

图们江下游地区生物多样性(虎、豹)跨国保护机制与策略
**Transboundary Conservation Mechanism and Strategy of
Biodiversity Conservation (Tiger and Leopard)
in Lower Tumen River**

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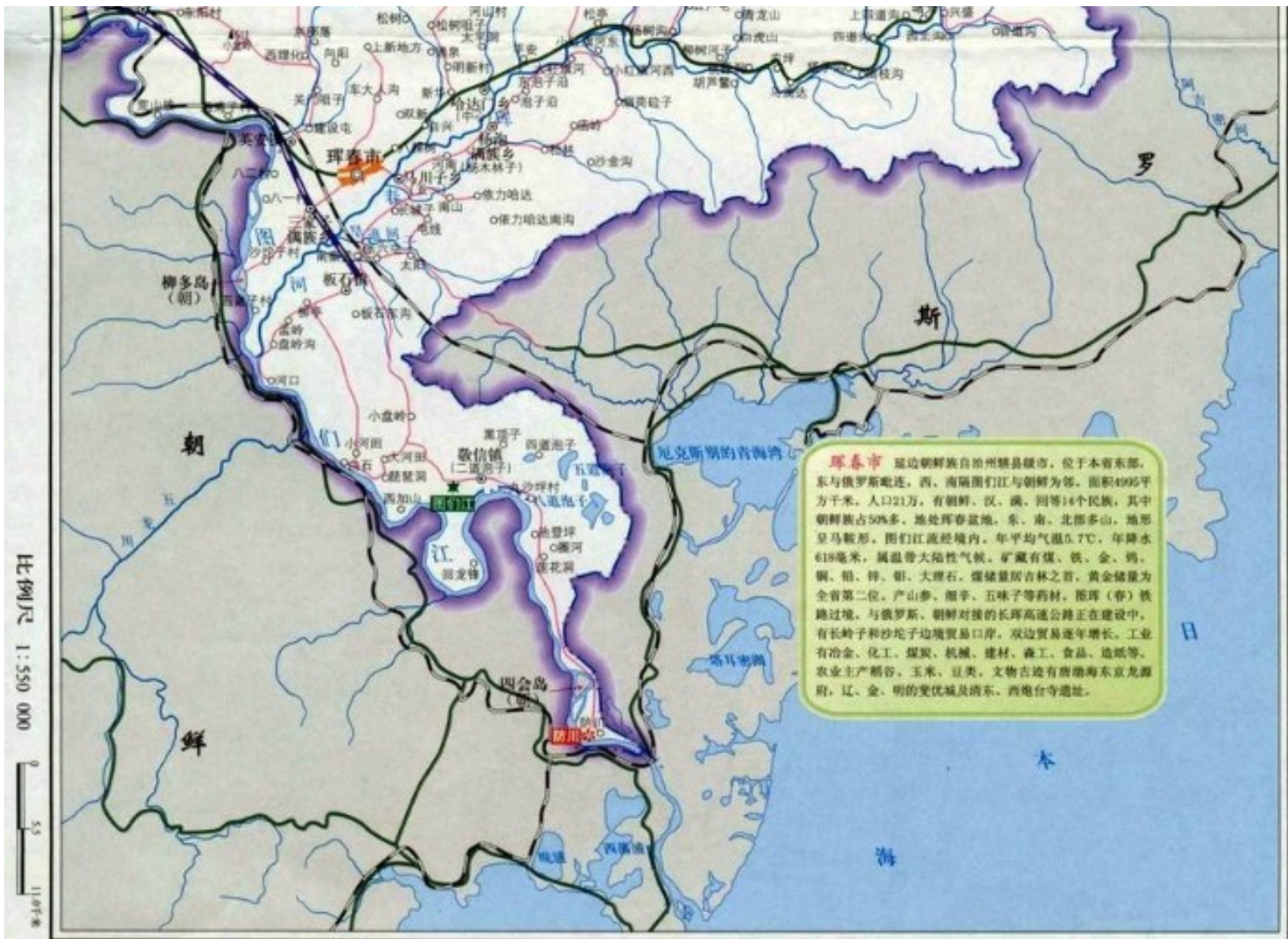
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1 背景

Background

- 1.1 图们江下游 Lower Tumen river
- 图们江地处中俄朝三国边境，因其独特的地理位置，具有多样的森林和湿地生态系统，是多种濒危哺乳动物和水禽的栖息地。
- The Tumen River Area is located in the international boundary regions among China, Russia and DPRK, where various forest and wetland ecosystems have remained due to the distinctive geographical location. It provides large habitats for endangered mammals and waterfowls.
- 其中东北虎和东北豹是图们江下游地区森林生态系统的旗舰物种。
- Amur Tiger and Amur Leopard are two flagship species in the lower Tumen River area.



