	(ix)(x)	The closed salt lake system of Uvs Nuur Lake is of great importance for international research in the natural sciences because of its special climate and hydrological systems.

5.2 Contrast with other mountains in Central Asia

(1) Pamir

The natural landscapes of Pamir give rise to impressive views of landforms and the most striking features are the expansive plateau in the eastern part and the high mountains with deeply-carved valleys in the west. Because of the much more abundant precipitation, there are more diverse plants in Xinjiang Tianshan where the intact montane vertical natural belts have been more fully developed. The plateau landscapes of Pamir and these vertical natural belts are not comparable.

In the region of *Middle Asian Montane Steppe and Woodlands* of the Global 200 Ecoregion, the ecoregions in Xinjiang Tianshan are *Tianshan montane conifer forests*, *Tianshan montane steppe and meadows*, and *Tianshan foothill arid steppe*, while the Pamir Plateau belongs to the *Pamir alpine desert and tundra* ecoregion (IUCN, 2005). The two regions belong to different ecoregions and, thus, have different biological communities and corresponding ecological processes.

(2) Altai Mountains

The average height of the Altai Mountains is much below that of Xinjiang Tianshan. It also has smoother slopes and fewer glaciers compared with Xinjiang Tianshan, which is grander. On the south slope of the Altai Mountains, intact vertical natural belts are also developed, but the forests are dominant by mixed forests of Siberian Spruce, Swedish Birch, Siberian Larch and juniper, while the forests of Xinjiang Tianshan are dominated by snow spruce. The two forest landscapes cannot be replaced by each other.

According to the Unified System of Natural Regions of Land and Freshwater Lakes of the World for the Purpose of Conservation (Udvardy, 1975), the Altai Mountains lie in the Palaearctic

Realm of the 8 biological realms, located in the Altai Highlands of the 193 biological provinces and belong to the mixed mountain system. Among the WWF Global 200 ecoregions, the Altai Mountains lie in the ecoregion of *Altai-Sayan Montane Forests*, including *Altai montane forest and forest steppe, Altai alpine meadow and tundra,* while Xinjiang Tianshan is located in the ecoregion of *Middle Asian Montane Steppe and Woodlands.* The Altai Mountains and Xinjiang Tianshan are located in different biological provinces and ecoregions of WWF Global 200 and have completely different patterns of biodiversity and ecological processes, and thus cannot be compared.

(3) Karakoram Range and the Kunlun Mountains

The vertical vegetation belts of the Karakoram Range are xerophil, dominant by montane grasslands and lack sub-alpine forests and meadows. The vertical belts, from top to bottom, are an ice and permanent snow zone, alpine brush, meadow belt, sub-alpine steppe belt, montane steppe belt, and montane desert belt, all of which are typical alpine desert landscapes. The vertical vegetation belts of the Kunlun Mountains are xerophilous vegetation types and they have been intensely desertified. The vertical natural landscapes, from top to bottom, are cold alpine desert, alpine brush, meadows, sub-alpine steppe, montane desert grasslands and montane deserts, which are also desert grassland landscapes. The vertical vegetation belts of Xinjiang Tianshan are more inclined to be mesophytic with montane forests and meadows developed relatively well. The vertical natural landscapes of Xinjiang Tianshan are completely different from those of the Karakoram Range and Kunlun Mountains.

According to the Unified System of Natural Regions of Land and Freshwater Lakes of the World for the Purpose of Conservation (Udvardy, 1975), both the Karakoram Range and Kunlun Mountains lie in the Palaearctic Realm of the 8 biogeographical realms and, on a small scale, belong to the Tibetan of the 193 biogeographical provinces, and the cold-winter deserts and semi-deserts of the 14 biological regions. The two regions are in different biogeographical provinces from Xinjiang Tianshan, and are incomparable with each other.

5.3 Contrasts with the protected areas in the Tianshan Mountains on the Tentative List of World Heritage that are outside China

There is no natural property on the World Heritage List in the Tianshan Mountains so far. However, there are 5 protected areas in the countries that border on Xinjiang Tianshan have been on the Tentative List of World Heritage since 2010. There is similarity or resemblance on the vegetation types and altitudinal natural belts between Xinjiang Tianshan and the 5 above-mentioned protected areas abroad. As for the 5 protected areas abroad, their advantage focuses on abundant rare and endangered species as well as numerous endemic species, while in comparison with these 5 protected areas, Xinjiang Tianshan has the highest peaks of the Tianshan Mountains

and has vast vertical space for the altitudinal natural belts and Tianshan montane ecosystems to develop as well as displaying the integrity of these natural belts and ecosystems of the mountains in arid zone. Thus, Xinjiang Tianshan outstandingly represents the biological evolution, in space, of the Pamir-Tianshan Highlands bio-geographical province.

There is great altitudinal difference in Xinjiang Tianshan nominated property, as well as great difference between the south and north slopes and between the east and west parts of the mountains, which provides enough space for the coming of variety of beautiful landscape. Thus, Xinjiang Tianshan nominated property is the region where the landscape monomer is the most abundant, and types of landscape are the most numerous and the combination of landscape is the best in the Tianshan Mountains. In view of the variance of landscape, complete in landscape, continuity and succession of landscape as well as wholeness of landscape, Xinjiang Tianshan nominated property is incomparable in the whole Tianshan Mountains.

Table 2 5 Protected areas in the Tianshan Mountains on the Tentative List of World Heritage

Property	Nation	Criteria met	Main biological and ecological features	Main aesthetic features
Western Tien-Shan	Kyrghyzstan	(vii)(viii) (ix)(x)	There are 7 vertical natural zones, with forests, sub-alpine meadows and alpine meadows dominant. There are 676 species of high plants and 204 species of vertebrates.	The main landscapes include grasslands, forests, meadows, snow peaks, waterfalls, valleys and streams. Valley landforms are well developed with cliffs interspersed with basins.
Western Tien-Shan	Kazakhstan	(vii)(viii) (ix)(x)	The vertical natural zones in this region including five belts: desert, true prairie, larch forests, alpine meadows and ice and permanent snow belts. There are 2, 000 species of high plants and 293 species of vertebrates.	Typical vertical natural landscapes of mountains in the desert areas.
Northern Tyan-Shan	Kazakhstan	(x)	The vertical natural zones in this region including four belts: low-mountain desert zone, alpine steppe zone, sub-alpine steppe zone and alpine meadow zone. There are 1, 200 species of high plants and 215 species of vertebrates.	The natural beauty is mainly composed of montane steppes, forests and plains on the front of the mountains.
"Altyn-Emel" National Park	Kazakhstan	(vii) (viii)(ix)	The forests are widely spread. There are 634 species of high plants and 282 species of vertebrates.	Vegetation is greatly affected by the warm and wet currents from the Atlantic.
Mountains of the Western Tien Shan	Uzbekistan	(viii)(x)	There are three vertical natural zones, including montane steppes, mixed forests of larches and conifers and alpine meadows. There are 1, 186 species of high plants and 292 species of vertebrates.	The main natural beauty can be found in the mixed forests of wild fruit and meadows.

*Data sources: http://whc.unesco.org/en/tentativelists/

In conclusion, the global uniqueness of Xinjiang Tianshan is as follows:

(1) The Tianshan Mountain Range is the largest latitudinal mountain range worldwide, and Xinjiang Tianshan is the only huge mountain range in the world that is surrounded by two large deserts. This special geographical pattern is unique in the world.

(2) The huge vertical difference in Xinjiang Tianshan nominated peoperty is 6, 063 m. When combined with the extremely different physical geographical features, this outstanding example of the integrated mountain natural beauty of the temperate arid desert regions is incomparable.

(3) Xinjiang Tianshan is the most outstanding representatives of the biological and ecological processes in the Pamir-Tianshan Highlands biogeographical province.

(4) Xinjiang Tianshan is the most typical representative of mountain ecosystems in the temperate arid desert regions.

(5) Xinjiang Tianshan is an outstanding example of the succession of the biological communities of the mountain ecosystems in arid regions under the effects of global climate change.

(6) Xinjiang Tianshan presents the most typical and intact montane vertical natural zones in a short horizontal distance in the temperate arid region, which is unique worldwide.

6. Conclusions and discussion

According to the analysis of the natural heritage features and heritage values and a global comparative analysis, using a comprehensive analysis of the region's attributes and geographical comparison, Xinjiang Tianshan meets criteria (vii) and (ix) of the natural World Heritage.

(1) Criterion (vii): contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance. Xinjiang Tianshan is the typical representative of the integrated mountain natural beauty in the temperate arid regions, and has remarkable landscape diversity and spectacular natural beauty.

(2) Criterion (ix): be outstanding examples, representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals. Xinjiang Tianshan is the most typical representative of the mountain ecosystems in the temperate arid desert regions,

and has intact vertical natural zones in an arid region, so it is an outstanding example of the biological succession of communities in mountain ecosystems in the arid regions in the context of global climate change. Xinjiang Tianshan is the outstanding representative of the biological and ecological processes of the Pamir-Tianshan Highlands biogeographical province. Xinjiang Tianshan also possesses abundant species, so it is significant habitat for many rare, endangered and endemic species.

In conclusion, Xinjiang Tianshan has Outstanding Universal Values aesthetically, biologically and ecologically.

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The Heritage Value of Mountain Vertical Zonation in Temperate Desert Region of China

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Abstract: Mountains around the Junggar basin in Xinjiang possess the most integrated vertical zones in the temperate desert regions in the world, including the deserts, steppes, forests, alpine shrubs, meadows, tundra, periglacial scattered vegetation, modern glaciers, lakes and wetlands. This is a unique natural area with a predominant example of biome evolution process and the habitats of rare and endangered species of worldly value, fully according with the criteria of world natural heritage site. In addition, this desert region also possesses the rich and unique flora of plants and animals, distinctive scenic spots of lakes groups and modern glaciers, abundant and distinctive biological gene resources, and unique multinational culture and religion. In order to make this area into the list of World Cultural and Natural Heritage, it is suggested to improve the official hierarchy for applying heritage, management of related nature reserves, and comanaging hierarchy of Bogda Biosphere Reserve and Kanas Nature Reserve, develop a series of industries related to biodiversity based on the local conditions, intensify the science research on this area, and strengthen the propaganda to the local residents and tourists about how to conserve the heritage.

Key words; world heritage; natural heritage site; vertical zonation; biodiversity; cultural diversity; landscape diversity.

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2008 is the 30th year for World Cultural and Natural Heritage Convention entered into force. Xinjiang set up leading group of inscription for World Heritage and its office following after many provinces, with aims to discover its varous unique natural and cultural areas, play their roles in the construction of ecological civilization and new socialist countryside, and contribute to the maintenance of regional ecological safety, prosperity of the local economy and improvement of local people's living level. Some essences can be for the inscription for the World Heritage List to be showed to the world public. Three alpine lakes such as Kanas Lake, Tianchi Lake and Sayram Lake are recommended as the first to apply for the World Natural Heritage. There is no doubt that these regions have unique features and are in accordance with the basic needs of Natural Heritage. Although, the heritage value of Kanas Lake has been analyzed1, a wider

Chinese temperate desert region needs to be covered. In order to better show its essence, and attract people's more attention, this article elaborated the region's heritage value, and how to make the temperate desert region enter the World Cultural and Natural Heritage List in a faster and better way, to better protect the heritage and develop the regional economy.

1. Basic features of the temperate desert region in China

1.1 Horizontal zonality

Chinese temperate desert region was divided into the Western Desert (West of the Central Asia) and Eastern Desert (Central Asia). The former is mainly located in the Junggar basin, to the south, it reaches northern Tianshan Mountains, to the east , it reaches east edge of Gurbantunggut Desert, to the north, it reaches Taerbahatai Mountain west of Junggar and southern highlands of West Altay Mountains at the west of Saur. The latter includes southern Xinjiang south of watershed of Tianshan Mountains, eastern Xinjiang, Hexi Corridor in Gansu province, Alashan plateau in between Beishan Gobi and Gansu, Ningxia, Inner Mongolia, with its south border at the norther edge of Loess Plateau and east border at western Erdos Tableland.

The western desert subregion climate is characterized by westerly jet control, its water vapor is from the west, the annual average temperature is 6~10℃, in the coldest month (January), the average temperature is -10~-20℃, in the hottest month (July), the average temperature is 24~27℃, the absolute minimum temperatures can reach -42℃, the absolute maximum temperature is 40~42℃, frost-free period is 140-190 D, and ≥1 0℃ annual accumulated temperature is of 3100~3900℃. Annual sunshine hour is of 2800~3100 h, with sufficient heat supply for plant growth, but the low temperature in winter is a restricted factor for the perennial plant in warm temperate region. Annual precipitation is 100~200 mm usually, and the winter and spring precipitation accounts for about 45%. Featured with the western central Asia-Kazakhstan desert climate, the dryness is generally 4~6, and Ebinur Lake is in rain shadow region of western mountain and becomes the drought core in where it is located with a dryness of 9. Higher plants known now is about 500 species in this sub region with Chenopodiaceae Plants as the major one, the composite family, Cruciferae, Tamaricaceae, and Ji of Chenopodiaceae as supplemently ones, which are basically the ancient Mediterranean components. According to the preliminary statistics, Western Central Asia components account for 53%, Central Asia components account for 36%, and Mediterranean components account for 11%, which shows it is a transition region in between desert in central part of Asia to Central Asia desert. Zonal vegetation includes small subtrees desert and half shrub desert, with *Haloxylon ammodendron, Haloxylon persicum, Seriphidium borotalense, Seriphidium kaschgaricum, Seriphidium santolinum, Artemisia arenaria, Seriphidium terrae-albae* as the maior and *Anabasis salsa, Salsola laricifolia, Calligonum aphytlum, Calligonum leucocladum, Calligonum rubicundum,*

Reaumuria soongorica, Ceratoides latens being popular. Spring rain typed ephemeral plant *andanalogous* ephemeral plant layer often appear in the communities. The mountain has a complete vegetation vertical zone distribution.

The eastern desert sub-region is under the control or strongly influence of northwest wind of Mongolia high pressure anticyclone, climate is more arid than the western part, and it is a typical Central Asian temperate desert climate featured with violent cold and heat change and strong wind and much sand. The annual average temperature is of 7.4~8.8 ℃, in the coldest month (January) the average temperature is -1 0~-13℃, in the hottest month(July), the average temperature is of 22~26℃, and ≥1 0℃ annual accumulated temperature is of 3100~3600℃, frost-free period is of 130~160 d, annual rainfall is of 40~150 mm, descending from southeast to northwest, which is 200mm in the southeast due to southeast monsoon of the ocean, with more than 70% concentrated in from July to September, winter-spring snow understood, dryness in 4~16, from the southeast to the Northwest enhancement. The core of flora is central Asia component, accounting for more than 70%, greatly different from the western desert sub-region. Zonal vegetation type includes super xerophytic shrubs, subshrub, desert and super xerophytic small subtrees, and shrub sand desert with *reamuria songarica* to occupy main position, *Salsola passerina, Mtraria sphaerocarpa, ephedra przewalskii, Zygophyllum xanthoxylon, Cymnocar posprzewalskii, Convolvulus tragacanthoides* are also common. Almost no spring rain typed ephemeral plant appears in the community, summer rain typed annual herbaceous plants are popular. Mountain vegetation vertical distribution is not complete, subalpine forest only appears in some parts.

1.2 Vertical zonality

Temperate desert region of China has a series of huge mountains, including Tianshan Mountains, Altay Mountains, Kunlun Mountains, Qilian Mountains and the Altun Mountains. Along with the altitude elevation, a series of vertical distribution of vegetation are formed, which are roughly the following 3 kinds;

(1) There are strongly mesophytic vegetation vertical zone featured with developed mountain forest and meadow zone including mountain desert zone-mountain steppezone and mountain deciduous broad-leaved forest-subalpine forest and meadow zone-alpine bush and meadow zone-alpine sparse vegetation zone at glacier edge or alpine tundra zone-alpine glacier zone, such as north slope of Tianshan Mountains, Tianshan in Ili, south slope of Altay Mountains, eastern Qilian Mountains, etc, with a complete vegetation vertical zone and complicate structure of zonality.

(2) There are xerophilous vegetation vertical zone featured with mountain steppezone and lack of subalpine forest and meadow zone, including mountain desert zone-mountain steppezone

(patches of forests dotted here in this zone)-subalpine grassland zone-alpine bush and meadow zone- alpine glacier zone, which can be mostly found in the leeward slope, rain shadow belt and inner part of mountains, such as the southern slope of Tianshan Mountains, west Kunlun Mountains, west Qilian Mountains, etc.

(3) There are super xeromorphic vegetation vertical zone) strongly desertificated, including mountain desert zone- mountain desert steppe zone- subalpine grassland zone-alpine bush and meadow zone-alpine frigid desert zone such as middle Kunlun Mountains, east Kunlun Mountains and Altun Mountains[2] [3].

1.3 Name and area which are to apply for the Natural World Heritage

To sum up, the Junggar basin, the western desert subregion (west subregion of Central Asia desert), own the most complete mountain vertical zone and belongs to the first type, and we can make choice of some regions in northern slope of Tianshan Mountains and the south slope of Altay Mountains together to be declared. They are as follows;

1.3.1 Complete vegetation vertical zone on the northern slope of Tianshan Mountains

Northern slope of Tianshan Mountains is a reflection of the most complete mountain vertical zone, the vertical zone schema is a representative. Mountain desert belt occupies the altitude of 800 ~ 1100 m, where are short lifed and analogous short lifed plants of Artemisia desert such as *Seriphidium borotalense, s. kaschgaricum, Kochia prostrata, Poa bulbosa var. vivipar, Alyssum desertorum, Tulipa iliensis, Gagea bulbifera,* etc. mountain steppeoccupies the altitude of 1100 ~ 1500 m (1600m) with mountain desert steppe at the altitude of 1100 ~ 1300 m where are *Stipa capillata, Seriphidium borotalense, Allium polyrrhizum, Anabasis brevifolia* and mountain typical steppe subzone where *Stipa, Festuca sulcata,* some xerophilous or meso xeric or mesophytes forbs and meadow steppe in some wet gentle slope. There is no mountain deciduous broad-leaved forest, but Tianshan Mountains in Ili have such forest due to its altitude, and the biological factors such as abundant precipitation, remarkable inversion layer in winter, as well as terrain conditions from cold invasion, etc. You can find Malus sieversii, Armeniaca vulgaris, Prunus sogdiana, Fraxinus sogdiana, Acerse menovii, J uglans regia, etc. here. In the sunny slope you can find the ancient tropical ones such as Bothriochloa ischaemum grassland, which is unique here. At altitude of 1500 (1600 m)~2800m is subalpine forest zone where *Picea schrenkiana* forest can be found, with some *Populus tremual, Betula tianschanica, Betula microphylla, Populus talassica* , etc. dotted； there are meadow in the gentle slope in beween the forests where Geraniu albiflorum. Alchemilla vulgaris, Polygonum viviparum, Alopecurus pratensis are popular with some meso xeric plants such as Helictotrichon tianschanicum, Anthoxanthum odoratum, Stipa kirghisorum, etc； On the sunny slope, there are some patches of cushion of Sabina zaidamense. In Bole and Jinghe in the west, there are

greatly developed mountain steppewith a distribution line reaching above 1500m, for example, altitude of the mountains sourrounding Sayram lake can reach 2000m, Picea schrenkiana forest will live together with Sabina pseudosabina and grassland communities to form subalpine forest and grassland zone. At the altitude of 2800~3600 m, is alpine bush and meadow zone where *kobresia capillifolia, Carex stenocarpa , Polygonum viviparum, Papaver nudicaule, Leontopodium ochroleucum, Aster alpinus, Saxifraga hirculus, Potentilla vernosa,* etc can be found. At the altitude of 3600~3900m (4000m) below the snow line, there are gravel beach or debris slope where plants can not live in a harsh condition to form a sparse distribution pattern which is called alpine sparse vegetation zone on the edge of glaciers. Some grasses such as *Saussurea involucrata, Archangelica brevicaulis, Geranium saxatile, Callianthemum ahavicum, Polygonum alpinum, Valeriana fedtschenkoi,* big flower *Saxifrage, Thylacospermun caespitosum, Sibbaldia tetrandra, Potentilla biflora,* etc can be found.

At elevation above 4000 m, is alpine glacier zone. So, put Bogda Biosphere Reserve in Fukang County, West Tianshan Mountain National Reserve and wild walnut provincial reserve of Gongliu County, and Sayram Lake National Park (National Wetland Park) together, the vertical zone and rich biodiversity mentioned above can be reflected.

1.3.2 Obvious vertical vegetation zone of the south slope of Altay

The southern slope of the Taishan and the northern slope of Altay Mountains are of roughly similar in terms of vertical vegetation zone, but the plant community composition and plant species are obviously not the same. Below altitude of 600 m above is the desert, at elevation of 600~1100 m is mountain steppezone, mainly for desert steppe featured with Kyrgyz stipa, stipa glareosa, stipa lessinggiana which are mixed with some small subshrub such as Artemisia gracilescens, Artemisia frigid, anabasis salsa, anabasis truncate, Horse-weed, etc. Under good water condition, there is typical steppe featured with stipa and F. sulcata mixed with few meso xerophilous shrub such as *Spiraea hypericifolia, Lonicera microphylla, Sabina vulgaris,* etc. At elevation of 1100-1300, is mountain forest steppe zone, on the shady slope is mainly growing sibirica, on the sunny slope is the typical steppe featured with stipa and F. sulcata, on the wet place of the gental valley there is mesophyte forbs to form meadow steppe and on the bank are the *Picea sibirica* forest and *Betula pendula* forest. On elevation of 1300-2300 is subalpine forest zone, on the sunny slope are *sibirica* forest and pinus sibirica and on the shady slope is abies sibirica and siberia spruce. With the destroy of these coniferous forests by human, betula pendula forest and *populus tremula* forest will appear mixed with *Betula microphylla* and *Betula rotundifolia* forests. On elevation of 2300-2600 is alipine bush and meadow zone with numerous types of meadow where *Carex orbicularis, Carex ledebouriana, Poa annua, anthoxanthum odoratum, trisetum sibiricum, Ranunculus altaicus, Draba alpina, saxifrage hirculus, Primula nivalis, Gentiana algida, Pedicularis proboscidea* are poplar. In some few sites are small leaved Betula rotundifolia Spach and Salix turczaninowii short bush.

On elevation of 2600~3100m is alpine tundra zone with some alpine willows such as *salix glauca, salix arctica, salix berberifolia, salix turczaninowii, salix rectijulis, salix vestita* and *dryas soxyodonta* are most popular mixed with few grass featured in alpine meadow. On the moraine are mosses, and lichens. On elevation of 3100m and above is alpine glacier zone. Kanas reserve in Berchen county is its representative. [4] [5] (figure 1)

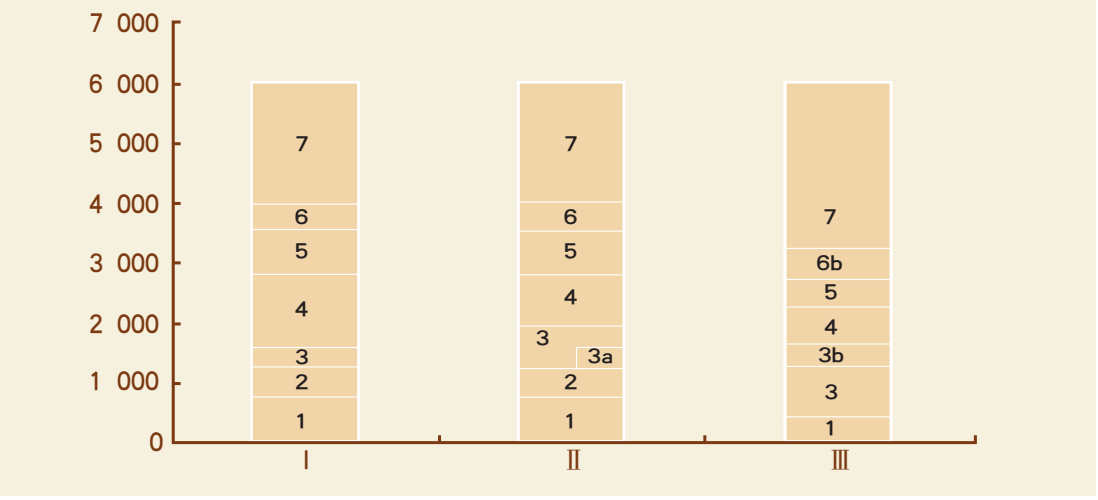

Figure 1 *the graph of the three vertical zones on western desert subregion in temperate zone in China*

Ⅰ. Bogda Mountain of Tianshan Ⅱ. Tianshan Mountains in Ili Ⅲ. South slope of Altay Mountains
1. desert zone 2. mountain desert zone 3. mountain steppe zone 3 a. mountain deciduous broad leaved forest zone 3 b. mountain forest steppe zone 4. subalpine forest zone 5. alpine shrub and meadow zone
6. alipine glacier edge sparse vegetation zone 6 b. alpine tundra zone 7. alpine glacier zone

Therefore, the Bogda Biosphere Reserve, West Tianshan Mountain National Reserve, wild walnut provincial reserve, Sayram National Park and Kanas Lake National Reserve together with each other can show the whole view of complex mountain vertical zonality in Junggar Basin Desert Area, which can be as the sites to declare for the World Natural Heritage.

2. Analysis on value of the heritage

World heritage refers to the natural and cultural regions with outstanding universal valute and uniqueness, which is the essence of the essence sites in a certain country and area. From the following analysis we can conclude that the vertical zonlity in this area is unique, which meet three criterias of the World Natural Heritage at least;

(1) *to be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;*

(2) *to contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;*

(3) *to contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation.*

2.1 complete and unique ecosystem

Vertical zonality in this region is featured with the combination of steppe, forest, desert, alpine shrub, meadow, tundra, ice edge sparse vegetation, glacier, lake, wetland, which fully embodies the basic characteristics of landscape diversity complex, it is the most complete representative of the vertical zonlity in mountain desert area and a unique transiton region from the desert in central part of Asia to Central Asia. The vertical zones are even more than that of Golden Mountains of Altai of Russia which was inscribed in the World Heritage List[1] .

2.2 rich and unique flora

Northern slope of Tianshan Mountains in China is a biologically diverse area of world wide significance, with approximately 2500 species of higher plants, and it is place where are the most abundant plant species in mountains in desert area[9] . Floristic composition is relatively complex, and elements of the northern temperate zone, Eurasia temperate zone, west of central Asia in ancient Mediterranean area, central part of Asia, temperate Asia, and the Arctic-Alpine respectively occupy their importantance in different vegetation types. There are ancient tropical elements relics in Ili mountains, which fully confirms location from the region's transitional properties form desert in central part of Asia to that in Central Asia. Plants are less in south slope of Altay Mountains, and record from the Kanas reserve of its 798 species of higher plants show that flora composition is also very complex. Similar with north slope of Tianshan Mountains, it is mainly featured with elements in north temperate zone and Eurasia temperate zone and the elements in siberan and Europe-siberan are also important, which is the only place where siberan elements are widely distributed in China.

2.3 complicate and unique fauna

Numbers of animal species in this region is not so large, but its composition is ancient, complex and unique, in Mogolian- Xinjiang region of palaearctic realm. As is the case with plants, different species in different ecological systems occupy their specificly important positions. 160 vertebrate species known include 39 species of animals, 117 species of birds, 4 species of amphibious reptiles, of which 27 species were listed as what are pretected under state-level, and the ones under first class protection are *panther uncial, ciconia nigra, gulo, martes zebellina, capra*

ibex , 5 altogether, and the ones under second calss protection are *lepus timidus, ursus arctos, lutra* lutra, *lynx lynx, moschus moschiferus, lyrurus tetrix, bonasa bonasia, accipiter gentilis, accipiter nisus, nyctea scandiaca, strix uralensis, milvus korschum, accipiter badius, Aquila clanga, falco finnunculus, grus grus, glaucidium passerinum, martes foina,* 23 altogether. Seven are listed in *convention on international trade in endangered species of wild fauna and flora* such as panther uncial, *gulo, lynx, lepus* timidus, *capra ibex, and cervus elaphus Linnaeus. Rana* altaica, vipera *berus, lacerta vivipara, lygopus mutus nadezdae,* and *tetra urogallus* are only distributed in Altay Mountains in China. In short, animals in this area are famous for its complexity of composition. New species are discovered gradually such as *strix uralensis yenisseesis burturlih, melanitta fusca* lin., *gallinago megala swinhoe, emberiaz variabilis temminck carpodacus roseus pallas,* etc. there are 224 species of insects known, Coleoptera, Hymenoptera, Orthoptera are of largest numbers, most of them belong to Palaearctic region with Siberia and Central Asian species predominate. Their distribution has obvious vertical zonality, many of them are rare species, endemic species, or species of new record, which further explains the regional ecological system's uniqueness and its protection value. [10] . There are 99 types of known fungi, many are of new records in Xinjiang, and of which many are edible and medicinal. All of these show the regional biodiversity, and its uniqueness and complexity, and it is of research value, but the relative work is still insufficient, we should seize the opportunity of" World Heritage Inscription" to strengthen study and realize its role in keeping regional ecological security and prosperity of the local economy and improving local people ' living level. [11-12]

2. 4 unique lakes

There are numorus glacier erosion lakes with 319 lakes in region of Kanas lake and they are various in size with kanas Lake (with the area of 45. 7km), Sayram Lake in Tianshan Mountains(with an area of 29. 5km) and Tianchi Lake(with an area of 2. 5km)are of the most famous. The average depth is 60-90m. The lakes are featured with dense forest, fresh air, beautiful environment surrounding them to make them perfect attractive tour destinations. Numerious fish are in Kanas Lake with *hucho taimen, brachymystax lenok, lota , thymallus arcticus, acipenser baeri,* etc. the most famous and unique in China. Hucho taimen belongs to Salmonidae of Salmoniformes, the local people call it big red fish due to a orange color of its body, it is a kind of large scaled violent carnivore fish in the fresh water and so it is called monster in the lake.

