[ANNEX I]

[DRAFT]

Review of Environmental, Socioeconomic and Institutional Conditions and Experiences in Multi-/Bilateral Cooperation on Nature Conservation for the Amur Tiger and Amur Leopard in Transboundary Areas in North-East Asia

Submitted to the SOM 17

NEASPEC SECRETARIAT

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Acronym	
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DIPA	Dauria International Protected Area
DPRK	Democratic People's Republic of Korea
ENFA	Ecological Niche Factor Analysis
FSC	Forest Stewardship Council
GEF	Global Environment Fund
GRP	Gross Regional Product
GTI	Global Tiger Initiative
IUCN	International Union for Conservation of Nature
KLINR	Khanka/Xingkai Lake International Nature Reserve
MNR	Ministry of Natural Resource and Environment of the Russian Federation
NEASPEC	North-East Asia Subregional Programme for Environmental Cooperation
PSPAA	Primorsky Specially Protected Areas Administration
RSF	Resource Selection Functions
SFA	State Forestry Administration of China
SLHS	Temporary Regulations for Scenic Landscape and Historical Site
SPNA	Specially Protected Natural Areas
SSNR	State Strict Nature Reserves
UNESCO	United Nations Educational Scientific and Cultural Organization
UNDP	United Nations Development Programme
WCS	Wildlife Conservation Society
WWF	World Wildlife Fund
YKA	Yanbian Korean Autonomous Prefecture

Summary

The project "Development of the Cooperation Mechanisms for Nature Conservation in Transboundary Areas in North-East Asia" is dedicated to strengthening multilateral and bilateral cooperation between the member states of the North-East Asia Subregional Programme for Environmental Cooperation (NEASPEC).

In particular, this project is aimed at conservation of Amur tigers and Amur leopards, because the major expanse of their habitat is located in a transboundary region without adequate inter-governmental coordination among the governments of the near-border states.

- **National protected areas framework and flagship species**
  - **Russian Federation:** The original Russian system of protected areas started a few centuries ago. The establishment of the first State Strict Nature Reserves (SSNR), the Barguzinskiy (Lake Baikal), in 1916 marked the inception of the current framework of national protected areas. The number of Specially Protected Natural Areas (SPNA) in the Russian Federation is more than 13,000, covering 10.5 percent of the national territory.
  - **China:** The development of protected areas in China dates back to 1956, when the Dinghushan Nature Reserve in Guangdong Province was established. Since then the number of protected areas increased slowly, and rapidly increasing after 1979. At the end of 2010, 2,588 nature reserves of various types and levels had been established, covering 149,000 km^2, which amounts to 14.9 percent of Chinese territory.
  - **Amur tiger:** The current extant population in the Russian Federation is estimated to be between 428 and 502. In China, the estimation is from 20 to 22, among which 10-12 are in the Heilongjiang Province and 8-10 in the Jilin Province. About 95 percent of the total population is observed to live in the Sikhote-Alin Mountain.
  - **Amur leopard:** Amur leopards are living in the Russian Far-East and the trilateral transboundary areas of China, DPRK, and the Russian Federation. Currently, the Amur leopard habitat is significantly reduced and covers only the extreme south-east of Heilongjiang Province and the eastern part of Jilin Province in China, the extreme south-west of Primorsky Krai in the Russian Federation, and possibly some northern parts of DPRK. The total global population of Amur leopard is estimated to be between 40 and 52.

- **Socioeconomic conditions of protected areas of the Amur tiger and Amur Leopard in transboundary areas**
  - Primorsky Krai is located in the Far-East of the Russian Federation and lies to the east and south-east. The Russian Federation, China and DPRK share a border on the Tumen River area in the far south of Primorisky Krai. The Krai covers 165,900 km^2, approximately 2.67 percent of the entire Russian territory. As of January 2009, the region's population was 1,988,000 and the 2010 Gross Regional Product (GRP) was 432.7 billion RUB (14,234 million USD), ranking 26th out of 83 states in the country. As one of the most actively developing territories in Russian Federation, Primosky Krai has the largest and most balanced economy in Russian Far-East.
  - Federal-level Leopardovy Zakaznik, another federal-level Baroviy Zakaznik and a regional-level Borisovo Plateau Zakaznik merged into one protected area. In addition,

The Land of the Zakaznik was established on 262,000 hectares in the south-west region of Primorsky Krai, over the Khasansky, Ussuriysky, and Nadezhdensky districts.

- Jilin Province lies in the central part of north-eastern China, bordering the Russian Federation to the east and DPRK to the southeast. Jilin has a total land size of 187,400 km^2 and population of about 27 million. It reached 1,053 billion CNY (167 billion USD) in 2011. Jilin's GRDP ranked 22nd out of 31 provinces in China.
- Heilongjiang Province is located in the north-eastern part of China, covering an area of 454,000 km^2. The province's total population in 2010 was 38 million. Heilongjiang GRDP maintained a steady growth rate of 12 percent over the past few years and reached 1,250 billion CNY (198 billion USD) in 2011, ranking 18th out of 31 provinces in China.
- Jilin Hunchun Nature Reserve was established in 2001 as a provincial-level reserve, but it acquired a State-level Nature Reserve status in 2005. It is located in the Yanbian Korean Autonomous Prefecture (YKA), which is east of Jilin Province. The reserve shares border with China, the Russian Federation and DPRK. It covers 108,700 hectares, comprising of its 50,536-hectare core reserve, a 40,571-hectare buffer zone, and a 17,593–hectare experimental zone. The reserve was established mainly to protect Amur tigers and Amur leopards.
- The 190,781-hectare Changbai Mountain National Nature Reserve sits over three different counties: Antu, Fusong and Changbai. Its forest coverage is roughly 88 percent, and the timber storage capacity is 44 million cubic meters. The Reserve was established in 1960 by the local government, and in 1992 the World Wildlife Fund (WWF) listed it as one of the 40 Class-A reserves in China.

- **Cooperation on nature conservation for Amur tiger and Amur leopard and recommendations**
  - In August 2010, Jilin Province of China and the neighbouring Primorsky Krai in the Russian Federation agreed to formally collaborate towards creating the first transboundary Amur tiger protected area. The two sides aim to establish a protected area in both provinces and to restore the endangered species. The agreement expects to double the number of wild tigers by the next Tiger Year of 2022.
  - One of the urgent tasks is the development of international transboundary reserve to save Amur tigers, Amur leopards, and other rare species near the border area. Mutual understanding of the necessary cooperation on saving them will improve information sharing, coordinate scientific studies, streamline methods for making inventories and surveying population and habitat status. Collaboration will also enhance guarding against illegal transboundary trades.
  - The small population of Amur leopards existing near the borders strongly calls for intergovernmental co-ordination. Conservation of the Amur leopards in the Russian territory will be difficult without the collaboration from China and DPRK.
  - Participation in The Global Tiger Initiative (GTI) requires convening of efforts from all relevant countries to coordinate tiger conservation activities.
  - Involvement of international environmental organizations, charity funds, foundations, and other NGOs would help fundraising, knowledge-sharing, and research on the Amur

tigers over the entire habitat range.

- Restricting the sales of illegal hunting products and smuggling requires coordination as well. Collaboration among the local customs units on both sides of the border can effectively intervene on illegal animal product trading. Also, intelligence can be shared on international channels of illegal trade.
- Coordination of scientific programmes and studies by specialists from various countries will help produce streamlined methods, leading to comparable results of studies. Scientific collaboration may also help encourage wider participation from the managing bodies.
- Effective SPNA management in transboundary areas should be implemented through the development of joint management plans, agreed by the competent authorities of the countries. The objective of joint plans is to optimize management system and all activities of the transboundary SPNA, and also to identify opportunities for maintaining sustainable ecosystems for conserving the biological and landscape diversity.
- The joint commissions should comprise responsible representatives from the states with jurisdiction in the transboundary SPNAs. Also, coordination of the transboundary area management and the relevant agreement should be concluded. In some cases, the representatives of multilateral environmental agreements interested in the conservation of rare and endangered species and making efforts for their restoration could partake in the joint commission.

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1. General framework of national protected areas

The first protected area was created in the Russian Federation in 1916, while that of China was created 40 years later in 1956. Both countries are similar in that the protected areas are administered under different agencies and categories with specified functions and regulations.

The development of the original Russian system of protected areas began when at the end of the 19th century Russian scientists started to build scientific foundations for having reserve systems. The legal basis of protected areas was developed by the early 20th century. In China, since the designation of the first protected area, the Dinghushan Nature Reserve in Guangdong Province, the number of protected areas increased slowly, expanding rapidly after 1979. Chinese government issued three major laws and regulations associated with protected areas, including *Temporary Regulations for Scenic Landscape and Historical Site* (SLHS) in 1985, *Regulation of the People's Republic of China on Nature Reserves* (Nature Reserve Regulations) in 1994, and *Management Measures for Forest Parks* in 1994.

Currently, the number of specially protected natural areas (SPNA) in the Russian Federation is over 13,000 and covers 10.5 percent of the national territory. In China, 2,588 nature reserves of various types and levels have been established, covering the total land area of around 149,000 km^2 – about 14.9 percent of Chinese territory.

1.1 Framework of national protected areas in the Russian Federation

In the Russian Federation, the comprehensive and unique system of protected areas comprise the SPNA, areas of traditional nature-use, water protective zones, nut-harvesting zones, specially protected forest areas, protective massifs of forests with high environmental protection value, recreational areas, etc. First dubbed as State Strict Nature Reserves (SSNR), the SPNA is the core of the system and is also widely known as Zapovednik (this Russian term is included without translation in many international glossaries). The federal law *On Specially Protected Areas* defined the SPNA as "areas of land, as well as the water surface and air space above them, where the natural complexes and objects are located, which have special environmental protection, scientific, cultural, aesthetic, recreational and health-improvement significance, which are fully or partially removed from economic use by the decisions of the state authorities, and which are assigned with the special protection regime".

The major SPNAs are usually categorized by the governing regimes, land management, functions, and management purposes. The categories are the following:

- state natural reserves, including biosphere;
- national parks;
- natural parks;
- state natural zakazniks (sanctuaries);
- natural monument;
- dendrologic parks and botanic gardens;
- medicinal and health-improvement localities and resorts; and
- others established by the executive authorities and local administrations.

SPNAs may have federal, regional or local significance. Furthermore, SPNA of federal significance are classified into four major groups: state natural reserve, national park, state natural zakazniks and natural monument [Table 1].

[Table 1] Summary of Major SPNA of Federal Significance in the Russian Federation

SPNA Categories	Number	Area (million hectares)	Percentage of the national territory
State natural reserve	101	33.8 27.3*	1.6
National parks	41	9.1 8.3*	0.49
State natural zakazniks	69	12.7 9.8*	0.67
Natural monument	31	0.037	-

* excluding sea areas

The Federal Law *On Specially Protected Natural Areas* stipulates that the federal governments and authorized state environmental bodies are responsible for management and operation of SPNA of federal significance, while regional authorities and environmental bodies manage the state nature reserves, natural monuments, arboretums and botanical gardens, curative and sanative lands and resorts of regional importance. There are over twenty governmental bodies at the federal and regional levels in charge of the management and operation of SPNA. The major ministries and agencies for SPNA include the Ministry of Natural Resources and the Environment of the Russian Federation (MNRE), Ministry of Agriculture of the Russian Federation, Ministry of Economic Development of the Russian Federation, Ministry of Regional Development of the Russian Federation, Russian Academy of Sciences, and the Ministry of Defence of the Russian Federation.