琿春市 延边朝鲜族自治州辖县级市，位于本省东部，东与俄罗斯毗连，西、南隔图们江与朝鲜为邻。面积4995平方千米，人口21万，有朝鲜、汉、满、回等14个民族，其中朝鲜族占50%多，地处珲春盆地，东、南、北部多山，地形呈马鞍形，图们江流经境内，年平均气温5.7℃，年降水618毫米，属温带大陆性气候，矿藏有煤、铁、金、铜、锡、铅、锌、铂、大理石，煤储量居吉林之首，黄金储量为全省第二位，产山参、细辛、五味子等药材，图珲(春)铁路过境，与俄罗斯、朝鲜对接的长珲高速公路正在建设中，有长岭子和沙坨子边境贸易口岸，双边贸易逐年增长，工业有冶金、化工、煤炭、机械、建材、森工、食品、造纸等，农业主产稻谷、玉米、豆类，文物古迹有唐渤海东京龙源府，辽、金、明的受忧城及清东、西地台寺遗址。

比例尺 1:550 000

- 图们江下游

- **Lower Tumen River**

- 图们江下游为中俄朝三国共有，三个国家具有各自的社会经济和文化特点。图们江起源于长白山，最后注入日本/东海。图们江的源头—长白山位于中朝边境，同时也是鸭绿江的源头，位于中朝南部边境。图们江全长521公里，只有17公里流经俄朝边界，其余504公里流经中朝边界。在中方的主要支流是嘎牙河和琿春河。图们江下游部分年平均净流量为 $215\text{m}^3/\text{s}$ 。

- Lower Tumen River is shared by three countries (China, the DPRK, and Russia), all of which have different socio-economic and cultural features. The river then rises in the Changbai Mountains and eventually discharges into the Sea of Japan/East Sea. The Tumen River source, Mount Baekdu, is located on the Chinese-North Korean border; Baekdu is also the source of the Yalu River, which forms the southern border between China and North Korea. The Tumen River is 521 km long. Only 17 km of the river forms the border between North Korea and Russia, while the other 504 km forms the border between North Korea and China. The main tributaries on the Chinese side are Gaya River and Hunchun River. The mean annual flow is $215\text{m}^3/\text{s}$ in the lower parts of the Tumen River.

- 在图们江下游地区，曾实施过很多保护（东北）豹和虎的项目。由于近年来，该地区经济发展迅速，运输业相对发达，促进中俄朝三国交流，但是，在经济，农业和运输发展的同时，对环境的潜在威胁日益凸显。
- Great number programs related to tiger and leopard conservation were conducted in Hunchun. On one hand this makes its fast development in economy, relatively well developed transport conditions and mixed culture from China, Russia and North Korean. While on the other side, the development of economy, agriculture and transportation make potential threat to environment.

- 图们江位于中国延边朝鲜族自治区南部。图们江流域地区以及相毗邻地区，为大量的野生动物提供栖息地，形成东北亚地区重要的生物地理和社会经济中心之一。29%的流域位于朝鲜咸镜道内，只有1%的流域在俄罗斯莫尔斯基地区哈桑湿地内。超过220万人口生活在图们江流域地区，其中75%来自中国延边朝鲜族自治区。延边朝鲜族自治区的发展在图们江下游地区的环境和社会经济的变化中，起着不可替代的作用。
- Yanbian Korea Nationality Autonomous Prefecture (YKA) is located in the Jilin province in northeastern China. Lower Tumen river located in the south part of YKA. The Tumen River basin area, with various habitats for high abundance of wildlife and adjacent territories, 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. One percent of the drainage basin is located in the Khasan wetlands in Primorsky Territory in Russia. Out of the 2.2 million people that live in the basin area, about 75% are from YKA of China. Development of YKA plays an irreplaceable role in the river basin of Environmental and socioeconomic variation of lower Tumen river.

