ASIAN DEVELOPMENT BANK

RRP:PRC 35289

DRAFT

PROJECT DOCUMENT

SANJIANG PLAIN WETLANDS PROTECTION PROJECT

FOR

THE PEOPLE'S REPUBLIC OF CHINA

27 July 2004

CURRENCY EQUIVALENTS

(as of 29 June 2004)

Currency Unit	–	Yuan (CNY)
CNY1.00	=	$0.121
$1.00	=	CNY 8.28

ABBREVIATIONS

ADB	–	Asian Development Bank
BCAP	–	Biodiversity Conservation Action Plan
CSP	–	country strategy and program
EMP	–	environmental management plan
GEF	–	Global Environment Facility
HPFD	–	Heilongjiang Provincial Forestry Department
HPG	–	Heilongjiang Provincial Government
NDRC	–	National Development and Reform Commission
NFPP	–	Natural Forest Protection Program
NTFP	–	non timber forest project
NR	–	nature reserve
NWCAP	–	National Wetland Conservation Action Plan
PIU	–	project implementation unit
PMO	–	project management office
PRC	–	People's Republic of China
TA	–	technical assistance
UNDP	–	United Nations Development Programme
UNEP	–	United Nations Environment Programme
VDF	–	village development fund

WEIGHTS AND MEASURES

ha	–	hectare
km	–	kilometer
km^2	–	square kilometer
m	–	meter
m^3	–	cubic meter

NOTES

(i) The fiscal year (FY) of the Government and its agencies ends on 31 December. FY before a calendar year denotes the year in which the fiscal year ends, e.g., FY2000 ends on 31 December 2000.

(ii) In this report, "$" refers to US dollars.

This report was prepared by a team consisting of K. Choe (team leader), L. Adriano, S. Ferguson; Xiaoying Ma and V. You

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LOAN PROJECT SUMMARY

Borrower	:	People's Republic of China (PRC)
Project Description	:	The Sanjiang Plain[1] comprises 108,900 square kilometers, where the Songhua, Heilongjiang, and Wusuli rivers are confluent in a vast alluvial floodplain in the northeast Heilongjiang Province. The Plain is one of the most important grain production areas in the PRC. Supporting rich biological diversity, which includes 23 species listed in the World Conservation Union as globally threatened, the wetlands in the Sanjiang Plain are some of the most species-rich and endemic-rich ecosystems in Asia. However, the wetlands and forestlands have shrunk to one fifths of their original size in the last five decades because of rapidly increasing population and grain production, and flora and fauna in the wetland nature reserves are threatened by farmland encroachment and water resource exploitation. To protect these ecosystems while supporting the sustainable development of the area, the Project adopts a holistic model framework of watershed management by (i) rehabilitating and protecting degraded forests in the upper watershed areas; (ii) restoring and protecting wetlands nature reserves in the downstream areas; (iii) providing alternative livelihoods to farmers; and (iv) strengthening the capacities of the local agencies in charge of watershed wetland and nature reserves management. By developing and pilot-testing a model framework to protect wetland biodiversity while promoting the sustainable development of the areas, the Project will be instrumental in establishing a wetland protection program in the PRC that protects wildlife biodiversity effectively and generates employment and income in a sustainable manner.
Classification	:	Poverty: Other Thematic: Environment
Environment Assessment	:	Category B: An initial environmental examination was undertaken, and a summary initial environmental evaluation was prepared.
Rationale	:	The Sanjiang Plain is one of the richest areas in the PRC in globally significant flora and fauna (*it supports 23 globally threatened species and 16 endemic species, and has 3 Ramsar sites*),[2] which are mostly concentrated in nature reserves (NRs). However, over the past five decades, the Government has extensively developed Sanjiang Plain for farming to provide food for the country, shrinking the wetlands to a fifth of their original size (because of conversion and sedimentation) and thus bringing about various climatic changes (dry weather, drought, and frequent floods) and water shortages throughout the area (low ground-water table). As the wetlands lost their self-cleaning capacity, plant and

[1] *Sanjiang* means "three rivers"—the Heilong, Wusuli, and Songhua rivers. The Heilong and Wusuli rivers run along the border between the PRC and Russia, while Songhua River runs through the middle of Heilongjiang Province. The area of the Heilongjiang Province is almost equivalent to that of France, and the Sanjiang plain comprises 20% of Heilongjiang Province.

[2] The Ramsar Convention on Wetlands, ratified by the PRC on 31 July1992, lists three wetland nature reserves in the Sanjiang Plain as wetlands of international importance.

animal biodiversity of global significance was reduced. Further, this wetland biodiversity is threatened by local communities exploiting biological resources for income, inappropriate farming practices at NRs, and the limited management capacity of NR staff. Recent government policies and plans are aimed at halting and reversing environmental degradation in the area. However, the restriction of economic activities in the wetlands will affect the life and well-being of the communities, and must be linked to sustainable livelihoods and wise use of wetlands. The Government needs improvement to achieve a "model" for sustainable livelihoods to farmland-to-wetland conversion and forestation as part of an integrated river-basin management policy. At the same time, Heilongjiang Provincial Government (HPG) is committed to strengthening its forestry and nontimber forestry sector to promote economic development and generate employment for forest workers and farmers. Designated as one of the three environmental provinces in the PRC, HPG is looking for development opportunities that integrate watershed and wetland management in a sustainable way and that could be replicated throughout the Sanjiang wetland NRs and other areas with similar environmental conditions. An enabling framework is urgently needed. The proposed Project will prepare investments for wetland and forest conservation by adopting integrated watershed management in the Sanjiang Plain, based on their potential to support ecologically sustainable economic development, and will provide a model framework that can be expanded for comprehensive, longer-term management of wetlands and biodiversity on a large river basin scale.

Objectives and Scope : The overall goal of the Project is a sustainable management of natural resources to protect globally significant biodiversity and to promote economic development. The immediate objective of the Project is the protection of the natural resources of the Sanjiang Plain wetlands and their watersheds (biodiversity, water, forests), from continued threats, and the promotion of their sustainable use, through the integrated conservation and development of selected wetlands and forest areas of the Sanjiang Plain, and the improved well being of local communities.

Four key changes threaten environmentally sustainable development in the Sanjiang Plain: (i) hydrology changes and desiccation, (ii) conversion to farmland, (iii) inappropriate resource use in the wetland, and (iv) limited technical and management capacity of NR staff. The Project will have four components to deal with these key threats. *Component 1 (Watershed Management)* will remove threats from wetland desiccation by increasing forest cover and improving water resource planning and management. *Component 2 (Wetland Nature Reserve Management)* will remove threats and reversing trends from past wetland conversion and degradation of habitat quality by converting farmland to wetlands and enhancing wildlife recovery. *Component 3 (Alternative Livelihoods)* aims at diversifying the income sources of poor farm households who are dependent on forest and wetland cultivation, thus reducing the threats from inappropriate land and resource use of nature reserves (NRs), by creating sustainable income-earning opportunities for farmers through inter-cropping, non-timber forest production, sustainable resource use in wetlands, and eco-tourism. *Component 4 (Education and Capacity*

Building) will remove threats from the limited capacity of NR staff through conservation education, training, and ecotourism awareness programs. The *project management component* will carry out overall implementation, administration, and monitoring. The world will benefit from the enhanced conservation of globally significant biodiversity through the Project.

Geographic Scope : About 18 counties are situated in the Sanjiang Plain, at the northeast corner of Heilongjiang Province. Thirteen of these have submitted viable forest investment proposals, which would strengthen the watershed approach through forest improvement and conversion of farmland back to its legally required forest use. The watersheds selected for watershed management in Component 1 are the Anbang, Dajiahe, Muling, Naoli, and Zhanbaodao watersheds. All are adjacent to the Songhua River basin and share many similar hydrologic and socioeconomic conditions. Six nature reserves in the five watersheds will be the focus of Component 2 (developing protection/restoration models); they are Anbanghe, Dajiahe, Naolihe, Qixinghe, Xingkaihu and Zhenbaodao nature reserves. Xinhkaihu NR is one of the sites listed by the Ramsar convention, and the others are all part of national nature reserves.

Cost Estimates : The Project will cost about $54.39 million equivalent, $5.32 million of this in foreign exchange costs and $49.07 million in local currency costs.

Financing Plan :

($ Million equivalent)

Source of Financing	Foreign Exchange	Local Currency	Total Cost	Percent
Asian Development Bank	1.02	14.00	15.02	28
Global Environment Facility	3.04	9.10	12.14	22
Government	1.26	21.52	22.78	42
State Forest Farm	0.00	4.44	4.44	8
Total	**5.32**	**49.07**	**54.39**	**100**

Loan Amount and Terms : It is proposed that ADB provide a loan to the PRC in the amount of $15.02 Million equivalent (28% of the total project cost) from its Ordinary Capital Resources to finance the foreign exchange cost of $1.02 million equivalent and a portion of the local currency cost amounting to $14.00 million equivalent. The loan will have a 25-year term, including a grace period of 5 years, an interest rate determined in accordance with ADB's LIBOR-based lending facility, a commitment charge of 0.75% per annum, and a waiver of the front-end fee 1.0% (if this proposed loan gets approval before 30 June 2005). GEF cofinancing of $12.14 million has been proposed for the Project that will be administered by ADB.

Period of Utilization : Until 31 December 2010

Implementation : From July 2005 to June 2010

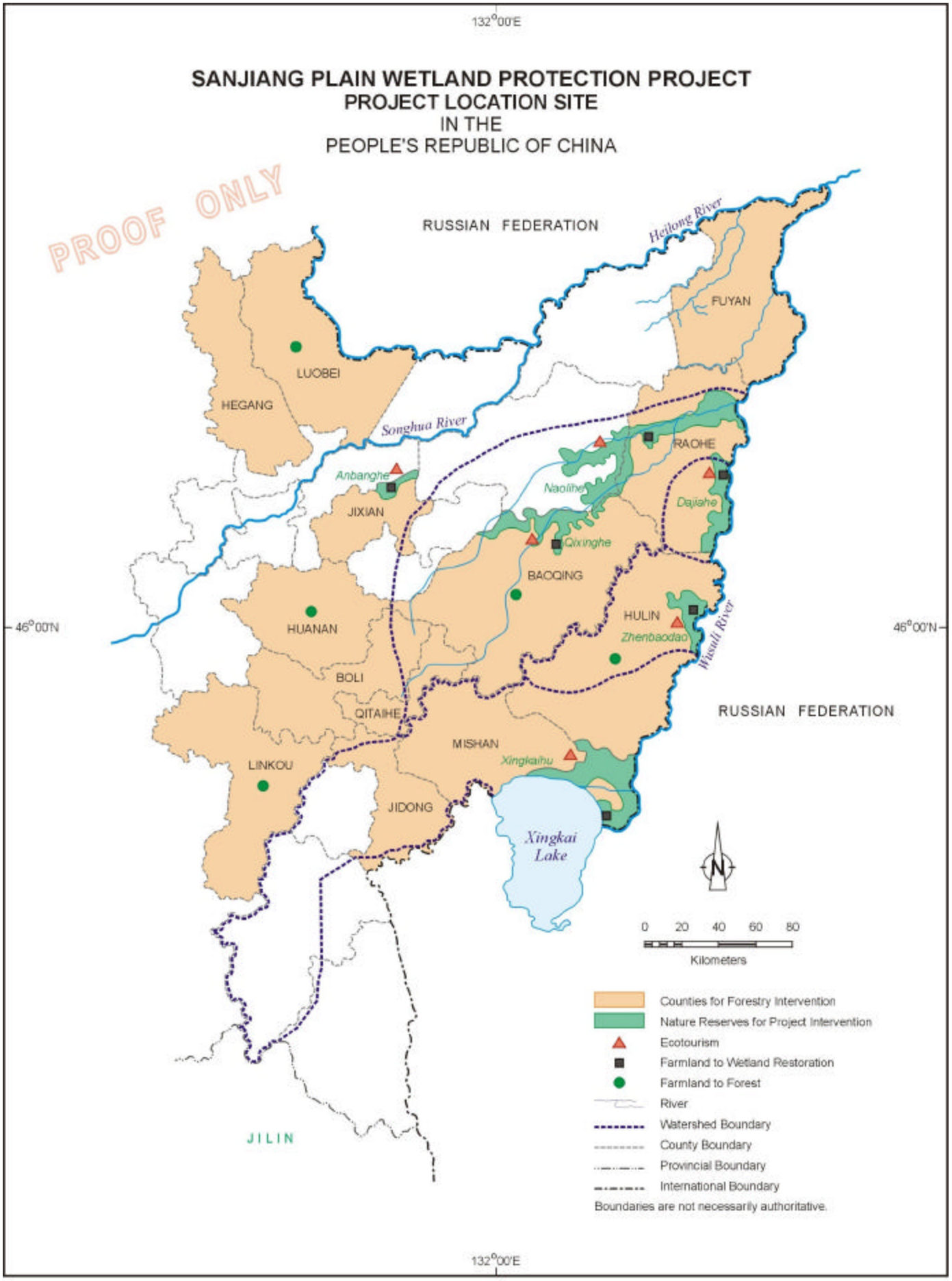
Executing Agency : Heilongjiang Provincial Government

Implementation : A project management office (PMO) will be established within the HPG

Arrangements		Forestry Department to take charge of day-to-day administration and implementation of Project activities, in cooperation with other key implementation agencies, civil society organizations, public and private enterprises, and local communities. The PMO will be guided by a project steering committee, and assisted by a team of international and domestic consultants under a project director. A total of 18 Project implementation units (PIUs) will be established, one in each of 13 counties forestry bureaus and 6 nature reserves.
Procurement	:	Goods and services to be financed by the ADB loan and the GEF grant will be procured in accordance with ADB's *Guidelines for Procurement*. Each contract estimated to cost $100,000 or more, but less than $500,000, will be awarded through international shopping. Contracts for less than $100,000 will be by direct purchase. Civil works contracts will be relatively small, relating to site preparation, weeding or planting, and may be carried out through force account.
Consulting Services	:	Consultants will be selected and engaged in accordance with ADB's *Guidelines on the Use of Consultants* and other arrangements satisfactory to ADB for engaging domestic consultants. The consulting firm will be selected using ADB's quality-and-cost-based selection method to provide implementation support to PMO. The total consultant input for the Project is estimated at 601 person-months of technical assistance, consisting of 133 person-months of international consultants and 468 Person-months of national consultants. Consultants are required in the water resources, wetland biodiversity and nature reserve management, eco-tourism, conservation education and awareness sub-components under GEF grant funding. The Project will also engage qualified academic/ research institutes for several studies, surveys and long-term training programs, including those in water resources and in long-term training.
Project Benefits and Beneficiaries	:	It is estimated that about 46,000 forestry workers will have working opportunities during the implementation period. In addition, using non-timber forest resources to develop apiculture products and adopting agro-forestry intercropping as forest investments will enhance employers' benefits for the forest workers. The financial internal rate of return of these forest developments were overall 19% for treatments and 9% for new plantations, greater than the estimated weighted average cost of capital of 6.1%. The high financial return is due to low capital costs required on existing forest treatment. Economic internal rate of return on national environmental benefits outweighs the social cost of capital of 12%. The potential global environmental benefits will be (i) increases in areas of breeding and foraging habitats for waterfowls and other wildlife, and resulted in increases in populations of globally threatened species; (ii) improved water resources management at local and watershed scales leading to improved wetlands habitat quality and increasing wildlife numbers; and (iii) reduced threats to globally threatened wildlife through increased public and private awareness on the importance of wetlands for environmental conservation. The Project will result in positive environmental impacts (globally, nationally, and locally).