[Table 2] Major SPNA of Federal Significance in Russian Federation

State Natural Reserve
The state natural reserves are the natural reserves at the strictest level. They are designated for highly valuable areas in terms of ecological assets and are given federal status of significance. Their basic purpose is to protect natural complexes and to serve for scientific studies and environmental education activities. Access to these reserves is highly restricted, and only educational excursions are permitted under the supervision of reserve staffs.

National Park
The national parks are land and water areas of natural complexes and subjects with special environmental, historic and aesthetic value. They are designated for environmental protection as well as for educational and scientific research. Land, water, sub-soil, and the wildlife located in the national parks are provided for use (possession) according to the rights envisaged by the federal laws. *T*he protection of natural complexes and objects located in the reserves and national parks is enforced by the special state inspection agencies.

Zakaznik
Zakazniks are mainly game reserves and are established for preserving the game commercial resources. Zakazniks are established for secure existence of animals and plants, addressing integrated tasks on conservation of unique or typical natural environments. Zakazniks could be of federal or regional significance. Specific endeavors aimed to improve the state of protected species or natural complexes are allowed in Zakazniks.

In most cases, SPNA of the federal significance are under the authority of the MNRE of Russian Federation. After re-assigning of SPNA to federal significance in 2008, the territorial bodies of Rosprirodnadzor (Russian Federation's natural resource protection agency) perform the state control and surveillance for SPNA. The SPNA management system at the regional level has specificities. Along with federal representation of executive power (through its territorial bodies), the SPNA management and surveillance in the regions of the Russian Federation are carried out by local administration representatives. The scientific community plays a key role in information sharing, provision of monitoring data, scientific studies and education programs.

1.2 Framework of national protected areas in China

In China, the *Nature Reserve Regulations* defines the nature reserves as areas on land, inland water bodies, or marine districts with any of the following traits: representing various types of natural ecological systems, providing home to a natural concentration of rare and endangered wild animal or plant species, or encompassing natural traces or other protected subjects of special significance. Establishment and management of nature reserves within the territory or other sea areas under the jurisdiction of China must comply with the Regulations.

Since the enforcement of *Nature Reserve Regulations*, the Chinese government only allowed one management category of protected areas – nature reserves. Nonetheless, other types of protected areas have been developed for various purposes at different levels of government
[Table 3].

[Table 3] Major SPNA of Federal Significance in China

Nature Reserve
Nature reserve is the most common protected area management category in China, established for multiple purposes at national, provincial, prefectural, and county levels. Three management zones are: (i) core area permitting only research and conservation; (ii) buffer zone permitting collection, measurements, management and research; and (iii) experimental zone permitting scientific investigation, public education, tourism and raising of rare and endangered wild species. The four objectives are: (i) natural ecosystems (forest ecosystem, grassland ecosystem, desert ecosystem, inland wetland and watershed ecosystem, ocean and coast ecosystem); (ii) wild animal; (iii) wild plant; and (iv) natural monument.

National (local) Forest Park
This category was established for recreational purposes in China under the Forestry Administration at national and provincial level.

Ecological Function Conservation Areas

This category consists of large areas that include settlements and a wide range of human activities, often overlying with existing nature reserves. The aim is to provide land use guidance across ecological zones with important biodiversity and ecological processes.

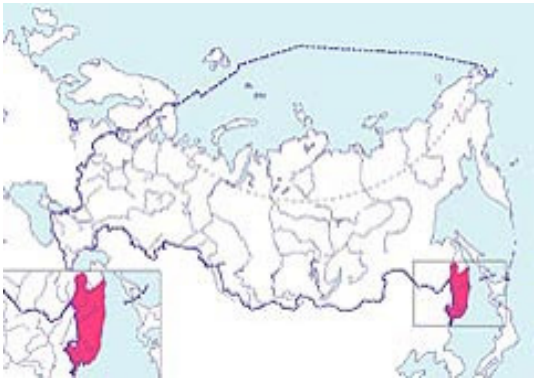
Scenic Landscape and Historic Site
This category consists of recreational or educational sites designated for protection of landscape or historic resources. These typically lack management personnel or infrastructure and are not governed by a national legislation or regulation.

2. Key features of flagship species and their habitats

2.1 Amur tiger Panthera tigris altaica

VERTEBRATA
Order: Carnivora
Family: Felidae
Genus: Panthera
Category: 2 – rare subspecies, inhabiting the territory of Russian Federation, China and DPRK only.

2.1.1 Habitat Range and Distribution



Extant wild Amur tigers are found only in the Russian Federation and China world wide, mostly in the Sikhote-Alin Mountain. The northern boundary of the Amur tiger's habitat runs along the south border of the Far-East Russian Federation. Presently, Amur tigers inhabit three isolated areas in the Far-East. Population in the Sikhote-Alin Mountain accounts for 95 percent of the total number of tigers in Russian Federation. The other two areas are the south of Khasansky district in the Primorsky Krai and the large region stretched from Borisovsky plateau towards the Tesnaya River basin. The western border of the two areas covers the upper Komissarovka river basin. The tigers were not found in the latter two areas until the late 1980s. Rarely, individual tigers reach the region below the Ussuri River estuary.

Amur tigers are severely endangered in China. Historically, they were distributed across the forested ecosystems in northeastern China. Based on records including the historic land cover data, Amur tigers are presumed to have roamed across Daxing'anling, Xiaoxing'anling, Laoyeling, Zhangguangcailing, Wandashan, and Changbaishan mountains. Currently, reports of spotting the tigers in Laoyeling, Zhangguangcailing, Wandashan, and Changbaishan Mountains are not uncommon, but there is no evidence that a stable and reproducing population exists here.

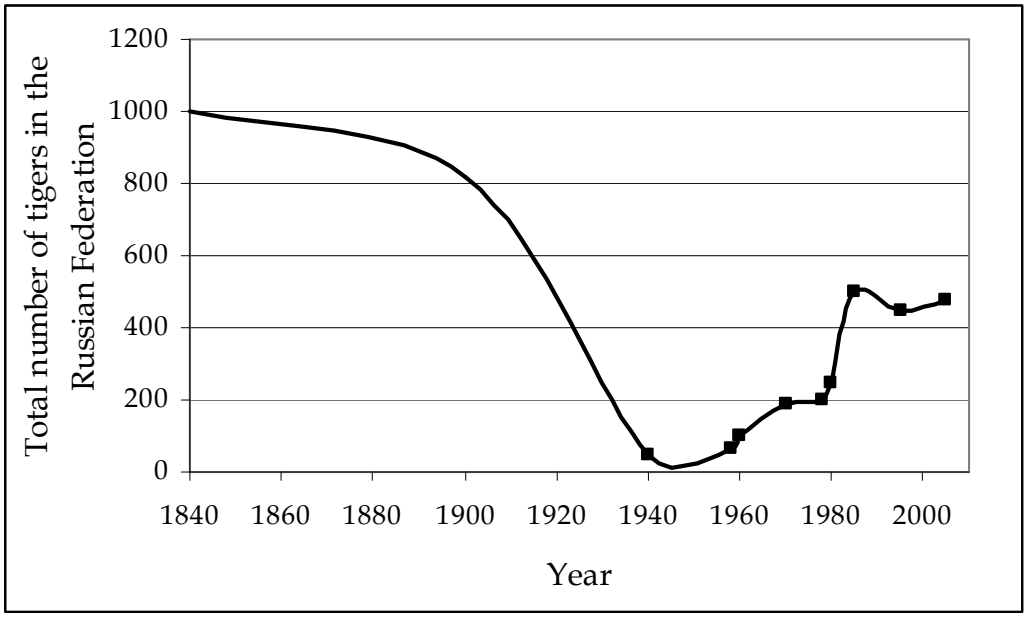
2.1.2 Features and habitats

Broadleaf forests are the Amur tiger's primary habitats. Having the largest body size in the Felidae family, each adult Amur tiger needs a large area of land as its territory. Amur tigers rely on trails to move in the confines of their territories; their typical routes are relatively fixed. On average, an adult tiger needs around 400 km^2 of non-overlapping areas to survive and raise healthy cubs. Males require 600-800 km^2 and females need 300-500 km^2. The gender ratio is 1:2 or 1:4, indicating polygamy. The breeding period frequently falls in the second half of the winter season and gestation lasts for 95-107 days. For each birth, litters of 2-3 kittens are born. Kittens reach their sexual maturity 3-4 years after birth and breeds once every two years. The young tigers account for roughly half of the total population.

2.1.3 Population

Russian Federation
Throughout history, the Amur tiger population in the Russian Federation plunged in the mid 20th century, but recuperated by deliberate efforts to restore the endangered specie [Figure 1].

[Figure 1] Tiger Numbers in the Russian Far East (1850-2009)



(Points on the line represent surveys conducted)
Adapted from Presentation on Ecology and Conservation of Tiger and Leopard and Transboundary Cooperation by Dr. Dale Miquelle during NEASPEC meeting in 2010

During the 19th and 20th centuries, about 120-150 tigers were bagged annually in the Russian Federation. At the beginning of the 20th century, intensive hunting and habitat destruction led to dramatic decline in their numbers. By the end of the 1930s, only 20-30 tigers remained in the Russian Far-East, making Amur tigers one of the most critically endangered species. The

population faced extinction between 1940 and 1960. Consequently, actions were taken to reverse the trend; in the following two decades, the number of tigers stabilized between 90 and 100. Also, more programs were launched to help increase the number to 150 in the early 1970s, which further rose to 170 by the mid-70s. In the mid-80s, the number reached 245. A survey conducted in Primorsky Krai and Khabarovsky Krai during the winter of 1995-1996 showed that the total number of tigers was between 415 and 476, including 330-371 adults. As the increasing trend continued, the latest full-range survey [1] conducted in 2005 by the Wildlife Conservation Society (WCS) in collaboration with the World Wild Fund for Nature (WWF) and other affiliated government entities estimated the population in Russian Federation to be between 428 and 502.

China

Historically there were more than 4,000 Amur tigers living in northeastern China. This number dropped dramatically to approximately 150 tigers in the 1970s. The latest survey of the Amur tiger in China was conducted between 1998 and 1999, which reported no more than 16 tigers remaining in China. Although there is no evidence that a stable, reproducing population exists in the northeast of China, there are regular reports confirmed that tigers cross the border between Russian Federation and China.

After year 2000, scientists in Heilongjiang Province focused on collected information of population from tracks left by the roaming tigers. Based on the tracks, it is estimated that the number of Amur tigers was 5 to 6 in 2000, 9 to 11 in 2004 and 20 to 24 in 2007. The monitoring showed that Amur tiger territory was diminishing in size; for example, the tracks disappeared in the southern Zhangguangcailing since 2004.

Since year 2001, Amur tiger monitoring has been carried out in Jilin Province by the Hunchun National Nature Reserve and survey analyses have been conducted to observe and estimate the frequency of tiger appearance, quantities and sex ratio. By the end of 2009, activities monitored in the area had been counted 256 times, and the frequency of activities counted per year was nearly 20 in 2002, 20 in 2003, 19 in 2004, 17 in 2005, 21 in 2006, 6 in 2007, 38 in 2008, and 29 in 2009. More male tigers have been recorded than female, while traces of kittens and young males were each found only once.