1.2 图们江下游地区的生物多样性 Biodiversity of Lower Tumen River

表 1 图们江流域（中国境内）高等植物多样性状况

Table 1 The status of higher plants diversity in Tumen river area(in china)

类别 Category	世界种数 Number in the world	中国种数 Number in China	图们江流域种数 Number in Tumen river area	占全国比例 Percentage in China
裸子植物 Gymnospermae	850~940	240	30	12.50%
被子植物 Angiospermae	> 2 600 000	>30 000	2 060	6.86%

表 2 图们江流域珍稀濒危植物情况

Table 2 The status of endangered and rare flora in Tumen river area

类别名称 Category	珍稀濒危植物种数 The number of endangered plants	植物种数 The total of plants	所占比例 Percentage of the total of plants
裸子植物 Gymnospermae	6	30	20%
被子植物 Angiospermae	88	2 061	4.27%

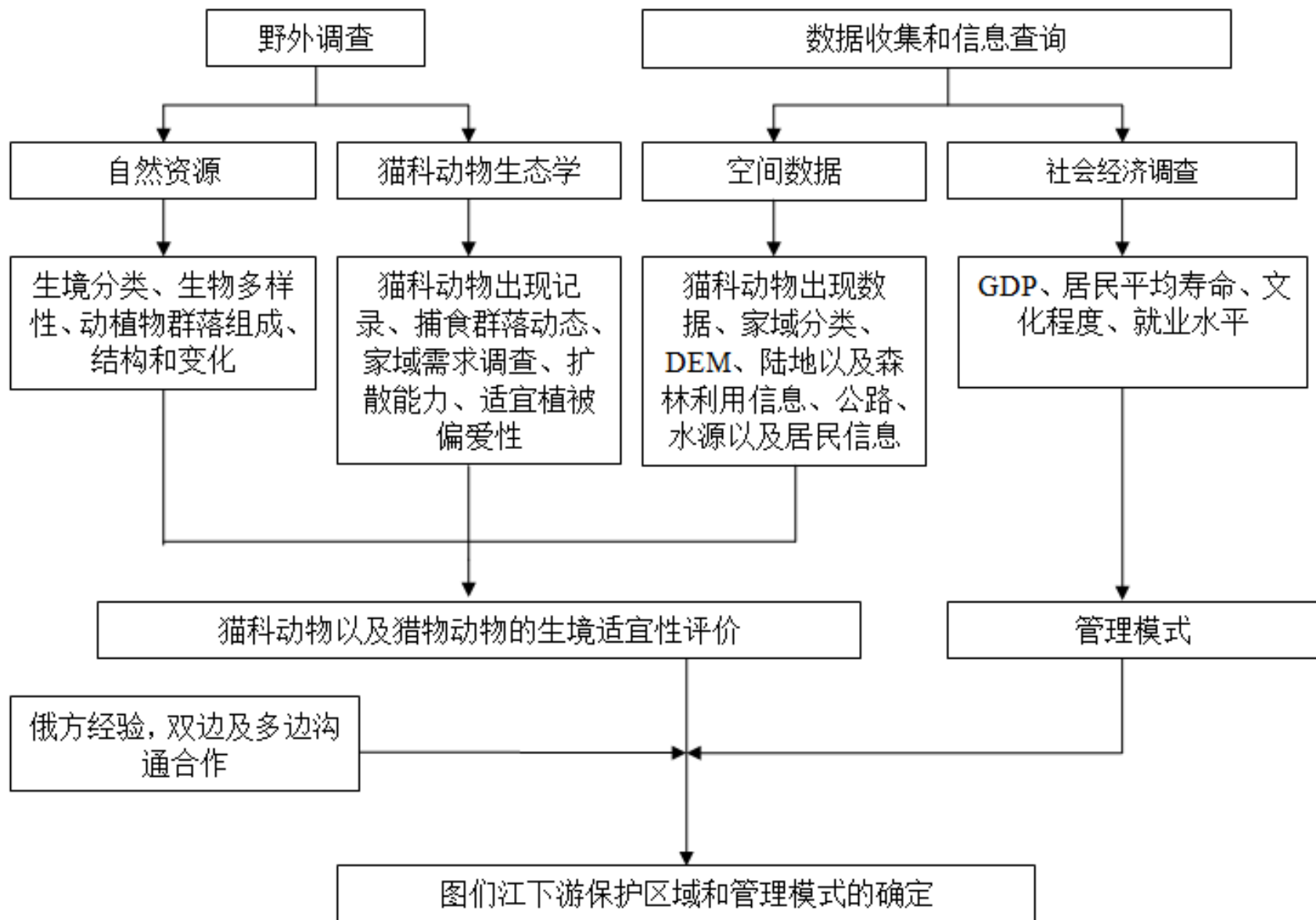
1.2 图们江下游地区的生物多样性 Biodiversity of Lower Tumen River