SANJIANG PLAIN WETLANDS PROTECTION PROJECT
HEILONGJIANG PROVINCE
IN THE
PEOPLE'S REPUBLIC OF CHINA
National Designnated Poverty County
Sanjiang Plain
Songhua River Basin
Provincial Capital
City/Town
River
River Basin Boundary
County Boundary
Provincial Boundary
International Boundary
Boundaries are not necessarily authoritative.
126°00'E
132°00'E
48°00'N
44°00'N
40°00'N
Heilong River
Yilehuli Mountain
XIA HINGGAN MOUNTAINS
Oroqen Zizhiqi
Jagdaqi
Gan River
Aihui
Kumotun
INNER MONGOLIA
Nenjiang
Nen River
Nirji
Bei'an
Tongmeng
Gannan
Nianzashan
Qiqihar
Longjang
Jiangqiao
Daqing
Anda
Zhenlai
Baicheng
Dalai
Xiadaji
Harbin
Acheng
Shangzhi
Wucheng
Jalin R
Mudanjiang
Dunhua
Tumen
JILIN
HEILONGJIANG
Songhua River
Nancha
Wuyiling
Hegang
Jixian
Jiamusi
Yilan
Tonghe
Linkou
Jixi
Suifenhe
Xingkai Lake
Fujin
Tongjiang
Fuyuan
Qianjin
Jiansanjiang
Raohe
Hulin
Qitaihe
Wusuli River
RUSSIAN FEDERATION
RUSSIAN FEDERATION
PROOF ONLY
Project Location
PEOPLE'S REPUBLIC OF CHINA
HEILONGJIANG
JILIN
INNER MONGOLIA
LIAONING
BEIJING
TIANJIN
HEBEI
NINGXIA
SHANXI
SHANDONG
QINGHAI
GANSU
SHAANXI
HENAN
JIANGSU
SHANGHAI
SICHUAN
HUBEI
ANHUI
ZHEJIANG
CHONGQING
JIANGXI
HUNAN
FUJIAN
GUIZHOU
YUNNAN
GUANGXI
GUANGDONG
HONG KONG SAR
HAINAN
100°00'E
120°00'E
20°00'N
25°00'N
East China Sea
South China Sea
Gulf of Tonkin
0 50 100 200 300
Kilometers
N

SANJIANG PLAIN WETLAND PROTECTION PROJECT
PROJECT LOCATION SITE
IN THE
PEOPLE'S REPUBLIC OF CHINA



I. THE PROPOSAL

1. I submit for your approval the following Report and Recommendation on a proposed loan to the People's Republic of China (PRC) and the proposed administration by the Asian Development Bank (ADB) of a grant from the Global Environment Facility (GEF) for the Sanjiang Plain Wetlands Protection Project (the Project).

II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

2. At the request of the PRC Government (the Government), ADB in 1999 provided a project preparatory technical assistance for Song-Nen and Sanjiang plains, PPTA 3376-PRC: Songhua River Flood and Wetland Management Project.[1] The project was co-financed with a $330,000 PDF-B grant from the GEF. However, after an initial analysis of the socioeconomic and biophysical conditions in the project area, the Government requested ADB to process first the Songhua River (in Song-Nen Plain) flood management component as a matter of some urgency.[2] In July 2001, it was decided that the wetland protection component (in Sanjiang Plain) should be processed as a separate project. In 2002, ADB provided another technical assistance, PPTA 3998-PRC: Sanjiang Plain Wetlands Protection Project (approved in November 2002, for $600,000), for the design of the proposed investment project. Despite that the geographical focus has shifted from overall Songhua river basin to Sanjiang Plain since then, the original concept of river basin flood management has been expanded toward an integrated water resource management for the protection of wetland Nature Reserves, and thus the conservation of globally significant biodiversity. Followed by the consultant's submission of draft final report in March 2004, a fact-finding mission visited the PRC in April and May 2004 to refine the Project design and agree on the objectives, scope, implementation arrangements, costs, financing plan, and components of the Project with officials of the Government. This report is based on the findings of that mission, discussions with national and local government agencies concerned, and talks with international organizations. The Project framework is in Appendix 1, and the processing chronology is in Appendix 2.

A. Performance Indicators and Analysis

3. The PRC's agricultural and food security policies during the last half of the 20th century included a massive effort to expand grain production into the last areas of uncultivated fertile soils. The area known as the Sanjiang Plain,[3] a vast complex of marshes, meadows, and forests along the Russian border in northeast Heilongjiang Province, was a major focus for the expansion of national grain production. Starting in 1949, agricultural development programs transformed the Sanjiang Plain from almost uninhabited wilderness into one of the eight national bases for grain production (corn, soybeans, rice). Over the past five decades, the Government has extensively developed Sanjiang Plain for farming to provide food for the country, shrinking

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1 ADB. 1999. *Technical Assistance to the People's Republic of China for Songhua River Flood and Wetland Management Project* for $1.215 million. Manila. The Project concept entered the GEF financing pipeline in December 1999.

2 ADB. 2002. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the People's Republic of China for the Songhua River Flood Management Sector Project* for $150 million. Manila

3 *Sanjiang* means "three rivers"—the Heilong, Wusuli, and Songhua rivers. The Songhua River runs through the Sanjiang Plain, and the Heilong and Wusuli rivers run along the border between the PRC and Russia. The Sanjiang Plain (with about 8 million people living on 108,900 sq km of land, or slightly bigger than the Republic of Korea) accounts for 20% of Heilongjiang Province (both in area and population) and lies at the confluence of the three rivers. Before the agricultural development programs started in the 1950s, almost 50% of the Plain used to be wetlands.

the forestlands and wetlands[4] to a fifth of their original size and thus bringing about various climatic changes (dry weather, drought, and frequent floods).

4. As the Plain has become more densely settled and reclaimed into farmland, the water-holding capacity of the wetlands has diminished even as flooding has increased in frequency and intensity. To reduce economic damage to farmland and protect the people from the immediate dangers of destructive flooding, the Government has built flood control dikes, causing rapid rainfall runoff and severe soil erosion. Wetland drainage and dike construction on river floodplains have helped increase the cultivated land base but have also damaged the natural flood-retention capacity of wetlands that support globally significant fauna and flora, dehydrating these wetlands and threatening their biodiversity. As the population grows, development accelerates, and the floodplains are more densely settled, the economic cost of flood damage will also increase. The Government has therefore integrated nonstructural measures such as flood forecasting and the development of decision support systems to better manage flood emergencies.[5] Yet, other than forecasting and warning for decision support systems, wetland protection measures are limited by low awareness of water resource allocation among competing economic activities and insufficient knowledge of holistic watershed management as part of an integrated floodplains approach.

5. In the Sanjiang Plain, deforestation and cultivation of hillsides have caused soil erosion, diminished the water-retention capacity of uplands, and increased the vulnerability of farmland to both floods and droughts. Over the last five decades, the forest cover has also shrunk from 49% at the turn of the century to only 10% (about 11,000 sq km). These forests are almost entirely on State Forest Farms, parastatal enterprises managed by County Forestry Bureaus under the supervision of the Heilongjiang Provincial Forestry Department (HPFD). These Farms endure wood shortages, reduced harvests, and other economic constraints. Many of them have leased land to their workers for farming to offset the income lost from timber production. This arrangement has worsened deforestation in the Sanjiang Plain, and brought many erodible forest soils into inappropriate agricultural production. Forest workers with no access to arable land often fall into poverty.[6] Because these plantations are not scientifically managed, their growth and quality potential has not been realized. Consequently, a potentially self-sustaining sector is not delivering satisfactory outputs, and whatever benefits the remaining upland forests provide to the hydrological cycle in the watersheds are undermined. A new policy[7] emphasizes

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4 "Wetland" is a general term for marshes, swamps, wet meadows, shallow lakes, and streamside areas. Boundaries of wetlands are transitional and are shaped by precipitation, evaporation, watershed hydrology, and wetland vegetation.

5 From 1999 to 2002, the Government invested CNY178.6 billion ($22.3 billion) in infrastructure building for hydraulic projects, almost 2.5 times more than in the previous five decades. About 10% of such investments went to nonstructural measures, particularly flood detention basins and forecasting and modeling systems. Australian AID is funding the Yangtze River Flood Control and Management Project ($12 million), which will improve flood forecasting, flood warning, and the operation of 24 flood detention basins (up to 300 km^2 in area) along the middle reaches of the Yangtze. The Canadian International Development Agency has recently completed a major hydraulic modeling study to improve flood forecasting for Donting Lake, in the middle reaches of the Yangtze River. ADB's Songhua and Yellow river flood management projects also adopted nonstructural measures—flood forecasting and modeling.

6 Heilongjiang has a poverty incidence of 9.7%–10.3% in the countryside, using official rural poverty lines national-level—and a per capita net annual income for poor households of RMB 1,000. About 10% of households in State Forest Farms are poor.

7 The policy initiatives, by former Premier Zhu, are written in 32 words in Chinese, but no other formal documentation is available. The policy calls for the following: enclosing mountains to plant trees; transforming arable land back into forests; demolishing polder fields to release floods; transforming farmland back into lakes; supplying labor as contribution; relocating people to build townships; reinforcing stem river levees; and dredging river channels and lakes. Under the initiatives, the PRC is renewing flood control plans for all major river basins.

the need to move toward natural resource management as a long-term, holistic way of flood plain management, which includes the restoration of farmland to wetlands and forest. The sector is challenged to increase the forest cover and the production of high-quality wood, as well as to ensure the livelihood of forest workers whose land has to be reverted to forest, as required by law.

6. The Sanjiang Plain is one of the PRC's richest in globally significant flora and fauna, supporting about 37 ecosystems, 1,000 species of plants, and 528 species of vertebrate fauna.[8] It supports 23 of the globally threatened species on the World Conservation Union Red List. Of these, 10 species are waterfowls such as cranes, storks, and swan geese, which require extensive, undisturbed wetlands during their migration and breeding seasons. The Sanjiang Plain wetlands are an important nesting and stopover location at the northern end of the East-Asian-Australian Flyway for migratory waterfowls, most notable of which are the white-naped and red-crowned cranes. These wetlands are also ranked as globally important in the *Directory of Asian Wetlands*. The transformation of the Sanjiang Plain into a major grain production field over the last five decades was therefore achieved at considerable cost to the environment. Immense networks of drainage channels, pumping stations, and flood control dikes destroyed millions of hectares of natural marshes and wet meadows, and altered the water cycle of entire watersheds. The use of flood control dikes to protect farmlands prohibited wetlands from being naturally recharged, thus dehydrating and reducing the wetland habitats. Large portions of the uplands were deforested, further upsetting the water balance in the watersheds. As the altered water cycle in the wetlands reduced their habitat size and self-cleaning capacity, plant and animal biodiversity of global significance has declined. Large wildlife such as the northeast tiger, red deer, and bear were exterminated, and formerly abundant ducks, geese, cranes, and other waterfowls nearly disappeared. Since the 1950s, human economic activities have degraded and disturbed natural wetland habitats. Less than one-tenth of the original population of cranes now nest in Sanjiang Plain. For these wetland-dependent wildlife species to survive, the continuing trend toward the reduction and degradation of the Sanjiang Plain wetlands must be reversed.

7. Recently, the Government has adopted several important national policies and legal measures[9] to guide and direct habitat restoration and biodiversity conservation. The Wild Animal Protection Law of 1988 has reduced the overexploitation of wildlife from hunting and egg collecting. The PRC ratified the Convention on Biological Diversity, which resulted from the Rio de Janeiro Conference on United Nations Environment and Development, in 1993 and issued the Biodiversity Conservation Action Plan in 1994. The HPG issued the Regulation of Nature Reserves in 1996, establishing priority wetland Nature Reserves (NRs),[10] and the Decision on Wetland Conservation in 1998 (Document of Heilongjiang Party Committee, No. 21, 1998), suspending the further conversion of wetlands to farmland. In 2002, the National Wetland Conservation Action Plan, outlining priority actions to guide conservation, use, management, and institutional frameworks, was approved. The HPG reinforced this a year later by issuing one of the PRC's first wetland regulations (Regulations on Wetland Conservation of Heilongjiang Province, HPG, 2003). These new regulations recognize the multiple values of wetlands, the necessity of their conservation and wise management through the establishment of NRs, and the reality that wetlands and their wildlife remain threatened by expanding agricultural activities

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[8] A detailed review and analysis is included in Supplementary Appendix A: Profile of Wetlands Biodiversity in the Sanjiang Plain.

[9] A detailed review and analysis is in Supplementary Appendix B: Institutional, Legal, and Policy Analysis.

[10] Nature Reserves (NRs) are specially designated areas protected by PRC laws (National Regulation of Nature Reserves, effective 1 December 1994) to conserve wetland habitats. The National Regulations for Nature Reserves is the basis of the current body of regulation. These regulations direct NR establishment and operation at all levels. Article 43, however, requires the use of these regulations as a blueprint by administrative levels below the State in developing and implementing their own regulations.

and by water and land resource exploitation. Despite these impressive legal steps, however, wetland restoration and protection is still a new concept in the PRC. Wetland restoration programs have been planned, but the appropriate technologies have yet to be developed. Sound wetland management expertise and scientific knowledge, not to mention familiarity with healthy water resource management, is scarce.

8. The protected wetland area in the Sanjiang Plain now includes 28 NRs that cover 10,278 sq km (9.4%) of the Sanjiang Plain. Three of the NRs have been listed by the Ramsar Convention Bureau[11] as wetlands of international importance. The NRs were established to protect the best remaining wetland habitats and their biodiversity, including most of the known sites for waterfowl nesting and migration. This is a major step forward in wetland conservation. Nevertheless, wetland biodiversity is further threatened by local communities that exploit biological resources for income, inappropriate farming practices in NRs, commercial tourism, and the limited management capacity of NR staff. Wetland protection policies and laws should be further strengthened, and supplemented with operational tools and enforcement measures. Moreover, the low awareness of communities with respect to wetland values still presents a serious challenge, preventing the NRs from attaining their objectives of habitat conservation and environmental protection through laws.

9. Different economic activities and wetland-dependent wildlife species vie for land and water resources in the Sanjiang Plain. Economic decisions on wetland use are fragmented among various sectoral agencies of HPG, such as the Agriculture Department, Water Resources Department, Forest Department, Environmental Protection Bureau, State Farms, and State Forest Farms. An integrated water resource plan for wetland management and biodiversity conservation, with NRs playing a key role, is needed. However, the 2003 Heilongjiang Wetland Regulations gave official authority and responsibility for wetland management to the HPFD. Wetland management also requires the various institutions to coordinate among themselves in water and land resource sharing, as well as in information gathering and planning. Coordination mechanisms have yet to be established, and roles and responsibilities still have to be defined clearly, for more efficient management of wetlands and biodiversity conservation. With funding from the National Development and Reform Committee, the HPFD is about to launch a project that will restore 1,500 sq km of farmland to wetlands and replant 685 sq km yearly from 2006 to 2010. With such a challenging task ahead, the HPG realizes that it must improve its wetlands management approach, knowledge and capacity. It has therefore sought ADB's assistance in developing a model approach that could be replicated effectively on a wider scale and in strengthening the HPG's capability to manage wetland biodiversity.