Experts estimate that 10-12 tigers remain in Heilongjiang Province and 8-10 in Jilin Province. Such findings suggest that re-colonization of previously occupied tiger habitat in northeastern China is still possible if appropriate steps are taken to identify and manage these landscapes.

The total size of the protected areas for Amur tigers is 9886.84 km^2. Currently 16 nature reserves for the Amur tiger have been established in China at provincial level, including the Hunchun Tiger Nature Reserve and Changbai Mountain Natural Reserve in Jilin Province; the Niaoqingshan Natural Reserve and Phoenix Mountain Natural Reserve in Heilongjiang Province. The State Forestry Administration of China (SFA) identified three priority protection areas for the Amur tiger: the Changbaishan Mountain region, Hunchun-Waingqing-Donging-Suiyang Region, and the Wandashan Mountain region. Within these protected areas, the main Amur tiger protection efforts proposed by the State Forestry Administration include habitat conservation, capacity building for habitat preservation and monitoring, community development, and international cooperation.

[1] D.G. Miquelle. *et al*. "A Survey of Amur (Siberian) Tiger in the Russian Far East, 2004-2005"

2.1.4 Protection Efforts and Methods

Russian Federation

The Amur tiger has been registered in the 1996 Red List of the International Union for Conservation of Nature (IUCN) and Annex 1 to CITES. In the Russian Far-East, Amur tigers are primarily located in Sikhote-Alin Mountain and Lazovsky areas. Faced with a grave threat on the population in the mid 20th century, a ban on Amur tiger hunting was enforced in 1947, followed by more population restoration programs in the 1960s and 1970s, mostly through improving the ecological conditions in the Sikhote-Alin.

The necessity of conservation of the Amur tiger at the Far East is consolidated by the legislation and other regulatory acts of the Russian Federation, including the Federal laws *"On environmental protection"*, *"On wildlife"*, *"On specially protected areas."* In 1996 *"Strategy for the Amur tiger conservation in the Russian Federation"* pronounced the major principles and outlined a comprehensive set of tools for long-term conservation. Based on this Strategy, the Federal Targeted Programme for 1999-2003 was developed. The implementation of the Strategy between 1997 and 2008 succeeded in maintaining a stable trend of growing population and expanding habitat boundaries.

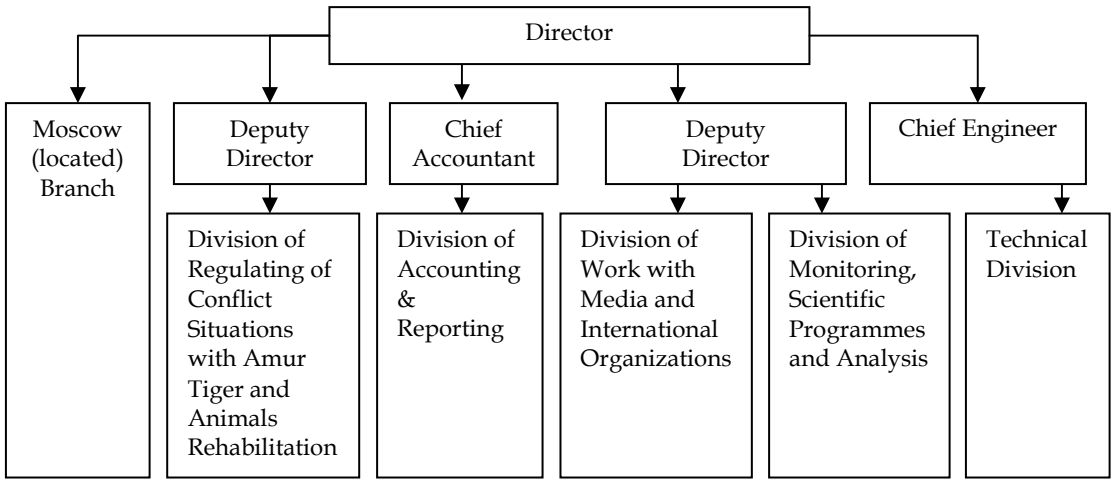
Unfortunately, compared to the 1990s, the present situation for Amur tigers is grave: the forested plains have become sites of intensive agricultural development; Sikhote-Alin and Eastern Manchurian mounts have become more isolated; and finally, the number of tigers is on a decline. On a positive note, 9 new SPNAs covering 1.14 million hectares have been established during the past 15 years. During the course of implementing the Federal Targeted Programme "Conservation of the Amur Tiger," a federal state institution titled Specialized Inspection for the Protection of Rare and Endangered Wildlife Species (Spetzinspektzia Tiger) was established in 2000 to conserve the population of Amur tigers and Amur leopards as well as other endangered species registered in the Red Book of the Russian Federation [Figure 2].

In 2007, the *Resolution of the Government of the Russian Federation* re-assigned the "Spetzinspektzia Tiger" under the *Federal Service for Nature Use Surveillance*. Also, changes to the legislation on wild animals deprived the Inspection of several authorities including the power to settle conflicts between wild animals and villagers. The Spetzinspektzia Tiger experience drew international attention. The CITES technical mission recommended its utilization to all countries providing home to the Amur tigers. The Russian Federation was found to be the only country with such a highly skilled and effective specialized division on the tiger protection in force.

In 2008, the Government of the Russian Federation established national parks "Udaegeiskaya Legenda" (Udaeg's Legend), "Zov Tigra" (Tiger's Call) and "Aneuysky", a federal zakaznik "Leopardovy", and also adopted a unique annual programme for the Amur tiger studies at the Russian Far East. Around 45,000 hectares of forest adjacent to the SPNA were designated as conservation sites and restoration work on cedar-broadleaf forests was launched.

[Figure 2] Structure of Federal State Institution "Spetzinspektzia Tiger"

The Inspection has over 50 staff members, and there are 18 task brigades operating in the Primorsky Krai and Khabarovsky Krai. During the operational period of the Inspection agency, over 13,000 poachers were detained, 82 fells and around 3,600 hunting equipments were confiscated. The Inspection also registered 3,920 violations, over 1,100 units of firearm, 2,700 illegal fishing gears, 70 tiger and leopard fells, 19,000 fur animal fells, 126 kg of ginseng, etc. Furthermore, 194 criminal cases were filed against the registered violations. Nearly 200 conflicts between Amur tigers and local residents were reported. As result, the Inspection had saved 21 tigers, and 37 other tigers were saved by using preventive measures.



China

The Chinese government has developed related projects on Amur tiger conservation management. Under the guidance of State Forestry Administration, wildlife conservation management agencies in Jilin and Heilongjiang have conducted a series of work for Amur tiger conservation management. At national level, laws and regulations including *Implementation Regulations on the Protection of Terraneous Wildlife*, *Regulations on the Wild Plants Protection*, *Regulation on Nature Reserve Management*, and *Decree Trade Ban in Rhinoceros Horn and Tiger Bone* were established for wildlife and forest management.

At provincial level, the governments of Jilin and Heilongjiang issued a series of local regulations on conservation management of wildlife and their habitats, as well as their prey population. The provincial level regulations include *Jilin Wildlife Protection Regulation*, *Decision for a Five-Year Hunting Ban on Terraneous Wildlife in Jilin Province*, *Several Provisions on Hunting Ban on Terraneous Wildlife in Jilin Province*, *Compensation Method for Personal and Property Damage Caused by the Jilin key Protected Terrestrial Wildlife*, *Heilongjiang Hunting Regulation for Foreigners, Heilongjiang Wildlife Protection Regulation*, *Regulation Measure for Heilongjiang Nature Reserve*, and *Heilongjiang Forest Management Regulation*.

2.2 Amur leopard Panthera pardus orientalis

VERTEBRATA
Order: Carnivora
Family: Felidae
Genus: Panthera
Category: 1 – critically endangered species at the territory of Russian Federation and China

2.2.1 Distribution

In the early 20th century, the leopards in Russian Federation inhabited the areas of Primorsky Krai and the left bank of Amur River in Khabarovsky Krai, mostly in the vicinity of Small Hinggan. The leopards also occupied the far south Ussuriysky Krai, but economic activities of the region divided the leopard population into three isolated areas. Before the 1970s, Amur leopard population in China was still significant. Though information of other provinces is unavailable, about 50 Amur leopards were estimated to be in Jilin Province. From 1970 to 1983, habitat degradation and poaching led to a sharp reduction in the population of Amur leopards. Since the 1980s, their habitats have shrunk and the extreme southwest of Primorsky Krai has become the last remaining Amur tiger and leopard habitat in the Russian Federation, providing an area of approximately 3,000 km^2 along the borders with China and DPRK. Now the range of Amur leopard has significantly reduced, leaving only the extreme southeastern part of Heilongjiang Province, eastern part of Jilin Province, farthest southwestern part of Primorsky Krai, and possibly the northern part of DPRK.

The tripartite joint investigation by China, Russian Federation and USA in 1998 found only three leopard tracks in Jilin Province. Experts estimated the leopard population size to be 7-12. Information of Amur leopard in China was scarce in recent years. Currently, the number of Amur leopards is less than 50 globally. All of them are in the Russian Federation and in the transboundary region with China.

2.2.2 Features and habitats

The mature female leopard requires an area of 35-45 km^2, while the males need an area 4-6 times larger. Amur leopards prefer living in the mountain areas covered by forests with narrow watershed ridges and steep slopes up to heights of 300-500 meters above sea level. The Amur leopard does not approach higher altitudes of the mountains, especially during winters. The vegetation in their habitat range is presented with cedar broadleaf, oak broadleaf, and black fir forests. Steady decline of suitable habitats of Amur leopards was brought upon by deforestation of coniferous species, mature oaks, and ash trees, as well as by new road constructions that prohibit access to the most remote and hospitable lands. The preferred preys of Amur leopards are roe deer and sika deer. Also, a number of species, such as badger, raccoon dog, and Manchurian hare play minor role in the leopard nutrition. As for reproduction, after a gestation

period of 90-105 days, kittens are born in litters of one to four. The Amur leopard is a solitary lifestyle species. The kin is represented with the female with kittens, in some cases there are females with kittens of different ages. The young specimens are separated at 12-16 months. As result, the ranges of the same-sex adult will not collide.

2.2.3 Population

About 38-46 Amur leopards lived in the Primorye region in the mid-1970s. The census between 1983 and 1984 indicated that 25-30 Amur leopards remained in the western Primorye and the southern Sikhote-Alin, about 10 of which inhabited the areas close to the Chinese border. A series of surveys conducted in the 1990s consistently reported that 35-40 leopards were found in the south-western Primorye. Since the exploration of the DPRK areas located close to borders with the Russian Federation and China has not been reliably confirmed, Amur leopard's habitat is currently estimated to be limited to the mountainous area of 10,000-15,000 km^2 along the borders of Russian Federation, China and DPRK. The most optimistic assessment indicates that the total population of the Amur leopard on earth does not exceed 40-52, consisting of 30-40 in Primorye, 4-7 in Jilin and 3-5 in Heilongjiang.