表 3 图们江流域动物多样性情况

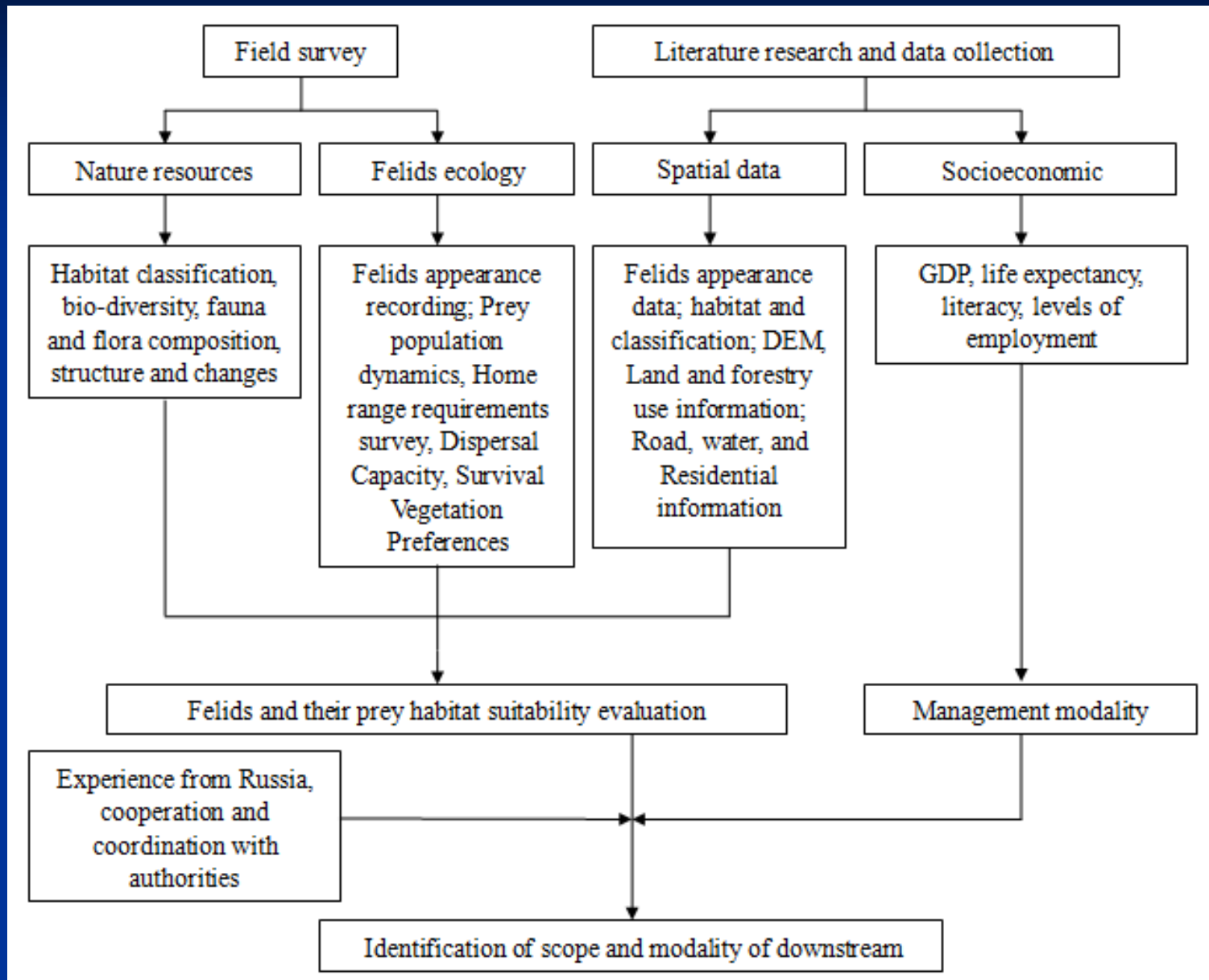
Table 2 The status of fauna biodiversity in Tumen river area

类别名称 Category	目 Number of orders	科 Number of families	种 Number of species	占吉林省种类比例 Percentage of species in Jilin province
圆口纲 Cyclostomata	1	1	2	66.67%
硬骨鱼类 Osteichthyew	7	11	38	88.37%
两栖纲 Amphibia	2	6	12	85.71%
爬行纲 Reptile	2	4	13	72.22%
鸟纲 Aves	18	46	291	88.99%
哺乳纲 Mammalia	8	19	66	82.50%