2. 5 unque glaciers

There are groups of alpine mountains with modern glaciers distributed in between them. There are 210 glaciers of various sizes at mountain tops around Kanas Lake covering an area of 209km2, with 13042m3 of ice storage which is eaqual to 117378m3 fresh water storage. From far

away, white glaciers shine in a silver color and you can have a special winter view in summer. If you go near or into them, crystal rivers converge to flow down the valleys or pour down to form waterfalls to bring you a strong and uniqe feeling. The most important is that oasis in desert is what people live on. If it dispear, people cannot live, so we should keep its sustainable supply. Alpine tundra zone and alpine sparse vegetation zone below glaciers are rare to make them valuable for research and sightseeing.

2. 6 sufficient and unique biological gene resources

There are sufficient biological resources in this region such as *saussurea involucrate, fritillaria walujewii, astragalus aksuensis, A. lepsensis, arnebia cuchroma, codonopsis clematidea, rheum altaicum, geum urbanum, hyoscyamus niger, ephedra equisetina, bupleurum aureum, cannabis sativa, rhapoticum cathamoides, erythronium sibiricum, orobanche sordid, malus sieversii, rosaceae, J. cathayensis Dode,* etc. which should be cultivated through introduction based on certain aims and plans to expand their production to fulfill social needs. Limitless expansion of picking and purchase should be banned to make them away from extinction. All these need a long term hard work.

2. 7 Unqie muti national culture and religion

The area is inhabited by various minority nationalities, and Kazak, Hui and Mongolia are of the majority. Whether in Tianshan Mountains or Altay Mountains, there are numbers of well preserved cultural diversity remains, such as the majic needle to stabilize Tianchi Lake (an elm tree growing at the bank of Tianchi Lake), rock carvings, rock paintings, stone man, sarcophagus, ancient tomb, cave groups, temple ruins, etc. They and the natural mountains, glaciers, forest, steppe, lakes and ethnic customs blend with each other, and landscape diversity, biodiversity and cultural diversity combine with each other to form a special ecological and cultural resort, attracting the public to spare no pains to be here form far away. Especially in near Kanas Lake, Tuwa People, a branch of Mongolia people, retain the ancient and complete tribe and clan consanguineous ideas, and strong national consciousness and language. Tuwa language which belongs to the Turkic languages of Altay group, is a rare language important for the study of ancient Turkic ethnic differentiation. Their religious beliefs retain the original spontaneous nature worship, spirit worship, etc. which are the early form of worship of primitive religion. At the same time, advanced form of primitive religion -- Shamanism, together with Confucianism and Lamaism, are believed in by them. Various religious activities are conducted annually, for example, mountain, heaven, tree, fish, fire, and aobao (a kind of stack of stones) are offered sacrifices and buddha worship and chanting are conducted also. The Tuwa people like living in the forest and steppe zone in the mountains, featured with nomad and hunting mainly. The social production gives priority to animal husbandry, hunting, with fishing, gathering, farming supplemented. Housed are made of wood with walls stacked with original woods and

canopy roof, floor, sharp and slanting tops are to adapt to the mountain rain. The establishment and development of the reserve should strive for their active participation. Especially in the development of ecological and cultural tourism, they can make a positive contribution, and continue to improve their standard of living.

3. Effective management

The world heritage is an honorary title which is more of a kind of responsibility. To maintain the glorious title requires effective management. At present, not a complete managing approach was set for the World Heritage, except for stressing the need to strictly protect. For many developing countries, due to lack of funding, it is difficult to keep on going. But if we do not emphasize the importance of protection, excessive development, especially the continuous development of tourism, will lead to unbearable consequences. As for biosphere reserves, there is a set of effective protection approach which integrate protection and development closely, and it can be applied to World Heritage because many World Heritage sites are once reserves. According to the actual situation in Xinjiang, in the planning of" World Heritage inscription", the following several aspects should be focused on;

3. 1 improve the system of leading group of World Heritage inscription and its office

Currently, leader and deputy leader of "inscription" leading group are relatively the president and vice-president of Xinjiang Uygur Automous Region, and members of the group include leaders of the relevant departments, such as construction, land resources, environmental protection, agriculture, forestry, science and technology, tourism, finance, etc. Its office is at construction department of Xinjiang whose leaders are responsible for the daily work, and relevant departments should also be involved in the actual work. This kind of system shows that the local leaders have placed enough attention on the World Heritage inscription. The key lies in the office leaders should unite all parties and the general public to work sincerely, and to solve various practical difficulties to obtain results. Who participating in World Heritage inscription are all various protection entities, such as reserves, scenic area, the forest park, geological park, wetland park, etc., and the leading group should develop gradually into a regional leveled body to coordinate planning and development of related protection entities and implement the strategy of sustainable development and ecological civilization construction[16].

3.2 strenthen the management of reserves participating in the"World Heritage inscription"

Reserves participating in the" inscription" are the most important protection entities. We

should strive for funds from the construction of ecological civilization, building new socialist countryside, National Tourism Administration and rural tourism projects promoted by the Ministry of agriculture, clearly position their management style, and carry out effective management, to play their role in maintaining regional ecological security, prosperity of the local economy and improving local people' living standards[17-19] .

3.3 improve co-managing system of Bogda biosphere reserve and kanas Lake National Reserve

Changji Hui Autonomous Prefecture is now responsible for the administration of Bogda Reserve, and environment and tourism committee in Buerjin county and administrative body of Kanas Lake Reserve are responsible for the administration of Kanas Lake Reserve. In fact, a co-managing system of department in charge and local government has been set which is a new system to be improved. The two protected areas have done a lot of work in ecological and cultural tour, and they should focus on planning, display, monitoring, advocacy, service, etc. to make them into famous ecological and cultural tourism zones. At the same time, an appropriate research institute or university should be invited to be science adviser and advisory committee composed of domestic and foreign experts should be set, to give advice and suggestions to their futher development and World Heritage Inscription and to promote scientific research and sustainable development

3.4 Scientific research on sustainable utilization of the heritage

In order to make sustainable use of cultural and natural values in this region, tourism fitting in with regional characteristics should be carried on. It depends on the research on the formation of the heritage to decide whether the high-end tourism or public tourism is more suitable. In addition, we should carry out the functional district planning research, for example, whether there is need of cement concrete pavement construction, and where is the place to build with the minimal damage, etc.

3.5 to strengthen the propaganda and education

The beautiful natural landscape attract countless tourists, propaganda work should not only consider what are to be appreciated in this area and how to appreciate, but also what should or not should be done by the tourists and local people in various ways, so as to better protect the heritage and make use of heritage in a sustainable way.

3.6 to set up a number of biological diversity industry

Unique and rich biological resources make it possible to explore and establish a number of

biological diversity industry focus on ecological and cultural tourism demand to meet varios social needs such as the artificial cultivation of medicinal plants and wild animals, etc.

4. Summary

(1)Mountain zonality in western subregion in Chinese temperate desert is featured with desert, steppe, forest, alpine shrub, meadow, tundra and ice edge sparse vegetation, glacier, lake and wetland. This region is one with world wide value, unique and complete, and biological diversity, cultural diversity or landscape diversity are all various which is in full compliance with the world natural heritage standards; this region has completed a detailed natural and socioeconomic characteristics background survey, it should actively seek to be inscribed on the world natural heritage list, not only allowing it to be conserved in a better way to show it to the public world wide, but also keep the regional ecological security and prosperious local economy and improve living level of the local people.

(2) Bogda Biosphere Reserve, West Tianshan Mountain National Reserve, Sayram Lake National Park, wild walnut provincial reserve and Kanas Lake National Reserve together can fully display the complex mountain vertical zonality in Junggar basin, which can be declared for World Natural Heritage.

(3) Each protected area's scenery is very beautiful, which attract a lot of tourists go sightseeing, attention should be paid to the implementation of sustainable tourism strategy, and a good division of functional area, partition management, control of environmental capacity should be possible to deal with protection problems.

(4) The local government has taken part in the management of Bogda reserve and Kanas reserve, and a co-managing conservation system was set. The departments in charge should improve the new born management system in terms of human, material and technology to make it a model and demonstrative body and promote them to develop into biodiversity managing and conservation region and Ecological Demonstration Zone. [25-27]

(5) Xinjiang has many unique natural culture and traditional agricultural regions, and many sites can meet critiera of world heritage such as Turpan Gobi, Karez well and grape cultivation and management technology, wild life habitat of Tarim Basin and its periphery mountain and Pamir highland, vertical zonality of Kunlun Mountains. [28] " The inscription" leading group should become a leading organ responsible for systemly harmonizing of nature protection, implement the strategy of sustainable development, and construction of ecological civilization to promote further development of the work.

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Geomorphological Features, Crustal Composition and Geological Evolution of the Tianshan Mountains

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Abstract: Located in Central Asia and extending in an E-W direction, the Tianshan Mountains are composed of arcuate mountain systems convex southwestward and large basins between them in Central Asian countries. NW and NE trending mountain systems and basins with nearly E-W-strike long axes between them in China and low mountains and gobies in southwestern Mongoha. The mountains are nearly 4000km long from east to west and >150 km wide from north to south. They are mostly separated from the basins on eitherside by thrusts and the basement of the basins is under thrust beneath the Tianshan Mountains. The crust consists predominantly of fragments of pre-Sinian continents, Paleozoic continental-margin rock series and oceanic lithospheric slices. The crust of the mountains and adjacent areas may be divided into 15 tectonic units. Roughly with the longitude90。E as the boundary, in the region west of the boundary the South Tianshan collision zone in the south is an arcuate tectonic zone convex southward and the cratonic fragments and the collision zone between them in the north are an echelon in a NW direction, forming a huge brush structure; in the region east of the boundary there occur the nearly E-W-trending active paleo-continental margins or island arcs and collision zones between them which are arranged altemately. The Tianshan Mountains formed after the closing of the Late Paleozoic oceanic basin and the geomorphological leatures of the present mountains are the production of Late Cenozoic crustal movement. The geological evolution after the formation of the Tianshan Mountains may fall into the stage of terminal Carboniferous-initial Permian syncollisional-post collisional tectonomagmatism. Stage of Early-Mid Permian mantle-derived magmatism and Crust-mantle interaction and stage of intracontinental since the Late Permian.

Key words: Tianshan Mountains; geomorphological features; crustal structural divisions; geological evolution

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Tianshan Mountains lie in central part of Asia, extend nearly form east to west across countries in Central Asia. It runs east from Uzbekistan, Kyrgyzstan and other countries in Central Asia,

through mid of Xinjiang Uygur Autonomous Region northern Gansu province and western Inner Mongolia Autonomous Region, Northwest China, to southwest of Mongolia, stretching nearly 4000 K M. From the geological point of view, Tianshan Mountains are formed by pericontinental type continental accretion-collision in the paleozoicera and intracontinental orogenesis in late Cenozoic era. In the mountains, there are abundant energy and solid mineral resources, as well as much information about the formation and evolution of continent crust. Therefore, many geological workers from different countries with a strong interest in Tianshan Mountains for a long term try to uncover the mysterious veil from different angles and identify and mine the sources, to make it serve for human' survive and reproduction in a better way.

Tianshan in China has been the focus of China's geological circles. In a new round of land resources survey project, the area continued to be identified as the focus of work. At the same time, Xinjiang Uygur Autonomous Region government and relevant departments of the state have also set up special project to research on the regional crustal evolution and mineral resources. All of these projects obtained the outstanding results. The album published 18 articles which are a small part of the relevant results with 13 articles reports the new achievement on Tianshan magma activity and mineralization chronology. Now they are put together, mainly on account of high precision chronological data is one of the key factors to recognize and reconstruct orogenic processes and mineralization and we hope these data published can help deepen people' understanding of Tianshan areas crustal formation and evolution and mineralization.

For a long-term the geological circle have different understanding on the key problems such as mountains ranges composing Tianshan Mountians, the crust structure in this region, the intra relationship of various mountain ranges, the formation and evolution of Tianshan Mountains, rule of the spatial and temporal distribution of mineral resources and mineralization , etc.

Based on years of work accumulated of the Tianshan Mountains and the comprehensive study of existing data and taking the opportunity of publishing of special series of geological surveying and researching achievements on Tianshan and its adjacent region by geological Bulletin of China, the article here made a preliminary exploration into several major issues, including geography and geomorphic characteristics of Tianshan, its crustal composition and tectonic division, and crustal evolution stages and each stage' features, please, which are expected to benefit study on the formation and evolution of the Tianshan Mountains and investigation on mineral resource .

1. Geomorphic feature

As shown in Figure 1, to the south of Tianshan are Karakum Basin (desert), Tarim basin and Hexi Corridor, to the North are Kazakhstan hills, Junggar basin, East Junggar and South

Mongolia hills, to the west it submerge into Turan lowland or gradually becomes Kazakhstan Hills, and to the east, it becomes Gobi desert in Mongolia. In China, A-erh-chin Mountains and Qilian Mountains are adjacent to it; in Central Asia, Pamir Mountain Range and the Tianshan mountains echo with each other form far away. On the whole, the Tianshan Mountains are wide in west and narrow in east with its highest peak Khan Tengri located at the China and Kyrgyzstan border with an elevation of 6995 M.

In contrast of the overall nearly east-west extension, mountains ranges of Tianshan are arc with SSW convex (Central Asia), S shaped wavy bend of NEE running (A-lai Shan Mountain-Harc Shan Mountain-Huola Shan Mountain) and wavy bend of nearly EW running (Bogda Mountain-Hal Lik Mountain). A-lai Shan Mountain-Harc Shan Mountain-Huola Shan Mountain is a longest range with complete continuity and on the north side of it, the ranges and basins are arranged alternately in echelon pattern converging to SE to constitute the giant broom style in west part of Tianshan. At East Tianshan and Beishan Mountain east of Korla City and south of Turpan-Hami basin are gobi desert and hills. Near the frontier line west of Xinjiang in China, ranges run NEE overall, and basins in mid Tianshan in China are in a diamond shape with long axis running near EW. The complicated internal geomorphic features reflect the crustal structure and geological history complexity.

According to geological circle in China, Tianshan is divided into West Tianshan and East Tianshan by 88。 E. Turpan-Hami basin is located in mid-East Tianshan with perennial snow on Bogda peak on the north of northern arc-shaped convex and Hal Lik Mountain is of southern convex arc, and they two respectively connect with Yilian-habirg Mountain running NW north of West Tianshan and Tianshan in the gobi desert in south Mongolia. Jueluo tag and Kuruk tag hills and gobi deserts south of Turpan-Hami basin go east to link with Beishan Mountain and Tianshan in in the gobi desert in Mongolia.

Tianshan in China is divided into North Tianshan Mountain, West Tianshan Mountain, South Tianshan Mountain and Mid Tianshan Mountain. North Tianshan goes NW including Yilian-habirg Mountain, Boluo-huoluo Mountain, etc. Mid Tianshan is mainly the Yili Basin. South Tianshan is composed of Harc mountain running NEE, Nalati mountain running NEE and Huola mountain running NWW. West South Tianshan is located at northwest edge of Tarim basin running NE. Tianshan Mountains in central Asia consist south arc ranges and basins in between them, and wider than what in China. They are divided into North Tianshan, Mid Tianshan and South Tianshan as well as in China in the literature, which are not the same as in China. The South Tianshan in central Asia is as the same as the west South Tianshan and south of South Tianshan in China, Mid Tianshan in central Asia dispear in China, North Tianshan in central Asia is nearly the same as Nalati mountain and Dahalajun mountain on the south edge of Yili basin, and Yili basin in China and North Tianshan in China are called north East Tianshan by some scholars in central Asian countries and Russia.

From a regional perspective, Tianshan is a part of the giant basin- mountain-highland system in central Asia continent. From south to north, the geographical units are: the Qinghai-Tibet Plateau, Kunlun Mountains, Qaidam Basin, Tarim Basin, Qilian Mountain, Hexi corridor, Tianshan Mountains, Junggar basin and the mountains of Altai. Different form the basin and mountain system under the background of stretching structure in the United States, the basin- mountain-highland system in central Asia is grand in scale and it is bounded by thrust fault or thrust-fold belt[1] , which is formed under extrusion background. Long axis of Issy-Kul lake basin, Yili basin, Bayinbuluk basin, Yanqi basin, Turpan-Hami basin, etc. are of nearly east-west extension and significantly larger than the short axis of north to south to extension, with the boundary at extending side of the basin is of a thrust fault and accompanied by strike-slip movement. In the north of Tianshan Mountains, from west to East, Kyzylkum, Muyun Qom, Chu-Yili, Junggar basins, etc are distributed diagonally, and are all have the features of narrowing to SE, which reflects that there is sinistral strike-slip of parallel mountains with the power from India and the Eurasian continental collision, especially western syntaxis' wedging.

2. Crustal composition

2.1 geological body exposed on surface

Geological body exposed on Tianshan Mountains' surface is mainly formed in Paleozoic era[2] . Before the Quaternary period, geological body has suffered varying degrees of structural change.

Tianshan Mountains' geological body in Paleozoic era includes the marine majored volcano sedimentary rock system and intrusive rock and metamorphic rock of various components. According to the tectonic background of information, these Paleozoic era's geological bodies can be divided into ancient active continental margin or island arc volcano sedimentary rock system, intrusive rock, ancient oceanic lithopheric debris, ancient passive continent rock system and magmatic intrusive complex rock of inrocontinental mantle source and crustal source, euptive rock, sedimentary rocks, etc.

Geolocial bodies from Mesozoic ear are distributed in basins in mountains and on both sides of the mountain range majored in continent sedimentary rock system and acid small laccolith intrusive body in Triassic period to Early Jurassic epoch expose in some parts of China's East Tianshan Mountians[3, 4] , with vocano rock in late cretaceous period exposed in Tuoyun basin in China's southwest Tianshan mountain[5, 6] .

Biological bodies in early Paleozoic era are fragmentarily exposed with verified oldest ones as

metamorphic complex rock and intrusive rock in Paleozoic eon which can be found in Kuluktag region east of Kuerle city. The Proterozoic eon's geological bodies exposed in a bigger size of area in not only the Kuluktag region, but also fragmentary in other regions in Tianshan mountains. In northwest Tarim basin, Kuluktag region and north Ili basin's Boluohuoluoshan mountain, obvious incomformity interface developed in between the Sinian period's strata and the underlying geological body in end of Proterozoic eon, with continuous sediment with the strata in Early Paleozoic era upward and all were formed in shallow marine environment with similar tectonic features[7].

2.2 crustal structure and tectonic

The above mentioned geological bodies are cut by large faults going nearly EW, NW and NE and along these fault belts, there are various scaled trust and strick-slip movements in various times. And in west Urumqi(line of 88°east longitute)and these large faults formed a giant broom pattern dispersing in NW and converging in SE. In east Urumqi(line of 88° east longitute), nearly EW trend large faults were cut by sinstral strick-slip fault of NE trend. Trust fault going in direction to the basin developed on both south and north sides of Tianshan Mountains in China.

Geophysical exploration revealed Tianshan Mountains' crust is of Stratification in vertical direction. Geophysical exploration along Dushanzi-Kuche road revealed there are inlay of ancient continental complex rocks, oceanic lithopheric debris and oldland fragments in the upper parts with Tarim block subducting to the north and Junggar block subducting to the south in low them[8, 9] . Natural broadland seismological detection along Urumqi-Kuerle road revealed that interface(speculated as Moho) at 50km deep below sealevel of Tianshan Mountains was obviously deformed featured with trust to the flanked basins especially in near Urumqi; in 70km underground near Urumqi, there is no obvious interface which indicates that there was once anatexis; in 70km underground near north Urumqi the south bend interface and nouth bend interface in the same depth of Tianshan Mountains may relatively the sufaces of bases of Junggar basin and Tarim basin(figure 2).

3. Tectonic partition

According to crustal compostion and tectonic features, the crust in Tianshan Mountains and its neighbor regions can be divided into 15 units as in figure 3. The composition features are introduced briefly now as follows:

3.1 Junggar and Turpan-Hami island arc (I)

Majority of this tectonic unit is now covered by basin accumulation in Mesozoic Era and

Cenozoic era with few geological body's outcropps of early Cenozoic era in Hallic mountain and south edge of Turpan-Hami basin. Aeromagnetic data and the research on near geological bodies in Paleozoic era, especially the recent study on detrital zircon in strata of Carboniferous(once compared as Devonian period and Silurian period) in northeast of Junggar basin revealed that this island arc take the older land curst as its base, with articles in this album, chronological data of intrusive rocks in Hallic mountain and south edge of Turpan-Hami basin in literature[11-18] and detrital zircon data recently gained by the author(to be pubished in other articles) all support that this island arc is formed by igneous rock from Ordovician period to Carboniferous period with the magmatic front migrated southword gradually from Ordovician period to Carboniferous period[19] .

Bogda mountain was formed by rift in Late Carboniferous or post arc basin accumulation superimposed on this arc island with this basin's formation probably related with northward subduction of ancient oceanic basin lithospheric plate as the predessor of south Tianshan Mountains[20-22] .

Form Permian period, this island arc evolved into introcontinental basins and mountain systems to form the bimodal volcano rocks in Permian period and base majored dike, mantle-derived basic and superbasic complex rocks, intermediate acid intrusive rocks in Triassic Period to Jurassic periodand so on[23-28] . They are coverd in uncomfirmity by intracontinental accumulation since Mesozoic era. Intracontinental Orogeny futher uplifted Hallic mountain and Bogda mountain with basins on both sides sank in a futher way.

It is nessary to note that as for the composition of bases and tectonic properties of Junggar basin and Turpan-Hami basin, there are two opposite opinions of traped oceanic crust[29-31] and land crust composed of substances in various times[32, 33] . Based on the existing data, the view of non oceanic crust is more in accordance with reality. Based on years of work, the author futher identified that this basin's base is island arc based on old land crust in Paleozoic era.

3.2 Accretionary complex rocks in Yilianhabierga (II)

It is composed of oceanic lithopheric debris represented by ophiolite in Bayingou and forearc and ocean bottom sediments in Devonion period to Carboniferous period, which constitute northward thrust imbricate structure. Siliceous rock associated with ophiolite in Bayingou contains conodont fossil in Late Devonion era[34] , which reveals the oceanic basin represented by the mentioned complex rocks has a large scale in late of Devonion period. how this belt extend to both sides is still not clarified. Recent years' study indicates Kangurtag belt is on northern slant and in its north, active continent margin construct gradually younger to the south in Ordovician Period to Carboniferous period; on north edge of Turpan-Hami basin, no oceanic debris similar with Yilianhabiergar belt in from Devonion period to Carboniferous period, therefore, Zhang

Liangche's[35] view of this belt going east to be connected with Kanguertag belt and Li Jingyi and so on's view[23] of this belt possibly going east to pass north edge of Turpan-Hami basin may both not in accordance with the reality. Here based on the study on large fault tectonic in Central Asia in recent years and the comprehensive analysis on existing data, the author think that this belt may be of the forearc accretionary complex rocks at north edge of Kazarkstan plate and belongs to different parts of the same active continental margin with the active continental margin complex rocks in west Junggar and Tarbahataishan mountain and it was the latter fault activity that dismembered and relocated them into the present place. Kawalulac fault belt in north edge of South Tianshan Mountains may be met in south Toksun along SE trend(figure 3).

3.3 Yili microcontinent (III)

Located in central of west of China's Tianshan Mountains, extending to the area of central Kazakhstan, disappearing gradually to SE. The microcontinent and Baluntai land turning out to be one old land or independent microcontinent in ocean separated by oceanic basin is not yet clear. The author considered that they belong to a continental. The oldest composition of geological body of the microcontinent are at Bole at the northern margin, Nalati mountain at the southern margin, Baluntai at the east and other places, mainly metamorphic rocks in Paleoproterozoic era, with intermediate-acid intrusive rocks and volcano rock in early neo proterozoic era identified gradually (to be published in another article). In the north margin of the land, terrestrial clastic rock and carbonate rock in Sinian to Cambrian are exposed in Boluo Huoluo mountain. Characteristics of passive continental margin are showed here.

In the southern and Northern margins of the microcontinent developed intrusive rocks and volcano sedimentary rocks in Ordovician period to Carboniferous period, with igneous rock showing characters of active continental margin [36-38] . In the interior of the microcontinent, the volcano rock in permian period is of comparative development, and there are two kinds of understandings on tectonic background of its formation such as underplating basaltic lower crust' melting in post-collision period and intracontinental rift [34] .

3.4 Jalaiier-Naiman collision belt (IV)

This zone is mainly exposed in the cenral Asia area west of line of 76。 E, it runs NW-SE at south of Balkhash lake, and ultramafic a mafic rocks of ancient lithosphere relic and forearc sediments in form Cambrian to Ordovician periods are exposed here. In its north east side, expose volcano sedimentary rocks in Cambrian period to Devonian period and moderately acidic intrusive rocks form Ordovician to Devonian. From 74。 E to79。 E and at north of Issy-Kul lake, ultramafic rocks volcano sedimentary rocks and intrusive rocks in Ordovician to Devonian periods are exposed along the the fault belt protruding slightly to SW. The author speculates that they are probably belong to the same tectonic unit. But there is no precise information to prove

this, especially early Paleozoic ocean lithosphere relic and early Paleozoic active continental margin construction are still not be found in where extends into China.

3.5 Muyunkum- Issyk island arc (V)

In some areas expose metamorphic rocks in paleoproterozoic era, forming the continental basement of the arc The geological body (form Ordovician to Silurian) of the arc are mainly volcano sedimentary rocks and intrusive rocks in early Paleozoic era, which are superimposed by volcano sedimentary rocks and intrusive rocks in from Devonian period to Carboniferous period. According to Mao's state[40] and literatures cited, the active continental margin magma activities continued until the Late Carboniferous epoch(320~300Ma).

3.6 Kalashan-Kyrgyz Range collision zone (VI)

In Central Asia, it is known as the Nikolayev line, extending into the territory of china where it is called Nalati fault zone. Along the strip expose ophiolite in Sinian period[41] and metamorphic rocks Proterozoic eon. Relatively speaking, the strip' exposed width is small, tectonic deformation is strong.

3.7 Kyzylkum microcontinent (VII)

The microcontinent in Central Asia is known as Middle Tianshan, and rocks in early Sinian period sporadicly exposed with volcano sedimentary rocks and intrusive rocks in Paleozoic era which indicating it may be a part of the island arc in Paleozoic era. In Tashkent City, Uzbekistan is the famous Almalyk gold- copper- tellurium ore concentration area. In recent years, data indicates mineralization mainly occurred in the Late Carboniferous period(told by Rima Seltmann face to face, 2006) . The famous Muruntau gold ore is located in the south margin of the land, Kumutuoer gold deposit is located in the arc, near Issyk-Kul lake. Recent studies show, these gold ores' mineralization is in early Permian period (around 285 Ma)[40] , all formed in the orogenic phase.

The microcontinent is cut by dextral strike-slip fault of Talas-Fergana in the east. As shown in Figure 3, the tectonic unit extends eastward to the territory of China, gradually narrowing, where mainly expose volcano sedimentary rocks and intrusive rocks from Silurian period to Carboniferous period. The Silurian granite is relatively rich in potassium, and Devonian intrusive rock belongs to the typical calc-alkaline series [42] .