B. Analysis of Key Problems and Opportunities

1. Threats and Constraints

10. Globally significant endangered species in Sanjiang Plain rely on wetland habitats, and wetlands depend on an adequate supply of water to maintain their saturated soils, distinctive vegetation, and productivity, and to prevent loss of peat. Agricultural development has dramatically altered the hydrology of the watersheds in the Sanjiang Plain, desiccating many of the remaining wetlands, even those within NRs. Also, the construction of flood control dikes to

[11] The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are at present 138 Contracting Parties to the Convention, including the PRC, and 1,367 wetland sites, totaling 1.2 million sq km, designated for inclusion in the Ramsar List of Wetlands of International Importance. The Ramsar sites in the Sanjiang Plain, Honghe NR, Sanjiang NR, and Xingkaihu NR, which is one of the Project site, represent 16% of the total Ramsar site area in the PRC.

protect farmlands, the deforestation of the middle and upper watersheds, and poor conservation practices on sloping agricultural lands have all tended to reduce water retention, increase evaporation, accelerate runoff, increase soil erosion, and increase sedimentation in entire watersheds in the Sanjiang Plain. These watershed alterations not only worsen flooding but also prolong droughts at critical times of the year. Wetlands and well-managed forests tend to moderate these hydrologic effects, but they cannot perform their watershed functions effectively if their area is too dramatically reduced, or their health is undermined by water shortages. Maintaining or increasing the remaining forest and wetland areas and providing the water supplies to maintain wetland health and function are vital issues and considered as immediate threats as farming expands and HPG faces a future of water scarcity. It is therefore important that the barriers to the protection of environment in a balanced manner for economic development be identified and removed. The proposed Project aims to remove them and to develop sustainable and replicable models for further application in other areas of the Sanjiang Plain and other provinces. The key barriers (Appendix 3) that restrict the protection of the wetlands in the Sanjiang Plain and conservation of their biodiversity are as follows.

11. **Unsound Local Planning of Water Resources Allocation.** Agriculture, industry, and domestic water uses compete with wetlands for water supply. Agriculture accounts for 70% of the total consumption of water in Heilongjiang Province. Although gross water supply from surface water and groundwater may be technically adequate for all current uses in Heilongjiang, the frequent droughts indicate serious problems of groundwater overdraft in the Sanjiang Plain. The Five-Year Comprehensive Water Plans for the Province estimate the "ecological water supply" at a marginal 3.6% of the total requirements, but in reality the Province does not calculate the wetland water requirements for the Sanjiang Plain. Dramatic increases in water consumption for agriculture in Heilongjiang Province are expected as the irrigated rice area expands from 9,530 sq km to 14,130 km^2 by 2010. The expansion of irrigation diversions and groundwater over-pumping will increase pressure on the available water for wetlands, besides lowering the groundwater table. Although Heilongjiang Province has formally halted further wetland drainage, agricultural interests in the Sanjiang Plain are still active in wetland drainage projects near, or even in NRs. Pressure for arable land is unavoidable as the population grows, and thus optimal water resource allocation planning at the local level is required to protect wetland NRs.

12. **Poor Understanding of Nonstructural Flood Mitigation and Floodplain Management.** Flood control and management is a high-priority issue for the provincial government, especially since the devastating floods of 1998. Flood control measures are still mainly structural—dikes, pumping schemes, and flood storage reservoirs, which often encroach on wetlands or obstruct water supply to wetland NRs. Wetland conservation has not been a significant consideration in flood control in the comprehensive water resource plans prepared every five years. However, flood control agencies of the Government now recognize the fact that wetlands must be supplied with adequate water for flood control and wetland management. An assessment must be made to (i) strike a suitable balance between flood protection and wetland conservation requirements, (ii) determine factors for the efficient implementation of integrated floodplain management in watersheds, and (iii) develop the most appropriate management model, which can be adapted to suit different watershed conditions.

13. **Lack of Alternative Livelihoods, Leading to Exploitation of Nature Reserve Resources.** The prospect of a net annual income of $210 to $256 per hectare from dry land grain production (wheat-soy-corn) provides strong motivation to farmers with access to drained farmland to expand the farmland in any way possible, including draining wetlands. Pesticide and fertilizer pollution, burning, grazing, and other agricultural practices within reserves adversely affect ecology. Rural residents exploit fish, wildlife (e.g., duck eggs), and other wetland products that are considered "common property" resources to supplement their diet and income.

Alternative livelihoods must be provided to discourage such harmful exploitation of natural resources in wetlands.

14. **Weak Inter-agency Coordination for Integrated Watershed Management.** Irrigation and drainage, flood control, agricultural development, and wetland protection responsibilities in the Sanjiang Plain are divided among agencies with little basis or incentive for coordination. It is not a common practice that relevant agencies get together to plan watershed resources development and use. Although the HPFD now has formal authority for wetland protection, State Farms and other provincial agencies that work in drainage and irrigation projects allocate water resources and make watershed forest management decisions quite independently of each other. Integrated watershed management would require inter-agency coordination.

15. **Weak Technical Capacity in NR Management.** Personnel now assigned to wetland nature reserves in the Sanjiang Plain rarely have the necessary training in natural resources or wildlife management. Many were recently reassigned to nature reserves from agricultural positions in State Farms, reed production companies, or similar productive enterprises. Moreover, nature reserve management is a new responsibility of the HPFD. It has no training program for its wetland nature reserve staff members, who are therefore seriously under-prepared for such reserve management duties as enforcement, wildlife surveys, natural resource monitoring, and public outreach.

16. **Lack of a Replicable Financing Model and Shortage of Available Capital on Replacement of Arable Farming Land.** To restore wetlands NRs and reverse the negative effects of farming on the environment, wetland protection will require converting farmland back to wetlands within certain Nature Reserves. Farmers on State Farms, villagers with agricultural leases within the nature reserves who lease farmland must be compensated for the income lost and provided with replacement of land as required. On the other hand, the financial burden on the Government to replace their farmland should be sustainable and manageable. The overall financial constraint to compensate conversion of vast areas makes it difficult for the Government to pursue sustainable management of wetlands NR. Alternative model approach would be necessary to enable that the Government's compensation on land would be less costly and bring out positive return as investment opportunities, not as a sunken cost foregone.

17. **Low Public Awareness of Wetland Values and Biodiversity Conservation.** The implementation of biodiversity conservation and wetland protection measures is hampered by the lack of education and training and low awareness of the environmental values of wetlands among the people in villages surrounding the NRs. Without an appropriate awareness promotion campaign, simply restoring farmland to wetlands would result in only temporary protection, less sustainable over the longer term.

18. **Incorrect Interpretation of Legislation Regarding Experimental Zones.** The establishment and management of NRs is currently governed primarily by regulations adopted by the State Council in 1994. The protected wetland NRs are defined by the Environment and Natural Resource Protection Legal Handbook (1998), including three types of zoning: core, buffer, and experimental zones. Any human activities in core and buffer zones are clearly prohibited, but the interpretation of permitted activities in the experimental zone (the outer portion of the NR surrounding the buffer zone) varies depending on local regulations, sometimes potentially harmful and disturbing wildlife' nesting and breeding. Unauthorized use of experimental zone could be a threat to wetland biodiversity conservation due to habitat loss and degradation. But, due to unclear definition, the enforcement of protection becomes difficult.

2. Government Policies and Plans

19. The Government's development program was set out by the 16th Party Congress in 2002, the 10th National People's Congress of 2003, and the Tenth Five-Year Plan (2000–2005).

The major focus of national economic policy has gradually shifted in the last few years from hard economic indicator targets toward quality of growth and sustainable development. In addition to continuing the strong emphasis on market-related reforms and nonstate sector development, the Government is increasingly emphasizing the protection of the environment, sustained natural resource management, and improvements in the quality of life through reduced poverty. National economic priorities include programs to increase rural incomes, reduce poverty in rural areas, improve income distribution, and enable the private sector to create employment. Farmers may now leave the sector by selling land-use rights or taking advantage of government land conversion programs. One such program is the Farm-to-Forest Program of the National Development and Reform Commission (NDRC), which has converted vast areas of marginal farmland to forestland in upper watersheds of northern PRC. The conversion of farmland to wetlands in Heilongjiang, begun in 2003, is in line with this program.

20. **Agricultural Policy and Wetlands.** At the same time, the PRC produced the *Agenda 21 White Paper* on China's Population, Environment and Development in the 21st Century, requiring, among others, holistic treatment of watersheds as fundamental to wetland management. The agricultural sector has increasingly emphasized environmental protection and sustainable farming since the *Agenda* 21 Agriculture Action Plan in 1998. This document mentions the need for biodiversity conservation and wise use of farmland, grassland, and ecosystems, as well as monitoring and control of agricultural pollution. It sets the goal of "strengthening the conservation of wildlife resources in the agricultural/pasture/fishery areas," and of "establishing 160 conservation zones to cover a total area of 25 million hectares" so as to form a network of natural conservation zones (to include monitoring and research) in agricultural/pasture/fishery areas.[12]

21. **Forest Policy and Watersheds.** The Natural Forest Protection Program (NFPP) for 1998–2010 drastically restricted the harvesting of natural forests nationwide, allowing the HPG to strengthen its commercial forests. Total forest area in the Sanjiang plain amounts to approximately 1.1 million ha: over 0.7 million ha of natural forests and almost 0.4 million ha of commercial forest plantations. Heilongjiang Province has the country's largest standing timber reserves and timber production. Hence, national and provincial policy is currently to replant forest on commercial basis on excessively steep, erodible, or unproductive farmland, and compensate the farmers under the Farm-to-Forest Program. Availability of compensation funds limits the State Forest Farms' ability to carry out this program only within their own forest lands, substantial portions of which are currently leased to forest workers for grain production as alternative income sources.

22. **Biodiversity Conservation.** PRC's Biodiversity Conservation Action Plan (BCAP) was issued on 13 June 1994. The BCAP lists and describes priority projects for biodiversity conservation. Project 18 is the "Establishment of Integrated Nature Reserve [Network] in the Sanjiang Plain, Heilongjiang Province." This has been achieved in part by the establishment of 28 national, provincial, and local Nature Reserves. Project 18 also requires "an integrated approach to conservation in the Sanjiang Plain." The PRC's National Wetland Conservation Action Plan (NWCAP) was published in September 2000. It complements the PRC's BCAP, and is the key document guiding the conservation, use, management, and exploitation of PRC wetlands. The NWCAP lists among "important wetlands in China" several that are to be included in the Project, i.e., the Sanjiang Plain in general, and the Naoli-Qixing river basin, the lower reaches of the Muling River, Xingkai, and the Small Xingkai lakes. Specific actions called for in the NWCAP include many activities for the inventory and study of wetlands, as well as "comprehensive management of wetland and hydrologic basins," and particularly, in Project 20, "wetland conservation and sustainable use of the Sanjiang Plain."

[12] Agriculture Action Plan for China's Agenda 21, Section 7.53, 1998.

3. ADB's Country Strategy

23. ADB's Country Strategy and Program (CSP 2004–2007) places strong emphasis on (i) pro-poor growth; (ii) enabling conditions for private sector expansion; (iii) financial sector reform; and (iv) environmental improvement, including land and water degradation issues. The preparation of the CSP thoroughly reflected the PRC's medium- and long-term strategy. The CSP emphasizes equitable growth, especially in remote rural areas, given the continued economic pressures on the environment and natural resources. The CSP 2004–2007 is focused on the following sectors: (i) agricultural and rural development, including land degradation; (ii) transport and energy; and (iii) the environment, including water and soil management. Conservation of soils, forests, and wetlands and abatement of water pollution are recognized as critical environmental interventions with a positive impact on the poor. In this context, the proposed Project strongly supports ADB's principal strategic concerns. The wetlands and forests of the Sanjiang Plain are major environmental assets. Appropriate conservation of wetlands and their forested watersheds will have a positive effect on flood management and overall watershed management in the river basins, while encouraging agricultural interests to use water more wisely. Project income generation initiatives are aimed at remote forest farms and wetland areas, supporting ADB's focus on equitable and inclusive growth.

4. External Assistance to the Sector and Lessons Learned

24. Wetlands and biodiversity conservation are relatively new concepts in the PRC as well as in the HPG, and there have been very little external assistance directly covering the issue of NRs and Sanjiang Plain wetlands protection (Appendix 4). ADB and World Bank assistance in the natural resources and environment sectors has focused on flood management and increasing production in agriculture sector. ADB's forest development projects in general provide lessons from various countries, indicating (i) community participation and (ii) partnership between forest department and participants, as key factors in the success of plantations and reforestation. More recently, ADB assistance to the PRC in the environment sector has shifted to address the broader context of the enabling institutional framework in reducing land degradation with the GEF. Only exception is a UNDP/GEF project (Honghe and Sanjiang NR in the Sanjiang Plain as two of the 4 pilot study cases). The UNDP-funded project, Wetland Biodiversity Conservation and Sustainable Use in China (2001-2006, for $12 million funded by GEF) could complement the proposed Project, as it recognizes the immense task of restoration ahead for the PRC and looks forward to the coexistence of wetlands and human activities within them. However, this project has been halted for over a year, pending the re-endorsement by the GEF secretariat of the revised project proposal, as the project has been (i) narrowly focused on an engineering approach to restore the hydrologic regime at specific NRs as an in-situ case, and (ii) institutional involvements at the national level on NR management have been complicated to implement at the local level. The proposed Project takes lessons from the UNDP/GEF project by dealing the barriers of wetland protection from water resources and watershed management scale holistically, not simply focusing on a NR site level. At the same time, a new UNEP/GEF initiative, the Amur River Basin Transboundary Cooperation Project, focusing on land-based pollution along the Amur and Hielong rivers on the boundary between the PRC, Russia and Mongolia, falls under the international water issue dealt with in OP 9, Integrated Land and Water Multiple Focal Area. Contrast to the UNDP/GEF initiative (expected PDF-B approval in 2004) which requiring international cooperation for biodiversity conservation, the proposed Project takes lessons from previous experience in the sense that overcoming the complexities of institutional coordination involved in wetland management could be demonstrated under one provincial government with the strong ownership of the HPG. The Project will exchange information and expertise with the ongoing UNDP-GEF project on Peatlands, Biodiversity and Climate Change, which is experimenting with wetland restoration in the Ruoergai marshes, and with the UNEP-GEF Siberian Crane project.

5. The Global Environment Facility

25. The Project addresses both the underlying and proximate causes of wetland habitat loss by creating a model framework to protect high-quality wetlands, and by building the community relations and Nature Reserve management capacity to maintain the health of these wetlands. Heilongjiang Provincial Government actions and the Project initiatives strongly complement each other. The Provincial Government took concrete regulatory steps in 2003 to clarify responsibility for wetland management and to emphasize the Government's commitment to improving the management of wetland Nature Reserves in the Sanjiang Plain. The Government will implement activities specifically identified in the PRC's National Biodiversity Action Plan and National Wetland Action Plan. The PRC is a signatory to the 1971 Ramsar Convention on Wetlands of International Importance, and the Project meets the GEF criterion of being a national priority. The GEF supports only those strategic operational program (OP) areas where global benefits are obtainable (Appendix 5).

III. THE PROPOSED PROJECT

A. Project Objectives, Rationale, and Area

26. The overall goal of the Project is the sustainable management of natural resources to protect globally significant biodiversity and to promote economic development. The immediate objective is the protection of the natural resources of the Sanjiang Plain wetlands and their watersheds (biodiversity, water, forests) from continued threats, and the promotion of their sustainable use through the integrated conservation and development of selected wetlands and forest areas of the Sanjiang Plain and the improved well-being of local communities.

27. The Project will give priority attention to the protection of globally significant wetlands in contiguous watersheds, by foresting areas upstream while protecting downstream wetlands and nature reserves. Eighteen counties lie in the Sanjiang Plain, at the northeast corner of Heilongjiang Province. Thirteen of these have viable investment proposals that would strengthen the watershed approach through reforestation interventions in the Sanjiang watersheds. Five contiguous watersheds—Naoli-Qixinghe, Muling, Zhenbaodao, Dajiahe, and Anbang—beside the Songhua River basin and with many hydrologic and socioeconomic similarities have been selected for the Project. Six Nature Reserves with greatest concentration of biodiversity (Anbanghe, Qixinghe, Naolihe, Zhenbaodao, Dajihe, and Xingkaihu)[13] in the selected watersheds will be the focus of protection/restoration models. Xingkaihu National NR is listed as a wetland of international importance by the Ramsar convention, and the others are all national reserves.