1.3 计划概要



Outline of the Plan



2 图们江下游虎豹现状

Status of Tiger and Amur Tiger in Lower Tumen River



2.1 东北虎 Amur Tiger (*Panthera tigris altaica*)

- 分布区：历史上，东北虎广泛分布于中国东北部的大小兴安岭，老爷岭，张广才岭和长白山，而现今，仅存在于中国黑龙江省和吉林省的部分地区，其中包括图们江下游地区
- 在图们江下游地区，自2001年的监测调查结果和中俄跨国界调查结果显示东北虎分布区有扩散到珲春西部和汪清县的趋势。
- **Range:** Historically, Amur tigers distributed widely in the Great and Lesser Khingan Mountains, Laoyeling, Zhangguangcailing, Wandashan And Changbaishan in northeast China. Currently, this species could be found only in part of Heilongjiang and Jilin Province.
- In Jilin Province, results of investigation developed by Hunchun National Nature Reserve since 2001 and analysis on the horizontal distance between trace spot and Sino-Russia border showed that distribution area tend to extend to eastern Hunchun and further to Wangqing Country. The western most activity point in recent years is Baiyan Villege in Wangqing Country about 100 km to Sino-Russia Border.

2.2 东北豹 Amur Leopard (*Panthera pardus orientalis*)

- 分布区及种群数量 **Range and Number**
- 东北豹栖息于黑龙江流域和中国东北部的山地中以及朝鲜半岛，20世纪70年代前，中国境内东北豹种群数量还较大，仅吉林省东部约有50只个体，但20世纪80年代后却鲜有报道。主要由于1970-1983这十几年的时间东北豹栖息地破坏严重和非法猎杀，使其野外数量大量减少。
- Amur leopards used to be found in northeastern China. Previously, the Amur leopard inhabited in the Amur River basin and the mountains of northeastern China and the Korean peninsula, however, related information was little since the 1980s in China. Before the 1970s, number of population is still large. In Jilin Province only, the population size was estimated to be 50 individuals. While, destroyed habitat and poaching in the time period from 1970 to 1983 were thought to be disasters to Amur leopards.

2.2 东北豹 Amur Leopard (*Panthera pardus orientalis*)

- 分布区及种群数量 **Range and Number**
- 1998年在中国开展的联合调查结果和分析显示吉林省仅有3只东北豹个体，且中国境内的东北豹数量约7-12只。近些年关于东北豹的报道极为少见，据估计世界范围内，东北豹仅有50只个体且均分布于中俄边境，更准确的种群数量和家域仍需更大尺度的调查。
- Three-country joint investigation in 1998 by China, Russia and USA found only 3 leopard tracks in Jilin Province. Experts estimated the leopard population size to be 7-12 individuals. Information of Amur leopard in China was scarce in recent years. Currently number of the Amur leopards was less than 50 individuals all over the world. All of them lived in Russia and boundary of China and Russia. Exact leopard population size and current home range needs further investigation with larger scale and range.

2.2 东北豹 Far Eastern Leopard (*Panthera pardus orientalis*)

- 但可喜的是近期研究人员较频繁的发现了东北豹个体的活动。
 - 2011年4月13日，研究人员拍摄到了东北豹的活动录像
 - 2011年9月19日，在吉林省汪清通过红外线照相机拍摄到了东北豹照片
 - 2012年1月份，由吉林省林业厅组织，世界自然基金会（WWF）和国际野生生物保护协会（WCS）参加的，采用访问调查，样线法调查开展了长白山区东北豹调查。结果表明表明琿春和汪清地区有8-11只东北豹。
 - 2012年7月，在吉林省汪清拍摄到了东北豹的照片和录像
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- In April 13, 2011, researchers captured video of the Amur leopard in the National Nature Reserve in Jilin Province.
 - In September 19, 2011, a photograph was taken by a far-infrared camera in Wangqing County, Jilin Province.
 - In January 2011, investigation-which organized by Forestry Bureau of Jilin Province-results from WWF and WCS indicated that there are 8-11 Amur leopard in Hunchun and Wangqing
 - In July 2012, photos and videos of Amur Leopard was taken.