3.8 South Tianshan Mountains collision belt (Ⅷ)

Located in the south of the Tianshan Mountains, it extends NW in Central Asia with SW arc and

goes nearly EW with northwards arc and in between them is the Fergana dextral strike-slip fault. The belt is mainly composed of continent marginal rock system in Paleozoic era and ocean residual. The continent marginal complex rocks include intermediate acid intrusive rocks of periods of Ordovician, Silurian, Devonian, Carboniferous, active continental margin complex rock composed of volcano sedimentary rock system from Ordovician period to Carboniferous period and passive continental margin complex rock south of Alai mountain. The ocean residual includes ocean lithosphere slices (with ophiolite as the representative) such as ophiolite north of Alai mountain, ophiolite of Nalati, ophiolite of Kule Lake, ophiolite of Mis Braque, ophiolite of Ku Mishi, ophiolite of Kava Braque, etc. Siliceous rock associated with ophiolite of Kule lake contains conodonts and radiolarian fossils in Devonian period and Early Carboniferous epoch and the siliceous rock associated with ophiolite of Ala mountain contains radiolarian and conodont fossils from Ordovician period to early Carboniferous epoch [43] . According to the Brookfield[44] , across Alai mountain from north to south, are island arc form Silurian period to Middle Devonian period and island arc in Carboniferous period, which are collaged in the late Devonian period, and island arc in Carboniferous period located on the south side collided with Karakum continent block onto which is superimposed the back arc basin construction in Triassic period.

In China, Halc mountain and Huo La mountian are different sections of this belt with composition obviously different. The author speculates, Halc mountian may be of fore arc accretionary complexes and Huo La mountian may be of ancient ocean mountain relics. And then east to the east of Lake Bosten, ocean debris are represented by ophiolite of Ku Mishi and Yushugou and ophiolite of Kava Braque, associated with epimetamorphic rock series. In addition to these ocean building, it may also contain remnant arc fragments.

In the Central Asia area of this belt, potash-rich granite intruded in post collision and orogenic styled gold mine developed in early Permian period, which reveals the prior ocean basin closed before it.

Kuruktag region located in the south of Ku Mishi ophiolite, is regarded as the uplift of basement of Tarim platform by many researchers. However, in recent years, magmatic activities in Paleozoic, especially early Paleozoic era are discovered which show the area may not be a part of Tarim oldland. As for tectonic deformation, Kuruktag region on the whole is a fan-shaped structure, different with Akesu area on northwestern margin of the Tarim Basin. Based on them, Jiang Changyi and other scholars [53] think there is ancient subduction zone southward at South Tianshan Mountains. Li Jinyi [21] [23] speculated that taking Xinditag fault as the boundary, to the north is Tianshan orogenic belt and to the south is Tarim basement. Considering the regional background information, especially the geology of extension areas in east and west, the author speculates, Kuruktag region is likely to be part of ancient arc in the ancient Asian Ocean in the Paleozoic period; Along the line of ophiolite in Ku Mishi, Seri Keya Irak and Mis Braque might develop an ancient right strike-slip fault, whose strike-slip movement makes the Kuruktag region

move to present-day location; We are not sure yet that Kuruktag region composed a line of arcs with Halc mountain or with Baluntai and Kalatag-Xingxing xia. The the author tends to the latter based on the existing data.

3.9 Karakuram and Tarim oldland (Ⅸ)

Located in the south of Tianshan Mountains, it is at present most covered by Cenozoic era's basin deposits with basement outcrops very limited. In around Aksu in the northwestern Tarim Basin, Akesu blue schist in early Neoproterozoic era is covered unconformably by Sinian period's sedimentary rock series [56] [57] , on which the Paleozoic era's strata composed of terrigenous clastic rocks and carbonate rocks are rolled into the thrust fold tectonic deformation pointing to the basin, indicating the strata from Sinian period to late Paleozoic era are similar to the sedimentary rock series on passive continental margin. The strata of basic sequential deposition developing in this region from Sinian period to Carboniferous period reveals the ocean basin as predecessor of Tianshan Mountains did not undergo the evolution history to close then open and close at last in Paleozoic, but closed until late Carboniferous period.

3.10 Dunhuang Block (X)

It is Located in south of Hongliuhe-Xiaohuangshan collision belt, east of Sailikshayi-Xingxingxia fault, west of Altun fault belt and north of ophiolite belt of Lapeiquan in Altun Mountains, mainly composed of early Precambrian period's metamorphic rock with volcano sedimentary rock series and intrusive rocks from Ordovician period to Silurian period and ntermediate-acid intrusive rocks from late Carboniferous epoch to Triassic period develop in the north. In the literature, the landmass was once called Anxi landmass, and is generally considered to be a part of the Tarim oldland. But from aeromagnetic data, the block has clear distinction with Tarim oldland, Sailikshayi-Xingxingxia fault as the dividing line between them is very clear, and geology on the northern margin of Tarim oldland and geology on the northern margin of this plot are very obviously different. Therefore, the author insists that the plot is an ocean microcontinent independent of the Tarim oldland, and at least in the late Paleozoic period, its northern edge may be similar to the Andean type active continental margin. In Liuyuan area, expose marine Pillow basalt in Permian period, which is generally considered to be formed in the Permian period's rift. However, this area did not have the typical rift sedimentary formation with calcium and alkali igneous rock series in same period developing in this region which reveal the basalt's formation environment may be the backarc rift or ancient ocean mountain, unlikely to be intro continental rift. From a regional perspective, late Paleozoic oceanic basin, represented by ophiolite of Xi Lamulun river and Suolunshan mountain in northeast China, should extend west to Beishan Mountain. If Liuyuan's pillow basalt was formed in the backarc, then the ocean basin represented by ophiolite belt of Hongliuhe-Baiyunshan-Xiaohuangshan in its north should closed in the late Paleozoic era. Although this do not coincide with the popular understanding, but belt-distributed

marine sedimentary rock series associated with ophiolite in Jinwozi gold mine region south of Xingxingxia, Niuquanzi region of Beishan mountain and Hongliuhe-Xiaohuangshan region indicate this possibility may not be excluded. If Liuyuan pillow basalt is ancient ocean mountain remains, Paleozoic era's active continental margin construction in Mazongshan region north of Liuyuan may be part of the remnant arc, not of Dunhuang block. Based on the present data, we cannot make sure which of the above conclusions is more consistent with the actual situation. But the author thinks, from existing geological data, Permian period's pillow basalt in Liuyuan area may not be formed in a intro continental rift environment, he will tend to think that its formation environment is the back arc basin in Permian period.

3.11 Hongliuhe-Baiyunshan-Xiaohuangshan collision belt (Ⅺ)

Ophiolite expose from Hongliuhe station of Lanzhou-Xinjiang railway to east to Yushishan, Niuquanzi, Baiyunshan and Xiaohuangshan SEof Shibanjing suffered different degrees of metamorphism, and yet no exact chronological data of oceanic basin's formation and evolution represented by them. Near ophiolite belt, belt-distributed Permian period's marine sedimentary strata parallelled to this belt in around Jinwozi, Niuquanzi, etc. may be the geological record of its predecessor of ocean basin which indicates its predecessor of ocean basin may continue to late Paleozoic era. According to magmatic activity characteristics on its both sides, the author further speculate, the predecessor of ocean basin may be connected with ocean basin in eastern Inner Mongolia in late Paleozoic era, which closed both in late Permian period. Existing geomagnetic data [59-60] of Tarim and Sino-Korean blocks tells they two were located at different latitude at that time. Geo data tells us the affinity of north margin of Dunhuang block and north margin of Sino-Korean block, which indicates ancient ocean basin represented by ophiolite belt of Hongliuhe-Baiyunshan-Xiaohuangshan may go west through south Tarim and connect with ocean basin in Pamir in late Paleozoic era.

3.12 Xingxingxia-Hanshan island arc (Ⅻ)

It is located in between the Kangguertag-Biyushan collision belt and South Tianshan collision belt and Hongliuhe-Baiyunshan-Xiaohuangshan collision belt including the Kalatag block, Xingxingxia block and Hanshan microcontinent recorded in literature [24] [61] . The island arc has Proterozoic eon crystalline basement, and active continental margin building is mainly plutonic rock in early Paleozoic era and plutonic rock and volcano sedimentary rock in Carboniferous period.

In the territory of Xinjiang, Arqickuduk fault belt in central of this l island arc was once taken as the subduction belt in early Paleozoic era or the ancient plate's boundary, but the author's work in recent years revealed this fault may be a strike-slip fault developing on a base of rift in the Late Carboniferous period to Permian period. Stratum in Carboniferous period located at Yamansu-

Aqishan region north of Aqickuduk fault is regarded as island arc belt formed by the southern subduction of the ocean basin, predecessor of Kangguertag collision belt. Author's work in recent years revealed early Carboniferous epoch's volcano rock in this region is actually formed in late Carboniferous epoch, and early Carboniferous epoch's stratum here is mainly terrestrial clastic rock and carbon acid salt rock similar to the passive continental margin sedimentary rock series.

In article of Li Jinyi [23] and so on Kalatag is a microcontinent in ocean flanked by passive continental margin on both sides based on Jiang Changyi's data, the research on Kawablak fault belt's tectonic style and lack of magma activity information in early of Late Carboniferous epoch in Kalatag area. Considering magmatic activities in Paleozoic era developing in Xingxingxia area, combined with the fracture structure research, they are speculated to be probably far apart, not directly adjacent with each other. However, in recent years' work, the author found intrusive rocks[64] [65] probably in Silurian period and early of Carboniferous period and andesite in early Paleozoic era on north of Kawabulak fault belt, which indicates ocean basin represented by ophiolites of Kawabulak fault may close through northward subduction. That is to say the Proterozoic eon's metamorphic rocks and Paleozoic era's rocks form a series of island arcs in Paleozoic era's, whose evolution is related to the northward subduction of oceanic lithospheric plate represented by ophiolite in Kawabulak and Kumishi south of the arc series.

3.13 Kangguertag-Biyushan collision belt (XⅢ)

It starts in the west from Queletag SE of Toksun to east through Qiatkarertag, Kangguertag, Tuwunan, Kushui(Sitian) station of the Lanzhou-Xinjiang railway, Huangshan to Biyushan at north of Beishan mountain 1000km long and 10-20 km wide, which are formed mainly by oceanic crust debris of basalt, Jasper rock, pelagic flysch, etc. and intruded by Permian period's Mantle source complex rocks containing copper and nickel and granite. The belt is narrow in north and wide in south to form a fan patterned tectonic style not in symmetry and experienced North and south to squeeze in direction of SN in early period(early Permian period) and dextral strike-slip movement in late period (middle Permian period)[23].

Western part of this belt is covered by northward thrust structure of Gangou fault and overlapped at the eastern end by sediments of Cenozoic era.

Strata in early Carboniferous epoch in Yamansu-Aqishan region south of this belt has the affinity of a passive continental margin[23] , and to the north active continental margin construction[19] in Ordovician period and carboniferous period developed at south margin of the Turpan-Hami basin.

These characteristics mentioned above indicate that, the band formation is the predecessor of oceanic lithosphere plate northward subduction of the results, it is therefore impossible to even ha Bill Garang belt extends eastward.

3.14 Kalamaili collision belt (XIV)

Located in between the Tianshan Mountains and the low mountains and hills of Junggar, it is the collision belt in between Junggar – Turpan and Hami island arc and southern Mongolia island arc. It is formed by Calamaili ophiolite, Devonian period's forearc sediments and early Early Carboniferous epoch's residual oceanic basin deposits[66, 67] . Geological data of Tuvabei fauna fossil's distributionreveals that predecessor of oceanic basin of the belt was formed in early of Devonian period, which is the Siberia ancient plate's margin's back arc basin or marginal ocean basin[21] .

3.15 East Junggar- southern Mongolia Island arc (XV)

It is composed of Volcano sedimentary rocks in from mid Devonian period to Early Carboniferous period, which is superimposing on Early Paleozoic era's island arc formation, with plutonic rocks' outcropping in a limited scale at the same time. It is intruded by granite in Late Carboniferous period and Permian period, with volcano sedimentary rocks developing in some parts of the area inthe same age.

To sum up, the Tianshan Mountains ancient tectonic pattern is formed by the remnant arc and related ancient oceanic basin's evolution. Central Asia and China's Western Tianshan Mountians are of ancient Kazakhstan plate converged in early Paleozoic era and the active continental margin zone flanking on its south and north side, with Tarim continental block and Karakuram continental block bordering at the south, and the latter two together with East European Craton constitute the continental group in ancient ocean with the passive margin facing the predecessor of ocean basin of Ural- Tianshan Mountains; and at the north is the active continental margin of Siberia ancient plate with Zaysan ocean basin in between them.

Due to the late fracture activity, ancient tectonic pattern of China's East Tianshan and Beishan mountain area in east section of Tianshan is not as complete as in the west section of Tianshan Mountians. Based on the integration of new progress in the study of evolution of ancient active continental margin on southern margin of Turpan-Hami basin[19] and the existing research data of paleontology and large faults in recent years, the author thinks that the main body of the east section of Tianshan Mountains at east of the city of Urumqi is the Siberia ancient plate's hyperplasia edge. From Hallic mountain to south margin of the Turpan-Hami basin is the active continental margin in from Ordovician period to Carboniferous period which gradually move southward. On this continental margin's south are Kangguertag-Biyushan (north of Beishan mountain) collision zone, Kalatag-Xingxingxia-Hanshan(mid Beishan mountain) island arc, Hongliuhe-Baiyunshan-Xiaohuangshan collision zone, and active continental margin northern of Dunhuang block. This pattern is apparently different with and that of west section of Tianshan Mountains.

4. Curst's formation and evolution

Above mentioned Tianshan Mountains' crustal tectonic partition is formed by various geological effects in the long geological time. Composition type and time of the Tianshan Mountains' crustal geological body, suggests that the Tianshan Mountains crust have experienced the formation and evolution from the Archean eon to today, about 3 billion years of geological history. The make clear the long geological history need us to answer whether there are stages in the crustal formation and evolution, if there are, how to divide, and what are the relations between the phases, etc. These problems are briefly discussed. based on the following existing information, including the regional geology, paleomagnetism, paleontology and isotopic chronology.

4.1 Division of tectonic phases

In the Tianshan Mountains geological history has developed ancient oceanic basin in different geological periods and the ocean basin in each geological period is in corresponding to evolution process of from continental rifting to re-converge. The tectonic stages mentioned here are corresponding to such various geological periods in this region. Therefore, to determine the ancient ocean basins in different ages in the long geological history is the key to divide tectonic phases in this region.

Generally speaking, an ocean basin's opening and closing will leave corresponding geological records, including sedimentary environment changs, specific components and types of magma activity, sedimentary rocks reflecting the transgression or regression of ocean, strong tectonic deformation and metamorphic event, etc. For example, the ocean basin's open will leave traces of sedimentary environment changes from continental ones to marine ones, bimodal of magmatic activity, and regional high angled unconformity interface; in its development and evolution period, continuous shallow and deep marine sedimentary rocks series, calc and alkaline series and tholeiite basalt series magma activities took place; in the closing of an ocean basin, sedimentary environment changes from marine to continental ones, and rapid accumulation of extremely thick sedimentary rock series, aluminum rich and potassic rich igneous rock, regional dynamic metamorphic rock series, thrust fold structure with obvious polarity and the consequent parallel mountains' large strike-slip fracture structure and regional high angular unconformity interface in geological records were formed.

Based on the above understanding, and taking the following as marks such as unconformity interface at the bottom of Mesoproterozoic era's strata, unconformity interface at the bottom of the Sinian period's strata, strong tectonic deformation event in late Carboniferous period to early Permian period and obvious difference of magma activity and sedimentation before and after this

time, and the unconformity interface at bottom of Xiyu conglomerate rock in early Pleistocene epoch. Tianshan mountains' crust formation and evolution can be divided into 5 tectonic stages such as Archean eon-Paleoproterozoic era, Mesoproterozoic era-mid Neoproterozoic era, late Neoproterozoic era- Carboniferous period, Permian period - Pliocene epoch and since quaternary period which are relatively corresponding to global land evolution of Columbia supercontinent, Rodinia supercontinent, Pangea super continent and the existing land, etc.

4.2 Ancient active continent margin relics and their geological meaning in Archean epoch to Paleoproterozoic era

The exact Archean epoch's and Paleoproterozoic era's geological body can now be found mainly in Kuluktag region, consisting of supercrust rock series, Amphibolite xenoliths, T T G gneiss and granite. Base on the existing isotopic chronological data[68-73] , rocks with TTG rock series features represented by grey gneiss south of Singer were formed in the late Archean epoch, with invading gneissic two mica granite being formed at around 2000Ma which underwent metamorphism respectively in around 2300 Ma and 1850 Ma. Whether more ancient geological body develops here in this region or not, it still remains at further research.

The metamorphic rocks outcrop in Wunquan area and Baluntai area can date back to Paleoproterozoic era[7] , but there has been no exact chronological evidence. In recent years, the granite dating in Baluntai area bring us ancient zircon information[74] , revealing that in this area may have once existed geologic body in early Precambrian.

These ancient geological bodys can be compared with the later active continent marginal rock series in terms of rock associations and chemical characteristics. Although no exact ancient ocean lithosphere relics have been found, these rocks existence reveals interaction of plates similar with Phanerozoic eon might develop here in the late Archean eon to Paleoproterozoic era; it also reveals these ancient rocks in Tianshan Mountains are fragments of ancient super continental, not the original ancient continent nucleus.

4.3 Geological records on ocean-continent evolution and ancient plate motion in Mesoproterozoic era to mid Neoproterozoic era

Geological records in this period are widely exposed in the Tianshan Mountains.

Aksu group exposed in Aksu area at the northwestern margin of the Tarim Basin was covered in unconformity by Sinian is composed by green schist and blue schist with the blue schist shaped in mid Neoproterozoic era and the original rock of green schist being the tholeiite balsat at the bottom of the ocean [55, 56] . These rocks existence in the area reveals there were subduction and collision of blocks in early Neoproterozoic era.

The Xingxingxia group, Kawabulac group and Tianhu group exposed in the region of Kalatag-Xingxingxia in China's East Tianshan Mountains are all formed of volcano sedimentary rock series metamorphosed at different levels with Kawabulac group having more carbonate rock, which may be possible the carbonate platform of ancient ocean or the ancient mountain deposition. In recent years, information on the chronology obtained reveals the geological bodys in Tianshan Mountains were mainly formed in Mesoproterozoic era and early Neoproterozoic era[75-80] . In icy passages high on mountains in Tianshan, China, the author identifies gneissic granite rock around 950 Ma, its chemical characteristics are similar to the calc and alkaline intrusive rocks of active continental margin.

In Kuluktag region, this period's logical bodies are devided into Yangjibulak group, Aierjigan group and Pargangtag group which are mainly formed by terrigenous clastic rock and carbonate rock, cover in onformity the geological body of Archean eon and Paleoproterozoic era showing characteristics ofpassive continental margin sedimentary rock series.

The different types of geological bodies' existence mentioned above reveals the evolution of Tianshan Mountains crust has undergone the ancient ocean and continent pattern change and ancient plates interaction in Mesoproterozoic era to Neoproterozoic era; although their spatial distribution shows the macro features of active continental margin debris located in the north and the passive continental margin and the fragments of ancient subduction zone located in the south, the ocean and continent pattern at that time is difficult to rebuilt.

Tarim oldland's base is composed by the blueschist, greenschist, etc. in Akesu region and in recent years in the Tarim basin mid Neoproterozoic era's igneous rock[82, 83] was also identified, which indicates Tarim oldland's basement is composed of crystalline rocks in Archean eon and early Proterozoic era(debris of more ancient oldland) and orogenic belt in Mesoproterozoic era and Neoproterozoic era, and it was finally formed in mid Neoproterozoic era. As an independent paleocontinent, it was from late Neoproterozoic era's supercontinents division where it was located.

It is noted that, even without considering the above speculation of later fault activities leading to the displacement of Kuruktag region, currently identified geological body'a composition and spatial distribution of Tianshan mountains in the Precambrian period (especially as they relate to Tarim oldland's basement outcrop), palaeomagnetic data of two oldlands of Tarim and Ili[59] , and the existence of other oldlands in, Tianshan Mountains in Central Asian region (Figure 3) will all not support the two oldlands of Tarim and Ili were once directly connected.

4.4 Ocean-continent evolution stages and formation of crustal mainbody's frame in Sinian period(late Neoproterozoic) to Carboniferous period

Continuous sedimentary rocks in Sinian period to Carboniferous period exposed at Keping to Akesu region at northwest edge of Tarim Basin reveal the predecessor of ocean basin of Tianshan Mountains in this geological period was of continuous development. the high angle unconformity between this area and Sinian system and the underlying geological body in Kuruktag region, development of Sinian period's extremely thick terrigenous clastic rocks and the moraine rock and bimodal volcanic rock in it, as well as the geological records in Sinian period to Carboniferous period of Tianshan Mountains, reveal the predecessor of ocean basin in Paleozoic era of Tianshan Mountains can be divided into the following several stages in terms of the formation and evolution.

4.4.1 Oldland pyrolysis and opening of predessor of oceanic basin of Tianshan Mountains in Sinian period

When the predecessor of ocean basin of Tianshan Mountains open is still in discussion in geological field. Some scholars, on the basis of the geological body's time and the Cambrian period's sedimentary characteristics, think that this basin opened in the Ordovician period or Silurian period[84, 85] . This is not only in conflicts with the phenomenon of successive passive continental margin sedimentary rocks system in Sinian period to Carboniferous period exposed in northern margin of the Tarim Basin, but also in conflicts with the widely exposed active continental margin complex rocks in Ordovician period which indicate the ancient oceanic basin have began to shrink, in China's Tianshan and Central Asia. Therefore, L I[86] based on analysis on volcano sedimentary rock system at Sinian period's strata in the northern margin of the Tarim Basin and the northern margin of Yangtze Landmass, speculates that it was open in the Sinian period. The author also expounded similar recognition [20, 21, 23, 87] . Xia Linqi and so on[88] also made a similar conclusion. Xu and so on[89] 's chronology researchon the volcano rock of Beiyixi Fm in Kuruktag region further defines the time limit of this continental breakup which leading to the formation of ancient oceanic basin.

In recent years, study on ophiolite of Tianshan mountains gained some highly precise chronological data (Figure3). Yang Haibo and so on[41] underwent zircon dating of gabbron and basalt of ophiolite in Dalubayi region in Nalati mountain and found the ages of 590 Ma and 600 Ma, which is so far the oldest age of ophiolite obtained in Tianshan mountain range and reveals the predecessor of oceanic basin in Paleozoic era of Tianshan Mountains already has a certain scale in mid Sinian period. Long Lingli and so on underwent zircon dating of ophiolite and gabbro in Lule lake and Wang Runsan with other ones and Zhou Dingwu with other ones underwent dating and got the zirconU-P b age, which are all belong to Ordovician and Silurian periods, but these ages only indicate the ancient oceanic basin was in the expansion at that time

and can not prove that the ancient ocean basin opened in Ordovician period or Silurian periods, because in this area develop active continental margin structure from Ordovician period to Carboniferous period.

Considering the sedimentary rocks system characteristics on northern margin of the Tarim Basin in Sinian period and Paleozoic era, and the isotopic chronological data of ophiolite and the complex rock of active continental margin of Tianshan Mountains and the adjacent areas, the author believes that the oceanic basin of Tianshan Mountains during the Paleozoic era was formed during the continent breakup in Sinian period.

4.4.2 Continued expansion and passive continental margin basin evolution in Sinian period to Cambrian period

In Kuruktag, Keping , Akesu and so on on the northern margin of the Tarim Basin, as well as in BoluoHuoLuoshan mountain in the Tianshan Mountains, main body of strata in Sinian period to Cambrian period is all of terrigenous clastic rock mixed with carbonate rock, no volcano substance of calcium and alkaline series found[7, 81] . In the Tianshan Mountains, so far no exact magmatic activity of calc and alkaline series has been found in Cambrian period. These data indicate that the predecessor of Paleozoic era's ocean basin of Tianshan Mountains was likely to continue the expansion in Sinian period to Cambrian period, with the passive continental margin on the edge.

4.4.3 Ancient subduction zone's formation and evolutiona nd the ancient ocean basin's sustained contraction in Ordovician period to Carboniferous period

Magmatic activity in the Ordovician period and Silurian period found gradually in Harercshan mountai, Boluohuoluoshan mountain, Liuhuangshan mountain at South Tianshan Mountains, Hallicshan mountain in East Tianshan Mountains[12, 13, 91, 93-98] reveal predecessor of ocean basin of Tianshan Mountains had begun to shrink from Ordovician period, that is to say ancient lithosphere plate started to dive. From Long Lingli and so on's report of age (Silurian period) of ophiolite of Kule lake, we know at the same time of the marginal subduction and reduction, there was still new oceanic lithosphere formed at the ancient ocean's expansion ridge until Silurian period.

Geologic record on active continental margin in mid Tianshan in Central Asia reveals that, in the late Early Paleozoic era to early Late Paleozoic era, islands in ocean might gradually gathered together to form the Kazakhstan ancient plate. In Nalati mountain, Baluntai region and Kuruktag region, potassic rich granite's formation in Silurian period[42, 54, 74] might correspond to this event. But the presence of magmatic activity of calc and alkaline series in Silurian period to Devonian period at South Tianshan's Lake Kule's north, north of Baluntai to Kumishi region, southern

margin of Turpan-Hami basin in East, etc. [13, 14, 42, 94, 95] all reveal ancient oceanic basin was not closed in Silurian period to Devonian period.

In East Tianshan's Tuwu region and its north, Kalatag region, West Tianshan's Dahalajunshan mountain, Yilianhabirgashan mountain and Central Asia all develop magmatic activity of calc and alkaline series in Carboniferous period[15-19, 36-38, 40] and siliceous rocks associated with ophiolite containconodonts and radiolaria fossils in Devonian period and Carboniferous period[34, 99] , revealing the ancient oceanic basin's evolution and ancient oceanic lithosphere plate 's subduction both lasted into the late carboniferous period.

4.4.4 Ancient oceanic basin's closure in late Carboniferous period and unified continental crust's formation

As for the Tianshan ancient oceanic basin's closing time, there have been two kinds of understanding in geological circles of late Carboniferous period[87] and Permian period[100] . In recent years, Xia Linqi and so on[88] , according to research on the volcano rock and unconformity interface in strata in Carboniferous period, think this oceanic basin closed in late Devonian period and early Carboniferous period, and Wang Jingbin[101] also holds the similar view point. Zhang Lifei and so on[102] according to chronological research on high pressure metamorphic rocks on north slope of Hallic mountain, think that ancient ocean basin's closure might occur in the late Permian period orTriassic period; Li Rijun[103] and so on, based on study of microfossils in siliceous rocks on the southern slope of Hallic mountain also think that the evolution of predecessor of ancient oceanic basin of Tianshan Mountains might continue until the Late Permian period or the Triassic period.

As for the differences of this issue, the key lie in if the geological data is accurate and the explain is reasonable, whether all records on ancient oceanic basin's evolution are considered in this area, and when and where the main tectonic deformation dominated by compression in this area age took place.

First of all, we are to see whether there is sufficient evidence to show that the Tianshan Mountains' predecessor of oceanic basin closed in the early Carboniferous period or more earlier to Paleozoic era. Han Fubao and so on[74] found Silurian period's granite in Baluntai region is characterized with the rock geochemistry of post collision, but they did not specify which event was associated with it. Other scholars think similar granite at the same time in other places in Tianshan is formed in the active continental margin environment [42, 54] . Based on comprehensive analysis of existing data, the author speculates that this period is probably the Kazakhstan ancient plate's polymerization period, and Tianshan Mountains' predecessor of oceanic basin was not closed.

Secondly, the unconformity between Carboniferous period's Maanqiao group in Tianshan Mountains and its underlying geological body is considered by some scholars as strong evidence of Tianshan's predecessor of oceanic basin's closure[88] . Through the study of related data and the field investigation on some parts of the area, the author formed the concept that conglomerate placed at the bottom of Maanqiao group developed only in some regions such as north Baluntian town, and its relation of successive deposition with sedimentary rock of tight fold on it has not been found. Underlying geological body of Maanqiao group is basically the Proterozoic eon's metamorphic rocks system and its directly contact relationship with Paleozoic era's oceanic crust debris has not been found. Therefore, taking the unconformity interface as time limit of the Tianshan Mountains' predecessor of ancient ocean is of no sufficient evidence at least. As for unconformity interface in the strata, the author thinks that its geological significance can be determined only when other aspects of data are considered. We know in the magmatic arc of active continental margin and the forearc and back arc areas, unconformity interface is very common geological phenomena. For example, obvious unconformity interfaces in Mesozoic era's and Cenozoic era's strata in Cordillera in the west coast of the United States and Japan's forearc region all develop well, and if we come to the conclusion that the Pacific ocean closed, it apparently does not conform to the actual situation. As for the the unconformity interfaces in Tianshan Mountains and the adjacent regions in late Devonian period and Carboniferous period's strata, the author thinks that there are 2 cases, one is the local ocean basin's closure in the geological record, such as unconformity interfaces in late Early Carboniferous epoch; the other is local unconformity interface limited to the active continental margin. Unconformity interface Carboniferous period's strata in Tianshan Mountains and its underlying geological body may both belong to the latter.