28. ADB's intervention is based on the need to integrate sustainable environmental management strategies for rural economic development. Rather than simply addressing the sustainability of localized environmental issues in the selected six pilot NRs, the Project is aimed at developing a model framework for replication that provides direct examples for ongoing HPG wetland and forestland restoration programs. The Project approach will conform to ADB's Country Strategy and Program (2004–2006) and is fully compatible with the objectives of Strategic Priority Biodiversity-1: Catalyzing Sustainability of Protected Areas, as clarified in the "GEF Business Planning: Directions and Targets" document.

B. Components and Outputs

29. The four Project components will address the four main threats to globally significant biodiversity in the Sanjiang Plain. The global benefit will be the increased population of globally

[13] Supplementary Appendix C discusses the site selection analysis and the selected six Nature Reserves.

endangered species through improved wetland habitat and wildlife management at NRs. The country itself will benefit from strengthened forest development and sustainable environmental management. Appendix 6 summarizes the Project's physical components by location.

1. Component 1: Watershed Management

30. The Watershed Management component will address the threat to wetlands from competition for water resources and altered water balance in the Sanjiang Plain. The Project will (i) increase forest cover in upland watersheds by reforesting previously cultivated land and wasteland on poorer soils and slopes within the State Forest Farms; (ii) improve water management in wetland Nature Reserves in cooperation with local stakeholders; and (iii) develop the technical capacity of water resource agencies to estimate wetland water requirements and incorporate these requirements in provincial and local planning for water resources.

31. **Forest Improvement in Watersheds:** The Project will invest in the reforestation of upland watersheds that supply water to the remaining wetlands in the Sanjiang Plain. Forest plantations established on upland State Forest Farms can improve infiltration and reduce surface runoff, and increase soil water retention and groundwater recharge during summer rains. During the five-year Project, 4,500 hectares of low-quality agricultural land will revert back to legally required forestland, and 5,500 hectares of wasteland (secondary scrubland and denuded areas) will be converted into high-yield forest plantations growing indigenous larch and poplar species, for which strong markets exist in the local pulp and paper and other wood processing industries. During the same period, 36,900 hectares of poorly maintained plantations will be treated to improve their economic viability and overall forest health. The forest plantations (both new and existing) are located on State Forest Farms in the uplands and hills above the agricultural lands of the Sanjiang Plain. County Forestry Bureaus, working under the direction of the HPFD, will carry out these projects using loan funds and government contributions in kind (professional personnel, equipment, and materials). The Bureaus will produce all seedlings in their forest nursery operations. The HPFD and the County Forestry Bureaus have substantial experience in nursery production, plantation establishment, and silvicultural treatment. The program will be innovative in that the spacing adopted for new forest plantations will be wider than usual, not only to reduce costs and increase the volume per tree, but also to encourage "multipurpose use" by promoting the cultivation of farm crops, herbs, berries, and other nontimber forest products between the rows of trees, at least until canopy closure (see Component 3). This should increase the earning capacity of the forest workers besides providing environmental benefits.

32. **Local (Nature Reserve) Water Resource Management**: Biodiversity requires wetland habitats in the Nature Reserves to be sustained with a reliable water supply. NR managers will develop water management plans with the help of water resource experts. They will (i) study the nature and causes of water supply and water quality issues in watersheds that supply water to NRs; (ii) determine how these issues can be resolved in each reserve; and (iii) prepare water management plans based on the studies. To facilitate this process, the NR staff will form local working groups of stakeholders to address water supply and water quality problems at each Project Nature Reserve. Key agencies in the counties and State Farm and village agriculturists will be represented. The working groups will be trained in water resource issues, and will participate in workshops to share water resource information pertinent to the wetland Reserves, thus assisting the Nature Reserves in developing sound solutions for water resource issues. The water management plans, when completed, will become part of the Nature Reserve's management plans (see Component 2.1), and include a continued role for the working groups.

33. **Water Resource Planning in Watersheds:** Adequate water supply, which is needed to maintain and restore wetland habitats, is not considered in water resource planning at the

provincial and county level. Government water resource plans lack a scientific basis for allocating water currently or avoiding damage to wetlands. To deal with this deficiency, there must be coordination between institutions and the building of capacity within the Heilongjiang Province Water Resources Department (HPWRD) and the HPFD. A pool of specialized experts, such as research institutes, academics, or the Hydrologic Design and Survey Institute, will draw up a scientific basis for wetland water resource allocation and policy recommendations for taking this into account in provincial water resource plans. The HPWRD and the Project Management Office (PMO) will (i) define the areas where current infrastructure plans will encroach on important wetlands; (ii) develop model criteria and procedures for incorporating wetland issues into flood control planning; (iii) test the application of these new criteria and procedures to the watersheds above the Project NRs; (iv) hold workshops to report the results of the trial to local working groups and provincial planning authorities; (v) develop gross water balance estimates of wetland water allocations for all five watersheds; (vi) develop numerical computer models of water supply and demand in the Anbang and Naoli watersheds to determine the probability of adequate water supply to the major wetland reserves in the next 30 years; and (vii) hold conferences with local working groups during project development, and a conference on wetland water supply and basin water resource allocation involving a broad spectrum of county and provincial officials from State Farm Bureaus, the Forestry Department, the Water Resources Department, the Environmental Protection Bureau, and wetland NRs. The conferences will be used by project and HPWRD to identify a means of institutionalizing the inter-agency working group approach to solving basin water resource allocation.

2. Component 2: Wetland Nature Reserve Management

34. The Wetland Nature Reserve Management Component is designed to address the threats from past wetland conversion and degradation of habitat quality by converting farmland, restoring wetlands, and enhancing wildlife recovery. Measures to protect wetlands, as well as globally threatened wildlife species, especially the high-profile migratory waterfowls (cranes, storks, and swan geese), from these threats will be applied in the six NRs in the Sanjiang Plain that have been selected for the Project.

35. **Conservation Management:** The Conservation Management subcomponent will involve (i) setting up permanent water, wildlife, and habitat monitoring programs in all six NRs, to complement the information and recommendations from the water resource management, wetland restoration, wildlife recovery, resource use and exploitation, village development, and community relations subcomponents; (ii) and preparing manuals on the use of these monitoring programs; (iii) reporting on the condition of wetland habitats and numbers of globally threatened wetland wildlife species at national and international workshops; (iv) establishing geographic information systems (GIS) on all six NRs; and (v) drawing up adaptive management plans that incorporate the decisions taken by reserve managers on the basis of the foregoing information, and set action programs for each NR over a five-year period. The desired conservation management outcomes will be achieved as NR personnel learn to apply their training (see Subcomponent 4.3) in monitoring, enforcement, record keeping and mapping, education, and wildlife management. Senior NR personnel will use their training in nature reserve planning in developing adaptive management plan for their reserve. Expert technical assistance will be provided to ensure that lessons from training courses are applied properly in the field.

36. **Pilot Wetland Restoration:** Wetland restoration involves reestablishing hydrologic regimes and native marsh/swamp vegetation on lands that have been converted to other uses, especially agriculture. Although the PRC has a policy program for restoring farmland to wetland, there is little experience with wetland restoration.[14] This component is designed to provide

[14] Past conversion of wetlands to agriculture avoided peat areas, therefore restoration of farmland to wetlands is unlikely to require peatland expertise. This will be ascertained during the Inception Phase, and if peat is

models of well-designed and well-monitored wetland restoration in the six project NRs, using low-cost, appropriate local technology for reliability, so that future programs funded by the Government can learn lessons from the experience. The total area to be restored is about 3,342 hectares, and most pilot sites are 100 to 400 hectares each in size. Pilot restoration projects will proceed in two phases over the five-year Project period, applying lessons learned in the first phase to the second phase. Three types of wetland restoration are contemplated: (i) natural recovery, where wetland vegetation is expected to reestablish itself naturally when farming is discontinued; (ii) supported recovery, where small modifications in the land surface are required to restore wetland hydrology; and (iii) engineered recovery, requiring the removal of small dams and dikes, or the filling of drainage channels. Pilots trials will ensure that a balance of each of these three recovery types is included, along with a balance of habitat types. Each pilot site will be treated as an experimental field trial, with monitoring data being collected and analyzed to verify the degree of success of the program. Manuals on wetland restoration will be prepared near the end of the trials to capture and communicate the lessons learned.

37. **Wildlife Species Recovery:** Species recovery programs will be developed for specific globally threatened international migratory waterfowls (e.g., Red-Crowned and White-Naped Cranes, Oriental Storks, Swan Geese) that depend on the Sanjiang Plain wetlands for their long-term survival. Species recovery programs for large, easily observed species are a proven successful strategy in conservation, because (i) the public can understand and enthusiastically support the conservation of a large, recognizable, culturally symbolic species; (ii) habitats improved for large waterfowls will also benefit many other smaller, lesser-known wetland species; and (iii) international organizations already monitor some of these species in neighboring countries (e.g., Russia, Korea, Japan) but have relatively few data from northeast PRC. Species recovery programs will increase the populations of these target species in the Nature Reserves. Species recovery programs involve a combination of (i) applied research on the food and habitat requirements of each species; (ii) intensive monitoring and action programs to improve habitats; (iii) provision of proper nesting sites; and (iv) protection of key foraging, resting, and nesting areas. These programs will be coordinated through all six Project NRs, to facilitate close monitoring of the status of the selected waterfowls throughout the central and southern Sanjiang Plain. At networking meetings, NR managers will be informed about the regional and international status of the selected species and learn from one another about specialized conservation techniques. They will also be advised on how to link with the Asia-Pacific Migratory Waterbirds Strategic Plan.[15] A recovery manual will be published to disseminate experiences in species recovery.

38. **Reduction of Resource Exploitation:** Unsystematic harvesting of many resources in the Nature Reserves, including fish, waterfowl, reeds, and other plants, has reduced wildlife. The Project will design and implement programs to reduce the unsustainable exploitation of natural resources, with the cooperation of communities around the NRs, and train NR staff in community relations and in the enforcement of the related laws and regulations. Guidance manuals will be produced and distributed to allow the replication of learning at other protected areas and to provide inputs to NR management plans. This approach tackles the threat of over-exploitation of wildlife and plants by converting local resource users into allies of conservation. Visits will be made to villages around the NRs to inventory wetland resources, identify unsustainable exploitation, and design ways of bringing the use of these resources to sustainable levels, compatible with the objectives set in the NR management plans. Local

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encountered, links will be established with the UNEP-GEF project on Peatlands, Biodiversity and Climate Change, which is experimenting wetland restoration in the Ruoergai marshes.

[15] This Plan and its supporting networks has been endorsed by the Government of China, and is coordinated by Wetlands International.

working groups will be critical in building constructive relationships with the communities around the NRs. These can be the same groups working on water management issues and ecotourism.

3. Component 3: Alternative Livelihoods

39. This component will remove threats from inappropriate land and resource use at NRs by creating sustainable income-earning opportunities for farmers through non-timber forest production and ecotourism.

40. **Agro-forestry and Nontimber Forest Product Interventions:** Two kinds of activities are proposed. One is planting agricultural crops between the plantation species for a number of years (agro-forestry intercropping, focused mainly on soybeans), and the other activity is promoting nontimber forest products (NTFP) principally in combination with forest plantations. Farmers participating in agro-forestry intercropping activities will be allowed to plant crops such as soybeans, or *Tilia* for apiculture, between the rows of tree seedlings for up to five years before the canopy closure of the trees[16]. In return, they will be expected to tend the forest seedlings during the establishment stage. The forestry workers will receive wage income from tree planting and will be able to do agro-forestry intercropping between the young trees for 3 to 5 years at a nominal fee of RMB 6.7 per mu per year. The NTFP interventions will concentrate on crops that can be harvested yearly over a period of up to 10 years, including medicinal and culinary plants, mushrooms, and berries. Agro-forestry and NTFP operations under the Project will be carried out in six Project counties where new forest plantations are proposed. In five of these six counties, these operations will deal with compensation for forest farm workers who may lose farmland as it reverts to legally required forest use. As part of counterpart funding, the Forest Farms in Boli and Huanan counties will invest in NTFP (1,334 ha) and those in the four other counties will enforce agro-forestry intercropping on about 20% of the area of farmland that will revert to forestry.

41. **Village Development Fund**: The village development funds (VDF), to be managed by the Heilongjiang Province Financial Bureau (HPFB), will be aimed at replacing or increasing local incomes affected by the farmland-to-wetland restoration program. For the conversion of farmland to wetland, the provincial government will pay land compensation to the State Farms or village collectives, which in turn will provide replacement farmland to the affected households, readjust farmland among the other workers/villagers, and invest the compensation funds to benefit all villagers. Funds will be awarded to village committees to compensate villages for the loss of farmland due to the removal of farms from NRs under the wetland restoration program. The village committees will propose interventions to be managed by the villagers for the use of the funds in ventures intended to replace lost farm incomes. Compared with the cash compensation currently paid by the Government to relocated farmers, this subcomponent engages the farmers in alternative income activities capable of yielding longer-term benefits to affected families and to village communities and nearby NRs. This subcomponent will ensure that the creation of alternative incomes through the village committees can be replicated elsewhere by compiling and publishing guideline manuals describing the process. Information contained in the manuals will be used in Component 2.2 (Pilot Wetland Restoration) in documenting the removal of threats to wetland NRs through the restoration of farms to wetlands. The use of funds will be subject to the following guidelines and procedure:

(i) Investments should be identified with the participation of the affected persons (APs) and should be eco-friendly, according to the evaluation criteria presented in the Environmental Management Plan (EMP).

[16] Intercropping is further to be promoted as part of the normal rotational forestry cycle, and to become a normal procedure in newly planted areas.

(ii) Thirty percent [17] of resettlement compensation entitlements should be used as a revolving fund for alternative livelihood development, with first priority given to APs and second priority to hosts.

(iii) Training and technical assistance will be provided for alternative livelihoods and environmental protection if the investment proposals fit the "green" (eco-friendly) investment criteria presented in the EMP.

42. **Sustainable Ecotourism:** The Ecotourism subcomponent focuses on (i) master planning; (ii) development of awareness, safety, and environmental guidelines; and (iii) development of pilot ecotourism approaches. Ecotourism activities will be carried out in all six NRs. At the start, a comprehensive ecotourism master plan, providing an overall framework for ecotourism development in the wetland NRs, will be prepared. This will be followed by the preparation of planning guidelines, which can be tailored to the specific situations in each Project NR. Master planning will include the development of an ecotourism association for Heilongjiang Province, in collaboration with the Heilongjiang Provincial Tourism Agency, the Heilongjiang Tourism Association, and the Tourism Bureaus of the counties in which the Project NRs are located. The association would handle certification and advertising for wetland tourism. The ecotourism master plan will also include principles and guidelines for the certification of wetland ecotourism operators. Planning and environmental guidelines specific to each of the six Project NRs will be prepared by working groups, under the guidance of the NR management. These same working groups will design pilot ecotourism approaches specific to each Project NR and implement them while strictly following the guidelines. Pilot implementation will exclude physical infrastructure within NR boundaries or in sensitive areas outside the boundaries. Allowable activities could include interpretive displays, homestays outside Project NRs, and the development of promotional materials. Since activities of this type constitute a new form of tourism in the Sanjiang Plain, their success will depend on the development of human resources. Therefore, a significant part of the technical training efforts under Component 4 will focus on developing the ecotourism capabilities of NR staff, as well as ecotourism guides.