3 保护历史

Biodiversity Conservation History

- 自从20世纪90年代开始，图们地区就成为东北亚地区开展国际经济合作的焦点地区
- Since the beginning of the 1990s, the Tumen area has become a focus of prospective international economic cooperation in the Northeast Asia region.
- 联合国发展组织的图们江流域发展计划已经成为了该地区各部门合作的主要指导方针。
- The UNDP (United Nations Development Programme) TRADP (Tumen River Area Development Program) has become the major “locomotive” leading the cooperation effort.

3保护历史

Conservation History

- 我们设立了图们秘书处来协调和管理该计划相关的活动。
- A Tumen Secretariat of this program was created to administer and coordinate the program's activities.
- 目前，各成员国以实施产生的多项计划，涉及环保的诸多方面，例如包括污染问题，湿地的保护与利用，旗舰物种的保护，沙尘暴的控制等。
- Already, there has been a number of programs from participating countries, focusing on various aspects, which including pollution, wetland protection and restoration, flagship species conservation and dust and sand storm control.

3 保护历史

Conservation History

- 2009年9月，签署了为期2年的“东北亚跨国区域自然保护合作机制的发展”计划，该计划的目的是加强包括中国、朝鲜、俄罗斯在内的图们江下游地区的跨国合作机制，以应对自然环境保护方面面临的区域调整。
- In September 2009, a two-year program named “*Development of the Cooperation Mechanisms for Nature Conservation in Transboundary Areas in North East Asia*” started, aiming at strengthen transboundary cooperation mechanisms in Lower Tumen River Area encompassing China, Democratic People’s Republic of Korea and the Russian Federation for effective subregional responses to challenges in nature conservation.

3 保护历史

Conservation History

- 根据中国东北部长白山生态系统东北虎潜在栖息生境的研究报道以及我们的实际调查，在中国存在2处主要适于东北虎和东北豹栖息的潜在景观。在图们江流域的为长白山景观（ $40^{\circ} 52' - 45^{\circ} 59'$ ， $125^{\circ} 17' - 131^{\circ} 41'E$ ），该景观包括吉林东部，黑龙江东南部。图们江下游地区处于此景观的核心区域。
- According to the research report of *Technical report on the identification of potential tiger habitat in the changbaishan ecosystem, northeast China* and our investigation, there are 2 major landscape that could be considered as potential Amur tiger and leopard habitat in China including Changbaishan landscape(from $40^{\circ} 52'N$ to $45^{\circ} 59'$ and from $125^{\circ} 17'E$ to $131^{\circ} 41'E$) that covering the eastern part of Jilin and southeastern part of Heilongjiang),

- **相关保护区 Overview of nature reserves related to target species**
- **珲春国家级自然保护区 Hunchun National Nature reserve**
- 2001年，中国政府建立沿边境线建立的珲春虎豹保护区。中国东北部地区大面积的适宜森林生境得到了保护，通过林区管理方法的不断提升和反盗猎活动的深入开展，我们期望东北虎和东北豹能够回到他们的原始分布区。现在有迹象表明中国东北部地区的东北虎和东北豹种群已经开始恢复。
- In 2001 China established the Hunchun Tiger Leopard Reserve along the border. Large tracts of suitable forest habitat remain in NE China, and with improved forest management and anti-poaching we can expect the Amur tiger and leopard to make a comeback there. There are already indications that tiger and leopard populations in NE China have started to recover.

5 东北虎/豹种群数量研究方法 (need to large contents) Population Size Survey Methods

- -远红外照相机陷阱标志重捕法 Camera trapping
- -雪地踪迹计数 Snow track counts
- -虎豹粪便DNA标志重捕法 Fecal DNA analysis

6 中方管理和合作的建议

Management and Cooperation Recommendation in Chinese Side

- 总的来说，我们建议中俄两国的科学家应该根据项目的具体内容一起商讨以促进国际合作以及管理过程中的广泛参与。河两岸政府要做好两国主要主要利益相关者的工作。在计划的实施过程中，收集利益相关者的意见加以讨论形成一个行动大纲和两国间的合作。
- Generally, we recommend that Chinese and Russian scientists ought to be brought together within the context of the program to promote international cooperation and wider participation During the management. The government of the two riparian countries worked with key stakeholders in both countries. Stakeholder consultation should be organized during the project to discuss an action program and cooperation between the two riparian countries.