From the sedimentary environment, marine sedimentary environments in Tianshan Mountains and in the northern areas all continued into the end of Carboniferous period, and prior to this, from the Devonian period to the Carboniferous period, marine sedimentary environment took priority, without any indication of change from marine to land then to marine, ie the process of ocean basin's closure to open again. Especially in the northern margin of the Tarim Basin, strata in Sinian period to Carboniferous period is of substantially continuous marine sedimentary rocks system, indicating the ocean basin they faced in Paleozoic period developed continuously. As described above, in Kule Lake in southern Tianshan Mountains and Bayingou in North Tianshan, siliceous rocks associated with ophiolite all consist microfossils in Devonian period and Carboniferous period, and they are considered the component of ophiolitic melange. In recent , Xi and so on[104] l and Xu Xueyi and so on[105, 106] reported the 325 Ma isotopic age obtained from ophiolite in Bayingou region, and accordingly oceanic basin represented by the ophiolite is of red sea type formed in Early Carboniferous epoch. Because there is no obvious indication that the siliceous rock containing the Devonian period's microfossil and siliceous rock containing microfossil in Carboniferous period are relatively belong to 2 sets of ophiolites, which are geological record on two ocean basins' opening-closing, so if the 325 Ma ophiolite represents

new born oceanic basin in Carboniferous period, there is need to take into consideration all of sedimentary environment change, magma activity differences, strong tectonic deformation's age and other information.

Equivalent to layer of Maanqiao group or the Carboniferous period's volcano rock positioned on it and contemporary large area of granite, are of obvious geochemistry features of active continental margin complex rock[16, 17, 19 36-3, 40, 50].

High pressure metamorphic rock's formation age in Tianshan Mountains was once placed in the late Proterozoiceon[107, 108], Silurian period to Carboniferous period[85, 109], Carboniferous period [34] and Permian period or triassic. Period[102]. However, Klemd and so on[110] made systematic research on the existing chronological data and thought the high pressure metamorphism occurred mainly in late Carboniferous period, revealing the evolution of the ancient ocean basin continued until the late carboniferous period. This conclusion and the author's study on deformation age of Tianshan area in recent years are in good agreement.

Then was ancient ocean basin in this area not closed until Permian period or Triassic?

Magmatic activity during the Permian period in Tianshan area was very strong. But, mantle-derived magma activity took the priority during Permian period, different with the Carboniferous period. And it was of bimodal feature with similar magma activity widely developed in the both sides of Tianshan Mountains, including wide area of Altay mountain and Tarim oldland[7, 23-28, 44-46, 48-53, 111-120]. Intrusive rocks and volcano rocks in this time can be seen both in Tianshan Mountains 'Kanggurtag collision belt and South Tianshan collision zone, with youngest perilith of intrusive rocks being the deformed marine sedimentary rock series in Carboniferous period, and volcano rock's occurrence and deformation characteristics are also clearly different from the geological body covered by it or associated with it. As for type of rock and rock's chemical composition, igneous rock in Permian period has no obvious polarity features. As for occurrence, the Permian period's rocks are mainly of small laccolith with basic dike broadly developed. These characteristics reveal that they were formed in regional extensional tectonic background.

As for deposition, although there are reports of development of Permian epoch's marine deposits in southwest Tianshan Mountains, there are limited evidence to support it, and the possibility cannot be excluded that the marine sedimentary environment was in early phase of the foreland basin's evolution.

Gradually obtained chronological data of main deformation belt in Tianshan Mountains reveals the Tianshan Mountains in the Paleozoic era experienced 2 phases of strong tectonic deformation of the whole region, with the early tectonic deformation occurred in late of Carboniferous period to early Permian period and the late one, mainly of compression system, took place in mid

Permian period to late Permian period and most areas were dominated by strike-slip system[23, 121-125] . Although there is information of compression tecton deformation in late Permian period and strike-slip movement in Triassic period[126, 127] , there is no information of regional compressional tectonic deformation in Permian period or early Triassic period found. To date there is no evidence of regional strong tectonic deformation before Late Carboniferous epoch.

Based on the above data and analysis, the author believes that Tianshan ancient oceanic basin's closure occurred in the late of Carboniferous period, not in the earlier or later geological periods.

4.4.5 Introcontinental crustal evolution from Permian period to the early Cenozoic era and formation of current crustal tectonic framework

Crustal tectonic evolution of Tianshan Mountains since Permian period of all occurred in the intracontinental enviroment, with obvious difference with the 3 phases mentioned above. At present it is known that in addition to intracontinental large sedimentary basin; s formation and evolution, major geological events are magmatic activity of calc and alkaline series and extrusion deformation (290-300 Ma) in the early Permian, mantle magmatic activity and crust magmatic activity in early Permian epoch (270-280 Ma), strike-slip movement in mid and late Permian period (260 Ma), alkaline magmatic activity at the end of the Permian period to Triassic period (260-240 Ma), strike-slip movement in Late Triassic epoch (220 Ma), magmatic activity in Late Triassic epoch to early Jurassic period (220-180 Ma), magmatic activity in Cretaceous period, etc.

In the literature, the geological effect in Permian period of is attributed to the post stage plate collision with the rest belonging to tectonic movements in the plate. However, compared with the definition on post collision by Liegeois[128] , Permian period's tectonic evolution in the Tianshan Mountains and the adjacent region has its own characteristics, namely mantle-derived magma intrusion and eruption developed in this area.

Magmatic activity in Tianshan Mountains in the Triassic period and Jurassic period was found in recent years, which mainly developed in East Tianshan and Beishan area in China with rich alkali acid small laccolith taking the priority [3, 4, 47, 129] . Why magma activity developed in this time has been a puzzling problem. Based on the regional geological background analysis, found in the same time igneous rocks and thermal events can also be found in Altay mountain of China, Mongolia, outer Baikal in Russia, north of Northeast China, Beishan to I Suo Lunshan in Inner Mongolia and West Lamulun river as well as the northernedge of Dunhuang paleocontinent and China-Korea paleocontinent[130-133] . Igneous rocks in this time in Altay, Mongolia, Russia's outer Baikal and north of Northeast China spread up around Mongolia -Okhotsk orogenic belt and at Beishan-Suolunshan in Inner Mongolia- Xi Lamulun River and north edge of China-Korea paleocontinent is another giant igneous rock belt. The author speculates that they may

respectively related with continental margin evalution of predecessor of oceanic basin of Mongolia-Okhotsk orogenic belt and the collision of China-Korea paleocontinent-Dunhuang paleocontinent and Mongolia paleocontinent.

Magmatic activity in late Cretaceous is only found in the Southwest Tianshan Mountains of China and Central Asia, which is supposed to being the product of mantle plume activity. But volcano rock in Tuyon basin contains lower crustal xenoliths, and dominated by acidic igneous rocks, so it cannot be ruled out that their formation are related to Tethys ocean's lithosphere plate's subduction to Eurasia continent.

To sum up, based on regional geological background and dynamics system the Tianshan Mountains' tectonic evolution in Permian period to the early Cenozoic period, seemly can be further divided into 3 different stages such as periodsPermian period to early of Triassic period, Triassic period to Jurassic period and Cretaceous period to Neogene period, which are respectively related to post-collision evolution(P-T) in Central Asia, Mongolia-Okhotsk orogenic belt and predecessor of Kulun orogenic belt of ancient Pacific oceab and the ancient Tethys evolution (TJ), intracontinental evolution (K-N) and so on.

4.4.6 Intracontinental orogeny in Early Pleistocene epoch and the formation of current basin-mountian pattern

Tianshan Mountains in the early Pleistocene epoch experienced strong intraplate orogenic movement to form the basin-mountain patterns and landform features in the present day. The existing data show that in this area intraplate orogeny are mainly of thrust and nappe, strike-slip movement and differential uplift. The trust and nappe mainly developed in between the the mountain and basin on north and south sides of Tianshan Mountains leading to basin deposits with Neogene period's sedimentary rocks included to be involved in to the mountain chains, that is to say, the mountain grow to the basin. Strike-slip movement is mainly along the conjugated NE sinistral strike-slip faulting and NW right-lateral strike-slip fault, with the NE sinistral strike-slip faults more developed. Differential uplift formed today's lofty mountains with elevation of near 7000m and basins with the lowest one of minus 154 m below sealevel. An interesting phenomenon is, the present Tianshan Mountains and the ancient Tianshan Mountains have obvious differences with Halc mountain-Bogda Mountain-Hallic mountain being the main vein of present Tianshan Mountains, but their geological structure has obvious difference.

This intraplate orogeny is unique, and is generally regarded as the distance effect of collision between India continent and Eurasia continent. But why this introplate orogeny is so strong only in the Tianshan Mountains, why it is not total the same as ancient Tianshan Mountains in terms of

space, and why the geological structure background did not change while the mountain along the trend will gradually transform into a basin or plain, which are all necessary to further study.

5. Summary

On the whole, the existing information makes it possible for us to reconsider the major issues such as crustal evolution of Tianshan Mountains, geological background and the preservation potential of mineral formation and so on. It is not difficult to see from the above, there is big difference between the author's view on some issues of Tianshan Mountains and their predecessors'.

In general, these differences are mainly:

1. The author thinks the Tianshan Mountains crust structure is not in simple east-west trend and north-south zonality, but has a relatively complex structure. In literature it is often referred Kazakhstan ancient plate did not extend into the East Tianshan, and Tarim ancient plate did not extend to Beishan area; in the north of Kangguertag fault zone is Siberia ancient plate's active continental margin and North Tianshan Mountains and South Tianshan Mountains west of Urumqi are relatively of active continental margin on both sides of Kazakhstan ancient plate; ancient island arc in Xingxiangxia region and so on and the lost ancient lithospheric plates may constitute another ancient plate with ocean taking the priority which is independent with the above mentioned 3 ancient plates; Kuruktag region might be part of ancient island arc repositioned by fault activities. It is this ancient pattern that leads to the significant differences in between current East Tianshan and West Tianshan.

2. The Tianshan Mountains' crust formation went through 3 ocean-land evolution stages such as Archean eon-Paleoproterozoic era, Mesoproterozoic era-early Neoproterozoic era and Sinian period- Carboniferous period, and in this area, the present-day crustal structure framework was mainly formed in ocean-land evolution stage from Sinian period to Carboniferous period.

3. In the area, ancient oceanic basin ended in the late Carboniferous period and from Permian period to early Triassic period is the post-collision tectonic stage of the crustal formation and evolution in the area, and it is the important time of crustal consolidation and mineral resources formation. From late Triassic period to the early Cenozoic era, is both of intraplate evolution stage, with this period's crustal movement mainly constrained plates' interaction in between varous areas.

4. From Early Pleistocene era is the intraplate orogenic phase, and the author takes it independent, because tectonic framework and landform features of present Tianshan

Mountains and the neighbor area are mainly formed in this time, Tianshan orogenic belt formed by subduction and collision of the plate has been largely vanished in the early Pleistocene era which was replaced by the Tianshan intreplate orogenic belt, with mechanism of formation and spatial distribution not the same between them two.

As for the formation history of Tianshan Mountains, although the paper lays out an outline, the detailed process is not very clear. What still remain at further research are: 1. location of the oldland fragment composing Tianshan mountains in ancient ocean are basically in speculation. For example, if 3 micro continents of Muyunkum, Kyzylkum and Ili in Central Asia, are of oldland in archipelagic ocean or different parts of a series of island arc in the Early Paleozoic era is difficult to determine by the existing data. 2. The Permian period is an important period of Tianshan Mountains formation and Central Asian crustal formation and evolution and mineral formation, but if this period's magma activity derived from post collision delamination or mantle plume activity still needs further research. 3. In late Cenozoic era the intracontinental orogeny or intraplate orogeny of Tianshan mountains is unique, whose detailed process and formation mechanism are as yet poorly understood. 4. The Tianshan Mountains as one part of the Central Asian region, in phanerozoic eon, Mainly in Paleozoic era, the crust significantly grew. And the process and mechanism is still in fuzzy by now. 5. The reconstruction of crust history of Tianshan Mountains and its adjacent regions is still in vague, and as for detailed temporal and spatial evolution process, there is no systematic dissertation and dynamic reconstruction in the literature. Therefore, it is likely to achieve a major breakthrough and progress inside the near future if we undertake further pertinent research, which is of great theoretical and practical significance for earth science's development and improvement, and to accelerate the exploration of mineral resources in this area. Acknowledgement: This study used lots of the previous data, and the relevant departments of Xinjiang gave support and help energetically, here we express the highest respect and heartfelt thanks.

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The Second Part: Abstract

Characteristic Analysis on Ecosystem Coupling Relations in Arid Zone

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Abstract: The differences of ecosystem coupling relation characteristics in arid zone can be found by water-heat condition, landscape band spectrum, microclimate effects and factitious activities, and so on. Longitude, latitude, altitude and land coverage features are the most basis elements for ecosystem coupling characteristics. Meanwhile, variations of some physical geographical factors are important elements for characteristic discrimination and type classification. Based on theory and methodology of physical geography and landscape, combined with some related principles, two typical MODS coupling relations, such as, Kunlun Mountain, Hotan oasis and Taklimakan desert system and Tianshan mountaion, Fukang oasis and Guerbantonggute desert system are compared. Furthermore, general patterns and laws are analyzed in MODS.

Key words: arid zone, ecosystem, coupling relation, MODS, water-heat condition, landscape

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Cenozioc Evolution of Geographical Enviroment in North and South Sides of the Tianshan Mountains

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Abstract: Since the Cenozoic Era the development of the Tianshan Mountains has gone through two periods of the formation of peneplain under denudation and planation in the Early Tertiary and the rise of high mountains corresponding to block faulting by a big margin from the Neogene to the Quaternary. Therefore, the evolution of natural environment is controlled.

In Early Tertiary, replacement environment of sea and land sedimentation occurred in the southern piedmont of Tianshan Mountains, which was in contact with the Mediterranean Sea in some times; and in the northern piedmont of Tianshan Mountains there was terrestrial environment of river and lake deposits. Since the Late Tertiary, sedimentary environment has tended uniformity with slight difference in both mountain pieldmonts.

Tianshan region belongs to a part of arid land between the zone of deciduous broad leaf tree of the northern temperate zone and the zone of evergreen broad leaf trees of the southern subtropical zone. Since the Tertiary, it can be divided into two relatively humid periods (the Palaeocene-Eocene and the Oligocene-Miocene) and three drought periods(the Early-Mid-Oligocene, Pliocene and Quaternary). The Quaternary period featured also some relatively humid and drought pulsation.

Keywords: Tianshan mountains, Cenozoic, uplift, Environment evolution, Palaeo vegetation

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Relationship of the Occurences and Evolutions of Wild-fruit Forestswith Climatic Factors in the Tianshan Mountain

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Abstract: The distributions of wild-fruit forests in Yili River Valley of the Tianshan Mountain were investigated and the relationships of the occurrence and evolutions of the forests with climatic factors in the valley were accordingly analyzed in light of the multi-year climatic data. The results show that wild-fruit forests in Yili River Valley of the Tianshan Mountain are the "Mediterranean broadleaf forests occurring in mountainous lands of arid desert regions under the influence of prevailing west ward air currents. Their occurrences and evolutions and distributions closely relate to such ecological factors as abundant local rainfall, clear inversion layer in winter and landforms exempt from the impact of cold wave. They are precious and rare relict communities as well as the products resulting from the combination of the components of the teriary paleo-temperate broadleaf forests in the Tianshan Mountain and the forest meadows in northern China, and much differ from the wild-fruit forests of the Tianshan Mountain in the western part of central Asia. They are one of the important origins of the deciduous fruit trees planted in the world and a natural gene back of biodiversity rarely found in the world.

Key words: Tianshan Mountain; Yili River Valley; type; resources; ecotype; characteristic

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Indication of Desert Vegetation to Landscape Patterns and Dynamics at the Northern Edge of Tianshan Mountains

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Abstract: Landscape is an integrated earth surface unit composed of interacted landscape components such as climate, landform, hydrological condition, soil and vegetation. Vegetation is sensitive to other landscape components in a landscape and was usually employed to indicate the dynamics of other landscape components. In this paper, vegetation patterns with environmental gradients and their indication to landscape patterns and processes were studied in a typical area from middle mountainous zone of the northern slope of Tianshan Mountains, through the clayey desert at the southern edge of Jungar Basin, to the southern margin of GurbanTonggut Sandy Desert. 10 transects were set in the study area. 43 relevs of plant communities were recorded and soils at the depth of 15 cm and 45 cm for each relev were taken. TWINSPAN was adopted to distinguish plant community types and DCCA to reveal links between plant communities and habitat conditions. 10 types of plant communities were divided. Although the effects of soil salinity and water table upon vegetation in arid land have been convinced by previous work in this region, our results implied that physical composition of soils in the study area is also closely

linked to various plant community types remarkably. As to the preference to fine grain, the order is concluded as H.persicum-H. ammodendron community >H. ammodendron community>R. soongorica community, and an opposite order for coarse grain, therefore the H. persicum-H. ammodendron community on clayey desert in the study area is regarded as an indicator of sandy desertification.R.soongorica community has higher adaptability to saline soil than H. ammodendron community, and exist in habitat of higher salinity, while halophyte community indicates soil salinization.T. ramosissima community doesn't show obvious preference to salinity or water table depth, but a quite remarkable preference to a high soil moisture content. Vegetation patterns interpreted from ETM satellite images well reflects the spatial patterns of physical composition and total salt content of soils, which further demonstrated that vegetation well indicates landscape patterns in the study area. It is inferred from this study that dynamics of two types of desertification, sandy desertification and saline desertification, can be revealed by studies on vegetation dynamics in the study area.

Key words: desert vegetation, landscape pattern, indication, desertification, Jungar basin

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Study on Phyto-diversity and Conservation of the Wild Fruit Forest of Tianshan Mts in Xinjiang

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Abstract: The wild fruit forest in the Tiannshan Mountain of Mid-Asian, is the origin of the apple, walnut, apricot and plum in the world Xinjiang wild apple (Malus sieversii), wild walnuts (Juglans regia) has been listed as Class II of State Endangered pIants. According to the many years' investigation, collection and statistics, in the Ili wild fruit forest, there are various kind of plants and the spermological plants over 430 species of that wild fruit plant belongs to 7 families, 17 genus and 46 Species. Besides, also distributed many moss, lichen, large fungus and microbe resources . Meanwhile, the wild fruit forest is the living and breeding habitat of many birds and beats. protecting and studying the plains in the Ili wild fruit forest have an important significance, such as fruit plant, relatives of crop, edible, perfume and ornamental plants, and herbal medicine plants. The abound biodiversity in the Ili wild fruit forest is the important bio-gene pool that is essential for the human existence and development in the future.

Key words: wild fruit forest of Tianshan Mts, phyto-diversity, conservation.

1998, Vol.15, No.3, Journal of Arid Zone Research, P.10-13
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RS Research of Landscape Distribution Characteristics of Northern Piedmont, Tianshan Mountains

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Abstract: The northern piedmonts of the Tianshan Mountains are about 280 km long and 60 km wide, extending from Kuytun city to Fukang city, which are transitional belts between mountains and plains, appearing in three rows with different morphologies and with their age becoming younger from south to north. Based on GIS and RS, and the materials of the former researchers, this paper deals with the genetics of the piedmont belts and their landscape features resulting from piedmont folding by neotectonic movements, and also describes their length, width and slope by remote sensing image interpretation. The characteristics of the piedmont belts here are found to be very important for the surrounding environment by preventing underground water from flowing into plains, changing underground water, increasing the flux of surface flow water, in addition to its role in protecting the surrounding environment. The purpose of this paper is to provide an in-depth understanding of the piedmont belts and the influence on the surrounding environment of the piedmont belts.

Key words: piedmont belts; piedmont landscape; geomorphic landscape; geomorphic remote sensing; Tianshan Mountains

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Studies on the Floristic Composition and Genesis of the Wild Fruit Forest in Tianshan Mountains in China

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Abstract: A general study was made on the composition, characteristic and nature of the dominant plants in the wild fruit forest in Tianshan Mountains to discuss the origin and development of the wild fruit forest. The result indicated that the floristic elements of the wild fruit forest were complex. Owing to the interpenetration of floristic elements and the overlap of distribution, the wild fruit forest had no absolute native feature. Among them, the temperate elements were dominator (33.33%), and the Siberian-Tianshan Mountains transition elements (17.54%) joint the wild fruit forest to the northern Angara flora, and Himalayas elements (10.53%) also connected the wild fruit forest to Cathaysian flora. The majority area of Xinjiang was ever one part of the Tethys Sea, and some remains of floristic elements (5.25%) from old Mediterranean could still be found. Tianshan Mountains was one of the richest areas possessed of plants in Xinjiang area and its ratio of constituents (33.33%) was upmost The characteristic elements of eastern Tianshan Mountains represent the native part of the wild fruit forest and which should be local origin. The origin of the wild fruit forest was various, including the floristic elements from Angara, Old Arctic, old Mediterranean, Cathaysian and Xinjiang.

Key words: the wild fruit forest in Tianshan Mountains; floristic composition; floristic genesis

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Study on the Diversity of Steppe Types in the Middle Section of Northern Slope of the Tianshan Mountain

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Abstract: In this paper, the diversity indices, species richness indices and evenness indices of the different steppe types are quantitatively analyzed based on the data measured from 16 representative plots in all the vertical zones in the middle section of northern slope of the Tianshan Mountains. The diversity indices of the different steppe types in middle section of northern slope of the Tianshan Mountains are in a sequence of montane meadow>meadow steppe>typical steppe > desert steppe>subalpine meadow>alpine meadow>desert, in which the species diversity is the highest in the steppe of Dactylis glomerata+Geranium pratense+forbs and the steppe of Geranium pratense+ forbs + herbs in the montane meadow, but it is the lowest in the steppe of Salsola brachiata+Ceratocarpus arnariusand in the steppe of Nanophyton erinaceumin the montane desert. These differences are closely related to the ecological environment. The differences of composition, structure, function and dynamic change of the different steppe types are revealed by the species diversity of the steppes. The interaction between the diversity indexes and the biomass of steppes is researched by analyzing the correlation among the indices. The study results can provide the scientific basis for conserving the biodiversity resources in the study area.

Key words: steppe type; species diversity; middle section of northern slope of the Tianshan Mountains; vertical montane steppe zone.

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Composition and Vertical Distribution of Plant Resources at the Middle Section on the Northern Slope of Tianshan Mountains

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Abstract: Based on field investigation and relative data, the composition of grassland plant resources at the middle section on the northern slope of Tianshan Mountain was analyzed. The results showed that the complicated ecological and geographical conditions resulted in abundant plant resources in this area, and the maximum of the species richness appeared in the alpine meadow. The heterogeneity of species along the vertical zone and the diversity of habitats at different parts could be reflected obviously by β index. The vertical differentiation of grassland species resulted from the habitat and environment evolvement. The conclusion could provide a scientific foundation to the conservation of biodiversity in this region.

Key words: Tianshan Mountains, grassland plant resources, vertical distribution.

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The Preliminary Analysis of the Distribution of Vegetation on the Middle Stretch of Tianshan Mountains of Xinjiang

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Abstract: The interrelationship between vegetation and environment of the middle stretch of Tianshan Mountain from the vertical section of Duku road is studied. It indicates that wild seed plants growing in this area are classified into 50 families, 184 gener and 371 species and the flora is characterized by purity of floral composition and complicated geographical factors. The vegetation types are varied and vegetation vertical zonal spectrum is integrated. The difference between vegetation distribution on the southern and northern slopes is noticeable and each vegetation belt has its own distribution characteristics. The vegetation distribution has the characteristics of arid and transition.

Keywords: Xinjiang; Tianshan Mountain; vegetation; distribution rule arid; transitional characteristics

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The Analysis on the Distribution Characters of Desert Ecosystem and Evolution Tendency in Xinjiang

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Abstract: Based on the principle of China vegetation classification, the desert ecosystem of Xinjiang is classified in four types. According to the classification, authors analyze the spatial and quantity distribution feature deeply. The results showed the desert ecosystems in Xinjiang mainly distribute in Turban Basin, Hami Basin, Tianshan Mountain and Kunlun Mountain piedmont. The rule of desert ecosystem distribution in Xinjiang is: half-shrub、little half-shrub desert ecosystem span the most county .The lest amount desert ecosystem spanning in Xinjiang county is cushion half-shrub desert ecosystem. The authors analyze the evolution trend of Xinjiang desert ecosystem in recent 20 years. The area of desert ecosystem increases by 13.83×104km2.It shows that the quality of Xinjiang ecosystem is decreased. In the evolution process, the other types of ecosystem transfer to the desert ecosystem. They are the cushion half-shrub desert ecosystem and shrub desert eco-system, their areas are 12.20×104 km2 and 12.16×104 km2 respectively. The two types of desert ecosystem lie in the south of Xinjiang province. It shows the quality of eco-environment in south of Xinjiang province changed acutely.

Key words: Xinjiang province; desert ecosystem, evolution, GIS

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Study on Ecological Distribution and Geographic Regionalization of the Aves in Northern Foot of Tianshan Mountain

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Abstract: The northern foot of Mt Tianshan, the longest branch is the richest area in plants and animal species and the most complicated area in distribution types. The paper gives a deeper Analysis on fauna geographic regionalization in term of ecological distribution of Aves in this area. As a result there are 256 species and sub-species, 112 genera, 46 families and 17 orders of Aves, including 110 species and sub-species of non-Passeriformes and 136 species and sub-species of Passeriformes. It also analyzes the similarity of bird species composition in 3 sub-areas and concludes that there are little differences in the composition among these three sub-areas and suggests to classify them into one area.

Key words: northern off shoot of Mt Tianshan; Aves; ecological distribution; regionalization; similarity

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Snow Leopard Survey in Tumor Nature Reserve, Xinjiang

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Abstract: Snow leopard survey was conducted in Oct-Nov 2004 at Tumor National Natural Reserve, Xinjiang, China. Because of its special living style, snow leopard is difficult to be observed by sight. Signs left by snow leopard become a good index to proof the existence of the big cat. There are mainly five kinds of signs, footprints, feces, claw rakes and urine spray, From them we can know the distribution, probable population and habitat selection of snow leopard, This time in Tumor we investigated 5 different places: Pochenzi in Mozat River area, Bozidun in Little Kuzbay River area, Yinyer in Tomur River area, Kurgan and Taglak in Qiong Tailan River area. 42 transects were run in this trip and totally 57 signs found. Among them, footprints amounted to 71.9%, scrapes 21.1% and feces 7.0%. The results showed that the big cat existed in Yinyer, Kurgan and Taglak areas and liked to select their habitat in the valley and didn□t like to live in the barren.

Key words: snow leopard; sign survey; habitat selection; Tumor Nature Reserve

2005, Vol.24, No.4, Sichuan Journal of Zoologe, P.608-610
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CN 51-1193/Q

Grassland Types with Environmental Relations in Middle Zone of Northern Slope of Tianshan Mountains

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Abstract: The canonical correspondence analysis (CCA) methods were used to study the distribution patterns of 47 grassland dominant speices in 16 sites with of 10 environmental factors in the middle part of northern slope of TianShan. CCA results showed that the ordination analyzing method used here for handling the ecological data of and grassland types with great ecological diversity is highly efficient. Many factors worked together on population distributions in vegetation areas, but annual rainfall, annual average were the most important factors. This conclusion explained why there were different grassland types where landforms were similar in the middle part of northern slope of TianShan Mountains.