2.2.4 Protection Efforts

The Russian Federation
The Amur leopard was registered in the IUCN Red List 96 and Annex 1 to CITES. In the Russian Federation, hunting leopards has been prohibited since 1956, whereas the ban of capturing live animals was introduced in 1966. Amur leopard is under the protection in the Cedar Deep Reserve. In 1979, the zakaznik of the federal significance "Barsovy" was established for leopard protection. In 1996, the zakaznik of the regional significance "Borisovsky Plateau" was established, which partially covered the peripheral part of the leopard range areas. Furthermore, in line with the *Order of the Government of the Russian Federation the State Natural* "Leopardovy," zakaznik of the federal significance was established in 2008 (within the boundaries of the abrogated zakaznik of "Barsovy" and zakaznik of "Borisovsky Plateau"). The Amur leopard is held and well bred in captivity. Because only approximately 10 pure-blooded leopards of the Far-Eastern subspecies exist, breeding activities are of high importance.

Cedar Deep Reserve is the only reserve in the Russian Federation for Amur leopards. The population in Primorsky Krai is estimated to be 30. For many decades, Cedar Deep Reserve has been the research base for biological studies, phonological observations, and the inventory work for the scientists at Russian Academy of Sciences, Far Eastern Branch. A long-term study of the ecology and behavior of the leopard was carried out, using observation methods such as tracing tracks on snow and radio-tracing with radio-collars on the leopards. The Cedar Deep Reserve came under the authority of the Ministry of Natural Resources and the Environment of the Russian Federation in 2008.

China
In China, the Amur leopard is under the protection of the Hunchun Tiger and Leopard National Nature Reserve, but other potential habitats and parks that could qualify as protected areas are not included as reserves.

3. Provincial conditions of protected areas for Amur tiger and Amur leopard in the transboundary region

The protected areas of Amur tiger and Amur leopard in transboundary regions are located in the Khasansky District in the Primorsky Krai of Russian Federation, coupled with Jilin Province and Heilongjiang Province in China. This section presents the socioeconomic, environmental and institutional conditions of these three administrational regions.

3.1 Primorsky Krai

3.1.1 Location and size

Located in the Far East of the Russian Federation, Primorsky Krai shares its southeastern border with China. In the far south of Primorisky Krai, the Russian Federation, China and DPRK share a border on the Tumen River delta. The Krai covers 165,900 km^2, approximately 2.67 percent of the entire Russian territory.

3.1.2 Population

As of January 2009, Primorsky Krai had 1,988,000 residents, including 1,498,000 in urban and 489,000 in rural. Residents with the Russian nationality are dominant in the region, accounting for 90 percent of the total population. As for the rest, 4 percent are Ukrainians, while 5 percent comes from other foreign counties. Indigenous peoples (Udaegs, Nanais, and Tazes) contribute less than 1 percent to the total population.

3.1.3 Regional economy

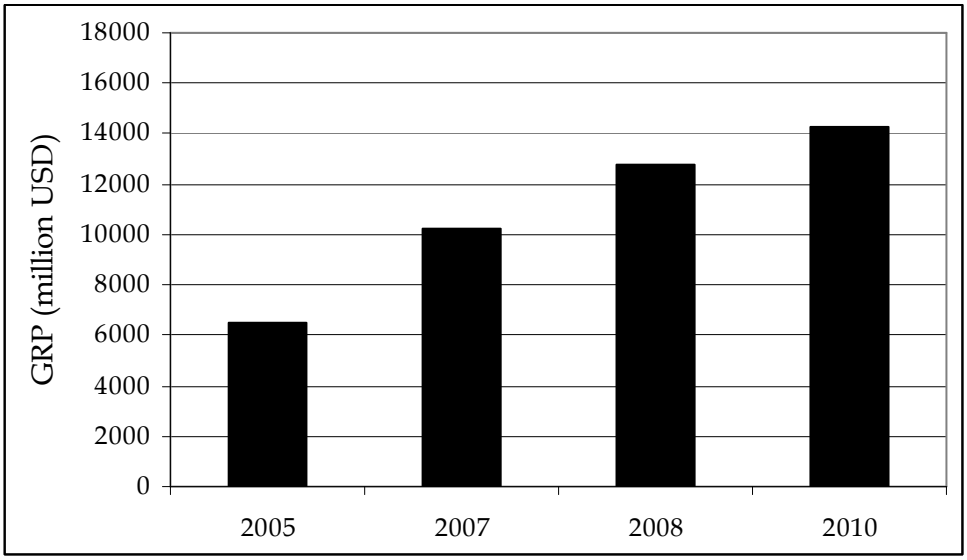
Primorsky Krai is one of the fastest growing regions in Russian Federation. Among all regions in Russian Far-East, Primosky has the largest and the most balanced economy. According to the Governor of Primorsky Krai, the GRP growth rate is comparable with the rate of the leading states in Asia and the Pacific. Shown in [Figure 3], the economy of the Krai gained a steady growth rate between 2005 and 2010. In 2008, the Krai contributed 0.4 percent of industrial output, 0.6 percent of agricultural output, 1 percent of retail turnover and 0.9 percent of basic capital investment to the total Russian output. In 2010, the Gross Regional Product (GRP) was 432.7 billion rubles (14,234 million USD) which ranked 26th out of 83 states in the country[2].

The economic growth is mainly contributed by metalworking, extracting and processing tin ore, manufacturing construction material, engineering in aircraft, radio-electronics, food processing, and chemical engineering. Furthermore, coal mining is essential for Krai's economy. Food industry (mainly fish and fish products) made the biggest contribution to the economy, representing about 45 percent of total production. Around 15.5 percent of the national fish products come from the Krai. In addition, the power industry and the engineering contributed 17

[2] List of Russian Federal Subjects by GRP

percent and 10 percent to the economy respectively.

[Figure 3] Gross Regional Production of Primorsky Krai 2005-2010



Agriculture is mainly carried out in the south-western part of the Krai and at the south end of the Prikhankai depression, where rice, buckwheat, soya, wheat, barley, oatmeal, potato, vegetables, and fodder crops are grown. Dairy farming, livestock breeding, deer-breeding, and apiculture are also developed in the Krai.

3.1.4 Protected Areas in Primorsky Krai

The protected areas of regional significance in the Primorsky Krai total around 1,208,000 ha, which is about 7.3 percent of the Krai's territory. There are 9 protected areas under the federal management in the Primorsky Krai (6 state natural reserves, 2 national parks and 1 zakaznik). The three types of protected areas are under the management and operation of different governmental agencies. The State Natural Reserves of Sikhote-Alinsky, Lazovsky, Khankaisky, and Cedar Deep, the National Parks of "Udaegeiskaya Legenda" (Udaegh's Legend) and "Zov Tigra" (Tiger's Call), as well as the State Natural Zakaznik of the federal significance "Leopardovy" are under the authority of the Ministry of Natural Resources and the Environment of the Russian Federation. The State Natural Reserves "Ussuriysky" and "Far-Eastern Marine" are under the authority of the Far-Eastern Branch of the Russian Academy of Sciences.

In line with the Federal Law "*On Specially Protected Areas"* and *"The Law of the Primorsky Krai*" coupled with "*The Charter Tasks"* – a state enterprise called the Primorsky Specially Protected Areas Administration (PSPAA) manages, operates, and enforces compliance for the state zakazniks. In turn, PSPAA is under the authority of the Department for Protection, Control and Regulation of Wildlife Use of Primorsky. It is also in charge of policy implementation, administrative operation and management of gaming and conservation in the state natural zakazniks.

Amur tiger conservation remains as a top priority in the regional and national environmental policy in the Primorsky Krai. Although there is no immediate threat of extinction of Amur tigers, the future remains a serious concern. Aside from the specially protected areas, the inhabited forests are at risk particularly because there was a significant decline in the number of ungulates, resulting in imbalance of population density between Amur tigers and their preys. In addition, driven by the revenues associated with illegal trade of tiger products, vigorous poaching activities had a huge impact on Amur tigers. Although reproduction compensated the losses, poaching led to a 10 percent decline in the tiger population annually.

3.2 Jilin Province

3.2.1 Location and size

Jilin Province, with a total area of 190,000 km^2, lies in the central part of northeast China, bordering Russian Federation and DPRK.

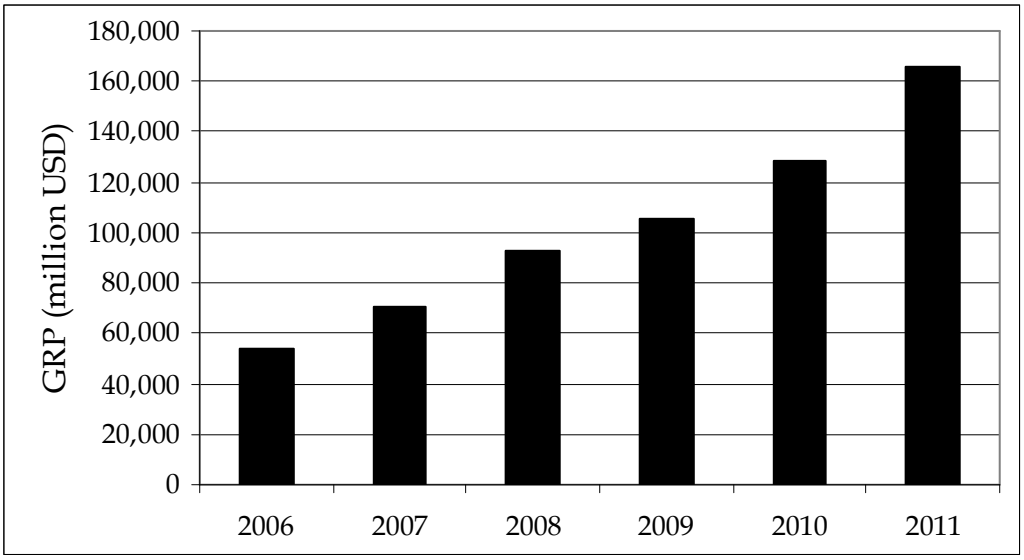
3.2.2 Population

According to the sixth national census (2010), Jilin Province has a total population of about 27 million, with 44 ethnic groups in total. Ethnic Han accounts for 91 percent of the total population. Koreans are mainly distributed in the east of Yanbian City, Jilin, Tonghua and Baishan. Mongolian and Xibe ethnic groups are mainly distributed in the western Baicheng and Matsubara City; Manchu and Hui are mostly present in the city of Changchun, Tonghua and Siping. There are four national autonomous areas including the Yanbian Korean Autonomous Prefecture, Guo'erluosi Mongolian Autonomous County, Changbai Korean Autonomous County, and Yitong Manchu Autonomous County.

3.2.3 Regional economy

Over the past few years, the GRP of Jilin Province accounted for 2 percent of the total national product. From 2006 to 2011, the GRP increased annually with an average growth rate of 20 percent, reaching 1,053 billion yuan (167.1 billion USD) in 2011 (22nd out of the 31 provinces). Since the 1980s economic reform, Jilin Province experienced economic growth driven by expanding secondary and tertiary sectors. Automobile industry, petroleum, and chemical industries contributed much to the economy. The province also put efforts in developing a high-tech industry centred in photoelectron products and developed five major Economic and Technological Development Zones.

[Figure 4] Gross Regional Production of Jilin Province 2006-2011



3.2.4 Protected Areas in Jilin Province

The first protected area, Changbaishan Nature Reserve, was created in 1960. As of 2010, Jilin has 36 nature reserves, including 13 protected areas at national level. The protected areas cover 2.23 million hectares, which amounts to 12.26 percent of the total territory of China.