6 中方管理和合作的建议

Management and Cooperation Recommendation in Chinese Side

- 尽管图们江流域地区存在大量的潜在栖息地，使得恢复中国东北部地区虎的种群数量成为可能，但是其栖息地已经严重破碎化的事实不可否认，可利用栖息地中环境容纳量较临近俄罗斯地区少，所以仍面临巨大挑战。作为虎豹主要食物来源的有蹄类动物的种群数量在中国分布区内减少，只有满足虎豹生存最基本的需求才能够恢复中国东北部地区虎豹数量，包括地区和国家的计划。在保护制度建立的同时不意味着阻碍地区经济的发展，但是在发展计划中考虑到“虎豹的和谐管理”是至关重要的。
- Though there exist large area of potential habitat in Changbai and Wanda Mountains area and Tumen basin, and people still have the opportunities to recover tigers in northeast China, yet we have no reason to deny the fact that habitat fragmentation has already progressed significantly, making the available habitat less capable of sustaining tigers than in nearby Russia, the challenges are great. Ungulate populations, major prey of tiger and leopard are low in the distributing areas in China. Recovery of tigers in Northeast China cannot occur unless the basic requirements for survival of tigers and leopards are included in regional and national planning. We do not mean to make impede economic development of the region when performing the conservation institution, but inclusion of “tiger and leopard friendly” management guidelines in development plans is critical.

6 中方管理和合作的建议

Management and Cooperation Recommendation in Chinese Side

- 1)在跨国区域即刻执行相关的保护工作
- **Immediate Conservation Efforts should be focused on transboundary protection areas**
- 1)保护行动应集中在长白图们江下游地区以及东北虎，东北豹历史和潜在分布区和俄罗斯SPA这些行动包括：未来在自然保护区和自然公园的帮助下加强跨边界保护区域的保护力量，保护东北虎的同时还要保护东北豹。中国方面，狩猎已被禁止，中国东北部的潜在栖息地在近几十年已经得到一定程度的恢复。同时，我们还建议在潜在栖息地评价方面运用统一的方法和技术进行跨边界的合作。中国专家希望参与到相关工作中，致力于恢复旗舰物种。
- Conservation actions should be focused on the lower Tumen river basin in Changbai as well as historical and potential distributing areas of tigers and leopards and the SPA in Russia. These actions include: further strengthen conservation power in transboundary protection areas with the assistant from nature reserves, national parks, from both sides conserving not only tigers, but also leopards. In Chinese side, hunting is already been forbidden, and potential habitat in northeast China have been evaluated in the last several decades. While, still we recommend a transboundary cooperation on potential habitat evaluation with unified evaluating method and technologies. Chinese experts would like to participate in related works and dedicated into recovering of the flag species.
- 遵照两国自然保护区，国家公园和狩猎场关于野生动物保护条例，应该建立适用于所有参与国家的保护条例。
- In accordance with regulations on wildlife conservation and nature reserve, national parks and hunting farms of both countries, regulations that suitable for all participant countries should be built.

- 2)采取必要行动以保护次级老虎管理区的栖息地包括跨边界廊道，自然保护区和保护区域。
- **Take Necessary Actions to Protect Habitat in Secondary Tiger Management Zones-transboundary corridors, nature reserves or protection areas**
- 中国专家已经提出长白山，穆棱和张广才岭南部也是重要的潜在东北虎种群的恢复区。为了确保这些地区成为东北虎的潜在栖息地，应防止该地区森林面积的进一步减少。在不远的将来，能够建成有实际效用的廊道使得东北虎可以在管理区之间自由移动成为可能。
- Chinese experts have pointed out that Changbaishan, Mulin and Southern Zhangguangcailing also represent potentially important recovery zones for tigers. To ensure that these zones retain potential tiger habitat, it is necessary to prevent further loss of forests in these management zones. In the immediate future it is critical that ground-truthing of proposed corridors linking these zones be conducted, and steps be taken to secure or create such corridors to ensure that movement between Tiger Management Zones is possible.
- 此外，鉴于国家的猫科种群之间存在地理隔离，从长远看，我们建议建立连接中国和俄罗斯的廊道，使得俄罗斯的东北虎种群可以扩散到中国。
- Moreover, as there exists geographical isolation between felid populations among countries, in the long-term, we recommend that corridors linking China and Russia should be built to allow Russian tiger population to spread to the Chinese side.