Key words: the middle part of northern slope of TianShan Mountains Grassland types; combination structure; environmental analyzing

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Comparison of the Natural Vertical Zones Between Mt.Namjagbarwa and Mt.Tomur

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Abstract: Mt.Namjagbarwa is situated in the east end of Himalayas and near the big turn of Yaluzangzu River with an altitude of 7782 m and favourable natural condition and relative huge altitude difference on its southern slope where a fairlycomplete tropical mountainous vertical zone series is formed. The basal zone of the southern slope is the quasi-tropical monsoon forest zone. Mt.Tomur, the highest peak of the Tienshan Mountain, rises 7435.3m above sea level and is situated at the western end of the Tienshan Mountain of China. A relatively complete natural vertical zone series is also formed with temperate zone as its basal zone in the area. There exists obvious spatial difference in natural vertical zones of Mt.Namjagbarwa in comparison with that of Mt.Tomur. These differences can be found either in formation, structure composition of the natural vertical zones, the basal zones, the composition of zones or in landscape characteristic, discrepancy degree between the southern and northern slopes and predominate differential factor and so on. The result of the study shows that the former is characteristic of forest-grassland-desert soil zone series, which belongs to the humid and semi-humid spectral system pattern of monsoon while the latteris characteristic of desert-grassland-desert soil zone series, which belongs to the humid and semi-humid spectral system pattern of monsoon while the latter is characteristic of desert-grassland-desert soil zone series, which belongs to the humid and semi-humid spectral system pattern of monsoon while the latter is characteristic of desert-grassland-forest(northern slope)-desert soil zone series, which belongs to the arid spectral system continental pattern. Different ways of resource exploitation and environmental protection also discussed in accordance with natural vertical zones.

Key words: Mt.Namjagbarwa; Mt.Tomur; natural vertical zone; comparison

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CN 51-1516/P

The Succession of Plant Communities in Alpine Grasslands in Different Ages of Enclosing

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Abstract: Bayinbuluke alpine grassland is one of the largest sub-alpine grassland in China. Due to the serious degradation of grassland in the recent years, the state and autonomous regions invested to enclosing the grassland. By using the method of space substituting time, alpine grassland in different ages of enclosing was studied. Four flat plots with relatively uniform topography and enclosed time of 1 year (E1), 3 years (E3), 5 years (E5) and non-enclosure (G) were selected for studying. The grasslands were freely grazing pasture, grazing rate of 5.7 sheep•hm-2. After enclosure, it was used as spring pasture with 5.72 grazing sheep•hm-2. The non-enclosure plot was loaded 5. 72 grazing sheep•hm-2 in addition to the winter. The results showed that the species of community from Leymus tianschanicus+Oxytropis ochrantha Turcz change to Festuca ovina+Stipa purpurea. E1 had the highest richness index and diversity index in the four plots; the Pielou's index increased gradually; index of Simpson was the maximum in G; index of Sorensen was higher than 65% within all the enclosures. The above-ground biomass of E1 was significantly higher than that of G and E3 ($P<0.05$); the belowground biomass of E1, E3 and E5 was significantly different; in G it was significantly lower than that in E3 and E5. The soil porosity of G and E5 were in the two U-ends, the volume weight of G and E5 were in the two inverted U-ends. Along with the changes in the characteristics of the community, index of succession and degree of succession were 3.53, 4.28, 6.06, 6.43 and 43.57, 46.35, 52.25, 61.14, respectively. Both of them were gradually increasing.

Key words: enclosure; alpine grassland; community succession

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Glacial Events in the Tien Shan Mountains and Long-range Correlation

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Abstract: Palynologie and radiocarbon studies of more than 20 peat moors in middle and high alpine areas of the Tien Shan served as a basis for Holocene paleoclimatic and paleoglacial reconstructions. Climate cooling and humidification have been registered in 6-5, 3-2 kyr B.P. and in the last millennium. Maximal three phase cooling in the Holocene took place in the latest period and brought about an advance of glaciers of Little Ice Age. The Tien Shan moraine complex of that period is represented by three moraine chains, the earliest has been dated to the first centuries of our millennium, the latest - to the seventeenth-nineteenth centuries.

Gtaciers-Ocean-Aanosphae Interactions IAHS Publ. no. 208, 1991.

Compatibility of Selected Natural Protected Areas of Kazakhstan with the Requirements of the World Heritage Convention for the Nominated Sites

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In part fulfillment of the requirements for the degree of Master of Environmental Sciences and Policy)

Abstract : he lands of Kazakhstan are rich with natural resources. And not only oil and gas were given to the people by the nature. It shared with us the most valuable of its treasures-the diversity of life forms.

Having inherited this beauty, we are to be dignified heirs and save it. However, paying attention to the economic development, we forget about the nature. Some of the developed countries passed through the stage of active lands exploration and natural resources use and learned how to protect their natural wealth. Kazakhstan can learn from their experience and avoid the mistakes connected with the inappropriate use of natural areas was developed, and it is quite effective. This system was not created in one day, many countries step-by-step were involved into its work. At the moment there are more than 160 natural protected areas in various states, of the World Heritage.

Natural protected areas of Kazakhstan have a great value on the local and international levels. They deserve being in the World Heritage. But to be nominated and included it is necessary to prove the compatibility of these areas with the requirements of the World Heritage. Partially the assessment of the natural sits was done by the IUCN experts, who made an analysis of the biodiversity state, having marked the most prominent sits .They gave some recommendations concerning necessary changes on the sizes of the natural sits, necessity of work done by the IUCN, there are some uncovered aspects, which are Very important from the point of view of the WH nomination. And first of all, this is the environmental legislation.

The effective legal protection is one of the main requirements of WH. That is why in this work it was decided to make an analysis of the active environmental legislation of Kazakhstan and to point out its pluses and minuses, Its was also planned to hold the interviews with the people

directly involved into the protection of the natural sites of Kazakhstan. The results have shown that the active legislation of Kazakhstan does not provide the effective protection of the natural sits. The interviews have also confirmed the existence of obstacles for the WH nomination.

The analysis of the environmental legislation of Kazakhstan and the recommendations, which follow the main research, are the main value of this research. By making the analysis of compatibility of the natural sits of Kazakhstan it was determined which changes should be done in the legislation in order to make the protected areas really protected areas really protected and to save their beauty for the future generations.

The Current Distribution of Deformation in the Western Tien Shan from Block Models Constrained by Geodetic Data

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Abstract: We interpret Global Positioning System measurements of inter-seismic deformation throughout the western Tien Shan in the context of a block model which accounts for important geologic features (faults) and physical processes (elastic strain accumulation.) Through this analysis we are able to quantify the amount of deformation localized on active structures. In the central part of the belt the Djuarnarik fault zone appears to be the most important thrust fault, accommodating nearly five millimeters per year of north-south shortening across it. Conversely, the most widely recognized strike-slip fault in the region, the Talas-Ferghana, is found to have very little of the previously estimated right lateral motion.

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ISSN 00167886

Building the Northern Tien Shan: Integrated Thermal, Structural, and Topographic Constraints

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Abstract: Paired apatite fission track and U-Th/He dates provide the first Late Cenozoic cooling ages for the northern Tien Shan. These data clearly argue for pulsed deformation since the Late Miocene, with early (10–11Ma) and late (0–3Ma) intervals of rapid exhumation separated by an extended interval of much slower rates. By integrating these bedrock cooling rates with shortening estimates derived from a balanced section, detrital cooling ages, and geomorphological estimates of conditions before deformation, we reconstruct a four-stage history of range growth and exhumation.

Following~100 m.yr. of tectonic quiescence, abruptly accelerated rock uplift, exhumation, and cooling in the Kyrgyz Range commenced at ~11 Ma with rates exceeding ~1 km/m.yr. During the subsequent 7 m.yr., deformation and cooling rates decreased three to six fold before accelerating by comparable amounts during the past
3 m.yr. Since mid-Miocene times, the surface elevation of the Kyrgyz Range has increased ~2 km, consistent with the reconstructed magnitude of crustal shortening (~11 km) and thickening (~12 km) across the range. The highly pulsed deformation rates indicate that the locus of deformation probably shifted repeatedly within the Tien Shan from the Miocene to present. Even at their most rapid, Cenozoic shortening rates in the Kyrgyz Range were equivalent to only 10%–20% of the modern geodetic convergence rate across the entire Tien Shan. This requires several ranges within the Tien Shan to have deformed simultaneously since the Middle Miocene, a situation analogous to the distributed shortening seen today.

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Interannual NPP Variation and Trend of Picea Schrenkiana Forests Under Changing Climate Conditions in the Tianshan Mountains, Xinjiang, China

Weiguo Sang, Hongxin Su

Abstract: The interannual net primary production variation and trends of a Picea schrenkiana forest were investigated in the context of historical changes in climate and increased atmospheric CO2 concentration at four sites in the Tianshan Mountain range, China. Historical changes in climate and atmospheric CO2 concentration were used as Biome–BGC model drivers to evaluate the spatial patterns and temporal trends of net primary production (NPP). The temporal dynamics of NPP of P. schrenkiana forests were different in the western, middle and eastern sites of Tianshan, which showed substantial interannual variation. Climate changes would result in increased NPP at all study sites, but only the change in NPP in the western forest (3.186 gC m-2 year-1, $P < 0.05$) was statistically significant. Our study also showed a higher increase in the air temperature, precipitation and NPP during 1987–2000 than 1961–1986. Statistical analysis indicates that changes in NPP are positively correlated with annual precipitation ($R = 0.77–0.92$) but that NPP was less sensitive to changes in air temperature. According to the simulation, increases in atmospheric CO2 increased NPP by improving the water use efficiency. The results of this study show that the Tianshan Mount boreal forest ecosystem is sensitive to historical changes in climate and increasing atmospheric CO2. The relative impacts of these variations on NPP interact in complex ways and are spatially variable, depending on local conditions and climate gradients.

Keywords: BIOME–BGC, Boreal forest, Climate change, Interannual variation, Net primary production (NPP)

2009, vol24, Ecol Res, P.441-452.

Plant Diversity Patterns and Their Relationships with Soil and Climatic Factors along an Altitudinal Gradient in the MiddleTianshan Mountain Area, Xinjiang, China

Weiguo Sang

Abstract: Patterns of plant diversity along the altitudinal gradient of Tianshan in central Xinjiang, China were examined. Plant and environment characteristics were surveyed from higher, south of Bogeda peak, to lower, north of Guerbantonggute desert. There were a total of 341 vascular plant, 295 herbage, 41 shrub, and seven tree species in the sampled plots. The plant richness of vegetation types generally showed a unimodal pattern along altitude, with a bimodal change of plant species number at 100-m intervals of altitudinal samples. The two belts of higher plant richness were in transient areas between vegetation types, the first in areas from dry grass to forest, and the second from forest to sub-alpine grass and bush. The beta diversity varied with altitudinal changes, with herbaceous species accounting for most species, and thus had similar species turnover patterns to total species. Matching the change of richness of plant species to environmental factors along altitude and correlating these by redundancy analysis revealed that the environmental factors controlling species richness and its pattern were the combined effects of temperature, precipitation, soil water, and nutrition. Water was more important at low altitude, and temperature at high altitude, and soil chemical and physical characters at middle altitudes. This study provides insights into plant diversity conservation of Bogeda Natural Reserve Areas in Tianshan Mountain.

Keywords: Altitudinal gradient, Beta diversity, Biodiversity conservation, Environmental gradients, Species richness, Species turnover

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The Third Part: Title

Preliminary Study on the Lichen Community Structure in Forest Ecosystem of Western Tianshan Mountains

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CN 11-3397/Q

Structure and Formation Analysis of Rangeland Complex Type in the Middle Zone on Northern Slope of Tianshan Mountains

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Accretionary Orogenic Process of Western Tianshan, China

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Community Structure and Conservation of Wild Fruit Forests in the Yili Valley, Xinjiang

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2001, vol28, No.1, Arid Zone Research, P.60-66
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CN 65-1103/X

Precipitation over the Middle Tianshan Mountains and Their Northern Slopes: Variations and Their Cause

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Tectonic Correlation Between the Western Chinese Tianshan and it's Western Adjacent Area

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(Department of Geography, Peking University, Beijing; Department of Geography, Xinjiang University, Urumqi)

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CN 23-1324/X

Stand Factors of Picea Schrenkiana var. tianschanica along the Altitudinal Gradient in Different Longitudes

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CN 11-1908/S

Characteristic Analysis of Seriphidium Transillense(Poljak.) Poljak. Desert Grasslands at Different Degraded Stages in the Northern Tianshan Mountains

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The Formation Characteristics and Taxonomic Classification of the Soil Under the Wild-Fruit Forests in Yili Valley, Xinjiang

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Ecological Gradient Analysis and Environmental Interpretation of Mountain Vegetation in the Middle Stretch of Tianshan Mountain

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CN 11-3397/Q

Evolution Feature of the Clastic Materials on the Southern Piedmont of Mount Tuomuer

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Characteristics of Climatic and Hydrological Variation in Southern Tuomuer, Tianshan, Xinjiang during the Past 40 Years

Wang Jian, Ding Yongjian, Liu Shiyin, Ye Baisheng

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On the Important Quaternary Events and Their Necessity for Deep Research at the Piedmont of Tianshan Mountains

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A Preliminary Study on Picea Schrenkiana Population Dynamics in the Central Tianshan Mountains, Northwestern China

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Distribution of the Ibex (*Capra ibex*) in Tomur National Nature Reserve of Xinjiang, China

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Tianshan Mountain Wild Fruit Resources

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Analysis on the Components and Resource Situation of Seed Plants in the Wild Fruit Forest in Tianshan Mountain in China

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Late Holocene Northern Slope of Tianshan Spruce Forest Line and Paleo-environmental Characteristics

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Palaeo-Biodiversity at the Northern Piedmont of Tianshan Mountains in Xinjiang During the Middle to Late Holocene

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Glacial Geomorphology and Glaciations in the Muzhaerte River Valley, Tianshan Mountains

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CN 65-1095/X

Annex 1

Adjusted Area of the Nominated Kalajun-Kuerdening and Its Buffer Zone

In July 2012, the environmental consultant of IUCN, Pierre Galland, and the national project manager of UNEP, Andrew Scanlon, made a field investigation of the nominated World Heritage components of the Xinjian Tianshan property. They suggested that they are reasonably and scientifically appropriate for Bogda, Bayinbuluke and Tomur, and that they meet the requirements for protection of the integrity of the natural heritage. However, they suggested that Kalajun and Kuerdening should be connected and that to better protect the biodiversity, a biological corridor should be designated to facilitate the interaction of plants and animals.

Based on the suggestions from the IUCN experts and after several rounds of study and discussion, the scope of Kalajun and Kuerdening has been adjusted.

1. Principles Underpinning the Adjustments in Area

1.1 Human activities should be minimized to keep the natural character of the nominated site, but should not be systematically excluded.

1.2 In order to ensure sufficient area for species interchange between Kalajun and Kuerdening, biological corridor should have necessary width.

1.3 Boundaries should follow ridges, valleys, rivers, forest lines and geomorphic units to facilitate identification and management.

1.4 Necessary natural elements, such as significant vegetation and animal habitats, should be included.

2. Details of the adjusted area

2.1 Scope of the nominated site

The area between Kalajun and Kuerdening will be added to the original nominated area. The northern boundary goes from the T1coordinate at the northeastern border of the nominated Kalajun, along the forest edge line where there has been little human interference and the edge of the field reclamation area, and then goes southeast along the branch of the TarimJiergalang river to coordinate T2 at the branch of Kuerdening river, where it meets the western boundary of the nominated Kuerdening. The southern boundary is from coordinates T3 at the south border of the nominated Kalajun, extending along the border between Hejing County and Gongliu County, and then goes east to the westernmost point T4 at the southern boundary of the nominated Kuerdening.

2.2 Scope of the buffer zone

The boundary of the buffer zone is basically the same as before. The northern boundary of the added biological corridor starts from coordinate T11 and goes east along the edge of the Piceaschrenkiana forest, along the TarimGiergalang river and its branch and Qiaxi river and its branch, and meeting the west border of the buffer zone of Kuerdening at atcoordinate T22.(see Table 1 for the adjusted coordinates, and Figures 1 and 2 for the adjusted area).

Table 1 Adjusted Coordinates of Kalajun-Kuerdening

No.	Coordinates	No.	Coordinates
T1	E82°30′47″, N43°01′51″	T11	E82°30′22″, N43°04′02″
T2	E82°51′33″, N43°04′36″	T22	E82°50′03″, N43°06′15″
T3	E82°29′02″, N42°51′30″	T33	E82°33′15″, N42°49′04″
T4	E82°53′12″, N42°59′27″	T44	E82°55′8″, N42°56′53″

2.3 Area after adjustment

After adjustment, the area of the nominated Kalajun-Kuerdening is 113,818 hectares, an increase of 30,911 hectares. The area of the buffer zone is 89,346 hectares, a reduction of 28,489 hectares. (see Table 2).

Table 2 Adjustment of the Area of Kalajun-Kuerdening(hectares)

	County	Nominated site	Buffer zone
Area after adjustment	Tekesi	53,684	28,619
	Gongliu	60,134	34,095
	Hejing	0	26,632
Total		113,818	89,346
Original area	Tekesi	47,768	35,296
	Gongliu	35,139	71,052
	Hejing	0	11,487
Total		82,907	117,835
Total	Tekesi	5,916	-6,677
	Gongliu	24,995	-36,957
	Hejing	0	15,145
Total		30,911	-28,489

3. Protection and management measures

The nominated Xinjiang Tianshan is composed of existing reserves and the newly added area of Kalajun-Kuerdening which is not currently part of a reserve. To strengthen the protection and management of the added area, it will be declared a national nature reserve to facilitate long-term and effective protection and sustainable development.

4. After adjustment

After adjustment of the scope of Kalajun-Kuerdening, the basic information of the nominated Xinjiang Tianshan is as follows.

(1)Coordinates

Coordinates of each nominated component of Xinjiang Tianshan

No.	Property	Located at	Center coordinates
1	Tomur	Wensu county	N 41°58′06″ E 80°21′15″
2	Kalajun-Kuerdening	Tekesi county	

		Gongliu county	N 43°0′3″ E 82°38′10″
		Hejing county	
3	Bayinbuluke	Hejing county	N 42°47′53″ E 84°09′50″
4	Bogda	Fukang county	N 43°50′00″ E 88°17′12″
		Urumqi	

(2) Area of the nominated properties and their buffer zones

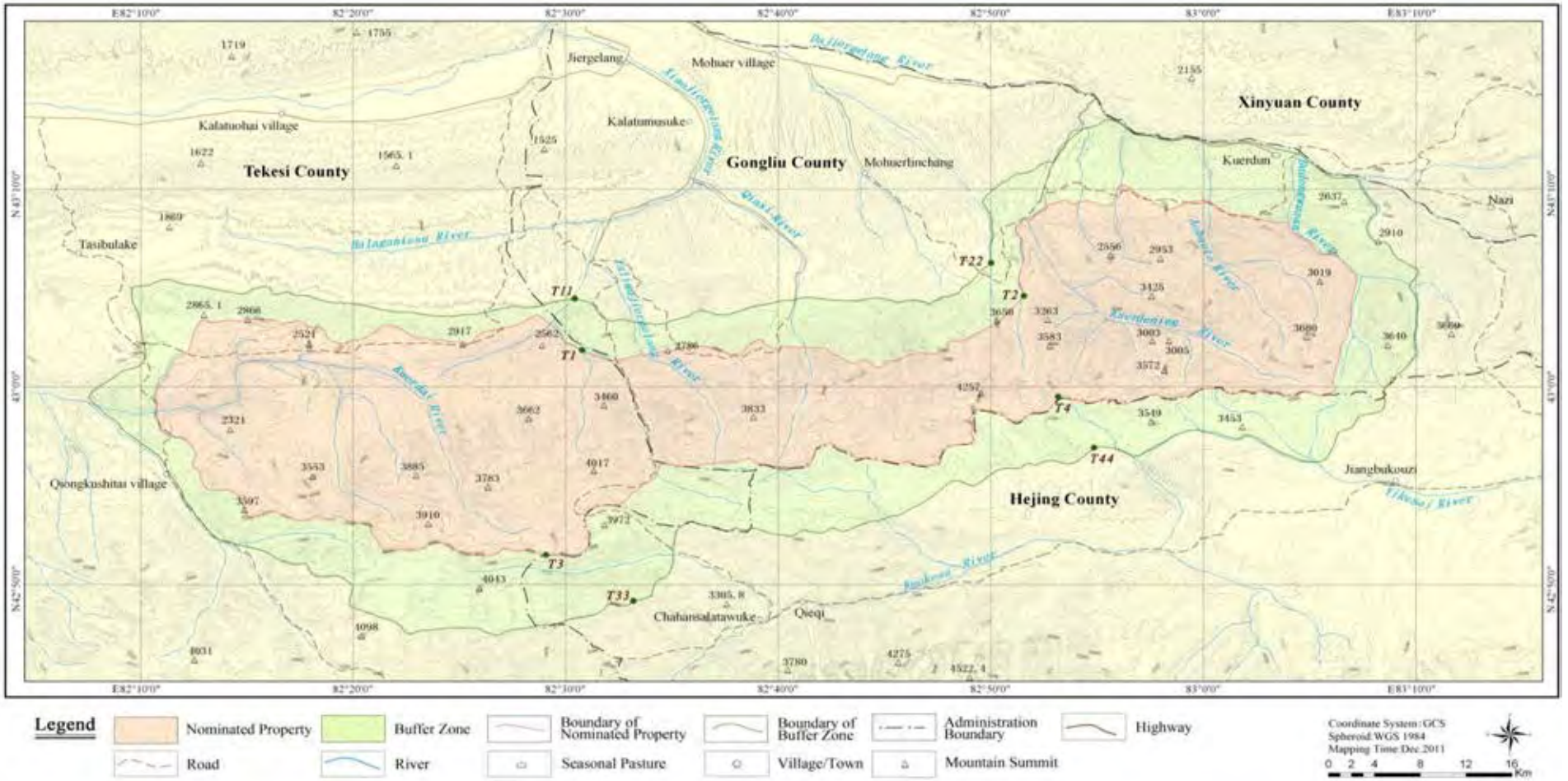
The total area of the nominated Xinjiang Tianshan is 606,833hectares and that of the buffer zone is 491,103 hectares.

Area of the nominated properties and their buffer zones (hectare)

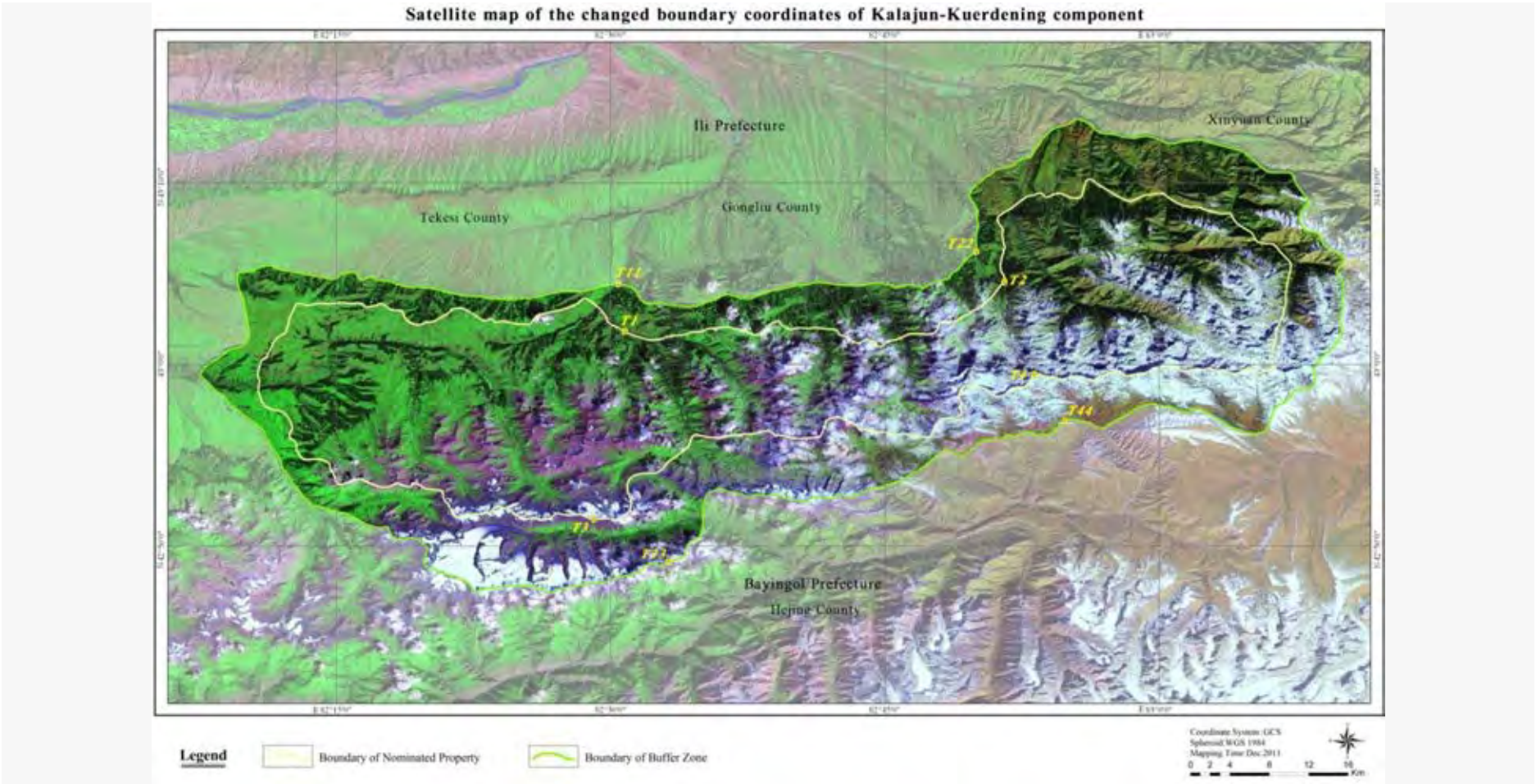
No.	Property	Area of the nominated property	Area of the buffer zone
1	Tomur	344,828	280,120
2	Kalajun-Kuerdening	113,818	89,346
3	Bayinbuluke	109,448	80,090
4	Bogda	38,739	41,547
	Total	606,833	491,103

(3) Summary of the serially nominated properties of Xinjiang Tianshan

No.	Property	Located at	Center coordinates	Area of the nominated property（ha）	Area of the buffer zone（ha）	Figure No.
1	Tomur	Wensu county	N41°58′06″ E 80°21′15″	344,828	280,120	Figure 1.e-4 Figure 1.e-5 Figure 1.e-6
2	Kalajun-Kuerdening	Tekesi county	N 43°00′03″ E 82°38′10″	113,818	89,346	Figure 1.e-7 Figure 1.e-8 Figure 1.e-9
		Gongliu ounty				
		Hejing county				
3	Bayinbuluke	Hejing county	N42°47′53″ E 84°09′50″	109,448	80,090	Figure 1.e-10 Figure 1.e-11 Figure 1.e-12
4	Bogda	Fukang ounty	N43°50′00″ E 88°17′12″	38,739	41,547	Figure 1.e-13 Figure 1.e-14 Figure 1.e-15
		Urumqi				
Total				606,833	491,103	