[Figure 5] Distributions of the Protected Areas in Jilin Province

3.3 Heilongjiang Province

3.3.1 Location and size

Heilongjiang Province, covering 454,000 km² and accounting for 4.7 percent of the nation's total, is located in the northeast of China at the northernmost end of the country. It neighbours the Russian Federation across the Heilongjiang and Wusuli rivers running in its north and east respectively. In the west, the province adjoins the Inner Mongolian Autonomous Region, with Jilin Province to its south.

3.3.2 Population

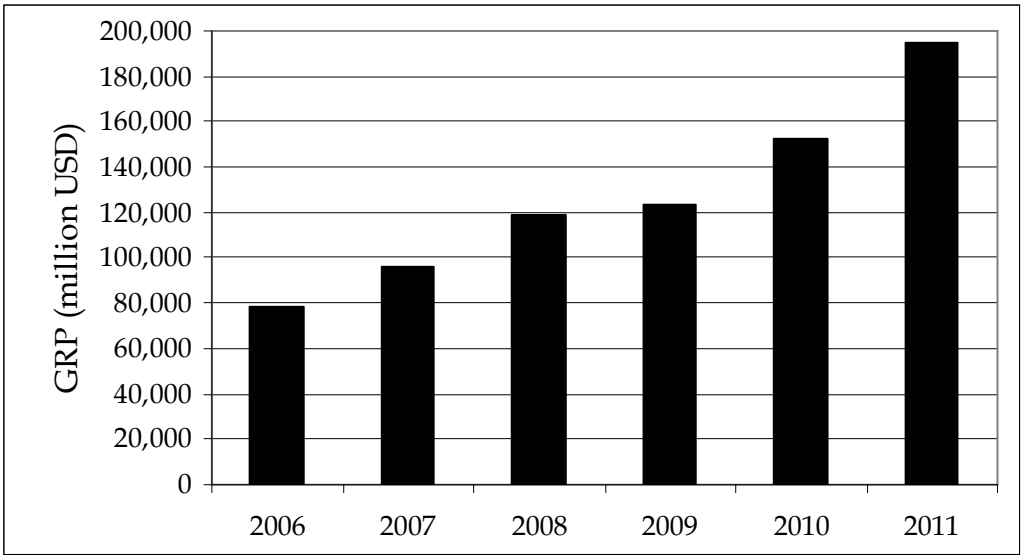
According to the sixth national census data of Heilongjiang Province, the total population in 2010 was around 3,831 million. The majority of Heilongjiang population is Han Chinese, accounting for 95 percent of the total population, while other ethnic minorities include the Manchus, Koreans, Mongols, Hui, Daur, Xibe, Oroqin, Hezhen and Russians.

3.3.3 Regional economy

Heilongjiang GRP maintained a steady growth rate of 15 percent over the recent years. It reached 1,250 billion CNY (198.5 billion USD) in 2011 and its per capita GRDP was 21,640 CNY (3,168 USD), ranking 18th out of 31 Chinese provinces.

Prior to year 2000, Heilongjiang Province had been a significant region of petroleum for China. Under the national plan of revitalizing north-eastern China, Heilongjiang experienced industrial structure adjustment in the 2000s and developed emerging industries such as manufacturing, petrochemicals, textiles and food processing. Six Economic and Technological Development Zones have been established in Heilongjiang Province: Daqing New& Hi-Tech Industrial Development Zone, Heihe Border Economic Cooperation Area, Harbin Economic and Technological Development Zone, Harbin New & Hi-Tech Industrial Development Zone, Sino-Russian Federation Dongning-Piurtaphca Trade Zone, and Suifenhe Border Economic Cooperation Area.

[Figure 6] Gross Regional Production of Heilongjiang Province 2006-2011



3.3.4 Protected Areas in Heilongjiang Province

As of 2011, 201 protected areas are established in the Heilongjiang Province, covering 360,000 km^2, which account for 0.8 percent of the total provincial territory. Heilongjiang has 23 nature reserves at the national level.

4. Local-specific conditions of protected areas of Amur tiger and Amur leopard

4.1 Ussuriysky State Natural Reserve after V.L. Komarov

The 40,432 hectare Ussuriysky State Natural Reserve was established on August 7, 1934. The Reserve is located in the southern part of Primorsky Krai and covers two administrative districts – Ussuriysky and Shkotovsky. It spreads out toward the southern slopes of Przewalski Mountain and covers the upper parts of the Komarovka River basin and Artemovka River, and the monsoon imposes significant effects on the Reserve. The administration centre of the Reserve is located in Kamenushka village, while there are several administrative offices in the city of Ussuriysk. The Ussuriysky State Natural Reserve is the pilot site of Amur tiger monitoring, jointly implemented by the WCS and the government. Sampling of blood, fur, and excreta is conducted for each captivated tiger for the molecular-genetic and hormonal studies. All animals are earmarked and collared with GPS-Argos; currently, a group of tigers in different ages are tracked using satellite collars by the Russian scientists. A database including photo identification of tigers and the findings from molecular-genetic and hormonal studies is being built.

4.2 Biological Zakaznik of "Barsoviy"

The Barsoviy Zakaznik was established in 1979 in order to protect and allow secure reproduction of the Amur leopard, Amur tiger, and other rare and endangered wild animal. Barsoviy Zakaznik

is located in the southern part of Primorsky Krai (Khasansky district), bordering with the north and west parts of the Cedar Deep Reserve area. With secondary broadleaf forests prevailing in the area, the natural environment of the Zakaznik is favourable to forest fauna species. Besides the major protected species Amur leopard and Amur Tiger, 65 mammal species inhabit this area. Barsoviy Zakaznik is the key site for carrying out conservation of Amur leopards (jointly with the Cedar Deep reserve and the "Borisovo Plateau" Zakaznik).

4.3 Zakaznik of the Federal Significance "Leopardovy"

Following the decree issued in 2008 relating to the creation of a federal-level Leopardovy Zakaznik, the federal Baroviy Zakaznik and the regional Borisovo Plateau Zakaznik merged into a single protected area. This new Zakaznik covers 169,429 hectares, encompassing Khasansky, Ussuriysky and Nadezhdensky districts of the Primorsky Krai. There are about 5,000 people residing in the 9 settlements within the new Zakaznik. The Zakaznik implements the following tasks: protection of game animal populations, the rare and endangered wildlife species, and their habitats. In addition, a population survey is also carried out. Moreover, the officers of the Far-Eastern Branch of the Russian Academy of Sciences and the Zakaznik staff will jointly conduct studies for individual environmental components as well as the ecosystem as a whole. Prior to the decree, the two protected areas had been managed by different state agencies, which led to conflicting authority and inefficiency. Along with its neighboring Kedrovaya Pad Nature Reserve, the new Zakaznik will be managed by the Ministry of Natural Resource. This transfer of jurisdiction to a single authority is expected to improve the management capacity of the protected area, ensure coordinated leopard and tiger conservation, and enhance international collaboration.

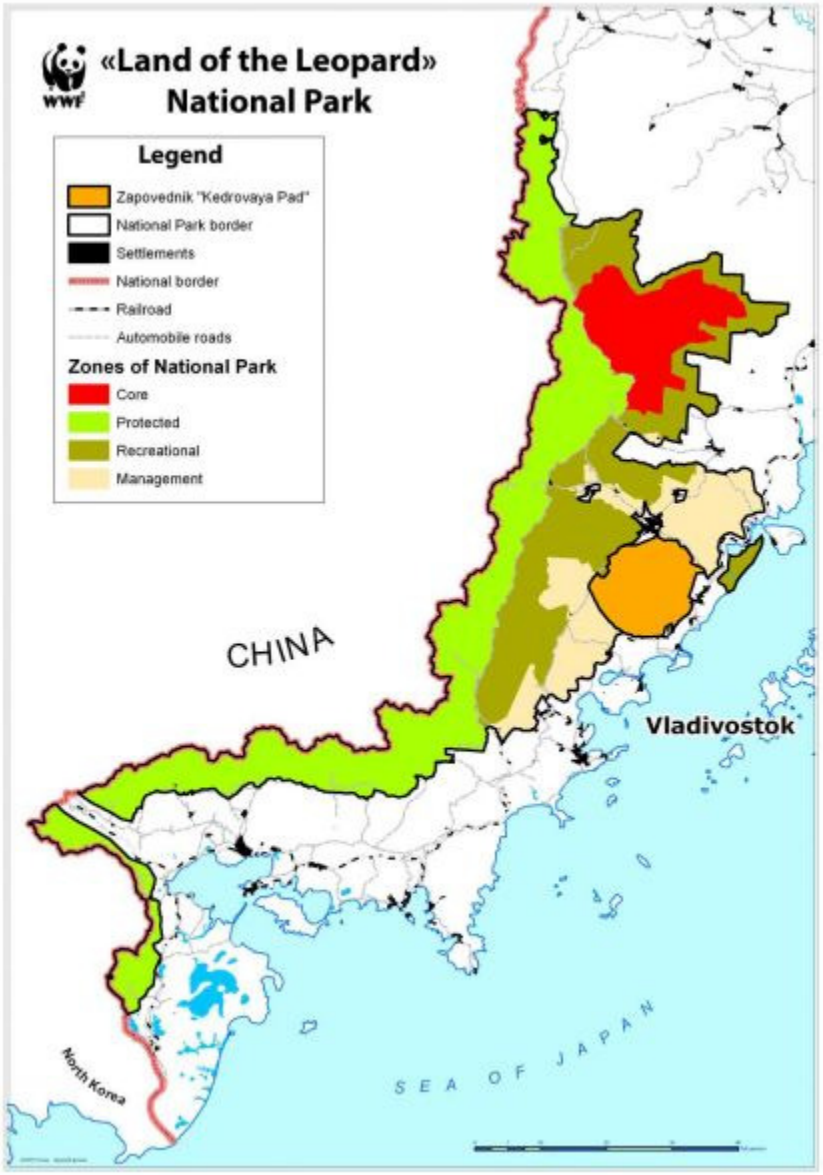
In April 2012, the Russian Federation government approved the establishment of the Leopard National Park of 262,000 hectares in the southwest of Primorsky Krai. The Leopard National Park not only embraces the entire area of the Leopardovy Zakaznik, but also expands to the area adjacent to the Hunchun Nature Reserve in Jilin Province, China
[Figure 7]. The park consists of two major parts: 300,000 hectares of strictly protected areas in the Borisovo Plateau and 1.2 million hectares along the Sino-Russian border. All farmlands, town peripheries, and military territories will be included in the economic development zone (38,000 hectares), and private ownership of such areas will not be altered. The remaining forest areas (72,000 hectares) are included in the recreational zone, where development of eco-tourism is planned.

4.4 State Natural Biological Zakaznik of "Borisovo Plateau"

The Zakaznik of "Borisovo Plateau" was established in 1996, aimed at the conservation of Amur leopards, Amur tigers, and other rare and endangered animal species. The 63,429 hectare Zakaznik is located in the southwestern part of Primorsky Krai along the border with China (at the junction of Nadezhdinsky, Ussuriysky and Khasansky districts). There are no settlements within the Zakaznik, which is covered by the black-fir broadleaf forest. Under the UN Convention on Biological Diversity (June 5, 1992), the Zakaznik of "Borisovo Plateau" is in line with the Resolution of the Government of the Russian Federation of August 7, 1995 № 795 "*On conservation of Amur Tiger and other rare and endangered wildlife species at the territory of the Primorsky Krai and Khabarovsky Krai*". It implements the following tasks: protection of populations of game animals, as well as rare and endangered animal and plant species and their habitats; carrying out biotechnical and reproduction activities, including annual census for wild animals, improvement

of forage capacity of lands, breeding works, strengthening regulation on game animals and combating the wild animal diseases.