4. Component 4: Education and Capacity Building

43. The Capacity Building component will address threats related to over-exploitation, human disturbance, and habitat degradation within Nature Reserves by increasing the capacity of NR staff and building community knowledge about wetlands, wildlife, and nature conservation. Where possible and appropriate, gender awareness and sensitivity is to be promoted in awareness and training programs. The Conservation Education subcomponent will target rural schools near NRs, especially teachers and their students; the Public Awareness subcomponent, rural residents around NRs; and the Wetland Management Training subcomponent, primarily NR staff, who will gain the necessary practical skills and knowledge to improve the management of the wetland NRs. A project website will be established to facilitate information exchange and enhance general awareness about the project and its activities. Further, the Project will actively involve academic/scientific communities to assist and to build up capacity on impact monitoring and evaluation.

44. **Conservation Education:** The Conservation Education subcomponent will train local teachers in nature conservation topics, and develop teaching kits to support their work, including maps, guidebooks, workbooks, and posters on the beneficial functions and conservation value of wetlands. This subcomponent will provide technical assistance and incentives to teachers to encourage them to use the new wetland curriculum materials and teaching aids in their classes. Teachers who show initiative in using these materials will be included in short-term technical training courses to gain additional knowledge about wetland ecology and nature conservation in

[17] This proportion will have to be adjusted further according to the estimates in the resettlement plan for each village.

northeast PRC. Through these activities schoolchildren will gain more knowledge about the value of wetlands and understand better the role of nature reserves in their community.

45. **Public Awareness:** The Public Awareness subcomponent will target residents of villages and towns near the Nature Reserves, who will learn more about the beneficial role of wetlands in the water cycle, as well as the international importance of nature conservation in the remaining wetlands of the Sanjiang Plain. Rural residents, State Farm officials, and local government staff in the Sanjiang Plain will be targeted, using mass media such as local television (widely available in villages); Nature Reserve "open house" during World Wetlands Day, Earth Day, and Bird-Loving Week celebrations; the screening of nature conservation documentary films at State Farms; and art and handicraft competitions. This subcomponent will also address the adverse effects of agriculture on wetlands and biodiversity, including the effects of agricultural chemicals and habitat destruction on globally significant waterbirds of the Sanjiang Plain. Eliminating or at least reducing the trade in endangered species will also be one of the aims of the program.

46. **Wetland Management Training:** The Wetland Management Training subcomponent will provide two types of practical training , primarily to wetland NR staff, but also to other key stakeholders.

(i) The short-term training courses will be targeted at NR technical staff, members of local working groups from State Farms and local agencies, teachers, village leaders. These short courses will last two weeks or less, and will include practical topics such as identification and survey of wetland fauna and flora; wetland management and restoration; public communication and outreach; patrolling and enforcement of regulations; and hydrology and ecology of wetlands. These courses will include conferences, workshops, and study tours to other areas of Heilongjiang or even other parts of the PRC. The study tours can be used as an incentive to encourage teachers and community leaders to work more closely with the Nature Reserves.

(ii) The second type of training, long-term professional training, is aimed at senior NR staff and senior to mid-level managers. The curriculum and course materials will be developed and delivered through a local university. This program will increase the capacity of senior NR staff to carry out their responsibilities and institutionalize wetland management capacity in the Provincial Forestry Department. Formal courses in wetland ecology, biodiversity conservation, wildlife management, watershed management, tourism and community development, and public participation/ community outreach will be combined with applied projects for all participants. These participant projects will include the development of NR management plans, species recovery plans, NR regulations, feasibility studies for tourism development, and community relations programs. The projects will feed directly into the NR adaptive management plans, thus reinforcing Component 2.1.Conservation Management of Nature Reserves.

47. The short-term and long-term training will enhance the conservation management skills of staff; improve relations between staff and stakeholders; raise the quality of NR monitoring, surveys, and management; improve the motivation and morale of staff and other stakeholders; and strengthen the overall capacity of the Provincial Forestry Department to carry out its new wetland management functions. A small part of the training budget is to be reserved for as yet unidentified training needs, and for training of non NR staff.

5. Component 5: Project Implementation

48. The component will provide consulting services to strengthen the coordination of technical support, improve the implementation capacity of the executing agencies, and

strengthen their institutional capacity to manage and supervise Project implementation. Project implementation capability at the provincial, county, and NR levels will be strengthened through technical support and training for finance and technical personnel. The executing agencies will receive the necessary technical and financial support to fulfill their coordination, monitoring, and evaluation functions in the counties and the province as a whole, including consulting assistance in institutional strengthening. Environmental monitoring will also be strengthened through (i) mitigations, specifically for forestry improvement components, as part of an integrated watershed management approach; (ii) additional environmental assessment for the pilot wetland, agro-forestry and NTFP components and VDF subcomponents; and (iii) monitoring and review activities of the Heilongjiang Provincial Environmental Bureaus, as part of the mitigation implementation and environmental assessment.

C. Special Features

49. The Project closely links integrated watershed management with the management of wetland NRs, and establishes measures for replicating this approach in other watersheds. The latter will be achieved by (i) involving water resource departments and related local institutions in watershed-level water allocation and flood management, (ii) establishing local working groups for water resource management, and (iii) developing a concrete replication model.

50. The model approach for wetland restoration will guide wetland restoration in more than 150,000 ha in NRs throughout the country. While restoring 3,442 ha of farmland back to wetlands, VDF will be attached to the restoration program to ensure that the livelihoods of villages affected by the farmland-to-wetland program remain at least at the same level. A portion of land compensation will be set aside as VDF. Individuals who give up farm lands in the NRs will receive replacement land in their village, provided by the affected village collective. Land compensation will be paid to the affected village collective, which will have to readjust the existing land. Depending on the village situation, about 30% of resettlement compensation will be be invested in alternative livelihoods, particularly encouraging those that are conducive to wetland management. These plans will be approved only after all the affected villagers are consulted and agreement is reached on village development plans, and after environmental screening. The village development plans will form part of resettlement plans, and guided by Environmental Management Plan (EMP) to ensure that activities near the NRs are consistent with wetlands/ biodiversity protection. Investments in agro-forestry and NTFPs will be made in conjunction with the farmland-to-forest restoration program, to ensure that (i) the livelihoods of villagers losing farmland remain at least at the same level, and (ii) sustainable financial returns from forestry development can be shared for day-to-day operational costs of NRs under the HPFD.

51. These Project design is (i) to ensure that the Project benefits the people; (ii) to provide a model framework that can be tested through Project implementation and replicated extensively; and (iii) to reduce financial burdens of the government on resettlement compensation that renews approach on compensation not as sunk costs but as environmentally sustainable investment opportunities for the villages.

D. Cost Estimates

52. The Project will cost about $54.39 million equivalent, $5.32 million of this in foreign exchange costs and $49.07 million in local currency costs. It is proposed that ADB provide a loan to the PRC in the amount of $15.02 million equivalent (28% of the total Project cost) from its Ordinary Capital Resources to finance the foreign exchange cost of $1.02 million equivalent and a portion of the local currency cost amounting to $14.00 million equivalent. Table 1 summarizes the cost estimates; details of the Project costs are in Appendix 7.

E. Financing Plan

53. Details of the financing plan are in Table 2. The proposed ADB loan will have a 25-year term, including a grace period of 5 years, an interest rate determined in accordance with ADB's LIBOR-based lending facility, a commitment charge of 0.75% yearly, and such other terms and conditions set forth in the draft loan and project agreements. A front-end fee of 1.0% will be waived if the loan is approved by ADB before July 2005. The GEF will co-finance the Project through a grant administered by ADB.[18] The GEF grant will be for $12.14 million equivalent: $3.04 million in foreign exchange and $9.10 million equivalent in local currency. The Government will contribute a total of $22.78 million (42% of total Project costs) to finance interest during construction and commitment charges in foreign currency in the amount of $1.26 and $21.52 million in local currency costs. Local currency costs will also be financed partly by the GEF and ADB. The remaining local currency costs amounting to $4.44 million will be financed in kind by the participating beneficiaries and state forest farms as part of their equity contribution for the income-generating activities.

Table 1: Cost Estimates
($ million equivalent)

Item	Foreign Exchange	Local Currency	Total Cost
A. Base Costs			
1. Watershed management	0.04	23.17	23.21
2. Wetland Nature Reserve management	1.63	3.77	5.40
3. Alternative livelihoods	0.33	15.42	15.75
4. Education and capacity building	1.21	2.42	3.63
5. Project management	0.30	2.39	2.69
Subtotal (A)	3.51	47.17	50.68
B. Contingencies [a, b]	0.54	1.89	2.43
C. IDC and commitment charges [c]	1.26	-	1.26
Total Cost (A+B+C)	**5.32**	**49.07**	**54.39**

Note: Figures may not add up to the given totals because of rounding.

a. Physical contingencies based on 5% of base cost.
b. Base costs have been prepared in domestic currency, with foreign costs converted to domestic currency units following an assumption of purchasing power parity. Price contingencies have been computed on the basis of domestic and international inflation rates prescribed by ADB.
c. No front-end-fee included, if approval is obtained by June 2005.
d. Taxes and duties on ODA financed projects are waived.

Table 2: Financing Plan
($ million equivalent)

Source	Foreign Exchange	Local Currency	Total Cost	Percent
Asian Development Bank	1.02	14.00	15.02	28
Global Environment Facility	3.04	9.10	12.14	22
Government	1.26	21.52	22.78	42
State Forest Farms	0.00	4.44	4.44	8
Total	**5.32**	**49.07**	**54.39**	**100**

F. Implementation Arrangements

1. Project Management and Coordination

[18] Co-financing is subject to the final approval of the Project by the GEF.

54. **Executing Agency:** The Heilongjiang Provincial Government will be the Executing Agency (EA) for the Project, and will have overall responsibility for coordinating, supervising, and implementing all Project activities.

55. **Project Management Office:** A Project Management Office (PMO) will be set up within the HPFD for the day-to-day implementation of the Project, under the guidance of the Steering Committee. The PMO will be composed of professional and administrative staff assigned from government agencies or hired specifically for the Project. The PMO will have the capacity to carry out the Project activities in coordination with HPG agencies. It will be headed by a full-time Project Director, a senior professional acceptable to ADB who will report to HPG through the Project Steering Committee. The Project Director will supervise all PMO staff, and will be responsible for delivering all Project outputs. The principal functions and responsibilities of PMO are (i) administering funds from grant, loan, and local government counterpart funding sources; (ii) managing all Project activities in coordination with HPG agencies and in accordance with the requirements and guidelines of HPG, ADB, and GEF; and (iii) administering, monitoring, reporting, and coordinating all Project activities. The Project Director, assisted by a Project Administrator, will ensure timely budgetary allocation and flow of funds to the various implementation levels.

56. **Project Implementation Units:** In addition to the PMO, 18 Project Implementation Units (PIUs) with adequate professional and technical staffing will carry out field operations and coordinate the flows of funds from County Financial Bureaus to beneficiaries. Thirteen PIUs will be housed at the County Forestry Bureaus, and will be responsible for day-to-day implementation of forest management, agro-forestry, and NTFP activities in the 13 Project counties. The other six PIUs will be housed at six NRs where wetland NR management activities will be implemented, and will be responsible for carrying out these activities. The PIUs will be staffed by adequate professional and technical personnel provided by either the County Forestry Bureaus or the NRs, depending on the type of PIU. The PIUs will prepare their annual operating plans detailing the physical and financial dimensions of their programmed activities. The PMO will consolidate these PIU annual plans into a Project-level annual work plan and budget.

57. **Coordination:** The Steering Committee will ensure coordination between Project management and all concerned provincial authorities. HPFD has responsibility for wetland management in the province, as well as over the forest management activities in State Forest Farms in the 13 Project counties. This will give the PMO staff clear lines of authority for Project activities in both the upland and wetland Project sites. Provincial-level coordination will also require close linkages with the HPFB, which will be responsible for all flows of funds coming from ADB, as well as the national and provincial governments. The PMO will report to a Project Steering Committee composed of representatives of provincial government agencies. The Project Steering Committee will oversee the Project's implementation, hire the Project Director and approve the hiring of other senior personnel, set general Project policies, and facilitate Project coordination with all other concerned agencies of the provincial government. A field office will be based in Baoqing County PIU, near the center of the Sanjiang Plain, to support field activities. A Technical Working Group to be established at each Nature Reserve will include staff of the Forestry Bureau, Environmental Protection Bureau, Water Resource Bureau, and Tourism Bureau; representatives of State Forestry Farms, State Farms, or Villages involved; and local schoolteachers. The organization and fund flows for Project implementation are shown in Appendix 8.

2. Beneficiary Participation

58. Since the lands within the NRs are still owned by the State Farms or village collectives, engagement and joint planning and development are essential. There is already a good level of

cooperation, and this goodwill should be used to strengthen the joint management of NRs. The Project will support the involvement of local communities in Project design, implementation, and management through participation in (i) NR master plan formulation, (ii) watershed management planning, (iii) alternative livelihood programs including the VDF, (iv) ecotourism planning and development, and (v) employment opportunities related to project implementation (e.g., tree plantation and treatment). Participation will be promoted through the provision of improved compensation to affected communities, and access to credit for alternative livelihood development. In return, the communities should agree to develop activities that are environmentally friendly. The Project has established guidelines for land development within NRs, State Forest Farms, and the surrounding villages. The human threats to the wetlands and forest area can be more effectively controlled through partnership with NRs rather than through reliance on regulations and enforcement alone. In addition, joint cooperation in alternative livelihood development will make both the local communities and the NRs financially viable by increasing household incomes and improving the management capacity of the Nature Reserves.

3. Implementation Schedule

59. The Project will be implemented over 5 years (July 2005 to June 2010). The first year will involve setting up the Project management and implementation framework and various other preparatory tasks. The fifth year will focus more on evaluation, monitoring, project design and sustainability, and handing over of responsibilities. The Project implementation schedule is in Appendix 9.

4. Land Acquisition and Resettlement

60. The Project involves the conversion of 3,422 ha of farmland to wetlands: 1,400 ha in five NRs, and 2,000 ha in Naoli NR which were converted in 2002 and now need alternative livelihood support. Since farmers will be displaced from the NRs and future land use will be restricted, compensation will be required for lost land use and nonmovable assets. Resettlement plans will be prepared for each village affected. The Project will provide VDF for the compensation payments, which will be managed and disbursed by HPFB through the relevant counties and NRs. The PIUs in the Nature Reserves will review the Village Resettlement and Development Plans for income restoration and community infrastructure improvements, to ensure that activities and locations are compatible with the master plans for the reserves. Once the plans have been screened for environmental impact, an agreement will be signed between the NR and the village committee or State Farm. The Village Resettlement and Development Plan will be submitted to the Provincial PMO and to ADB for approval. After the plan is approved, VDF can be disbursed by HPFB (through the County Financial Bureau) to the affected village committee or State Farm, and farmers will then abandon farming in the NRs. Summary Resettlement Framework is in Appendix 10.

5. Procurement

61. All supplies, equipment, and services to be financed by ADB will be procured in accordance with ADB's *Guidelines for Procurement*. Most of the items, such as basic equipment and materials (seeds and fertilizers), will be procured for subproject areas spread widely over the Project counties, and will therefore be procured centrally for cost efficiency. The items will be procured according to the Government's domestic procurement procedures provided these are acceptable to ADB. Supply contracts for equipment or materials costing more than the equivalent of $100,000 but not anticipated to exceed the equivalent of $500,000 will be carried out through international shopping. Other miscellaneous equipment and supplies, with each package valued below the equivalent of $100,000, will be procured through direct purchase. Since each civil works contract will have a value of less than $1 million and construction works of this type are highly competitive in the PRC, civil works contracts are not expected to be of

interest to international bidders. Thus, all civil works contracts will be awarded to prequalified private sector contractors under local competitive bidding procedures acceptable to ADB, and for the treatment of plantations of small size below $50,000 under State Forestry Farms' force account. Indicative procurement packages are listed in Appendix 11.