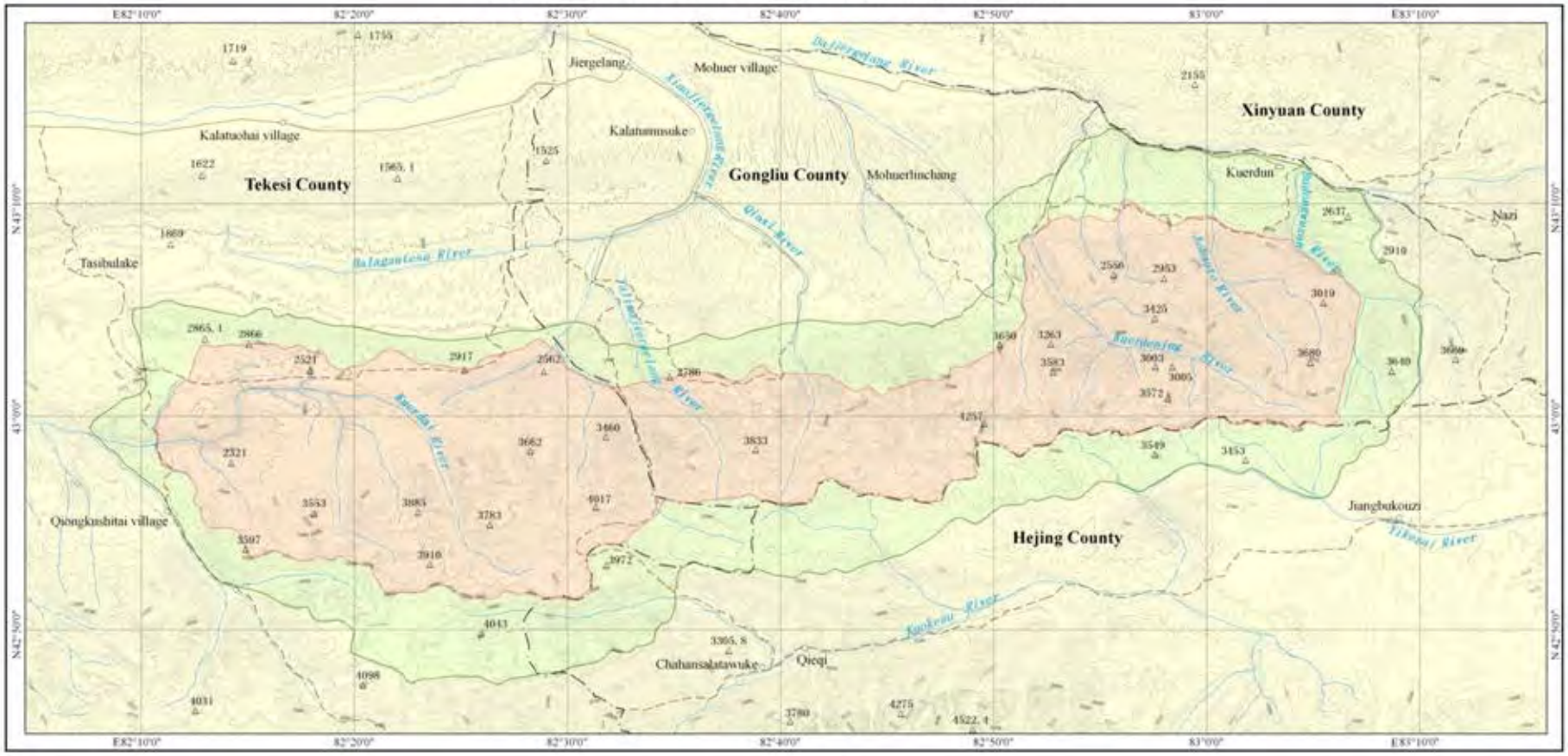


Satellite map of the adjusted areas of the Kalajun-Kuerdening component

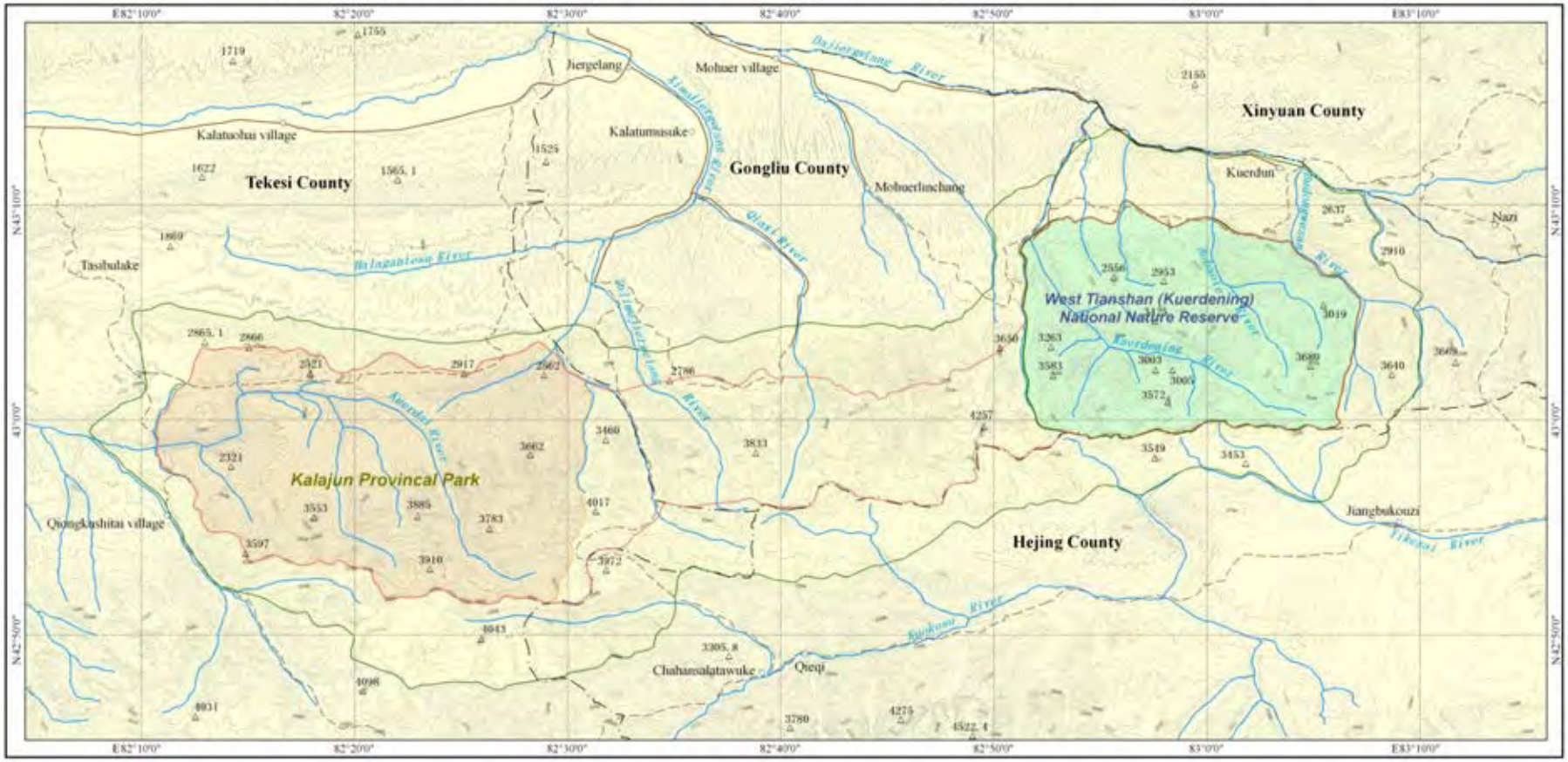


The adjusted boundary of the Kalajun-Kuerdening component

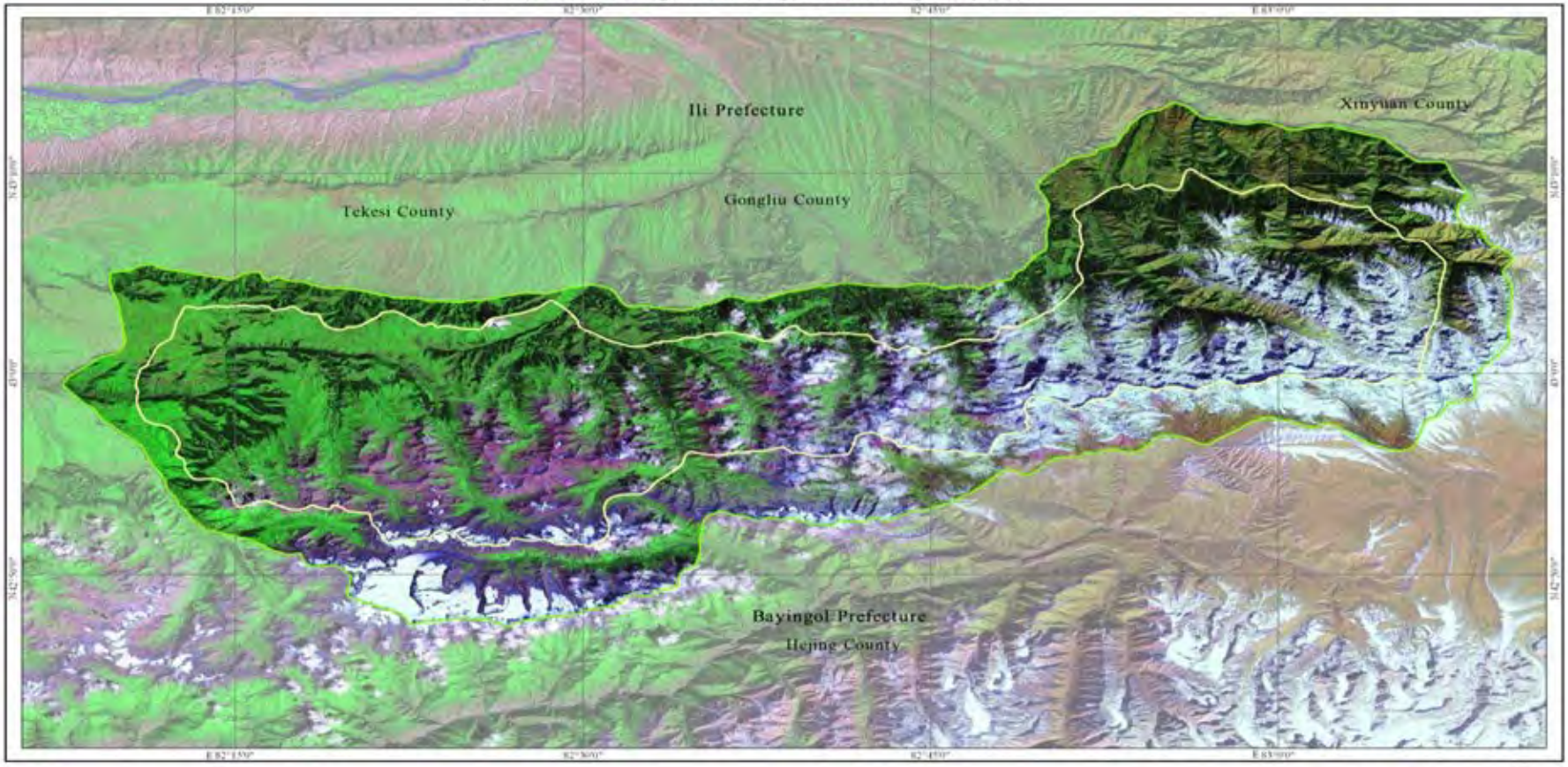
Map 1.e-7 Detailed Map of the Kalajun-Kuerdening Component



Map 1.e-8 Map Showing Relationship of the Nominated Kalajun-Kuerdening Sub-unit to the Existing Protected Area



Map 1.e-9 Satellite Image of the Kalajun-Kuerdening Component



Annex 2

Human Activities and Their Influences on the Nominated Xinjiang Tianshan

Xinjiang Tianshan is located in the centre of the Eurasian arid area. Its outstanding natural resources values were not widely appreciated until the 1980s due to the steep terrain, inaccessibility. As a result, it retains much of the original vegetation cover and the natural resources and environment are well preserved. Since the1990s, tourism and animal husbandry have been developed in the periphery of the nominated Xinjiang Tianshan and its surrounding area bringing a potential threat to the environment and biodiversity protection.

1. Pasture

Area of the nominated 4 components only is 604,000 hectares where the grassland area, which accounting for 66% of the total, is 396,500 hectares and the number of the livestock is 858,000. According to the Xinjiang Academy of Animal Husbandry, Xinjiang Agricultural University and other research institutions, the average livestock bearing capacity of various grasslands in Xinjiang is 0.25 animal / ha. It is estimated that the nominated Xinjiang Tianshan can sustain about 2.58 million sheep with an reasonable average bearing capacity of 4.28animal/ha. At present, all components of Xinjiang Tianshan Property are not over-grazed and the grasslands and livestock are in balance and the pastureland is well protected.

Since the nomination of Xinjiang Tianshan for World Heritage status, in order to further improve the environment of the grasslands and further secure the ecological integrity of the pastureland, the governments of the places where the nominated properties are located have **banned herding** and implemented **compensation mechanisms** to protect the grassland ecology, using funds allocated by the central government and Xinjiang government to increase grassland restoration efforts. As of 2012, grassland where herding is banned has been expanded to 92,000 hectares, accounting for 23% of the total area of the grassland in the nominated Xinjiang Tianshan.

2. Tourism

The development of tourism only began slowly from the 1990s in the nominated Xinjiang Tianshan due to the terrain and inaccessibility. Bogda component has the largest number of tourist arrivals in Xinjiang Tianshan. They increased to 1.082 million in 2010 with an average annual growth rate of 10%; and the other three nominated properties saw tourist arrivals of only 483,000 in total.

According to the environmental capacity calculations, the maximum number of people that should be allowed to visit each property is: 2.5 million annual arrivals for Tomur, 2.7 million for Kalajun-Kuerdening, 1.2 million for Bayinbuluke and 3.1 million for Bogda. Although there have been annual increases in the arrivals in the nominated Xinjiang Tianshan , there is still a room to the ceiling environmental capacity.

3. Infrastructure

At present, in addition to the necessary protection management station, exhibition centre and monitoring and communication facilities, there is other infrastructure in the nominated property. For example, visitor centers, parking lots, toilets, garbage disposal stations and garbage bins, as well as catering and reception facilities, are located in the buffer zone and the surrounding region.

For the protection of the integrity of natural heritage sites, traffic and electric constructions are being strictly controlled in the nominated property of Xinjiang Tianshan. There are 226 km paved roads in total in four components open for protection and management traffic, tourism traffic and private traffic, 60 km stone and sand road and 15 km dirt road for mountain protection, and 48 km wood road and stone slate road for tourism traffic and private traffic.

Except the 4 km 10 kVA electric power line at where the nominated property meet with the buffer zone in Bogda component, there is no electric power

line in the other components. There is also no gas and oil transportation pipes passing through in the nominated property.

4. Development

In recent years, the state and local governments at all levels have paid great attention to the protection of the environment and natural resources in the parks and natural reserves. The management departments have strengthened the governance, taken a series of strong protection measures, and obtained positive results. As of 2012, the nominated properties have no mining, quarrying, logging, hunting and grassland reclamation. There is only a handful of water conservancy developments, wind energy developments and herb collection activities which have little effect on the environment .

With the permission of administrative bodies of Xinjiang Tianshan can visitors pick small amount of medicinal herbs, mushrooms, wild fruits and other wild plants as souvenir(see annex). With the raising of environment protection concept of domestic tourists' and the strengthened protection and management, the personal pick is declining. Commercial collecting is prohibited according to Regulations on Protection of Nominated Xinjiang Tianshan and offenders will be given certain economic punishment by the administrative bodies. Small amount of collection for scientific research can be carried out only after get the approval by the administrative bodies of its plan of activities and conservation programs which will not damage the landscape and vegetation(see annex).

Annex: Human Activities and Their Influences in the Nominated Xinjiang Tianshan

Item			Tomur	Kalajun-Kuerdening	Bayinbuluke	Bogda
Pasturing	Area of the pastureland（10,000 ha）		16.07	10.4	10.93	2.26
	Number of livestock（10,000 animal）		19.98	58.92	7. 5	6.9
	Reasonable livestock capacity（animal/ha）		4.3	6	3	3.8
	Existing livestock capacity		1.2	5.66	0.75	3.15
Tourism	Arrivals in 2010（10,000 arrivals）		28.9	10	9.5	108.2
	Capacity （10,000 arrivals/year）		250	270	120	310
	Annual average increase （%）		11	8.5	6.4	10
Infrastructure	Roads（km）	Paved road	0	98	110	18
		Stone and sand road	15	30.5	0	14
		Dirt road	0	15	0	0
		Touring walk road	3	13	5	37

	Electric power communication	None	None	None	4 km 10 kVA electric power line
	Protection and management measures	Available	Available	Available	Available
	Gas and oil transportation pipes	None	None	None	None
Development	Mining and quarrying	None	None	None	None
	Timber utilization	None	None	None	None
	Development of water conservancy	Rare	None	None	Rare
	Development of wind power	Rare	Rare	Rare	Rare
	Hunting	None	None	None	None
	Picking herbs	Rare for scentific research	Rare for scentific research	Rare for scentific research	Rare for scentific research
	Grassland reclamation	None	None	None	None

中华人民共和国联合国教科文组织全国委员会

NATIONAL COMMISSION OF THE PEOPLE'S REPUBLIC OF CHINA FOR UNESCO
COMMISSION NATIONALE DE LA REPUBLIQUE POPULAIRE DE CHINE POUR L'UNESCO

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21 January 2013

Subject: Supplementary Information of Xinjiang Tianshan (China)

Dear Mr. Kishore Rao,

In reply to the letter concerning "IUCN Evaluation of Xinjiang Tianshan (China)-Request for Supplementary Information" dated 20 December 2012, I am pleased to forward to you the Supplementary Information of Xinjiang Tianshan (China) prepared by the Chinese Ministry of Housing and Urban-Rural Development.

Thank you for your continued support to the protection of the World Heritage in China.

DU Yue
Secretary-General

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Fax: +33 1 45 68 55 70

Cc: Chinese Permanent Delegation to UNESCO

24.01.13
PSM
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World Heritage Nomination
Natural Heritage . China

Supplementary Information on the Nominated Natural World Heritage:

Xinjiang Tianshan

Ministry of Housing and Urban-Rural Development
Of the People's Republic of China

January, 2013

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20 December 2012

IUCN Evaluation of Xinjiang Tianshan (China) – Request for Supplementary Information

Dear Ambassador,

The IUCN World Heritage technical evaluation mission to the Xinjiang Tianshan was undertaken by Mr Pierre Galland and Andrew Scanlon from 20 July to 2 August 2012. The evaluators greatly appreciated the excellent support and co-operation provided by your colleagues in the preparation and implementation of the mission, and the kind welcome of the State Party throughout the mission. Please convey our sincere thanks to all of the officials, scientists and contributors that assisted the evaluators in undertaking the mission.

The IUCN World Heritage Panel is in the course of examining World Heritage nominations for natural and mixed properties, and cultural landscapes. This process will conclude in March 2012. At its first meeting earlier this month, the IUCN Panel examined in detail each nomination dossier, reports and desktop reviews of field evaluators and external reviewers, as well as other references regarding the nominated properties. We have subsequently been considering further the findings of the Panel on the different nominations being evaluated this year.

As noted in previous correspondence, IUCN seeks to develop and maintain a dialogue with States Parties during the evaluation process. The Panel noted with appreciation the additional information provided by the State Party following the evaluation mission, and notably the amended boundaries to link two of the components of the property. We noted that these had been discussed by the field mission, but had not been officially requested to date, but we consider they represent an improvement.

The Panel agreed that this nomination should be discussed further at its second meeting in March 2013, and that additional information is required to enable the evaluation to be completed. We would therefore welcome information on the following points:

1. Please provide a clear statement indicating how each of the nominated properties will meet size and connectivity requirements to support the integrity of the ecosystem processes for which the components has been nominated under criterion ix.

2. The Panel considered that the overall management plan for the property is relatively weak and mostly restates elements of the WH nomination. An improved management plan is required for the property as a whole, across all its components. We therefore request the State Party to indicate the forward plan and timelines to put in place a more effective overall plan. We request that includes details on how the State Party will put in place harmonised management across all components of the property, and the management plans for each of the component parts of the property.

3. The protection measures for the area newly proposed for addition to the property (linking the Kalajun and Kuerdening components) should be specified, and specifically we request confirmation on the timetable by which the newly created corridor would be provided with national nature reserve protection.

4. The Panel noted that the total exclusion of grazing from the property may be excessive and could result in negative impacts on the ecology of the property which have evolved through the interaction of grazing and biodiversity. IUCN understands this blanket grazing ban was undertaken in line with national policy. We would be grateful for the State Party's response on the following points:
    a. The extent to which the total removal of grazing may impact on biodiversity values of the nominated property, and if necessary how sustainable grazing might be accommodated in future within the management system to maintain ecological balance.
    b. Whether concerns have been received from communities regarding relocation from the property, and if so how these have been resolved, together with translated statements of the local leaders confirming that these matters are resolved to the satisfaction of local people.
    c. Whether the State Party could consider a national reflection on policies regarding sustainable traditional use in natural WHS, to allow this to be considered as a viable means of protection rather than adopting a blanket exclusion of such uses.

We would appreciate your response to the above points as soon as possible, in order to facilitate the evaluation process, but **no later than the 28 February 2013**, as per paragraph 148 of the Operational Guidelines. Please note that any information submitted after this date will not be considered by IUCN in its evaluation for the World Heritage Committee. It should be noted, however, that while IUCN will carefully consider any supplementary information submitted, it cannot properly evaluate a completely revised nomination or large amounts of new information submitted at the last minute. So we request to keep your response concise and respond only to the above requests.

Supplementary information should be submitted officially in three copies to the UNESCO World Heritage Centre in order for it to be registered as part of the nomination. An electronic copy of any supplementary information to both the UNESCO World Heritage Centre (a.balsamo@unesco.org) and IUCN Headquarters (christelle.perruchoud@iucn.org) would also be helpful.

Taking into account your response, IUCN will formulate its final recommendation to the World Heritage Committee which will meet from 16 to 27 June 2013 in Phnom Penh, Cambodia.

Please do not hesitate to contact Ms Christelle Perruchoud, World Heritage Programme Assistant (Tel: +41 22 999 0358; Fax: +41 22 999 0002; email: christelle.perruchoud@iucn.org) if you have any questions.

Let me again reiterate our thanks for your support of the World Heritage Convention and for the conduct of IUCN's recent mission. We look forward to your kind cooperation in furnishing responses to the abovementioned points.

Yours sincerely,

Tim Badman
Director - World Heritage Programme

cc. Chinese National Commission for UNESCO, Mr. DU Yue, Secretary-General
UNESCO World Heritage Centre, Mr Jing Feng and Mr Alessandro Balsamo
Ms Aban Marker Kabraji, IUCN Asia Regional Office, Regional Director

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Annex: Community Statement 024

1. Please provide a clear statement indicating how each of the nominated properties will meet size and connectivity requirements to support the integrity of the ecosystem processes for which the components has been nominated under criterion ix.

1. Area of the nominated property and the connectivity

1.a Area of the nominated property

The area of the nominated Xinjiang Tianshan is 606,833ha and that of the buffer zone is 491,103ha. Even the component with the smallest area is more than 38,000ha (Table 1). The region included in the nominated property is the center of the main flora and fauna of the Tianshan Mountains in Xinjiang as well as the important habitat of many endangered species. It includes all the essential factors which represent the unique biological and ecological values of the Tianshan Mountains in Xinjiang.

Table 1 Area of the nominated serial property of Xinjiang Tianshan

Component	Area of the nominated property (ha)	Area of the buffer zone (ha)
Tomur	344,828	280,120
Kalajun-Kuerdening	113,818	89,346
Bayinbuluke	109,448	80,090
Bogda	38,739	41,547
Total	606,833	491,103

** Kalajun and Kuerdening have been connected as one integral part*

(1) Components of the nominated property and demarcation principles

Xinjiang Tianshan is serially nominated World Natural Heritage with four components. In order to get the appropriate area and border, adequate scientific research has been carried out. The major values of the Tianshan mountains in Xinjiang, such as the ecosystems of Xinjiang Tianshan, the evolution of fauna and flora, and the ongoing biological and ecological process can be fully displayed; sufficient area can be guaranteed. Scientific and complete demarcation will be based on the following principles:

- Borders of the nominated property will be in accordance with the existing national and provincial protected areas, such as nature reserves and parks. These are the best preserved areas with the least

human interference and best original condition, and they are already protected by laws and regulations.

- Essential physical elements related with criterion ix are included, such as biological and ecological features of representative biological altitudinal natural zones, habitat and vegetation types.

- The borders should be in accordance with the landforms and physical features, such as mountain ridge, valley, river, forest line, landform unit, etc. to facilitate demarcation and management.

The buffer zone is located at the surrounding region of the nominated property which provides extra protection for the nominated property. The demarcation of the buffer zone takes into account the continuity of physical elements, terrain and landforms, human interference, etc. Each component has an adequate buffer zone (see the Text at P242)

(2) Demarcation process

It has taken three years to decide on the area and border of the serially nominated Xinjiang Tianshan through consultation with experts, residents and local government, which resulted in revisions.

Several investigations were undertaken by experts in 2009 and 2010 and, as a result, it was initially decided to include Tomur, Kalajun-Kuerdening and Bogda in Xinjiang Tianshan. Then, under the requirement of the Xinjiang government, Housing and Urban-Rural Development Department of Xinjiang, the Xinjiang Institute of Ecology and Geography of the Chinese Academy of Sciences and the Forest Affairs Department of Xinjiang carried out field investigations and meetings to get suggestions from stakeholders, such as community residents and government officials. At the same time, discussions with domestic and international experts were undertaken by email and telephone over one-and-half years. In this way, the area and borders were defined.

For example, the south and east borders of Tomur initially go along the edge of glaciers to maintain the integrity of major glaciers such as Tomur, Tugbieliqi, Wukuer and Qiongtelian. The border then go along the lower forest edge in recognition of the heritage values of Tomur, particularly the importance of the altitudinal zones on the south slope of the Tianshan mountains in Xinjiang. Aksu Prefecture suggested that Yingyan road and Wenzhao road should not be included in the property and Wunsu Grand Canyon should be included in the property so that the south border should be enlarged in order to improve the local transportation and the development of tourism. After several discussions of the expert team, the south border was aligned from west to east along the end of Tomur glacier, the end of Keqiekaerbaxi glacier river, the end of Telian glacier and the Qiongkezibayi glacier river; the east border then goes

from north to south along the end of Wukuer glacier, the end of Tugebieliqi glacier and along the edge of Qiongkezibayi glacier, and it goes from a point 2.5km east of Ailimaiti mountain pass, along Kumugetashi and Kumukunaquekemake to the end of the Qiongkezibayi glacier.

Under the suggestion of the Ministry of Housing and Urban-Rural Development of the People's Republic of China, we invited several international experts to examine the application of Xinjiang Tianshan to be inscribed on the world heritage list in June, 2011. Then, based on their suggestions, Bayinbuluke was included in the property to insure the integrity of Xinjiang Tianshan.

When the experts of IUCN investigated Xinjiang Tianshan in July, 2012, they suggested that Kalajun and Kuerdening should be connected with a biological corridor. Related experts were then immediately organized to carry on field investigations and suggestions were collected from governments and communities leading to the adjustment of the scope of the Kalajun-Kuerdening component.

Figure1 Field investigation of experts

(3) Scope of each component and their typical features

- Tomur

The Tomur component is where the main peaks of the Tianshan Mountains are located. The Tomur component is the western part of Xinjiang Tianshan, located in the South Tianshan Mountains. The area of the nominated property is 344,828ha and the area of its buffer zone is 280,120ha. The demarcation takes into account how to keep the integrity of altitudinal natural zones on the south slope of the Tianshan Mountains, the representative foothill arid steppe, and the largest-scaled modern glacier of Tianshan. The border of the nominated property will be the same as Tomur Peak National Nature Reserve and there is no buffer zone at the west of Tomur because there are snow mountains and glaciers and it is also the national

Figure 2 Border of the Tomur component and its buffer zone

border of Kyrgyzstan and China (Figure 2).

It is 112km long from west to east and 132km long from south to north in Tomur and it elevates from 1,450m to 7,443m. The area is large enough and there are seven altitudinal zones, including: warm temperate desert zone (1,450-1,900m), temperate desert steppe zone (1,900-2,200m), mountain steppe zone (2,200-2,600m), sub-alpine meadow zone (2,600-2,900m), alpine meadow zone (2,900-3,600m), alpine cushion vegetation zone (3,600-4,250m) and ice-snow zone (4,250-7,443m).

- Kalajun-Kuerdening

The Kalajun-Kuerdening component is the central part of Xinjiang Tianshan, located in the Ili valley in the Middle Tianshan Mountains. The area of the nominated property is 113,818ha and that of the buffer zone is 89,346ha. Demarcation takes into account how to include the integral mountain forest ecosystem and middle Asian mountain meadow. The nominated property has the same border as West Tianshan National Nature Reserve and Kalajun Provincial Park (Figure 3).

Figure 3 Border of the Kalajun-Kuerdening component and its buffer zone

It is 88km long from east to west and 45km wide from south to north. The elevation rises from 1,600m to 3,910m. The area is large enough to include the highest and densest snow spruce ecosystem（1,600-2,700m）and Middle Asian mountain meadow ecosystem（2,200-3,500m）with no interference of humanity. It is the only protected area of category I of IUCN in Xinjiang. There are 1,594 species of wild vascular plants, accounting for 60.79% of that of Xinjiang Tianshan. There are 223 species of wild vertebrates, accounting for 40.54% of that of Xinjiang Tianshan.

- Bayinbuluke

The Bayinbuluke component is the central part of Xinjiang Tianshan, located in the Youerdusi basin of the Middle Tianshan Mountains. The area of the nominated property is 109,448ha and that of the

buffer zone is 80,090ha. The demarcation takes into account protection of the most outstanding alpine wetland ecosystem represented by alpine marsh meadow and alpine steppe in the Tianshan mountains in Xinjiang. Borders of the nominated property are partly the same as the Big Youerdusi basin in Bayinbuluke National Nature Reserve (Figure 4).