[Figure 7] Land of the Leopard National Park



Source: WWF Russia Far-Eastern Branch http://www.wwf.ru/resources/news/article/eng/9425

4.5 Hunchun Nature Reserve

The Jilin Hunchun Nature Reserve was established in 2001 as a provincial level reserve, and in 2005 it was upgraded to a State-level Nature Reserve. Located on the border between DPRK and the Russian Federation, Hunchun Nature Reserve covers an area of 108,700 hectares and abuts the border of DPRK in the south and Russian Federation in the north. The reserve was established

mainly to protect Amur tigers and Amur leopards, overseen by an agency affiliated to the Yanbian Area Forestry Administration under the supervision of Jilin Provincial Forestry Bureau.

It is estimated that about 3 to 5, or one quarter of the entire population of Amur tigers in China, reside in the Hunchun Nature Reserve. There are additional 100 tigers on the Russian side, making the reserve a critical corridor for protecting tigers. Hunchun Nature Reserve developed a series of measures to improve the conservation works of Amur tigers and Amur leopards. A farmer patrol team was developed to remove traps intended for other animals, and the local villagers are also volunteering. Meanwhile, the local restaurants have committed themselves to an agreement to not serve any wild meat, and the top government officials have started to elicit public appeals to stop consuming illegally hunted game. Moreover, the Hunchun Nature Reserve reduced poaching by establishing voluntary patrol teams in three villages, inspecting restaurants for poached meat and working with army border guards. Protection campaigns also strive to amend valley management contracts with additional requirements for protecting the animals.

4.6 Changbai Mountain National Nature Reserve

Changbai Mountain National Nature Reserve, established in 1960, is located in the boundary area of Antu, Fusong and Changbai counties with an area of 190,781 hectares. The forest coverage is 87.7 percent and timber storage capacity amounts to 44 million cubic meters. In 1992, the local government approved and listed the Reserve as one of the 40 Class-A reserves in China by WWF. In this reserve also rich in medicinal plants, the leopards, lynx, black bears and Amur tigers are the main species protected in this reserve.

4.7 Protected Areas at Lower Tumen River

The Lower Tumen River is shared by China, DPRK, and the Russian Federation, each with different socio-economic and cultural features. The Lower Tumen River is located in the southern part of YKA, the Yanbian Korea nationality autonomous prefecture (YKA), which is located in the Jilin Province [Figure 8]. With various habitats possessing high abundance of wildlife, the Tumen River basin area and its adjacent territory constitute one of the most important bio-geographic and socio-economic centers of Northeast Asia. Twenty-nine percent of the drainage basin is located in North Korea's Hamgyong Province, while one percent of the drainage basin is located in the Khasan wetlands in Primorsky Territory of the Russian Federation. Out of 2.2 million people living in the basin area, about 75 percent are from YKA of China. Development of YKA plays an irreplaceable role in the river basin of environmental and socioeconomic variation of the lower Tumen River. The 521 km long Tumen River forms a part of the border, travelling through the Changbai Mountains and eventually discharging into the Sea of Japan or the East Sea. Only 17 km of the river forms the border between North Korea and Russian Federation, while the other 504 km forms the border between North Korea and China.

[Figure 8] Yanbian Korea Nationality Autonomous Prefecture (YKA) in Jilin Province

5. Multi-/Bilateral cooperation

5.1 Leopardovy Sanctuary and neighbouring protected areas in China and DPRK

Establishing mutual understanding of the necessary cooperation will improve information sharing, coordination of scientific studies, streamlining inventory methods, surveying for population count and habitat range, as well as curbing illegal transboundary trade of biological resources. International cooperation includes the following activities:

- Establishment of international transboundary SPNAs for conservation of Amur tiger and Amur leopard;
- Coordination of efforts to curb smuggling and resale of products from illegal hunting (cooperation with China is especially essential to improve intelligence on illegal international trade corridors and to enforce customs inspection at local level);
- Coordination of research programmes (joint methods for monitoring is crucial for obtaining results that are comparable across different countries);
- Cooperation with international environmental organizations, charity funds, foundations, and other NGOs (diversity in collaborating partners will promote fundraising, sharing expertise, making reference to global experiences, and surveying the Amur tiger over a more comprehensive geographical site);
- Participation in GTI to reduce demand for tiger derivatives through consumer education, to devise incentives for action at local level; and to create innovative financing schemes.

5.1.1 Collaborated conservation efforts for Amur tigers

The necessity of strengthening international cooperation in the field of conserving and studying the Amur tiger is made even more compelling by the transboundary character. Without the

collaboration from bordering states, assessment of the level of degradation and restoration options will be tremendously difficult.

A coalition of WWF, Russian scientists, and various public organizations has been working in the Far East of the Russian Federation since 1996. WWF provided uniforms, ammunition, off-road vehicles and fuel supplies for over 10 mobile teams, who directly safeguarded the Amur tiger and wild ungulates. The winter period inventory for the entire habitat territory was carried out in 2005. The WWF's successful cooperation with the Far-Eastern Operational Customs and the Customs Academy prevented a full series of smuggling of tiger and bear derivatives through the Russian-Chinese border. Within the frameworks of forest conservation project, the WWF assisted partner organizations to participate in the Conservation Lease Program for a term of 49 years in the pine-nut production zones, covering over 600,000 hectares. The Forest Stewardship Council (FSC) has certified timbering lease in the 3,700,000 hectares of Sikhote-Alin forests.

5.1.2 Collaborated conservation efforts for Amur leopards

The extremely small size of near-border habitation and the small population number of Amur leopard calls for intergovernmental co-ordination of measures aimed at its protection. The maintenance of a stable presence of residual groups in the transboundary area is becoming the most important issue for saving the subspecies. It would be difficult to conserve the Amur leopard population in the Russian territory without cooperation from China and DPRK.

Considering that Amur leopard habitat ranges in the most preserved mountains and forests at the border area of the three States, the trilateral intergovernmental agreement to protect and conserve the unique biological diversity of this region is of great significance. Above all, it is necessary to establish collaboration initiatives at provincial level to elaborate on the common policy for near border areas. The development and implementation of this policy could be performed by a working body that is permanently operational on bilateral basis.

Implementation of the leopard reintroduction programme, which envisages breeding in captivity, would be difficult without assistance from the zoos of various countries. The combination of conservation activities for Amur leopard in the Russian Federation requires financial contribution. For this end, the support from foreign and international environmental funds would be necessary.

5.2 Jilin and Heilongjiang Provinces

Many nature reserves were established in Jilin and Heilongjiang Province in order to strengthen the protection efforts of Amur tigers and Amur leopards. In addition to domestic efforts, the cooperation with international NGOs such as WWF and WCS played a critical role in these two provinces. In particular, international NGOs provided technical and financial support for establishing nature reserves and initiating capacity building among government officials and technicians.

Surveying and monitoring Amur tigers and reviving the prey population have seen success with the support of wildlife conservation management agencies, research institutes, and universities. Heilongjiang and Jilin governments monitored the prey population, designed appropriate methods for field survey and monitoring, conducted trainings for technicians, and established professional monitoring teams. Through monitoring efforts, important information were

collected, such as the trend in population change of Amur tigers and their preys, status of habitats and ecological corridors, and main threats to the Amur tigers. Fourteen monitoring stations have been established in Heilongjiang and Jilin provinces. With the establishment of the monitoring stations, evidence of tiger presence has been collected, and the number of Amur tigers and their distribution has been better understood. The prey population density was also analyzed, and the habitat sites and ecological corridors were identified and assessed. In terms of outreach, workshops were organized on recovering the prey population, compensating for wildlife injuries, and raising public awareness.

On July 24th–25th 2006, the "International Workshop on Trans-boundary Recovery of Wild Population of Amur Tiger" was held in Yanji, Jilin Province under the collaboration among SFA, WCS and WWF. An agreement was reached to develop and implement the "Amur Tiger Conservation Action Plan" for the Changbai Mountain and Wanda Mountain. Also in this meeting, the potential risks and methods for transboundary recovery action plan were discussed. Key decisions from the Workshop included commitment to promoting international cooperation, integrating NGOs, and consolidating synergistic relationship among wildlife, forest, and wetland conservation.

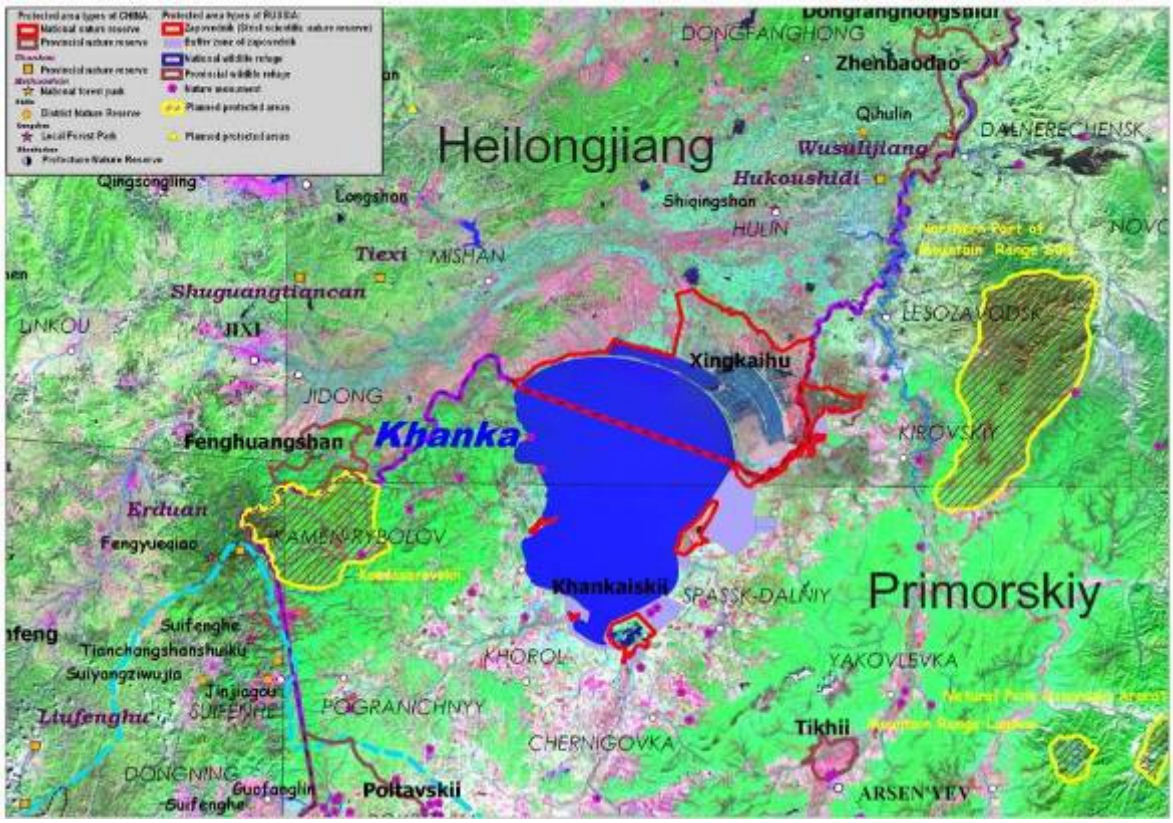
Amidst celebrations for the second Amur Tiger Cultural Festival in the northeast of Chinese city of Hunchun in August 2010, Jilin Province of China and the neighbouring Primorsky Krai of the Russian Federation formally agreed to collaborate in working towards the first transboundary Amur tiger protected area. The signed agreement, facilitated by WWF, would help wildlife authorities to establish a transboundary protected area – a cooperative conservation network across country borders. Under the agreement signed by Jilin Provincial Forestry Department of China and the two Russian agencies (Wildlife and Hunting Department of Primorsky Krai and the Bureau on Protection of Rare and Endangered Species of Flora and Fauna), Amur tiger conservation protected area will be established to double the number of wild tigers by 2022.