- “东北虎友好型”管理方法，旨在恢复并保护东北虎栖息地，已经在中俄两国间许多次会议中提出并讨论，鉴于东北虎和东北豹在图们江下游地区分布在相同保护区域内的事实，我们建议将保护的目标物种跨到猫科动物，我们热切希望发展“东北虎友好型”管理方法，例如高价值的保护林（由WWF提出），尽可能多的进行林木鉴定（由林业管理委员会执行）；保护猫科动物的潜在栖息地，确保跨边界地区森林覆盖率不会进一步减少以及减少破碎化现象的出现；适时迁走小规模居民点（林业局局址）；减少当地居民和野生动物之间的冲突—特别是野猪，经常破坏庄稼，这样本地的猎物种群的到充分恢复；限制道路建设以及人和交通工具的活动以保护动物安全。
- “Tiger Friendly” management approach, which aiming at restoring and conserving habitat of tigers, has been mentioned discussed in lots of meetings in Russia and China, considering the fact that tiger and leopard distribute in the same conservation area in Tumen river basin, we recommend to enlarge our target species to felids and we eager to develop “Felids friendly” management approach such as High Value Conservation Forests (as proposed by WWF), and Forest Certification (as conducted by the Forest Stewardship Council) as much as possible; protect potential habitat for the felids and ensure no further loss of forest cover and fragmentation occurs in transboundary areas; search opportunities to move small settlements (forest bureau settlements); reduce conflict between local villages and native wildlife – especially wild boar – which cause crop damages, so that native prey populations can fully recovery; restrict road building and movement of people or vehicles to improve security for the animals.

■ 3) 猎物种群的恢复 **Recovery of Prey Populations**

■ 3) 根据1999到2000年国家林业部（SFA）在研究地区收集到的数据，专家已得出长白山中方部分的有蹄类动物的种群密度（足迹链/km）。我们建议在多边/双边跨边界保护区内长期进行有蹄类种群动力学调查以恢复猫科动物种群。

■ Relative ungulate density (tracks/km) in the Chinese portion of the Changbaishan was derived by expert assessment based on data collected from field surveys conducted from 1999 to 2000 by the State Forestry Administration (SFA). We recommend a long term multi-/bilateral transboundary ungulate population dynamics investigation in protection areas to recover the felid populations.

- 分析结果证实猎物种群密度是长白山地区东北虎栖息地质量的一个关键的决定因素。为了恢复猎物种群，我们建议采取以下及方面行动：
- The results of analyses conducted here confirm that prey densities are a critical determinant of habitat quality for tigers in the Changbaishan landscape. To assist in recovery of prey, we recommend the following actions:
 - (a) 继续并加强吉林和黑龙江两省关于狩猎的禁令。这将有利于优先恢复猎物物种，如马鹿和野猪。
 - Continuation and strengthening of the existing ban on hunting in Jilin and Heilongjiang Provinces. This will benefit the recovery of preferred prey species, including red deer and wild boar.
Better enforcement of anti-poaching laws;
 - (b) 在整个东北虎管理地区发起清理陷阱和夹套运动。 An active and extensive campaign is to remove snares over the entire Tiger Management Zones
 - (c) 应建立起有蹄类详细监控计划。
 - detailed ungulate monitoring program should be established

■ 4)政府和利益相关者的政策支持

■ Policy Supports by Governments and Stakeholders

- 当人类的生活和工作活动靠近顶级捕食者时，冲突便不可避免。人类的活动导致栖息地破碎化，特别是边界上的围栏。
- When humans live and work in close proximity to apex predators such as tigers, conflict is inevitable. Human activities cause habitat fragmentation especially the barriers at the border.
- 在图们江流域地区的国际开发中存在补充合作和激烈的竞争，其结果在合作过程中会存在一些问题。例如相关邻近国家间在社会制度，意识形态，经济结构和技术水平上存在巨大差异，图们江流域的国际合作仍然处在起步阶段，松散的合作形式，缺乏广泛的，紧密的，双边的为基本的主要形式。就中方观点，图们江流域的国际合作应达成一致共识，不协调的活动和发展资金的短缺成为影响发展结果的主要问题。多文化见的协调应当被关注。
- Complementary cooperation, as well as fierce competition, exists in the international development of Tumen River area. As a result, 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 neighboring countries concerned, the international cooperation for Tumen River Area is still at a preliminary stage with loose cooperation forms. Lack of extensiveness and closeness, bilateral cooperation is basically the main form. As far as China is concerned, the ununified understanding of Tumen River Area international cooperation, the out-of-tune actions and shortage of development funds have become the main problems in affecting the development results. There for multi-culture coordination should be concerned.

谢谢!

Thanks for attention!