6. Consulting Services

62. All individual international and domestic consultants to the PMO will be selected and engaged by an international consulting firm in accordance with ADB's *Guidelines on the Use of Consultants*. The consulting firm will be selected using ADB's quality-and-cost-based selection method. The total consultant input for the Project is estimated at 601 person-months of technical assistance, consisting of 133 person-months of international consultants and 468 person-months of domestic consultants. Consultants are required for the Water Resources, Wetland Biodiversity and Nature Reserve Management, Ecotourism, Conservation Education, and Public Awareness subcomponents, under GEF grant funding. The Project will also engage qualified academic/research institutes for several studies, surveys, and long-term training programs. These institutes will be selected by the EA in accordance with competitive selection criteria and procedures acceptable to ADB. The outline terms of reference for consultant requirements are summarized in Appendix 12. Trainings and educations required for capacity building are summarized in Appendix 13.

7. Disbursement Arrangements and Funds Flow

63. An imprest account will be established by the EA, HPG in a commercial bank acceptable to ADB to speed up the disbursement of the loan proceeds. The imprest account will be established in accordance with ADB's *Loan Disbursement Handbook* of January 2001 and detailed arrangements between the Government and ADB. The initial deposit in the imprest account will not exceed 6 months of estimated expenditure or 10% of the total loan amount, whichever is less (or $1 million). The Borrower will disburse eligible expenditures under the Project either through (i) the imprest account, which will be established immediately after the effectivity date of the loan agreement and managed by the Heilongjiang Financial Bureau; or (ii) ADB's direct payment, commitment, or reimbursement procedures. ADB's statement of expenditures (SOE) procedures will be followed in liquidating the imprest account and reimbursing individual SOE payments up to $100,000 equivalent.

8. Accounting, Auditing, and Reporting

64. Nature Reserves and county PIUs will keep records and accounts according to sound accounting principles and in sufficient detail to identify subprojects financed by the loan and to disclose the use of funds under the Project. The records and accounts will be forwarded regularly to the provincial PMO. The PMO will ensure that the consolidated provincial Project accounts are prepared for final consolidation and audited yearly by independent auditors acceptable to ADB. The audit report should include a separate audit opinion on the use of the Imrest Account and SOE procedure. The audited financial statements will be submitted to ADB not later than 6 months after each fiscal year. The PIUs will submit bimonthly brief notes to the PMO detailing implementation activities, physical and financial accomplishments, problems encountered or anticipated, and actions taken to resolve the problems[19]. The PMO will compile bimonthly brief notes from the PIUs and submit the compilation to ADB for review. Also, the PMO will prepare consolidated Project progress reports twice a year, following the project

[19] EA has the capacity to effectively manage its financial resources, and experienced dealing with several ADB funded projects already. To strengthen forest department's capacity on effective management of financial resources, financial management specialists has been included in the implementation support to strengthen this capacity and project account and auditing systems, so that ADB's funds will be used in line with guidelines and project objectives.

performance report format proposed by ADB at the inception. Within 6 months after Project completion, the PMO will prepare, in coordination with the PIUs, and submit to ADB a Project completion report summarizing the loan and grant funds utilization, Project implementation, the attainment of objectives and targets, and an objective evaluation of implementation experience, Project performance rating, actual costs incurred, benefits, and other information requested by ADB or GEF. Copies of annual reports, and other reports as required, will be provided to GEF.

9. Project Performance Management System

65. During the first year of Project implementation, a Project performance management system (PPMS) will be established at the PMO with links to each PIU. The PPMS will be part of the Project's overall computer-based management information system. The PPMS will be prepared in consultation with the government agencies and Project management staff. Participatory monitoring and evaluation systems will be introduced, and resettlement monitoring will be included in the PPMS. The Project Monitoring and Evaluation Specialist (PMES) will identify strategic indicators at the start of the Project and monitor them in-process every six months and in more detail in the third and fifth years. The PMES will focus particularly on Project impact, including natural resource management, social impact, and institutional arrangements. The Project will require regular and timely feedback between components, as well as the incorporation of new and updated information as it becomes available. This will be accomplished through the annual Project reviews and will serve to adapt and refine individual components and activities to enhance their effectiveness and impact.

10. Project Review

66. The PMO will submit an annual work plan and annual reports to be reviewed in annual meetings with the Steering Committee, GEF, and ADB, and will be responsible for the final report. The PMO will prepare progress reports after every 6 months, indicating the progress made, problems met during the period under review, steps taken or proposed to remedy the problems, the proposed program of activities, and progress expected in the next half year.. In the first three years of the Project, ADB and HPG will jointly carry out semiannual reviews to (i) determine if the implementation arrangements are appropriate and in place; (ii) assess whether the various selection and intervention criteria remain appropriate; (iii) verify whether outputs, effects, impact, and benefits are being realized; and (iv) identify and resolve major issues. These reviews will also track relevant indicators, to be identified at the start of Project implementation. During the third year of the Project, a comprehensive midterm review and detailed evaluation of the Project will be undertaken jointly by ADB and GEF. This midterm review will assess performance, identify any problems and constraints affecting project implementation, and reach agreement on required changes to address any shortcomings. More specifically, the detailed evaluation will include an assessment of (i) the Project design and scope as formulated at appraisal; (ii) HPFD's capacity for effective implementation, and PIU effectiveness in implementing the Project; (iii) physical and financial progress of implementation (including contracts and disbursements), and performance of consultants; and (iv) beneficiary participation. Any required changes in scope, activities, and associated financial reallocation and implementation arrangements will be incorporated following the midterm review.

11. Advance Action and Retroactive Financing

67. The Government requested, and ADB approved, (i) advance procurement action for early planting, (ii) retroactive financing of eligible expenses incurred by the EA up to $200,000. Also, advance recruitment of consultants are justified as preparing baseline environmental benefit monitoring framework in line with project performance management system is the priority of implementation.

IV. PROJECT BENEFITS, IMPACT, AND RISKS

68. The Project derives its economic rationale from the need to protect globally significant flora and fauna, reduce natural resource losses, achieve the sustainable management of wetlands NRs, and improve the economic potentials of forest areas in the Sanjiang Plain. Increasing the forest cover and improving water resource planning will strengthen wetland protection and promote balanced agricultural development in an environmentally sustainable manner. Restoring the wetlands and protecting endangered species will increase biodiversity in the Plain. Institutional strengthening in forestry and NR management activities, training, and campaigns to make the public more aware of the value of biodiversity will also bring substantial economic benefits over the long term. To ensure the sustainable development of forests and the protection of biodiversity, alternative income-generating opportunities will be provided to the communities affected, such as village development fund or agro-forestry intercropping on 20% of new plantations that revert to legal forestry land use. NTFP activities will demonstrate the improved financial sustainability of forest development, for further replication. More balanced allocation and use of water resources will bring local economic benefits, as it will help reduce flooding and drought and recharge ground water.

A. Financial and Economic Analysis

69. The quantifiable benefits are (i) incremental forestry production from 10,000 ha of new plantings (7,000 ha for larch and 3,000 ha for poplar trees); (ii) benefits from the treatment of 36,900 ha of existing forest areas; and (iii) incremental production from 2,226 ha of NTFP and agro-forestry. Carbon sequestration[20] and the avoidance of costs of flood or drought damages[21] due to better management of water resources in wetland NRs would also be important quantifiable benefits, but these would not be in significant quantities because the effects would be limited to small areas. The nonquantifiable benefits are (i) improved conservation and recovery of globally endangered species in a number of NRs; and (ii) improved water retention in the hills, increasing base flows in watersheds during the dry season and thereby enhancing the wetland habitat. Thus, the financial analysis is focused only on revenue-generating activities, i.e., forest improvement, agro-forestry intercropping, and NTFPs. Incremental benefits arising from potential ecotourism are restricted as the scope of this component is capacity building for eco-friendly tourism rather than as commercial activities. The economic analysis is focused on components that will lead to national and local environmental benefits. The results of the financial analysis indicate a financial internal rate of return (FIRR) of 9% for new plantations and 19% for treatments, inclusive of intercropping and NTFPs in the designated areas.[22] High financial returns are possible as (i) sunk initial investment costs are not required for the treatment component; (ii) intercropping and NTFPs will produce high-yielding cash crops; and (iii) new plantations will adopt a least-cost approach to increase their maximum yield potential and production. The FIRR and economic internal rate of return (EIRR) of these forest developments were greater than the estimated weighted average cost of capital of 6.1% and the social cost of capital of 12%. Details are in Appendix 14.

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[20] Though carbon sequestration from plantations can be quantified, no reliable and widely acceptable estimation method for monetizing its economic value exists as yet.

[21] It is possible to estimate the costs of flood and drought damages that will be avoided, but the wetland restoration area will be less than 2% of the total in the Sanjiang Plain, and new plantations under the Project would be less than 1%. The impact of these components on the local climate will have to accrue over time to reach a substantial level.

[22] The Faustmann model was used to estimate the optimal rotation years of poplar (10 years) and larch (20 years) trees, using WACC as a discount rate for estimating maximum net present value with a single rotation during the Project.

B. Environmental Impact and Benefits

70. The Project is categorized as environmental category B. An overall initial environmental examination (IEE) was undertaken under the Project Preparation Technical Assistance to assess the generic impact of each project component. The IEE covers the full range of activities to be financed under the Project. The IEE shows that the Project will have significant environmental benefits. It will have a positive impact on both the Project area environment and globally important biodiversity by increasing forest cover, improving wetland hydrology, restoring degraded wetlands, improving the status of threatened wildlife, establishing wetland conservation education and awareness programs, and improving wetland management capacity. The IEE also shows that the potential negative effects on the environment are localized, short-term, and not significant, and can be fully mitigated. Therefore, no full environmental impact assessment (EIA) is required. (Supplementary Appendix G)

71. The six Project Nature Reserves (NRs) were selected because they support significant populations of globally threatened species, whose conservation would benefit from interventions to remove threats to global survival. The benefits of these interventions—predominantly conservation activities—therefore accrue mainly to the global community: (i) the breeding and foraging habitats of birds and other wildlife will increase, and so will the populations of globally threatened species, as a result; (ii) improved watershed management at the local and watershed level will secure water resources for wetlands supporting globally threatened biodiversity, and improved habitat quality will lead to increased numbers of wildlife; (iii) carbon sequestration in standing wood and forest soils will increase through reforestation and sustainable forest management; and (iv) threats to globally threatened wildlife will be removed through increased public and private awareness of globally threatened biodiversity and the importance of wetlands in environmental conservation. Replicating the model framework throughout the Sanjiang Plain will enlarge these global environmental benefits.

72. From the national and local standpoint of environmental benefits, the Project will enable local communities to benefit from restored wetland functions such as water storage for use in dry seasons, and groundwater replenishment. In upland areas, marginal agricultural land will be put to more appropriate use, namely, forest plantation. This will reduce erosion, improve water infiltration, and enable a more reliable supply to streams and aquifers during the dry season. Because of wider tree spacing, agro-forestry intercropping as well as the growing of NTFP crops, can be promoted. Benefits, both global and national, will accrue from the establishment of ecotourism guidelines that will help reduce adverse effects and inappropriate development. These two activities (NTFP and ecotourism) will stimulate local employment. The promotion of environmentally friendly livelihoods will provide long-term financial benefits to communities and heighten the demonstration potential of the Project.

C. Social Dimensions and Impact on Poverty

73. This Project will provide employment opportunities to State Farm forestry workers in tree planting, stand treatment, logging, and wood transport. During the implementation period there will be work opportunities for 7 months for about 36,000 forestry workers on larch plantations, and for 6 months for about 10,000 forestry workers on poplar plantations. Preferential access to employment and intercropping agro-forestry opportunities will increase incomes for the Project's beneficiary forestry workers. Off-season income and employment benefits will be strengthened through various non-timber forest products (NTFPs) such as herbal medicines, wild berries, and fungi in natural and plantation forests. Apiculture products can also be developed from non timber forest resources.

74. The development of village development plans and accordingly the use of VDF will be driven by community demand, as part of resettlement plans. Depending on the village situation, about 30% of resettlement compensation would be set aside as "village development fund" for

investments in alternative livelihoods, particularly those that are conducive to wetland management. The actual mix and scale of alternative livelihood outputs in each village is not easy to predict. However, as the Project aims to be both participatory and flexible, affected farmers and villages under wetland restoration activities could themselves decide the most suitable types of alternative livelihood investments instead of being provided with a blueprint. The farmers are mostly concerned with the yields and price of their grain crops. VDF could add value to their farm outputs through agro-processing businesses. The benefits of alternative livelihoods under VDF are expected to outweigh simple cash resettlement compensation, as these will (i) ensure that the Project benefits the intended beneficiaries over the longer term; (ii) provide a model framework that can be tested during the Project implementation; and (iii) assist the Government in adopting a model of compensation not as sunk cost but as sustainable investment opportunities.

75. **Impact on Poverty:** The poverty incidence in Heilongjiang is 9.7%, and is about 10% in the Project area and in the State Forest Farms under the Project. Of the 13 Project counties in the Sanjiang Plain, three are nationally designated poverty counties (Raohe, Huanan, and Fuyuan), which may have slightly higher poverty incidence (15%). Overall, the Project will enhance livelihoods in agriculture as well as create new economic opportunities for state forest workers through intercropping, NTFPs, and VDFs. The benefit distribution and poverty impact analysis shows that the poverty impact ratio of the Project is about 22%. Therefore, this project is classified as a "nonpoverty intervention." (Appendix 15)

76. **Ethnic Minorities:** The Project's components and locations have all been identified, and no impact on ethnic minority villages or groups is envisaged. Individual ethnic that may be affected by Project components will be compensated under the resettlement plans. Thus, the Project does not require a plan for indigenous peoples under ADB's *Policy on Indigenous Peoples*.

77. **Gender:** Women in Project areas are actively involved in both productive activities and household chores except where physical strength is required for logging or wood transport. Men and women have equal access to land resources. However, women may receive less awareness training in the value of wildlife or wetlands biodiversity conservation than men, because women are less represented in decisions on public affairs and are burdened with household chores. The Project strategies intended to promote gender awareness and sensitivity in training and awareness programs should therefore have a positive impact on women.

D. Project Risks

78. The removal of threats to wetland biodiversity in the Sanjiang Plain requires the following: (i) cooperation among resource authorities in integrating watershed management with development and conservation planning; (ii) improved NR management through better trained personnel; (iii) mutually beneficial relationships between protected areas and surrounding communities; and (iv) sustainable financial support to NR management. The measures included in the Project design to minimize the risk of failure are as follows.

79. **Cooperation to integrate resource management:** Integrated watershed management is a new concept in the Sanjiang Plain. The UNDP-GEF Sustainable Use of Wetlands in China Project established provincial Wetland Management Authorities (WMAs) in an attempt to foster cross-sector contribution to wetland biodiversity management. The WMAs were partly effective because of their geographic and institutional distance from the wetlands. The proposed Project will establish local working groups in the target pilot NRs. Working group members will represent all local stakeholders in water and biodiversity resource management.

80. **Improved NR management:** Barriers to the success of the 5-year Project must be removed early on. NR management standards are low at present, partly because there are no

equipment and materials for basic functions such as field surveys, long-term monitoring, data analysis and reporting, and patrol and enforcement. The pilot NRs should be supported with appropriate technologies and their capacity should be built up through short- and long-term training.

81. **Alternative livelihoods:** Lack of support from communities impoverished or disenfranchised by the Project and its NRs would make Project success less likely. To foster community support, the Project will address the need for alternative livelihoods at both the forest and wetland sites. Communities will also be involved in programs to reduce NR resource exploitation, and will participate in local watershed working groups. A public awareness and conservation education program will make the communities more aware of the relationship between resource protection and community welfare.