5.3 Lake Khanka and Dauria

Transboundary protected areas had existed in North-East Asia since the 1990s. The existing transboundary cooperation mechanism in the Khanka/Xingkai Lake International Nature Reserve (KLINR) and Dauria International Protected Area (DIPA) illustrate suitable cases of transboundary cooperation on nature conservation.

On the Russian side - Lake Khanka is the largest freshwater lake in North-East Asia. In 1976, this area was designated as a Ramsar Convention wetland site, on the basis of its importance for migratory bird species. In the Russian Federation, Khankaisky State Nature Reserve was established in 1990, while the Xingkai Hu Nature Reserve (1986) in China was upgraded to a national status in 1994. In April 1996, the governments of the Russian Federation and China signed an agreement to create KLINR by combining Khankaisky Nature Reserve in the Russian Federation with Xingkai Hu Nature Reserve in China (see [Figure 9]).

[Figure 9] Lake Khanka International Protected Area in 2000



Source: "Amur Heilong Basin Information Center." http://amur-heilong.net/

Since the creation of this transboundary nature reserve, more than 15 meetings have been held among government and law enforcement agencies, scientific institutions, and NGOs. During those meetings, several agreements were signed. In 2003, the Chinese and the Russian local governments, nature reserve administrations, and WWF discussed the creation of a Chinese-Russian co-commission for KLINR. In the same year, a working group meeting for promoting the activities of KLNR was held in Mishan, China. In 2005, a Chinese-Russian Workshop on Joint Scientific Research of migratory birds was launched in China, with the aim to promote wetland protection in the reserve. However, the first co-commission meeting of KLINR was not held until 2009, which was then followed by workshop for ornithologists of KLNR in 2010.

DIPA was established at the junction of the borders between the Russian Federation, Mongolia, and China on 29 March 1994 [Figure 10]. Four protected nature areas of the three countries were combined to create DIPA, which includes:

- Daursky Zapovednik (state nature reserve) and Tsasucheisky Bor National Wildlife Sanctuary under Zapovednik management in Chitinskaya oblast of Russian Federation;
- Mongol Daguur (Strictly Protected Nature Area) in Dornod aimag of Mongolia, which borders the Russian reserve; and
- Dalai Lake National Nature Reserve in the Inner Mongolia Autonomous Region, China.

DIPA was established by a trilateral agreement between the Ministry of Environment and Natural Resources of the Russian Federation, the Ministry of Nature and Environment of

Mongolia and the State Agency on Environment Protection of China. The International Commission for the Russian-Mongolian-China Zapovednik "Dauria" was established to advise and guide joint activities under DIPA. In the Fourth Meeting of the International Commission the Russian-Mongolian-Chinese Zapovednik "Dauria" in 2005, a draft of Intergovernmental Agreement on the Russian-Mongolian-China Zapovednik "Dauria" was approved.

[Figure 10] Protected Areas in Daurian Steppe, 2005

Source: Amur Heilong River Basin (http://amur-heilong.net/)

From 1994 to 2010, the Joint Commission held five meetings, organized more than 15 working group meetings, and launched more than 90 joint research, monitoring, and education programs. From 2000 to 2007, the range of joint monitoring was expanded to the eastern part of the Daurian Steppe and the total size of protected area increased to 300,000 square meters. In 2007, the Russian management body of the Dauria Protected Area started to conduct conservation studies on the Amur Watershed and the Chinese management body joined the study later in that year. In 2010, the Russians decided to establish a transboundary ecosystem monitoring network. Over the next few years, more than 100 monitoring sites in the Russian Federation, China and Mongolia will be included in the network. As of today, 60 monitoring sites have already been designated on the Russian side. The network will also include International Ecological-Ornithological Station, which comprises three or more national ecological-ornithological stations for joint study on monitoring and conservation of ecosystems and birds in Dauria. The national stations will operate under the joint international plan and methods.

5.4 Lower Tumangang River basin

A number of international cooperative approaches have been proposed for the lower Tumanagang river basin. For example, UNDP/UNESCO proposed to establish a transboundary biosphere reserve in the area of the lower Tumangan river basin in the territory of China, DPRK and the Russian Federation. It aims to designate the boundaries and the zone for SPNA, as well as coordinate the conservation of ecological zones and corridors that are separated by national borders.

NEASPEC proposed several main strategies to combat poaching, facilitate international cooperation, raise public awareness on the conservation of the Amur tiger and Amur leopard, and to support the capacity building for habitat management, monitoring, and development of ecological systems.

WCS proposed to ban timbering, construction of roads in forests, and decrease in human activity within the SPNA. The program on restoration of the Amur leopard population in the southern area of Sikhote-Alin also mentions improving the fire safety in forests, raising public awareness on biodiversity conservation, developing captive breeding of the Amur leopard, and enhancing international cooperation on the strategy of actions.

UNDP/GEF proposed to ensure the conservation and protection of the unique ecological reserves of the region for future generations, while allowing environmentally sustainable economic development of the territory. It also intends to improve international cooperation for pollution control, and political measures for prevention and elimination of industrial pollution in the Tumen River area.

6. Monitoring method and techniques

6.1 Available tools and methods

Phototraps
Phototraps are cameras for remote observations located in the roaming range of the species under survey. They are mounted in a way to photograph the animal from two sides simultaneously. Using the tiger's print on its skin as a way of identification, scientists compile the memory cards to track the tigers to see how many tigers populate an area and to understand the population trends over a period of time. Phototraps provide reliable estimation in an unobtrusive and non-invasive manner.

Snow track counts
The system of snow track counts is based on the traditional methodology of monitoring the Amur tiger population employed by Soviet/Russian scientists for decades. During the winter months, snow provides a continuous tracking medium, and the field scientists regularly walk transects to find tiger tracks. This can be done on a small scale to study a subset of the tiger population, or it can also be used to survey the entire Amur tiger range. Because of the sparse distribution of Amur tigers, snow tracking is the main method to estimate the entire population of Amur tigers, with a complete census carried out at ten-year intervals by replicating the transects walked across their range.

Specialized loop-traps for catching tiger
A camouflaged trapping device is mounted underneath a tree that has been marked with valerian odor. The tiger is trapped with a front paw so that there is no space to jump. When the animal is caught, the transmitter connected to the trap sends a signal.

Pneumatic devices for immobilization the tiger
The pneumatic guns with optical sights are used to immobilize the trapped tigers for further studies. The device is a specialized rifle for shooting with syringes, putting the animal to dormant state for 30 to 40 minutes. The shooting range can reach up to approximately 40 meters. The shot can be appropriately leveled to each situation: the gas pressure can be regulated according to firing range and the drug dosage can be adjusted according to the size of the tiger. All procedures are carried out by specialist veterinarians. Trapped animals are examined via ultrasound and blood tests, after which satellite collars are buckled around their neck for future tracking.

Satellite collars
The satellite collars track animal location in real time. The collar imposes minimal disturbance on the tiger and automatically unfastens at the end of its battery life, which is approximately 18 months.

Ecological Niche Factor Analysis
The Ecological Niche Factor Analysis (ENFA) can be used to define the potential habitat range using a multifactor analysis akin to the principal components analysis. The ENFA approach is appropriate when absence data are difficult or impossible to collect; it has been applied successfully to presence-only data in terrestrial mammal survey data.

Resource Selection Functions
Resource selection functions (RSF) are logistic regression models to predict selected habitats given a set of available data (same as the ENFA) or a presence-absence data. It is dependent on having data points for the locations of where the tigers were observed.

Molecular-genetic methods
No large-scale comprehensive research using molecular and genetic methods has been conducted so far. But potentially, this method is another option to study the tigers via analysis of the microsatellite parts of nuclear DNA (from blood and skins).

6.2 Russian Federation

The Russian Federation commits to monitoring, inter alia, the changes in biodiversity level, composition of biota, condition of populations, and ecosystems, the number of protected species and their prey populations; and the various conditions about the monitoring areas.

The devices used by the Russian side are phototraps (LifRiver and Reconix), specialized loop-traps (Margo Supplies Ltd.), pneumatic devices (Zoletil and Medetomidin), and satellite collars (Sirtrack, Telonics, and Glonass). Monitoring Amur tiger population entails prolonged tracking for distribution among other population parameters, as well as habitat conditions. The monitoring system aims at timely detection, analysis and forecasting of the ecological changes and the impacts of anthropogenic factors. The fact that Amur tigers are rare and secretive animals renders the monitoring task as quite difficult to obtain reliable tracking of the tiger population.

The inventory of the Amur tiger in the Russian Federation in natural habitats, as well as long-term monitoring of the subspecies at the federal and regional level are carried out pursuant to the recommendations on organization adopted by the Order of the MNRE of Russian Federation of March 15, 2005 № 63.

Once every ten years, a *solid* inventory is created for the Russian territory. Signs of drastic change in habitat conditions will trigger a more frequent inventory cycle. The primary task of the solid inventory is to identify the following: the total number and boundaries of distribution of the Amur tiger; dispersal pattern and density of population; age-sex structure of population; and the status of the feeding base.

On the contrary, an annual *selective* inventory is created at permanent routes fixed within the sample area, which are representative sites within the area for solid inventory. The primary task of the selective inventory is to identify basic parameters of the tiger population at sample sites, the annual index of reproduction activities for the entire population, and the status of feeding base and habitats. Since the winter of 1997-1998, selective inventories have been established for 16 sample areas in Primorsky Krai and Khabarovsky Krai. The accumulated selective inventories become the major components of the long-term monitoring programme and serve as the ground for making operative decisions on conservation and identification of solid inventory cycle period.

In many ways the parameters for the status of the Amur leopard population are similar to those for the Amur tiger population. At the same time, critically low numbers of the subspecies in the wild and the extremely limited area of the leopard's habitat render several elements of permanent special monitoring of the surviving population and its habitat as essential. Monitoring efforts for the Amur leopards include, inter alia, special winter censuses of the leopard throughout its entire habitat, at least once every three years; yearly observation of sample sites in reserves, sanctuaries, and hunting grounds, traditional tracking and radio-collar facilitated monitoring, special research on genetic distinction between leopards in the wild compared to the leopards in captivity, and research into the relations of the leopard with other large predatory mammals.

6.3 China

Based on the current conservation status of flagship species in China, catching individuals in the wild is nearly impossible in China. Also, in the course of the felid population recovery, special loop-traps, pneumatic devices, and satellite collars are judged to be less effective in the early stage than in the matured stage, where felid populations have recovered to a proper size, allowing relatively easy capture of the tigers. Meanwhile, samples for molecular-genetic experiments and analyses are collected more easily and thus provide appropriate monitoring approach.