Figure 4 Border of the Bayinbuluke component and its buffer zone

It is 86km long from east to west and 42km wide from south to north. The elevation rises from 2,390m to 2,600m. The nominated property has enough area, including 80% of the area of wetland in the Big Youerdusi basin and nearly all of the alpine marsh meadow ecosystem.

- Bogda

The Bogda component is the eastern part of Xinjiang Tianshan, located in the major peak region of the North Tianshan Mountains. The area of the nominated property is 38,739ha and that of the buffer zone is 41,547ha. Demarcation takes into account protection of the most representative altitudinal zones on the north slope of Tianshan. It is composed of the major parts of Tianshan Tianchi National Park and Bogda Provincial Nature Reserve (Figure 5).

It is 42km long from west to east and 41km wide from north to south. The elevation rises from 1,380m to 5,445m. The nominated property has enough area and there are six altitudinal zones including the alpine snow zone (3,700-5,445m), alpine cushion vegetation (3,300-3,700m), alpine meadow (2,900-3,300m), sub-alpine meadow (2,700-2,900m), mountain coniferous forests (1,650-2,700m) and mountain steppe (1,380-1,650m).

Figure 5 Border of the Bogda component and its buffer zone

1.b Connectivity of the components

Xinjiang Tianshan is the most typical representative of mountain ecosystems in the temperate arid zone. Xinjiang Tianshan is a unique huge mountain ecosystem surrounded by two vast deserts. It is outstanding

among the global mountain systems because of the pattern of two deserts flanking one mountain, the location deep in the Asian hinterland and the arid continental climate. Major ecosystems include the mountain forest, mountain steppe, alpine meadow, alpine wetland and desert steppe, which make it the most typical representative of mountain ecosystems in the temperate arid zone. Numerous glaciers and rivers in the huge mountains act like a water tower which maintains the mountain-oasis-desert ecosystem in the arid zone. In climatic terms, there are five temperature zones (warm temperate, temperate, cold temperate, frigid and alpine permanent ice-snow) and four precipitation zones (humid, semi-humid, semi-arid, and arid).There are seven first level habitat types according to IUCN/SSC, including forest, shrub, steppe, wetland, etc. as well as 22 second level habitat types. The vegetation of Xinjiang Tianshan can be divided into 9 vegetation types, 25 vegetation subtypes and 82 formations. It is the typical representative of Tian Shan montane conifer forests, Tian Shan montane steppe and meadows, Tian Shan foothill arid steppe, which belong to the Global 200 Ecoregions 111 "Middle Asian Montane Steppe and Woodlands". Xingjiang Tianshan boasts a typical range of mountain altitudinal natural zones in the temperate arid zone, it significantly presents the distributional features and development laws of mountain ecosystems in the temperate arid zone, and it is an outstanding example for the study of biological community succession in mountain ecosystems in an arid zone undergoing global climate change. Xinjiang Tianshan has obvious altitudinal vegetation distribution, significant differences between north and south slopes and diversity of flora. Its features of altitudinal vegetation distributions, significant differences between north and south slopes, diversity of flora, large areas of wild fruit forest, and refuge of relict species in the Neogene period, all illustrate the biological and ecological evolution of the Pamir-Tian-Shan Highlands. Xinjiang Tianshan has outstanding biodiversity and it is important habitat for relic species, and numerous rare and endangered species, as well as endemic species. It is a significant representative of the process whereby the original warm and wet flora has gradually been replaced by modern xeric Mediterranean flora.

(1) Necessity of the components

The Tianshan Mountains in Xinjiang are 1,760km long and 300km wide on average, composed of three large mountain chains and more than 10 inter-mountain basin and valleys. The average elevation of the mountain ridge is 4,000m with a relative relief of more than 7,000m. Outstanding differences exist among mountains in terms of physical geography and biological and ecological features. Thus, any single region cannot display the unique and varied biological and ecological processes of the Tianshan Mountains in Xinjiang. So, serial sites are necessary to display the typical biological and ecological processes.

The four components contain the most representative and important ecosystems in Tianshan Mountains in Xinjiang. In longitude they are located at the west, middle and east parts of the Tianshan Mountains in Xinjiang, and in latitude they include the major peaks of the North Tianshan Mountains in Xinjiang and

the South Tianshan Mountains in Xinjiang, the most abundant biodiversity valley in the Middle Tianshan Mountains in Xinjiang and the most typical large inter-mountain basin in the Tianshan Mountains in Xinjiang. At the same time, they cover large range of elevation. In this way, the four components represent various biological communities and ecosystems.

(2) Representativeness and connectivity of the components

The biological and ecological features of the four components of Xinjiang Tianshan are different as well as related with each other, displaying the integrity of the ecosystems of Xinjiang Tianshan. The typical biological and ecological features are as follows:

- Tomur

The Tomur area is the largest center of modern glaciers and super large glaciers of the Tianshan Mountains. The Tomur component can be divided into eight vegetation types, 14 vegetation subtypes and 27 formations. Widely-distributed typical vegetation types include: alpine cushion vegetation, alpine meadow, sub-alpine meadow, meadow steppe, foothill arid steppe, desert steppe and shrub desert. Tomur is also the best representative of foothill arid steppe within the Global 200 Ecoregions 111 'Middle Asian montane woodlands and steppe'. In the Tomur component, the altitude rises from 1,450m to 7,443m within 70km horizontal distance and seven altitudinal zones have developed on the south slope. It is the most representative example of mountainous altitudinal zones in a temperate arid region in the world. The Tomur site is the natural habitat and breeding ground for some rare and endangered animals, especially those which prefer or tolerate the cold such as *Rhodiola pamiro-alaica, Tulipa sinkiangensis, Orchis cruenta, Orchis 1atifolia, Panthera uncial, Falco cherrug, Tetraogallus himalayensis, Canis lupus*, etc. Tomur is one of the important habitats for snow leopards in the world, as well as their distribution center in Central Asia.

Figure 6 Foothill dry steppe of Tomur

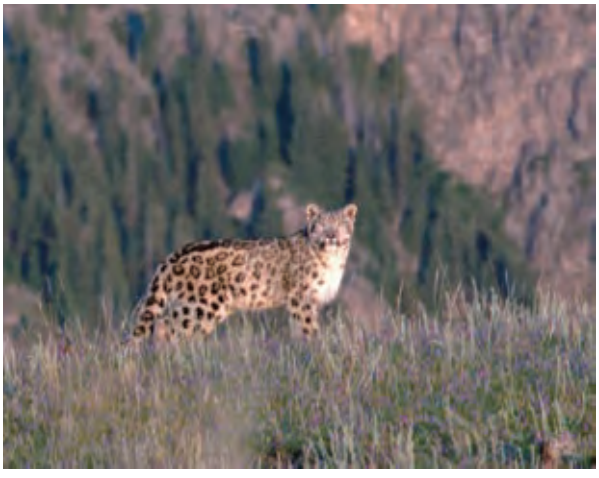


Figure 7 Snow leopard

Kalajun-Kuerdening

Kalajun-Kuerdening has the richest biodiversity in Xinjiang Tianshan and the natural vegetation in Kalajun-Kuerdening can be divided into eight vegetation types, 17 vegetation subtypes and 39 formations. Representative vegetation types include: alpine cushion vegetation, alpine meadow, subalpine meadow, mountain evergreen coniferous forest, mountain deciduous broadleaved forest, xeric evergreen coniferous shrub and mountain steppe. It includes the highest and densest mountain forest ecosystem and Middle Asian mountain meadow and the most representative region of Tianshan coniferous forest and Tianshan mountain steppe and meadow of Global 200 Ecoregions 111 'Middle Asian montane woodlands and steppe'. It is a habitat for endangered species such as *Juglans regia, Armeniaca vulgaris, Fraxinus sogdiana, Sorbus tianschanica, uniperus sabina, Orchis umbrosa, Corallorhiza trifida, Gyps himalayensis, Sturnus roseus, Marmota bobak, Vipera ursinii, Aquila heliaca, Aquila clanga, Falco cherrug, Mustela altaica, Vormela peregusna, Ovis ammon, Ochotona iliensis,* etc. And it is the refuge for many ancient relic species such as *Crataegus songorica, Acer semenovii, Prunus sogdiana,* etc. It is an important part of the Central Asian wild fruit forest. It is also the original area and the distribution centre of wild apple, wild walnut and European plum and other species.

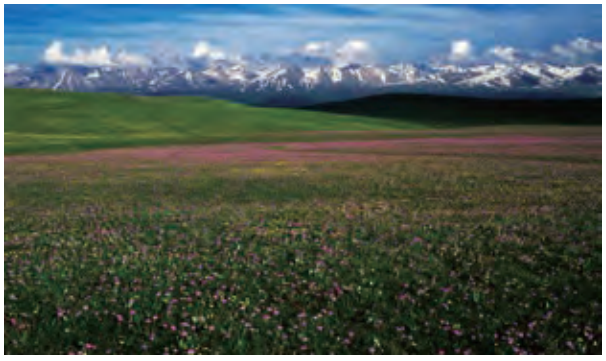


Figure 8 Mountain meadow of Kalajun

Figure 9 Kuerdening mountain forest

Bayinbuluke

The most outstanding alpine wetland ecosystem, represented by alpine marsh meadow and alpine steppe, in the Tianshan Mountains in Xinjiang has developed in Bayinbuluke. Bayinbuluke can be divided into three vegetation types, three vegetation subtypes and 14 formations. Because of frosty weather and frozen soil, there are hardly any large trees in this region, with the main vegetation being typical alpine swamp and meadow. On the slopes and pediment of the mountains, there is widespread alpine *Stipa purpurea* steppe; on the wet basin floor there is marsh meadow and marsh vegetation, consisting of moss grass, rushes and other kinds of grass. The evenness and dominance of the marsh plant community is higher than that of dome swamp. There are abundant species of birds in Bayinbuluke. In total there are 119 species of all kinds

of birds, such as cranes, egrets, golden eagles, bar-headed geese, grey geese, whooper swans, tundra swans and mute swans, amounting to tens of thousands of birds in the nominated property. Bayinbuluke is the best habitat for breeding and summer habitat for wild birds. It is the largest National Nature Reserve for swans in China. There are nearly 7,000 swans inhabiting the marsh and swamps of the basin, making it the largest breeding group of wild swans in the world. It is also the most southern limit for wild swans to breed in the northern hemisphere.

Figure 10 Alpine marsh meadow in Bayinbuluke

Figure 11 Whooper swan

● Bogda

The natural vegetation in the Bogda component can be divided into 8 vegetation types, 18 vegetation subtypes and 27 formations. The *Picea* schrenkiana formation, which belongs to mountain evergreen coniferous forests, is the main formation in this site. The main vegetation types include alpine cushion vegetation, alpine meadow, sub-alpine meadow, mountainous evergreen coniferous forests and mountain steppe. The elevation rises from 1,380m to 5,445m in no more than 30km with six altitudinal natural zones. It is the most representative example of the altitudinal natural zonality in the temperate arid region in the

Figure 12 Mountain steppe of Bogda

Figure 13 *Cervus elaphus songaricus*

world. Bogda has numerous endangered plants and animals. It is the reproduction place and habitat for *Betula tianschanica, Myosotis alpestris, Juniperus pseudosabina, Larix sibirica, Goodyera repens, Neottia camtschatea*, *Lynx lynx*, and *Capreolus capreolus*.

To sum up, the four components of Xinjiang Tianshan are located in different regions of Tianshan with enough area and clear borders and buffer zones. As for the biological and ecological process of criterion ix, each component has its unique features. There are differences among the four related components, which together form a complete representation of the biological and ecological processes of Tianshan and collectively support the integrity of the ecological system of Tianshan.

2. The Panel considered that the overall management plan for the property is relatively weak and mostly restates elements of the WH nomination. An improved management plan is required for the property as a whole, across all its components. We therefore request the State Party to indicate the forward plan and timelines to put in place a more effective overall plan. We request that includes details on how the State Party will put in place harmonised management across all components of the property, and the management plans for each of the component parts of the property.

2. Management plan

2.a Schedule of revision of the overall plan

Compilation of the *Management Plan of Nominated Xinjiang Tianshan* started in January, 2011. Shortness of time, the size and breadth of the area of investigation, heavy commitment to field investigation and information compilation led to weaknesses in the plan. After the field investigation of the experts of IUCN in July, 2012, the Housing and Urban-Rural Development Department of Xinjiang decided to revise the plan according to the suggestions from the experts and principles of heritage management, by reference to the management plans other World Heritage Sites, taking into account the practices of Xinjiang Tianshan.

Revision will focus on the resources and their evaluation, key projects and their schedules, as well as protection measures.

Revision of *Management Plan of Nominated Xinjiang Tianshan* started in September, 2012 and it will be finished in June, 2014 (Table 2).

Table 2 Timetable of revision of *Management Plan of Nominated Xinjiang Tianshan*

No.	Item	Schedule								
		2012	2013		2014					
		September to December	January to October	November to December	January	February	March	April	May	June
1	Field work									
2	Initial planning									
3	Collection of suggestions									
4	Plan Revision									

No.	Item	Schedule								
		2012	2013		2014					
		September to December	January to October	November to December	January	February	March	April	May	June
5	Expert examination									
6	Plan Revision									
7	Publicity									
8	Finalize plan									
9	Government Approval									

2.b Schedule of management plans for each of the components of Xinjiang Tianshan

Based on the *Management Plan of Nominated Xinjiang Tianshan,* compilation of the management plan of each component of Xinjiang Tianshan will start in March, 2013, and will be finished in December, 2014 (Table 3).

Table 3 Timetable of revision of management plans for each component

No.	Item	Schedule									
		2013		2014							
		March to August	September to December	January to April	May to June	July	August	September	October	December	November
1	Field work										
2	Initial planning										
3	Collection of Suggestions										
4	Plan Revision										
5	Expert Examination										
6	Plan Revision										
7	Publicity										
8	Finalize plan										
9	Government Approval										

2.c Coordination and management of the components

(1) Management system

A four-level management system, from the national to the local level, and a cooperative mechanism for

governments, technological institutes, research institutes and communities have been constituted (Figure 14). Management will occur under the supervision of the Ministry of Housing and Urban-Rural Development of China and the leadership of the Housing and Urban-Rural Development Department of Xinjiang, administrative departments at Aksu prefecture, Ili prefecture, Bayangol Mongol autonomous prefecture and Changji Hui autonomous prefecture. Administrative agencies of the nature reserves or parks where the property is located will cooperate with the administrative bureau of each of the properties of Xinjiang Tianshan which will be responsible for the implementation of works. Simultaneously, by relying on local governments, and monitoring by scientific institutes and colleges, the monitoring, protection and sound management should be strengthened. Furthermore, to incorporate the folk customs and nature conservation traditions of local residents, a multi-level and multi-departmental system of cooperation will be formed, ensuring that the protection and management system is in order.

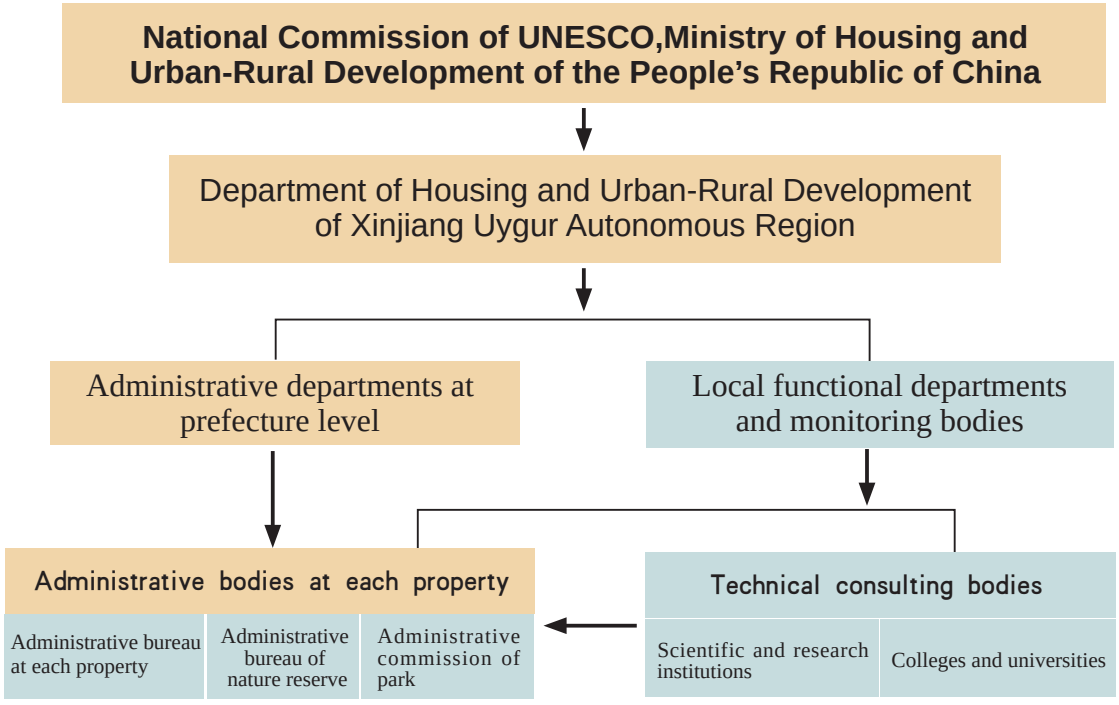


Figure 14 Management Organization of Xinjiang Tianshan

(2) Management agencies

A unified management mechanism will be established and the administrative bureau of Xinjiang Tianshan will be responsible for the management of all the components. Management agencies of Xinjiang Tianshan exist at four levels, including national, provincial, prefectural and the nominated properties' agencies (Figure 15).

- National level

The Ministry of Housing and Urban and Rural Development of the People's Republic of China is mainly responsible for the application of the properties for Natural World Heritage designation, supervision and administration of conservation.

- Provincial level

Administration of the World Natural Heritage of Xinjiang Tianshan will be formed after it is inscribed on the World Heritage List. It will be responsible for the management of the whole serial property.

- Prefectural level

Administrative departments of the prefectures where the properties of Xinjiang Tianshan are located will be formed after it is inscribed on the World Heritage. Theywill be responsible for the implementation of protection and management, scientific research, monitoring, planning and development, construction and so on.

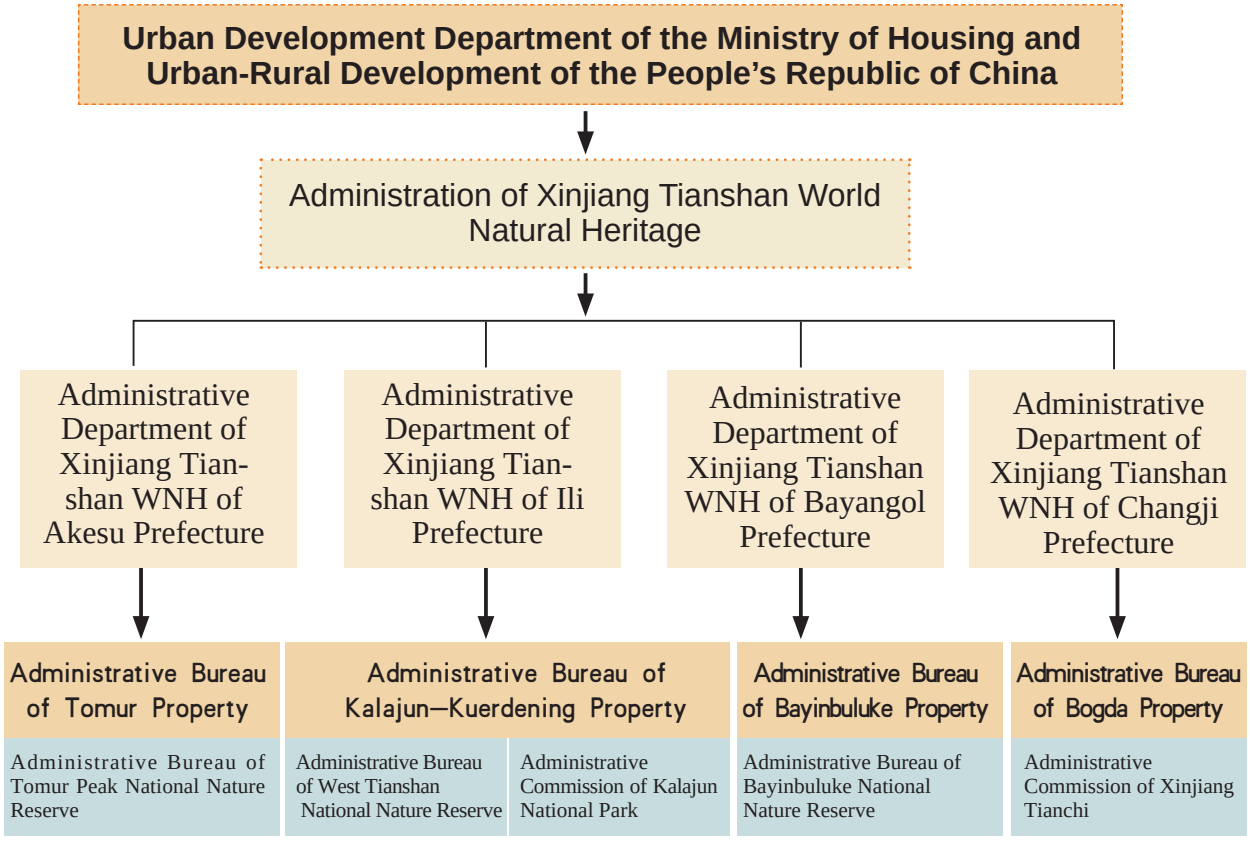


Figure 15 Management bodies of Xinjiang Tianshan

- Property level

This refers to the administrative bureau of each of the properties of Xinjiang Tianshan after it is inscribed on the World Heritage List. They will be responsible for the monitoring of resources and environment, planning, presentation, implementation of laws and regulations and so on in thei respective properties.

(3) Coordination on the spot

Tomur is located at Wunsu county, Aksu Prefecture, and its buffer zone is located in Wunsu county and in Ili prefecture, Zhaosu county. Administration of the World Natural Heritage of Xinjiang Tianshan will require coordination between the administrative department of Aksu prefecture and that of Ili prefecture. The administrative bureau of the Tomur property will be responsible for site management.

Kalajun-Kuerdening and its buffer zone are located at Tekesi county and Gongliu county. The administrative department of Ili prefecture will coordinate work between the administrative commission of Kalajun National Park and the administrative bureau of West Tianshan National Nature Reserve. The administrative bureau of the Kalajun-Kuerdening property will be responsible for site the management.

Bayinbuluke and its buffer zone are located in Hejing county and the administrative bureau of the Bayinbuluke property will be responsible for site management.

Bogda and its buffer zone are located at Fukang county and the administrative bureau of the Bogda property will be responsible for site management.

3. The protection measures for the area newly proposed for addition to the property (linking the kalajun and kuerdening components) should be specified, and specifically we request confirmation on the timetable by which the newly created corridor would be provided with national nature reserve protection.

3. The protection status and measures at the national level of the area connecting Kalajun and Kuerdening

3.a Protection status

- In order to strengthen the connectivity, 31,507ha of the area between Kalajun and Kuerdening has been included in the nominated property according to the suggestion of world famous experts and field investigation.

Figure 16 The adjustment of the area of Kalajun-Kuerdening

- The People's Government of Xinjiang Uygur Autonomous Region approved the decision to include this area in Kalajun Provincial Park in January, 2013.

- The Ministry of Housing and Urban-Rural Development of the People's Republic of China has started the declaration of the Kalajun Provincial Park for National Park.

3.b Protection measures

- The Administrative Commission of Kalajun Provincial Park was set by the Ili Prefecture to coordinate the management of **the newly added area** which spans two counties in the Kalajun-Kuerdening property.

- *Regulations of the People's Republic of China on Parks* and *Regulations on the Protection of Nominated World Natural Heritage Property of Xinjiang Tianshan* will be the legal basis of protection.

- *The Master Plan of Kalajun National Park* will be finished in October, 2014 and will be submitted to the State Council for approval.

4. The Panel noted that the total exclusion of grazing from the property may be excessive and could result in negative impacts on the ecology of the property which have evolved through the interaction of grazing and biodiversity. IUCN understands this blanket grazing ban was undertaken in line with national policy. We would be grateful for the State Party's response on the following points:

   a. The extent to which the total removal of grazing may impact on biodiversity values of the nominated property, and if necessary how sustainable grazing might be accommodated in future within the management system to maintain ecological balance.

   b. Whether concerns have been received from communities regarding relocation from the property, and if so how these have been resolved, together with translated statements of the local leaders confirming that these matters are resolved to the satisfaction of local people.

   c. Whether the state party could consider a national reflection on policies regarding sustainable traditional use in natural WHS, to allow this to be considered as a viable means of protection rather than adopting a blanked exclusion of such uses.

4. Grazing exclusion

The area of grassland of Xinjiang Tianshan is 301,800ha, accounting for 49% of the area of the nominated Xinjiang Tianshan and supporting 850,000 animals (Table 4). In particular, Tomur, Kalajun-Kuerdening and Bayinbuluke are the major traditional pasturelands of the Tianshan Mountains in Xinjiang, where the water, soil and climatic conditions are good, grassland productivity and quality are high, and the area is large. However, overgrazing emerged in these places in the 1990s.

In order to protect the grassland, in October, 2010, the 128th executive meeting of the State Council decided to establish reward-compensation mechanism in eight pasturing regions, such as Xinjiang and Inner Mongolia. The policy is as follows: grazing will be excluded from grasslands where the environmental quality is very poor and seriously degraded, it is not suitable for grazing or it is a water conservation area; grasslands outside of the area from which grazing is excluded can support animals based on maintenance of balanced forage-livestock management according to the approved stocking capacity. After the expiration of grazing in a period of five years, according to the condition to which it has been restored, the grassland will excluded from further grazing or subjected to balanced forage-livestock management, seasonal grazing or

rotational grazing, to form long-term rational grassland utilization.

Table 4 Distribution of traditional pasturelands in the four components

Component	Location	Name of pastureland	Area (ha)	Animal (10,000)
Tomur	Kumalike river, Big Tailan river and Small Tailan river	Pasturelands such as Bozidun, Tagelake and Sawapuqi	86,600	19.98
Kalajun-Kuerdening	North of Biyike-Nalaty mountain	Pasturelands such as Kaladala, Mohuer, Giergalan and Dongmaili village	90,000	58.92
Bayinbuluke	The lower land of Youer-dusi basin	Pasturelands such as Bayinbuluke, Derbilejin and Yikezhagasitai	102,600	7.5
Bogda	Valleys of Sangong river and Sigong river	Pasturelands such as Sangong river, Baiyang river, Shuimogou village	22,600	6.9

4.a Effects of grazing exclusion on biodiversity and sustainable pasture management

(1) Grazing exclusion in nominated Xinjiang Tianshan

The local people, government officials and experts have different views on grazing in the traditional pastureland in the nominated Xinjiang Tianshan. They are unanimous in their opposition to overgrazing but have different positions on the total exclusion of grazing. Some officials insist on the implementation of national policies and periodical total grazing exclusion so as to restore the grassland ecosystem that has been damaged by overgrazing and protect the environment of the nominated property. Some herdsmen worry that grazing exclusion will change their traditional lifestyle and reduce their income. Some experts think that different policies, such as grazing exclusion and grazing limitation, should be carried out according to the goals of protection in different regions.

Different measures are in place in the four components. For example, in Tomur there is total grazing exclusion in water source areas while other parts are rotationally grazed yearly; in Kalajun-Kuerdening, grazing is totally excluded in the core areas of the nature reserve and park with other parts seasonally grazed; in Bayinbuluke, grazing is totally excluded in the seriously degraded region of the grassland ecosystem with limited grazing in other parts; and in Bogda grazing is totally excluded. In 2015, grazing will be totally excluded from the nominated property and limited in the buffer zone.

(2) Effect of grazing exclusion's on the biodiversity

During the field investigation in Xinjiang Tianshan from July 21st to July 31st in 2012, experts discussed pasturing with an assessor from IUCN and they paid special attention to the effects of total grazing exclusion on the biodiversity value.

In the nominated property, pasturing dates back to one hundred or even one thousand years ago. Biological processes have been kept in balance in some regions and, if the balance is disturbed by grazing exclusion, the biodiversity may be unsustainable. Moderate pasturing can reduce the elimination of vulnerable species by dominant ones and improve the species diversity of a community, resulting in a high stable ecosystem. In addition, moderate eating by animals can result in the compensatory growth of plants and improve their productivity[1]. To sum up, the effects of pasturing on biodiversity is scientific and a practical and problem in Xinjiang Tianshan, as well as elsewhere in the world.