82. **Sustainable financial support to NR management:** Several factors will contribute to the sustainability of Project benefits beyond the life of the Project. Among these is the financial commitment of the Government to conserve the wetlands. Innovative approaches to alternative livelihoods for forest workers and the adoption of the Village Development Fund as an investment alternative rather than sunk cost will further mitigate the financial risks. As NR management is a function of the Forest Department, HPG demonstrates a high level of commitment to improve the economic potential of forest development, and thus sharing state forest revenues for daily operation of NRs management.

V. ASSURANCES

83. The National Government and the HPG have given the following assurances, in addition to the standard assurances stated in the legal documents:

(i) **Environmental Issues:** HPG will ensure that the Project complies with applicable PRC environmental laws and regulations, ADB's Environmental Guidelines 2003, and that environmental mitigation measures set forth in the IEE and EMP for a component carried out on time.

(ii) **Experimental Zone of Nature Reserves:** The Government and HPG will amend the National Regulation of Nature Reserves and the related Heilongjiang provincial regulations wherever appropriate to harmonize their provisions regarding permissible activities in the experimental zone of NRs to promote conservation management. The amendments will take into account the recommendations of a proposed ADB TA (Support for Environmental Legislation in the PRC).

(iii) **Conversion of Farmland to Forest:** In converting farmland to forest, HPG will ensure that (i) forestry workers receive wage income from tree planting; (ii) 20% of the converted land is used for intercropping; (iii) intercropping is allowed at a nominal annual contract fee (around RMB 6–RMB 7 per mu) for the first 3 to 5 years; and (iv) the remaining farmland is recontracted to all workers within each forest farm so that all forestry workers share equally in the benefits.

(iv) **Ecotourism:** In consultation with ADB, HPG will see to it that a comprehensive ecotourism master plan and detailed planning and environmental guidelines are prepared for each Project NR and are made publicly available, so that these can be replicated in other provinces.

(v) **Resettlement:** HPG will ensure that any Project resettlement conforms to the relevant PRC laws and regulations, ADB's Policy on Involuntary Resettlement and *Handbook on Resettlement*, and the Resettlement Framework agreed on between HPG and ADB (including (a) preparation of sub-project resettlement plans by an appropriate milestone, (b) updating sample resettlement plans on

competion of detailed design and finalization of livelihood development plans, (c) disclosure of all sub project resettlement plans, (d) its provisions on eligibility for compensation, compensation rates, rehabilitation measures, institutional arrangements, resettlement costs, consultation, disclosure and grievance redress, and monitoring and evaluation).

(vi) **Participation:** HPG will ensure that stakeholders in the Project area, including women, minority groups, and the poor, participate in Project design, management, and implementation. They will help formulate the NR Master Plan, watershed management plan, alternative livelihood programs including the Village Development Fund, ecotourism planning and development, and employment opportunities related to Project implementation.

(vii) **Counterpart Funds:** HPG will ensure the timely provision of all counterpart funds required for the successful implementation of the Project, including incremental recurrent costs and the funds for resettlement compensation through the Provincial Wetland Restoration Fund. The PRC Government will ensure that counterpart funds for resettlement in connection with the state farms are provided according to the Master Plan for the Heilongjiang Wetland Restoration.

(viii) **Project Implementation Arrangements:** The HPG will be the Executing Agency for the Project and will ensure that the PMO, PIUs, and Steering Committee are established to perform their tasks.

(ix) **Monitoring and Evaluation:** HPG will implement a monitoring and evaluation system, including performance indicators relating to forestry development, wetland restoration, NTFPs, use of the Village Development Fund, ecotourism, and beneficiary participation. HPG and ADB will carry out a mid-term review in 2008.

84. **Conditions for Loan Effectiveness:** Loan will be effective once GEF financing is confirmed through Corporate Executive Office's endorsement on grant funding.

VI. RECOMMENDATION

85. I am satisfied that the proposed loan would comply with the Articles of Agreement of ADB and recommend that the Board approve:

(i) a loan of $15,020,000 to the People's Republic of China for the Sanjiang Plain Wetlands Protection Project from ADB's Ordinary Capital Resources, with interest to be determined in accordance with ADB's LIBOR-based lending facility, a term of 25 years including a grace period of 5 years, and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan and Project Agreements presented to the Board; and

(ii) ADB's administration of a grant of $12,140,000 to be provided by the Global Environment Facility to the Government of the People's Republic of China for the Sanjiang Plain Wetlands Protection Project.

Tadao Chino
President

Date

PROJECT FRAMEWORK

Performance Targets:	Key Performance Indicators	Monitoring Mechanisms	Assumptions/Risks
GOAL:			
Sustainable management of natural resources to protect globally significant species and promote economic development.			
PURPOSE:			
The protection of the natural resources of the Sanjiang Plain wetlands and their watersheds (biodiversity, water, forests), from continued threats, and the promotion of their sustainable use, through the integrated conservation and development of selected wetlands and forest areas of the Sanjiang Plain, and the improved well being of local communities.	• Sanjiang Plain NR wetlands expand • Wildlife populations increase • Forestry investments are economically viable Communities are not adversely affected by farmland to wetland or farmland to forest restoration programs	• Inventory of wetland area • Wildlife censuses • Economic assessment of forestry program • Per capita income at community level measured by surveys	• Provincial regulation preventing further wetland conversion in NRs is enforced • Provincial program to compensate farmers with SDRC funds for farmland to wetland restoration is implemented
COMPONENT OUTCOME:			
1. Watershed Management Improved			
1.1 Forestry Investment	• Increased forest cover • Increased income • Improved stand health and performance	• Monitor project inputs • Per capita income at community level measured by periodic surveys • Surveys of plantation forests • planted or improved by Project	• Government forestry sector and resettlement investments carried out
1.2 Local (NR) Level Water Resource Planning	• Improved water resources management at the local level, relative to the baseline situation. • Management of water resources at local level carried out in coordinated way among local stakeholder agencies. •	• Review of NR management plans for inclusion of water issues • Monitor water quality improvements	• Agencies increase cooperation in water resource management
1.3 Watershed Level Water Planning	• Ecological water requirements of NRs are met • Management of water resources at watershed level incorporating wetland protection criteria	• Models available for targeted watersheds • Water balance estimates used in NR management plans • Systematic recording of water flows and levels, and assessment if these agree with allocation plans	• Ministry of Water Resources takes the lead • Agencies cooperate in watershed water resource management
2. Wetland Nature Reserve Management improved			
2.1 Conservation Management	• Condition of wetland habitats and wildlife species numbers improves relative to baseline.	• Systematic census of key wetland species and assessments of habitats.	• Government provides adequate NR staff, salaries and operational budget • External (to NR) causes of decline in wildlife or habitats

Performance Targets:	Key Performance Indicators	Monitoring Mechanisms	Assumptions/Risks
2.2 Pilot Wetland Restoration	• Farmland area in core and buffer zones decreases; total wetland area in NRs increases.	• Annual inspection of restored wetland sites, and assessment of their functioning and condition.	• Government provides adequately for resettlement, and resettlement funds used for economic development rather than provided as direct compensation • Farmland to wetland conversion program continues
2.3 Wildlife Species Recovery	• Numbers of key species increase in the six pilot NRs	• Species recovery plans for globally threatened species in each reserve • Periodic systematic survey of population numbers	• Local and regional survival of target species
2.4 Reduction of Overuse	• Reduction in NR wildlife and plant utilization, relative to the baseline situation • Recovery of populations of key exploited species	• Annual survey and quantification of natural resource use in and around NRs • Annual census of key indicator species & habitats	• Trained and fully competent staff, able to carry out reduction program and census • NR and local support for enforcement of existing legislation on Core and Buffer zones, and on protected species.
3. Alternative Livelihoods provided and incomes maintained			
3.1 Intercropping (agroforestry) and Non-timber Forest Products (herbs/fungi/fruit)	• Incomes of villages affected by farmland to forest restoration program remains at least the same or improves relative to the baseline.	• Per capita income surveys at beginning and towards end of Project • Surveys of types of economic activity • Survey of area under NTFPs, agro-forestry/ intercropping	• Market intelligence • No market saturation
3.2 Village Development Funds (VDFs)	• Incomes of villages affected by farmland to wetland restoration program remains at least the same or improves relative to the baseline.	• Per capita income surveys at beginning and towards end of Project • Surveys of types of economic activity, and results of VDF investments	• Government resettlement funds available, and can be (mainly) used for village development funds rather than provided as direct compensation. • Villages choose economic development projects and green projects
3.3 Ecotourism	• Ecotourism opportunities developed for community and NRs, and not having adverse effects on wetland habitats or key species	• Census of key indicator species, assessment of area and health of wetland habitats • Survey presence of improved tourism infrastructure and human capacity for tourism. • Surveys of community participation in tourism activity	• Market not saturated • NR management and local community receptive to alternative, low key ecotourism • Environmental impacts of tourism managed. this extra task
4. Conservation management Capacity increased			
4.1 Conservation education	• Increased knowledge about conservation issues and the local NR among school children, relative to the baseline.	• Review of school curricula: do they include wetland nature conservation program. • Review involvement of school children in	• Cooperation and interest from local school systems • Teachers are interested in • Local community interest • Reserve managers are not transferred in the

Performance Targets:	Key Performance Indicators	Monitoring Mechanisms	Assumptions/Risks
	•	conservation projects in and around NRs • Interviews with teachers	short-to medium -term
4.2 Conservation Awareness	• Increase in knowledge of conservation in general, and local NRs in particular, relative to the baseline situation.	• Surveys of attitudes and knowledge at beginning and towards end of Project	• Local communities and State Farms support wetland NRs
4.3 Wetland Management Training 4.3.1 Short-term Technical 4.3.2 Long-term Professional	• Staff at six NRs and leaders (including women leaders) of local community with enhanced conservation knowledge & skills. • Nature reserve Managers in NE China with enhanced natural resource management capacity.	• Performance review of NR personnel • Survey use of best management practices in neighboring agricultural areas • Annual NR Evaluation: • Inventory & evaluation of management plans (including water resource plans), species recovery plans, monitoring programs	• Staff stability in NR
COMPONENT OUTPUT			
1. Watershed Management 1.1 Forestry Investments New Forestry Plantations 10,000 ha of new forestry plantations: 8,700 ha of larch and 3,200 ha of poplar Treatment of Existing Forestry Plantations 40,000 ha of existing forestry plantations treated: 33,000 ha of larch and 7,000 ha of poplar	• Planting operations proceed per county schedules over 5-year period • Treatment operations proceed per county schedules over 5-year period	• Monitor area planted annually per operations plan • Monitor area treated annually per operations plan	• Human resources available for operation at State Forest
1.2 Local (NR) Level Water Resource Planning • Working groups established among stakeholders • Programs established for water supply monitoring, water use studies, policy development and problem solving • Annual monitoring workshops • Water management plan input to overall NR Management Plan	• Improved water resources management at the local level, relative to the baseline situation. • Management of water resources at local level carried out in coordinated way among local stakeholder agencies.	• Assessment of local level water resource allocation plans • Review of NR management plans for inclusion of water issues • Monitor water quality improvements	• Stakeholders are interested in identifying and solving problems • Cooperation increases between official authorities and stakeholders
1.3 Watershed Level Water Allocation Plan • developing estimate of water supply needs & • availability for wetlands • improve wetland protection aspects of regional • flood control planning	• Ecological water requirements of NRs are met • Management of water resources at watershed level incorporating wetland protection criteria	• Models available for targeted watersheds • Water balance estimates used in NR management plans • Systematic recording of water flows and levels, and assessment if these agree with allocation plans	• Ministry of Water Resources takes the lead • Agencies cooperate in water resource management • Provincial Forest Department staff have increased capacity for water resources

Performance Targets:	Key Performance Indicators	Monitoring Mechanisms	Assumptions/Risks
• develop and calibrate numerical models of water • use and availability for two watersheds provide capacity-building to the Provincial & County governments			management
2. Wetland Nature Reserve Management			
2.1 Conservation Management • Water, wildlife & habitat monitoring programs in NRs, & manual on monitoring programs • Annual monitoring reports & workshops • GIS established for six NRs • Adaptive Management Plan drafted for all six NRs	• Condition of wetland habitats and numbers of key species improves relative to baseline; overall condition of NRs improves relative to the baseline.	• Annual evaluation of NR performance based on operating plans • Field assessment of habitats, wetland 'health' (species diversity, habitat diversity, area of wetland), and regular census of key species	• Qualified personnel in sufficient numbers and equipment maintained in operating condition • Trained staff are not transferred to another NR site. • NR managers use Management Plans as policy & action guides
2.2 Pilot Wetland Restoration • 3,433 ha of farmland to wetland restoration model sites in 6 wetland NRs • Development of model for wetland restoration (including input from 3.2) • Input to NR Management Plan	• Area of (semi-) natural wetland in the six NRs increases relative to the baseline. • Development of replicable wetland restoration technologies	• Annual inspection of restored wetland sites, and assessment of their functioning and condition. • Progress according to detailed restoration plans, activity schedules and quality standards	• Government provides for resettlement adequately and in a timely fashion, and resettlement funds can used for promoting economic development in affected villages • Qualified personnel, equipment and necessary permits available in a timely fashion
2.3 Wildlife Species Recovery • Targeting and protection of selected globally threatened species and preparation and implementation of recovery plans • Input to Species Recovery Plan and NR Management Plan	• Increased population of target species in Project NRs • Publications on Project species recovery experiences • Networking with other species recovery activities in northeastern China and abroad	• Annual census of key indicator species • Peer and authority review of species recovery plans • Quarterly and annual reports on species recovery	• Critical number of qualified personnel committed to the task
2.4 Reduction of Overuse • Inventory of types and levels of exploitation • Development and implementation of plan for • Reduction of usage • Monitoring of effects, and adjustment of approach • Input to NR Management Plan	• Reduction in NR wildlife and plant utilization, relative to the baseline situation • Recovery of populations of key exploited species	• Annual survey and quantification of natural resource use in and around NRs • Annual census of key indicator species and habitats	• Trained and fully competent staff, able to carry out reduction program and census • NR and local support for enforcement of existing legislation on Core and Buffer zones, and on protected species.
3. Alternative Livelihoods			
3.1 Intercropping (agroforestry) and Non-timber Forest Products (herbs/fungi/fruit	• Incomes of villages affected by farmland to forest restoration program remains at least the same or improves relative to the baseline.	• Per capita income surveys at beginning and towards end of Project • Monitor area planted	• Markets and marketing channels are available • Financing for small farmers is available

Performance Targets:	Key Performance Indicators	Monitoring Mechanisms	Assumptions/Risks
• 1,476 ha of NTFPs, focusing on wild grapes, other wild fruit, mushrooms and potherbs in all 13 counties • Studies focusing on markets, prices, yields and costs to assess expansion opportunities for NTFPs		annually per operations plan • Plantations and monitoring system established • Plantation intercropping/NTFP performance documented and disseminated	• FDHP interested in pursuing and supporting the experiment
3.2 Village Development Funds • Screening process developed • VDF plans developed by affected villages • Projects screened, cleared, and implemented • Monitoring of effectiveness • Input to Wetland Restoration Manual and the NR Management Plan	• Incomes of villages affected by farmland to wetland restoration program remains at least the same or improves relative to the baseline.	• Per capita income surveys at beginning and towards end of Project • Surveys of types of economic activity, and results of VDF investments	• Government resettlement funds available, and can be (mainly) used for village development funds rather than provided as direct compensation. • Villages choose economic development projects and green projects
3.3 Ecotourism • Tourism Master Planning: determining potential demand and opportunities; pilot project options • Tourism guidelines for environmental planning, carrying capacity and safety • Ecotourism pilot projects: capacity building of local community and NR staff; investment in basic NR • infrastructure (demarcation, signboarding0	• Ecotourism opportunities developed for community and NRs, and not having adverse effects on wetland habitats or key species	• Census of key indicator species, assessment of area and health of wetland habitats • Survey presence of improved tourism infrastructure and human capacity for tourism. • Surveys of community participation in tourism activity	• Market not saturated • NR management and local community receptive to alternative, low key ecotourism • Environmental impacts of tourism managed.
4. Capacity Building			
4.1 Conservation Education (schools) • Selection of pilot schools • Preparation of teaching kits • Training of teachers • NR outreach/extension programs for schools	• Increased knowledge about conservation issues and the local NR among school children, relative to the baseline.	• Surveys of school curricula at beginning and towards end of Project • Attendance records of teachers at training events • Frequency of NR presentations at local schools	• Support from educational and NR authorities/staff • Teachers are interested in this extra task
4.2 Conservation Awareness (communities and State Farms) • Training of farmers and State Farm staff • Participation in national	• Increase in knowledge of conservation in general, and local NRs in particular, relative to the baseline situation.	• Project records • NR and State Farm annual reports • Public awareness surveys	• Strong involvement of public authorities at all levels in promoting awareness of environmental policies