7. Strengthening multi-/bilateral cooperation: recommendations

7.1 Russian Federation

The anthropogenic impacts (development, ploughing, poaching, etc.) and natural impacts (desertification, erosion, soil salinization, droughts, wildfire, soil infertility, declining biodiversity etc.) contribute to fragmentation of tiger and leopard habitats. In addition, artificial barriers made

by people, such as roads, lines of engineering facilities at the border also cause the reduction and isolation of their habitats. Approaches to tackle these problems could be implemented in the transboundary areas. Mechanisms to strengthen international cooperation within the transboundary SPNAs include:

- Consolidation of the legal status of transboundary SPNAs;
- Streamlining terminology across countries and also the process for transboundary SPNAs designation as well as monitoring methods for obtaining comparable results;
- Coordination among countries for joint research programs and scientific publications, reinforcing environmental protection inspections, and outreach work to the general public;
- Establishment of an international ornithological station and a system for mutual awareness during migrations;
- Conservation of the unique natural complexes in the border river basin - including restoration of food resources for the Amur tiger (Manchurian deer, boar, roe), restoration of broadleaf and coniferous forests, and organization of effective anti-poaching, etc.;
- Provision of targeted funding and specialists for transboundary SPNAs, simplification of visa regime for transboundary SPNAs' staff; and
- Development of ecotourism for transboundary SPNAs including the transboundary tours.

With the above mechanisms, the international cooperation should pursue the following ends:

- Provision of safe and sufficient area, for instance, the area of Sikhote-Alin and Lazovsky reserves through the expansion of the territory with the maximum density of tigers and wild ungulates;
- Establishment of ecological corridors to connect fragmented habitats to securely keep tigers and leopards within the transboundary reserve but also to connect all ecosystems of the mountainous areas of this region of three countries;
- Restraint on overexploitation of forests and ungulates in game hunting - permitting restricted shooting only at hunting farms where the density of major tiger prey range around 5 to 10 specimens respectively per 1,000 hectares of forest massifs;
- Restraint on felling of trees in the habitat area, for instance, restricting felling within the Leopardovy zakaznik of the federal significance, as well as in zakazniks of "Birsky," "Mataisky," "Taiozhny," "Verkhnebikinsky";
- Establishment of protective zones in areas adjacent to the transboundary SPNA to prohibit or to require approval by the state environmental expertise the projects such as those aimed at the development of economic infrastructure of the Russian Far East;
- Restraint on combating poaching through enacting relevant legislations, for instance, making revisions to the Russian laws "On environmental protection," "On wildlife," "On specially protected areas," as well as the relevant legislative acts of China and DPRK.

7.1.1 Effective SPNA management in transboundary areas

Effective SPNA management in transboundary areas should be implemented through the development of joint management plans, agreed by the competent authorities of involved countries. The objective of joint plans is to optimize the management system and all the activities regarding the transboundary SPNA, as well as to identify strategies for the sustainable operation of ecosystems aimed at the conservation of biological and landscape diversity.

The joint commissions should be composed by representatives from the states in the transboundary SPNAs. In addition, coordination of transboundary area management should be implemented through an agreement. In particular cases, it is reasonable to include multilateral environmental organizations into the joint commissions.

The joint management plans to be adopted by the joint commissions should address the following tasks:

- Provision of reliable protection of the transboundary area;
- Optimization of existing special protection regimes;
- Prevention and timely response to forest fires;
- Regulation of economic activity and ecological services within the SPNA;
- Identification of funding and financing mechanisms;
- Coordination of scientific studies with nature protection interests;
- Improvement of interaction between transboundary areas management bodies and national bodies, local administrations, scientific and environmental institutions;
- Galvanization of wide public support at local, regional and national levels;
- Optimization of human resources and the professional skills of officers;
- Development of awareness campaign and education programs at local and regional levels;
- Conservation of historic and cultural heritage.

The following should be performed under the development of transboundary SPNA management plans:

- Analysis of the current state of natural environment and objects of SPNA;
- Identification of problems hindering the successful development of SPNA and threatening the conservation of its natural diversity and historic and cultural heritage;
- Identification of possibilities for the development and improvement of the transboundary areas management based on their current situation and available resources;
- Development of methods for addressing existing problems and reducing threats to species.

Effectiveness transboundary SPNA management plan requires the following principles in the process of planning:

- Compliance with domestic legislations for the participating countries;
- Consideration of all natural, historical, and socio-economic traits of transboundary areas;
- Coordination with national programs, planned actions and activities in transboundary SPNA;
- Incorporation of existing activities and implementations into new developments of plans;
- Precision and punctuality in activities using clear wording, specified deadlines, and quantitative indicators and results;
- Flexibility with earlier decisions in accordance with changing circumstances;
- Integrity in mutual programmes of various activities and in consolidation of common objectives and tasks of the transboundary SPNA;
- Economic utilization of allocated resources for the implementation of the transboundary SPNA core activity.

7.2 China

Chinese and Russian scientists ought to be brought together within the context of the program to promote international cooperation and wider participation of the management. The government of the two riparian countries should work with key stakeholders in both countries. Stakeholder consultation will be organized during the project to discuss an action program and cooperation between the two riparian countries.

There are large areas of potential habitat in Changbai Mountain, Wanda Mountain area and Tumen basin, and great opportunities to recover tigers in the North-Eastern China. There is no doubt that habitat fragmentation has already progressed significantly, making the available habitat less capable of sustaining tigers than in areas near the border with Russian Federation. Major prey of tiger and leopard are low in the Chinese part of the habitat range. Recovery of tigers in the northeast of China will be difficult unless the basic requirements for survival of tigers and leopards are included in regional and national planning. While promoting economic development of the region, it is important to include "tiger and leopard friendly" management guidelines for the conservation institutions.

7.2.1 Transboundary area protection

Immediate conservation efforts should be focused on transboundary protection areas. Conservation actions should be focused on the lower Tumen river basin in Changbaishan as well as on the historical and potential habitat ranges in China and Russian Federation. These actions should highlight conservation measures in the transboundary protection areas with assistant from nature reserves and national parks of both sides. In Chinese side, hunting is already under restriction. The potential habitat in northeast China has been evaluated in the last several decades. However, transboundary cooperation on such evaluation with streamlined method and technologies has been lacking. In accordance with regulations on wildlife conservation and nature reserve, national parks and hunting farms of both countries and suitable regulations for all participant countries should be implemented.

Another approach is to take necessary actions to protect habitat in secondary tiger management zones-transboundary corridors, nature reserves or protection areas. The Changbaishan, Mulin and Southern Zhangguangcailing also represent important recovery zones for Amur tigers. To ensure that these zones retain potential tiger habitat, it is necessary to prevent further loss of forests in these management zones. It is critical to implement proposed corridors to link these zones; furthermore, steps should be taken to secure or create such corridors for facilitating movement between tiger management zones. Creating eco-corridors will also be critical to bridge existing geographical isolation between felid populations to allow Russian tiger population to spread to the Chinese side.

"Tiger Friendly" management approaches, which aim at restoring and conserving tiger habitat, has been mentioned in a number of meetings in the Russian Federation and China. Considering the fact that tigers and leopards inhabit the same conservation area in Tumen river basin, it is necessary to expand the target goals under the "Felids Friendly" management approach such as High Value Conservation Forests (as proposed by WWF), and Forest Certification (as conducted by the Forest Stewardship Council). The goals could include the following actions:

- Protection of potential habitat for the felids and ensuring that no further loss of forest cover and fragmentation occurs in transboundary areas;
- Relocation of small settlements (forest bureau settlements);
- Elimination of conflict between local villages and native wildlife (especially wild boar – which cause crop damages) so that native prey populations can fully recover;
- Restriction on road construction and vehicular/human activity to improve security for the animals.
- Strengthening anti-poaching efforts to protect the tiger population and its prey in Hunchun-Wanquing Tiger Management Zone; and
- Creation of Sino-Russian transboundary protected areas to enlarge the habitat range of tigers across the international boundary.

7.2.2 Recovery and policy support

Field survey of ungulate density (tracks/km) in Changbaishan was only conducted between 1999 and 2000 by the State Forestry Administration (SFA). The results of analyses confirmed that prey density is a critical determinant of habitat quality for tigers in the Changbaishan landscape. To assist in prey population recovery, the following actions should be taken into consideration: (a) Continuation and strengthening of the existing ban on hunting in Jilin and Heilongjiang Provinces; (b) Active and extensive campaigning to remove snares over the entire Tiger Management Zones ;(c) Implementation of detailed ungulate monitoring program.

When human activities are in close proximity to predators such as tigers, conflict is inevitable. Human activities, especially the barriers at the border, cause habitat fragmentation. In order to bridge the fragmented habitats, strengthening international cooperation becomes urgent.

Cooperation, as well as fierce competition, exists in the international development of Tumen River area. However, there are some problems in the progress of cooperation. For example, due to the significant differences in social system, ideology, economic structures and technological level between the neighbouring countries, the international cooperation for Tumen River Area is still at a preliminary stage with loose cooperation. Lack of extensiveness, bilateral cooperation is basically the main form. As far as China is concerned - the different understanding of the international cooperation over Tumen river area, uncoordinated actions, and shortage of development funds have become the main problems. Such problems could be overcome with more widely participating multi-lateral approach.

In this regard, five different types and modalities of participation among the stakeholders of Amur tiger conservation projects should be taken into consideration [Table 4]. It is necessary to establish Amur tiger conservation partnership in the early stages of project development. Corresponding responsibilities should be clarified in accordance with the ability and willingness to participate in the conservation projects.

[Table 4] Amur Tiger Conservation Partners

Type of Stakeholders	Partners	Functions	Main Responsibilities
Wildlife conservation management authorities	Provincial Forestry Department; Provincial Forest Industry Bureau	Legislative support; Fundraising; Project monitoring and evaluation	- MOU preparation - Development of local conservation objectives and strategies - Coordination of relevant departments of government - Organize part of the implementation of project activities - Establish, expand and construct new protected areas
	State Forestry Administration	Legislative and policy support; Coordination with inter-provincial & int'l organizations	- MOU agreements - Support for national protection policy - Project management and guidelines
Local Forest Industry Bureau	Forestry Bureau	Implementation	- Management planning - Implementation of project activities - Patrol, investigation and monitoring - Pilot demonstration - Public education and Publicity promotion
Other relevant departments	Local government	Project support and implementation	- Coordination of relevant projects - Updates on project progress - Rational planning of land use
	Environmental Protection Agency; Road Transport and Water Resources Bureau; Border Protection	Policy support	- Ecological corridors and border management - Demonstration of environment-friendly construction projects - Promotion of construction project management guides
International Organizations	WWF; WCS; World Bank	Policy advocacy	- Participation in policy advocacy - Information and experience sharing - Technical and financial support - Pilot demonstration - Independent evaluation of projects - Guidance for field work
Technical support unit	Universities; Research organizations	Technical support and implementation	- Background investigations - Research, survey and monitoring - Technology demonstration - Provide information of biodiversity conservation - Provide technical human resources - Technical Training
	Forestry Planning, Design and Exploration Institute	Technical support	- GIS map production - Provision of forest-related information - GIS Training

Others	Local NGOs; Volunteers; Local community	Project support and implementation	- Implementation of local community projects - Participation in problem analysis and develop appropriate objectives - Provision of human resources - Development of alternative livelihoods industry - Making adjustment in livestock cultivating methods