Bayinbuluke Grassland Biology Research Station of the Chinese Academy of Sciences set aside a 80 ha experimental region in the alpine meadow of the Tianshan Mountains in Xinjiang. It was divided it into sample plots of various research term of three years, five years, eight years, 25 years and in perpetuity, where the degree of interference of various pasturing styles, such as grazing limitation, grazing exclusion, grazing rest and grazing rotation, on the biodiversity was studied. It was shown that the grassland ecosystem will be restored effectively and its biomass, height, coverage and species diversity will reach healthy criteria and floral succession occurs appropriately following total grazing exclusion in a certain time. Long-term total grazing exclusion reduces the biodiversity and normal population replacement in the grassland or meadow communities and it may also stop the dissemination of seed by animals.

(3) Sustainable pasturing

Research shows that total removal of grazing does not benefit biodiversity whereas the vegetation can be sustained with moderate grazing. Administrative departments of Xinjiang, as well as China, agree with IUCN that grazing should not be totally eliminated and sustainable pasturing will be proposed which will protect the heritage values and realize sustainable development. This strategy will be followed in the planning and management of Xinjiang Tianshan.

In the revised Management Plan of Nominated Xinjiang Tianshan, terms of sustainable pasturing will be added, effective pasturing management will be undertaken and specific guarantee measures will be

McNaughton SJ. 1979. Serengeti ungulates: feeding selectivity influences the effectiveness of plant defense guilds. Science, 199: 806-807.
Belovsky GF. 1981. Optimal foraging and community structure implication for a guild of generalist grassland herbivore. Oecologia, 70: 35-52.

formulated. For example, various functional districts will be established in line with the different protection goals of different regions in the nominated property and total grazing exclusion, seasonal grazing, grazing rest and rotational grazing will be undertaken according to circumstances to support long-term, effective, rational use of the grassland; technical criteria will be formulated for determining grassland health, the stocking capacity will be calculated, and a monitoring system for sustainable pasturing will be established. Management plans for each of the four components will be finished by the end of 2014 and will further subdivide the functional districts according to sustainable pasturing measures.

4.b Local communities and their reactions to relocation

(1) General information on the relocated herdsmen

Before and during the application of Xinjiang Tianshan for WNH status, no permanent resident could be found and only seasonally moving herdsmen were located, such as Kazak, Mongolian and Kirgiz herders. They built temporary yurts, sheepfolds and warm houses (Table 5).

Table 5 Pasturing and relocation in each of the four components

Component	Pasturing time	Number of herdsmen	Temporary buildings (yurts, sheepfold and warm house)	Relocated herdsmen (household)s	New habitat of the relocated herdsmen
Tomur	From June to September	1361	2041	170	Pasturelands such as Bozidun, Tage-lake and Sawapu (existing)
Bayinbuluke	December to April	1000	606	267	Bayinbuluke town and Hejing County center (existing)
Kalajun-Kuerdening	From June to September	900	985	125	Kaladala, Mohuer, Jiergalang and Dongmaili villages (existing)
Bogda	From June to September	217	326	76	Xitaizi community center, Kuoke-hula village, Tulepaer village, and Baisihumu new village (newly built)

(2) Communities' reactions to the relocation and their resolution

Eco-migration is a large and systematic project which will modify the livelihoods of the herders and relocation is a fundamental part of this. Local governments have formulated detailed schemes according to the circumstances. The schemes have been improved through ideas collected in the delegate meetings and herders' meetings held in each village. Views were received from 136 herdsmen from Tomur: 10 written copies and 126 oral statements. Views were received from 90 herdsmen in Kalajun-Kuerdening: nine written copies and 81 oral statements. Views were received from 101 herdsmen in Bayinbuluke: 12 written copies and 89 oral statements. Views were received from 22 herdsmen in Bogda: 2 written copies and 20 oral statements. The information indicated that the majority of the herdsmen support relocation

because they can get improved housing, healthcare, education, transport, information and other public services. Some herders worried that a compensation scheme is not in place and that their quality of life will be reduced, their income will be reduced and that they will not be able to be accustomed to the new way of life.

Guarantees in terms of technology, funds and human resources have been formulated at the national, provincial and prefectural levels to address herders' concerns.

In-place compensation: The *Implementation scheme of the reward-compensation mechanism of grassland ecological protection of Xinjiang Uygur Autonomous Region* stated that 50 RMB per year will be allocated for one mu of excluded grazing area. Through administrative adjustments made during the application of Xinjiang Tianshan to be inscribed on the WNH list, 10 RMB will be added yearly. Thus, a herders' household of five members can get 30,000 RMB for an average of 6,000 per person if they have 500 mu of grassland that is excluded from grazing. The annual revenue per capita of a farmer in Xinjiang is 5,442. In addition, a household will get a compensation fee of 50,000 RMB (30,000 from central government, 10,000 from Xiniang and 10,000 from other channels) for the relocation.

Production change and resettlement: relocated nomads are to be settled outside of the nominated property by allocating farms, replacing pasturelands, developing tourism, city and county employment, etc. In order to better their life, the local government has carried out measures such as a preferential policy, helping herdsman apply for small loans and strengthening their skills through training, to encourage the herdsmen to expand their channels through breeding, agritainment, involvement in communication and transportation, tour guide service, song and dance performances and tourism commodity production.

Figure 17 Living condition of herdsmen in Laosanxiang village in Bayinbuluke before relocation

Figure18 Newly-built house in Laosanxiang village in Bayinbuluke after relocation

Improvement of living facilities: To ease moving herdsmen's feelings of unfamiliarity in the new environment and to help them to adapt to the new life as soon as possible, the local government, in line with the *settling and well-off* project, centralized all the relocated herdsmen and built new villages, hospitals, schools, roads, etc. This can greatly improve their living conditions by changing their way of life.

After settling down, more and more herdsmen have been engaged in tourism, agriculture and forestry industries and heritage management. Their living quality has been improved and the relocated herders are satisfied with what has been done (see annex: Community Statements). Observing what has transpired, herders in other places have even asked to be relocated.

4.c Traditional sustainable utilization and national policies about heritage protection

Sustainable utilization has become the guideline managing population, resource and environment relationships in recent years. WNH is a broader concept because it includes how to deal with resource damage from industrialization and urbanization, how to preserve the original state and how to maintain indigenous production and the way of life. The realization of sustainable utilization is a universal problem in heritage management. Traditional sustainable utilization not only refers to sustainable pasturing, but also refers to traditional subsistence agriculture. Theory regarding the protection of natural heritage has evolved from preservation, conservation and management to comprehensive management and sustainability. The protection concept has changed from insular protection to comprehensive management, with consideration being given to the sustainable utilization of resources and development of the surrounding communities.

In recent years, China has been searching for ways to promote protection of natural resource and their sustainable utilization in world heritage sites. In 2002, *Opinions about strengthening and improving the world heritage protection and management* was jointly issued by nine departments, including the Ministry of Construction of the People's Republic of China. It stated that all the development, utilization and management work should put preservation and conservation of the heritage first, take the preservation and conservation of the heritage as the prerequisite, and take sustainable utilization of heritage as the base.

We use traditional sustainable utilization as a practical way of achieving protection by putting the specific content of traditional sustainable utilization into heritage place planning, management and implementation. Heritage sites differ regarding their sustainable utilization. In Xinjiang Tianshan, the most prominent

problem is sustainable herding. Since the reward-compensation mechanism for grassland protection was established in 2011 by the state, the government of Xinjiang has formulated a series of measures, including exclusion of grazing in accordance with the circumstances, and periodic grassland use and protection in a cycle of five years. In order to put traditional sustainable herding into the legal system, we have brought specific content on traditional sustainable utilization of the nominated properties into the planning and implementation documentation. This is one of the most important modifications to the *Management plan of nominated Xinjiang Tianshan.*

The management departments of Xinjiang Tianshan are willing to take the nominated property as an example through the undertaking of research on sustainable herding and heritage management, giving full consideration to the place of heritage in environmental protection, aboriginal interests and local economic development, this is necessary to create synergy between heritage protection and sustainable development. In order to do this, we need help and support from IUCN.

Annex

Community Statement

Our village has 306 people from 86 families. Eighty percent are Mongolian and they live mainly on herding. In December of 2011, we were informed that Bayinbuluke will be nominated as world natural heritage. We feel so proud because our ancestral land could get world-class recognition. However, it means great changes will take place in our life. Early in 2012, a relocation plan was made by leaders of the Construction Bureau of Bayangol Prefecture and the village committee members. The new village with 100 earthquake-resistant houses will be built at a place which is 200 km away. Then a relocation mobilization meeting was organized. Our villagers are so concerned about their long-term livelihoods and compensation after relocation that the leaders made a detailed introduction of the compensation scheme and issued a Mongolian version of an informational brochure. It took six months to build the new village and in July, villagers successively moved into new houses. Villagers are pleased with the new home: it is 2 km away from Bayinbuluke town and it is more accessible and convenient and has better infrastructure. After relocation, some villagers continue to be engaged in animal husbandry and they rear livestock in pens with the forage from delimited grassland. Besides, they get regular compensation payments for grazing exclusion from the Animal Husbandry Bureau of Bayangol Mongol Prefecture. Young people prefer to work in the town; therefore, training for newly employed workers has been organized. The new village is located on the route to Bayinbuluke and 22 families have bought new mongolian yurts and plan to engage in tourism next summer. Now the environment and the living conditions are better and we all support the relocation without any objections. We have lived on this land from generation to generation, so we have the responsibility to protect it. Declaring world natural heritage and protecting and improving the environment will be a good thing. Keeping the natural beauty of this land is also a wealth for our future generations!

Duerzai
Head of Zangdetuhade village in Bayinbuluke town, Hejing county
June, 2012

Community Statement

I feel so pleased to give this statement on behalf of all the villagers. Kuokehula village was established in 2005 and is located 15 km north of Tianchi scenic area. To settle herdsmen who were engaged in the tourism industry, the government of Fukang county input 16 million RMB to build two Kazak villages in Sangong valley: Kuokehula and Tulepaer. In five years, ecotourism in Kuokehula village has developed fast and now it involves 130 families and 300,000 visitors in a year.

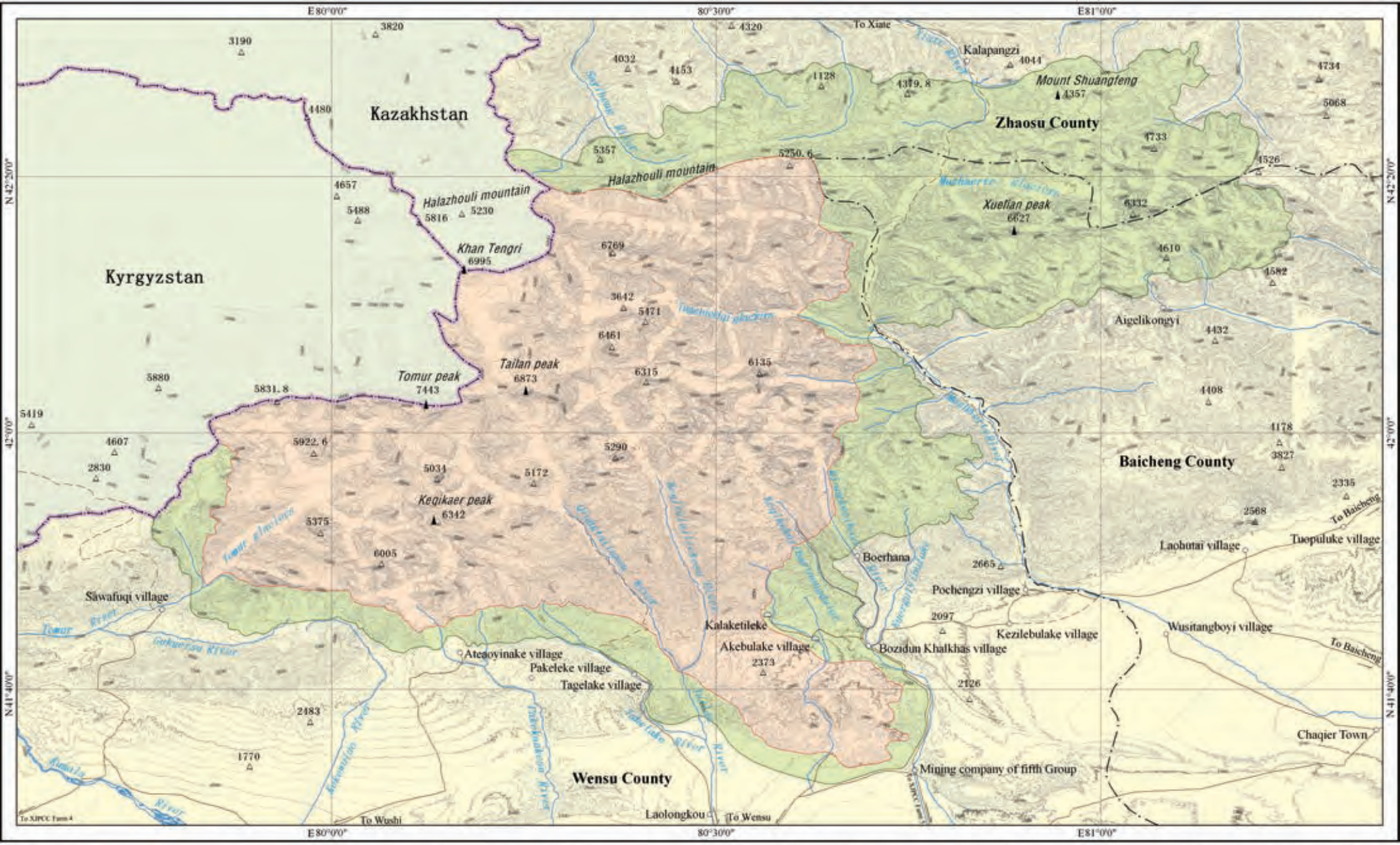
Since Tianshan has been nominated for WNH, our village committee has regularly visited 76 families scattered along the Sangong river to collect suggestions. Nomads were worried that compensation funds would not be in place, that they could not adapt to a new life and that their income will decrease. Therefore, we repeatedly introduced the importance of ecological balance, the grazing subsidy policy, the employment policy and the preferential policy to the herdsmen. These policies cover all aspects of the herdsmen's life: the government will build earthquake-resistant dwellings and pens for the herdsmen who will move to central village settlements; they will give each family 70,000 RMB to buy a new house to those who will settle down in the county center; people more than sixty years old in the grazing exclusion area will get 150 RMB monthly subsidy; students in university there will get 3,000 RMB; the herdsmen have priority in applying for jobs in Fukang county, the administrative commission of Xinjiang Tianchi, etc; for Kazak nomads who prefer to engage in tourism, the government of Fukang will give a 30,000 RMB loan without interest. The relocation of our village began on May 1st, 2010. Extensive propaganda and the relocation made nomads aware that the purpose of the grazing exclusion area is to realize the sustainable utilization of resources. All the nomadic families and livestock have now been withdrawn from the grazing exclusion area. Forty-two families moved to Xitaizi village and continue to be engaged in animal husbandry, and the other 34 families have been embedded into our village to continue to be engaged in transportation, food and beverage, etc.

All the KuoKeHuLa villagers are proud to declare their support for "world natural heritage". As the children of Tianshan, we fully support this work.

Muhuiti

Head of Kuokehula village

June, 2012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Kazakhstan
Kyrgyzstan
Zhaosu County
Baicheng County
Wensu County
Halazhouli mountain
Khan Tengri
6995
Tailan peak
6873
Tomur peak
7443
Keqikaer peak
6342
Mount Shuangfeng
4357
Xuelian peak
6627
Aigelikongyi
Kalapangzi
To Xiate
Boerhana
Pochengzi village
Laobutai village
Tuopuluke village
Wusitangboyi village
Kezilebulake village
Bozidun Khalkhas village
Akebulake village
Kalaketileke
Ateaoyinake village
Pakeleke village
Tagelake village
Sawafuqi village
Laolongkou
To Wushi
To Wensu
To Baicheng
Chaqier Town
Mining company of fifth Group
Legend
Nominated Property
Buffer Zone
Boundary of Nominated Property
Boundary of Buffer Zone
National Boundary
Administration Boundary
Highway
Road
River
Seasonal Pasture
Village/Town
Mountain Peak
Mountain Summit
Coordinate System:GCS
Spheroid:WGS 1984
Mapping Time:Dec.2011
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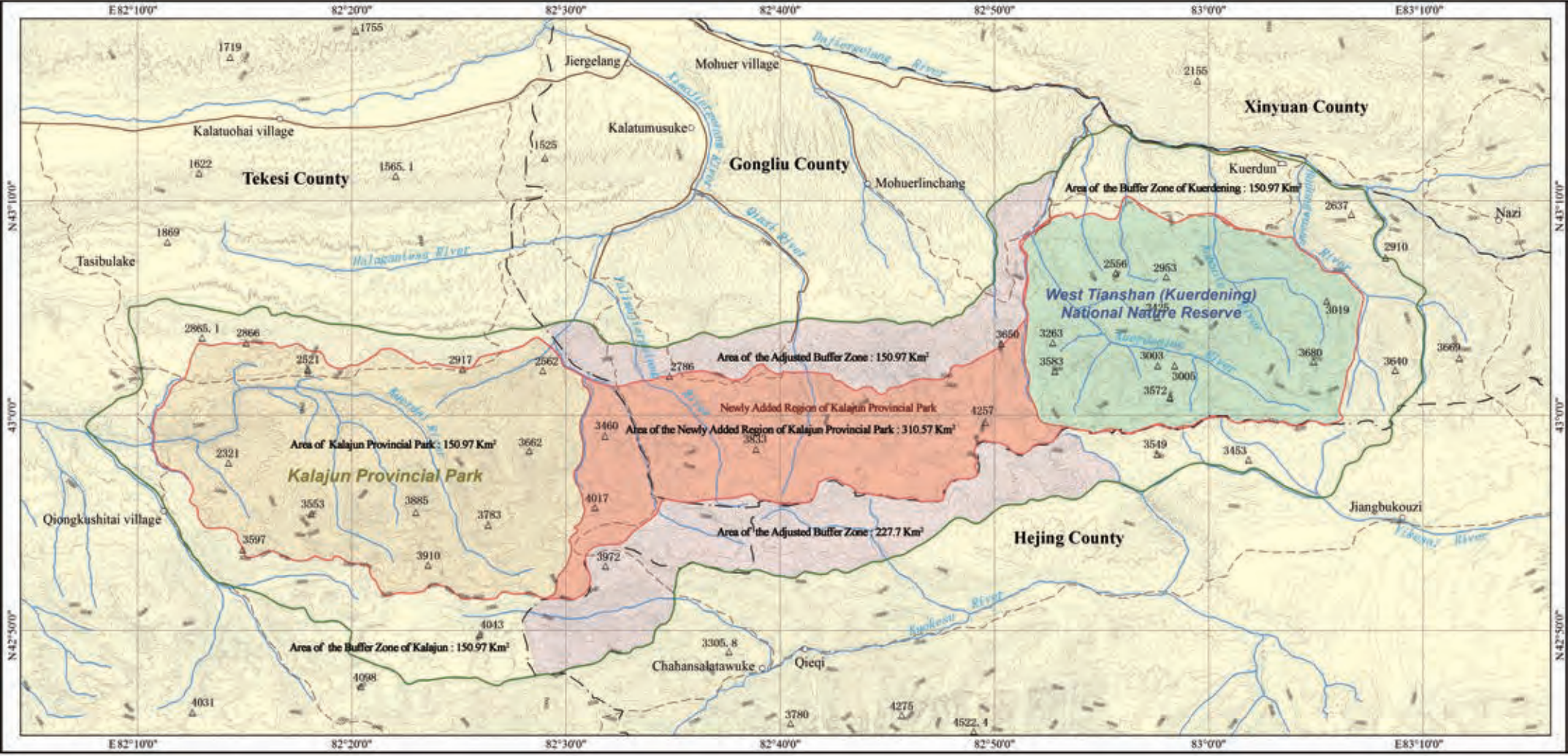
Km



Legend

- National Nature Reserve
- Provincial Park
- Boundary of Nominated Property
- Boundary of Buffer Zone
- Administration Boundary
- Highway
- Road
- River
- Seasonal Pasture
- Village/Town
- Mountain Summit

Coordinate System: GCS
Spheroid: WGS 1984
Mapping Time: Dec.2011

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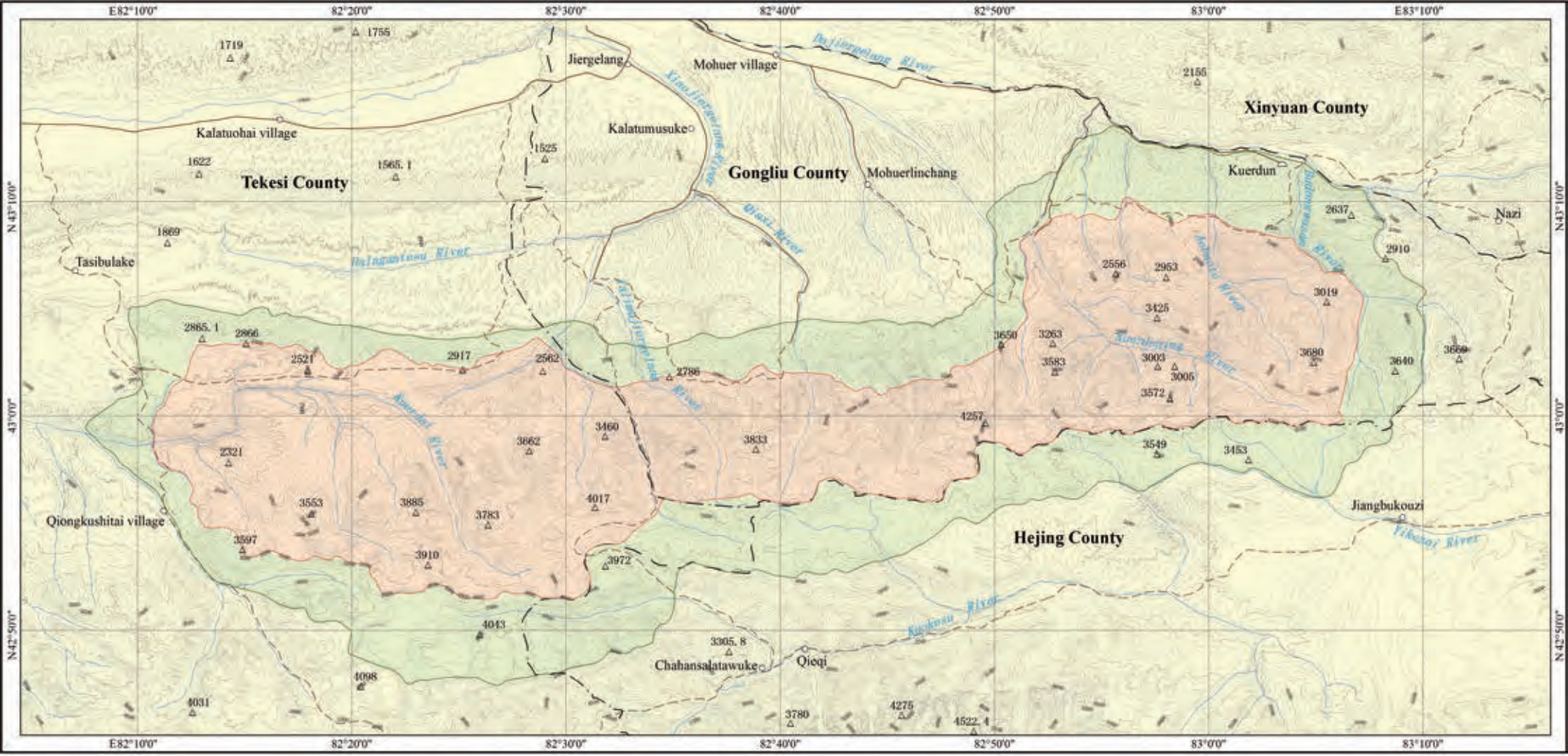

Legend

- Nominated Property
- Buffer Zone
- Boundary of Nominated Property
- Boundary of Buffer Zone
- Administration Boundary
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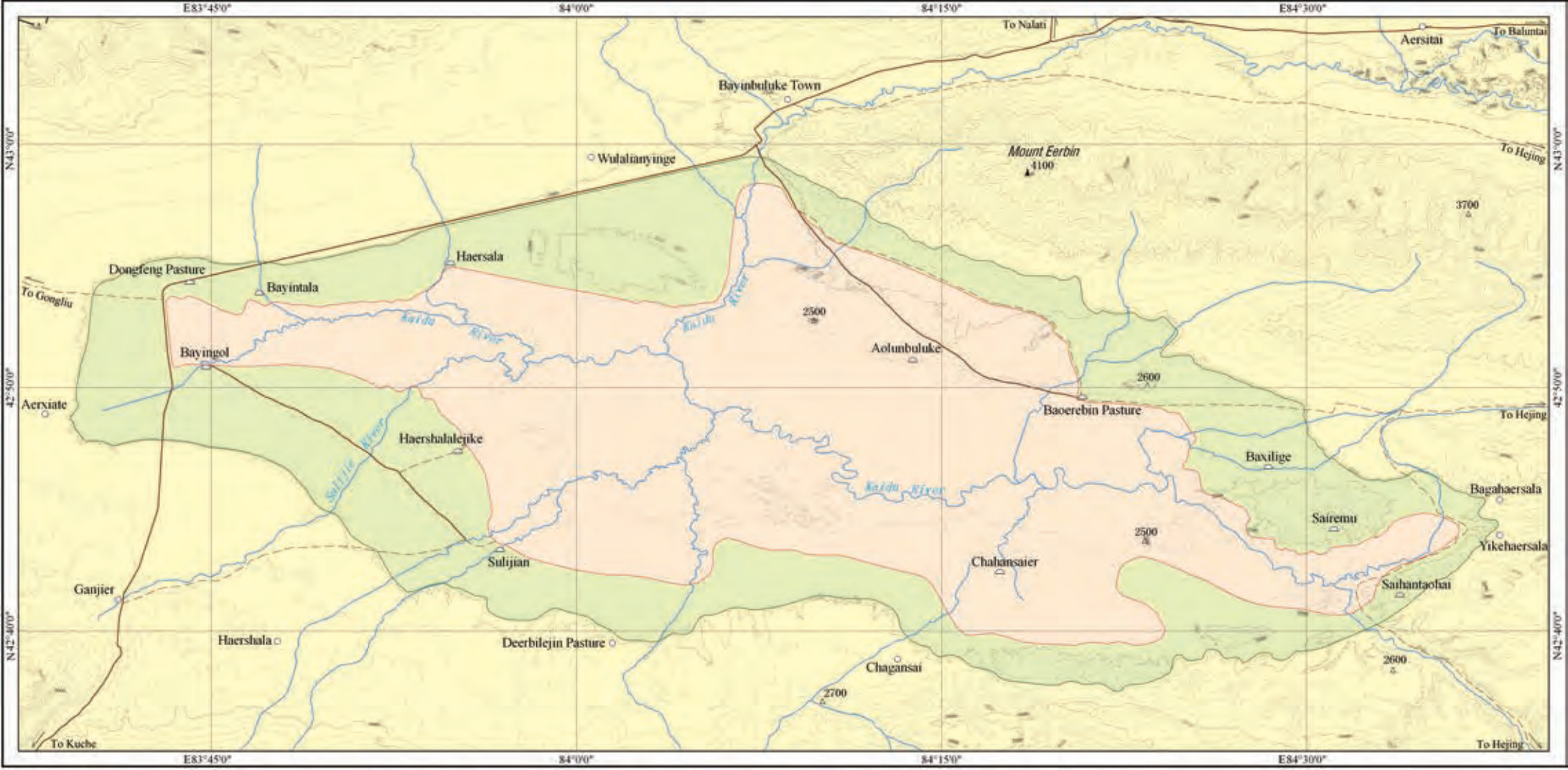

Legend

- Nominated Property
- Buffer Zone
- Boundary of Nominated Property
- Boundary of Buffer Zone
- Administration Boundary
- Highway
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- Seasonal Pasture
- Village/Town
- Mountain Peak
- Mountain Summit

Coordinate System: GCS
Spheroid: WGS 1984
Mapping Time: Dec.2011

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Legend

Nominated Property | Buffer Zone | Boundary of Nominated Property | Boundary of Buffer Zone | Administration Boundary | Highway

Road | River | Seasonal Pasture | Village/Town | Mountain Peak | Mountain Summit

Coordinate System: GCS
Spheroid: WGS 1984
Mapping Time: Dec.2011

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