Performance Targets:	Key Performance Indicators			Monitoring Mechanisms	Assumptions/Risks
and international events (e.g. Earth Day, World Wetland Day) • Development of promotional materials • Training of NR wardens and tour guides					
4.3 Wetland Management Training • Short-term training courses for technical NR staff and other stakeholders • Formal higher level courses for professional level NR staff and other stakeholders • Exchanges, study tours, internships, workshops	• Staff at six NRs and leaders (including women leaders) of local community with enhanced conservation knowledge & skills. • Nature reserve Managers in NE China with enhanced natural resource management capacity.			• Official records reflecting improvements in law enforcement in NRs • Surveys of participants in training programs • Performance reviews of NR staff • Review by provincial authorities of NR management and species recovery plans	• Provincial support for professional quality improvements at NRs through staffing plans and incentives • Commitment to maintaining high standards for training programs
ACTIVITIES & INPUTS:	**Foreign**	**Local**	**Total $ million**		
1.1. Forest improvement	0.04	22.17	22.21	Implementation schedule and work plans	• Good coordination among the Government, consultants, PMO, and PIUs
1.2. Local (NR) water resource management	0.00	0.33	0.33	• Consultants' progress reports	• Timely allocation of local counterpart funds
1.3. Watershed level water resource planning	0.00	0.67	0.67	• Disbursement of ADB loan funds	
2.1. Conservation management	0.54	1.24	1.78	• Annual progress reports	
2.2. Pilot wetland restoration	0.59	1.36	1.96	• Project review missions	
2.3. Wildlife species recovery	0.44	1.03	1.47	• PCR	
2.4. Reduction of resource exploitation	0.06	0.13	0.19	disbursement of ADB loan and GEF grant funds.	
3.1. Agro-forestry	0.00	4.34	4.34		
3.2. Village Development Fund	0.00	10.44	10.44		
3.3. Sustainable ecotourism	0.33	0.65	0.98		
4.1. Conservation educ.	0.15	0.30	0.45		
4.2. Public awareness	0.08	0.16	0.24		
4.3. Wetlands management training	0.97	1.96	2.94		
5. Project Implementation	0.30	2.40	2.70		
Base Cost	3.51	47.18	50.69		
Contingencies	0.54	1.89	2.43		
IDC/Financial charges	1.26	0.00	1.26		
Total	**5.32**	**49.07**	**54.39**		

PROJECT PROCESSING CHRONOLOGY

PPTA 3376-PRC: Fact-Finding Mission	24 May–18 June 1999
Project Entry into the GEF pipeline OP2	31 August 1999
Government Endorsement for the Support of GEF PDF-B grant	30 September 1999
Consultants' Selection	18 October 1999
Approval of PPTA 3376	10 December 1999
Approval of PDF-B Grant by GEF	21 December 1999
PPTA 3376 Consultants' Contract Negotiation	15 March 2000
Fielding of PPTA Consultants	31 March 2000
Consultants Submission of Inception Report	20 June 2000
Review Mission of PPTA	26 October 2000
Review Mission of PPTA	15 January 2001
Consultants Submission of Interim Report	10 June 2001
GEF's agreement to keep the project concept in the pipeline as the PRC Government requested and decided to separate Sanjiang from Songhua River Flood and to first process the latter on an urgent basis	4 July 2001
Review Mission of PPTA	6 August 2001
Approval of Loan 1919-Songhua River Flood Protection Project	20 September 2002
PPTA 3998-PRC: Fact-Finding Mission	9–24 September 2002
Approval of PPTA	22 November 2002
Consultants' Selection	January 2003
PPTA Consultants' Contract Negotiation	7 August 2003
Fielding of PPTA Consultants	25 August 2003
Inception Review Mission of PPTA	22–30 September 2003
Consultants Submission of Inception Report	8 October 2003
Consultants Submission of Interim Report	30 November 2003
Mid-term Review Mission of PPTA	7–14 January 2004
Consultants Submission of Draft Final Report	30 March 2004
Draft Final Tripartite Review Mission of PPTA	15–20 April 2004
Loan Fact Finding Mission	21 April–12 May 2004
Management Review Meeting	29 June 2004
Completion of Feasibility Study and Final Report	July 2004
Loan Negotiations	November 2004
Board Circulation	January 2005
Board Consideration and Approval	February 2005
Loan Agreement and Signing	April 2005
Loan Effectiveness	June 2005

THREATS ANALYSIS

1. Global Environment Facility (GEF) project design should be based on threats analysis to remove underlying causes of the problems identified. To facilitate project design, an analysis was carried out in which the immediate threats to biodiversity were identified, along with underlying and root causes and possible avenues for addressing them. The outcome of this analysis is illustrated in Figure A3 on Threats to biodiversity and the Project conceptual model. The indicative threats analysis is summarized in Table A3.

2. The indicative threats analysis identified the four main threats to globally significant biodiversity in the Sanjiang Plain as (i) changes in hydrology/desiccation; (ii) conversion to farmland; (iii) inappropriate use practices of resources (overexploitation of resources, disturbances, and habitat degradation); and (iv) limited conservation awareness and capacity of nature reserve (NR) staff and adjacent communities. Underlying causes of water pollution are closely related to incorrect or overuses of agricultural fertilizers, which are interrelated with their farming activities and farmers' awareness on conservation. Following from this analysis and from the logical framework, the four main threats (and their underlying causes) are targeted by four closely linked project components, each with a set of sub-components that address various aspects of the underlying causes.

3. Some of the underlying causes will not be addressed by the present Project, as they are already the focus of another project or beyond the scope of a GEF intervention. One of the unaddressed underlying causes pertains to nature reserve legislation, regulations and zoning, and differences in how these are applied or interpreted at national and provincial levels. This will be the focus of an Asian Development Bank (ADB) technical assistance (TA),[1] being developed at present that will address environmental legislation. The underlying cause of pressures on natural resources due to increases in the human population is regarded as being outside the scope of a GEF intervention. A more extensive account of the history of these threats, and an account of current threats are provided in the Supplementary Appendix I.

Table A3: Threats Analysis and Project Response Matrix

Threats/Constraints	Root Cause	Required Response	Proposed Project Intervention
Increasing Wetland Dehydration • surface water drainage, diversion and/or storage systems • deforestation changing water balance	• government crop production policy and practice • limited understanding of water requirements of various users, including wetland NR • road construction • flood management • irrigation supply	• forestry investments in watershed • integrated watershed-level water resource planning	• Subcomponent 1.1 reforestation of 10,000 hectares (ha) • Subcomponent 1.2 for local-level (NR) water management • Subcomponent 1.3 for watershed-level water resources management
Wetland Conversion • State Farm cropland expansion	• pressure to increase incomes by expanding crop production	• government farmland to wetland restoration with compensation • policy, regulation,	• Subcomponent 2.1 Management Planning to 'guide' transport development

[1] ADTA-PRC. Support for Environment Legislation for $600,000, programmed for 2004. One of the focal areas of this to-be-approved TA will be legislation related to protected area management.

Threats/Constraints	Root Cause	Required Response	Proposed Project Intervention
• leasing of farmland within Nature Reserves • expansion of road, rail transport corridors	• some farmland existed prior to NR establishment • need for lease income for NR operations • incorrect interpretation of legislation regarding experimental zones	and enforcement to prohibit conversion & do land use planning • increased financial allocation to NRs • integrated transport development planning & engineering • review of Protected Area legislation (focus of TA on environmental legislation currently being formulated)	• Subcomponent 2.2 on pilot wetland restoration, including development of model, & development of manual. • Subcomponent 3.2 establishing of village development funds for maintaining livelihoods of villages affected by wetland restoration program. • Subcomponent 3.3 will stimulate sustainable ecotourism development. • Subcomponent 4.3 wetland management training to include capacity building in wetland restoration.
Overexploitation of Wildlife and Plants • overfishing • overhunting • excessive plant product harvest • excessive medicinal herb harvest • excessive reed harvest	• increase household food supply • income generation • paper production • roofing material needs • fuel needs • construction material needs • few economic alternatives	• alternative income sources • improved enforcement of existing regulations and training • reduce exploitation to sustainable levels • education & training of NR staff in enforcement, management and wildlife conservation	• Subcomponent 2.4 Reduction of overuse, to focus on achieving sustainability and eliminating unsustainable use forms. • Subcomponent 3.2 establishing of village development funds for maintaining livelihoods affected by resource use reduction program. • Subcomponent 4.2 focuses on awareness raising of farmers and State Farm staff
Human Disturbance of Wildlife During Sensitive Periods (Nesting, Rearing, Migration) • households in wetlands • farms in wetlands • fishermen in wetlands • hunters in wetlands • tourists in wetlands • capturing wildlife for	• existed prior to NR establishment • to increase crop production • to increase household income • to obtain food supply • recreation • low awareness of wildlife biology and general conservation needs	• enforcement of existing regulations on use of NR zones • resettlement of households & removal of farmland from NRs • development of tourism management plans • conservation education among villagers • education & training	• Subcomponent 2.2 pilot wetland restoration, including development of model, and development of manual • Subcomponent 2.4 Reduction of overuse, to focus on achieving sustainability and eliminating unsustainable use forms • Subcomponent 3.3 ecotourism

Threats/Constraints	Root Cause	Required Response	Proposed Project Intervention
display in NR visitor centers		of NR staff	development of master plans & guidelines • Subcomponents 4.1 (education), 4.2 (awareness) & 4.3 (training)
Habitat Degradation (Other Than Related To Conversion) • anthropogenic fire • overgrazing	• forage improvement • livestock industry development • "controlled burns" as precaution against catastrophic fire • untrained NR personnel	• relocation & compensation of grazers • husbandry programs for grazing, hay, fire • education and training of NR staff	• Subcomponent 2.4 Reduction of overuse, to focus on achieving sustainability and eliminating unsustainable use forms. • Subcomponent 4.2 awareness of local farmers and State Farms • Subcomponent 4.3 training of NR staff
Water Pollution • agricultural fertilizers & pesticides • sedimentation • sewage	• to increase crop production • excessive use of agrochemicals due to poor user practice • no facilities for treatment of effluents	• increase public/ State Farm awareness • water resource planning for water quality • development of best management practice	• Subcomponent 1.2 local-level (NR) water resources management • Subcomponent 4.2 awareness of local farmers and State Farms

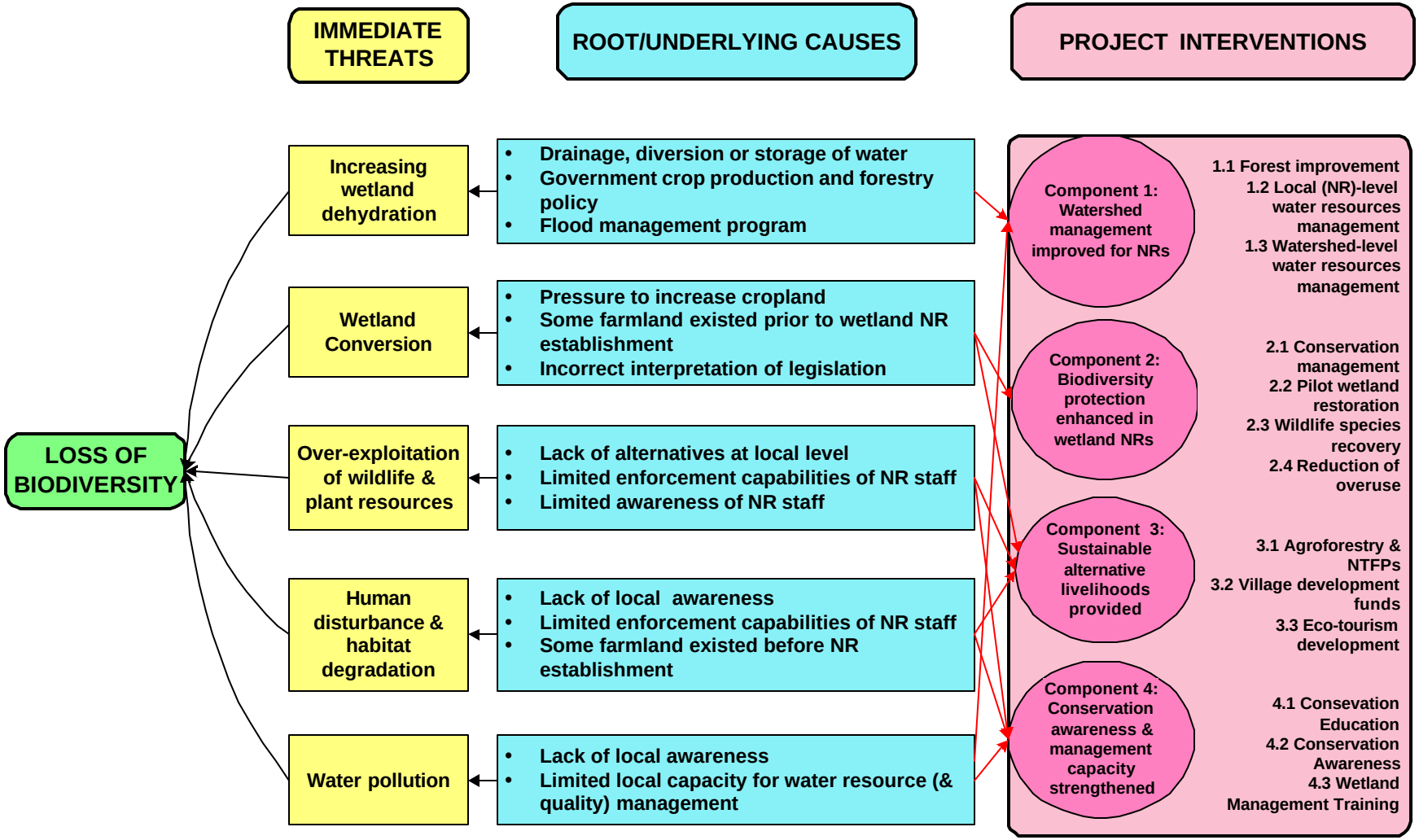


Figure A3: Threats To Biodiversity and the Project Conceptual Model

KEY EXTERNAL ASSISTANCE RELEVANT TO HEILONGJIANG PROVINCE AND TO THE ENVIRONMENTAL SECTOR (1994-2004)

Source		Project Name	Sector*	Loan/TA ($'million)	Year of Approval
Loan Projects					
ADB	1.	Changchun-Harbin Expressway: Hashuang Expressway	Transport	170.00	1998
	2.	Qitaihe Thermal Energy and Environmental Improvement	Energy	165.00	1994
	3.	Changchun-Harbin Expressway: Changyu Expressway	Transport	220.00	1998
	4.	Northeast Flood Damage Rehabilitation: Heilongjiang Province	Multisector	110.00	1999
	5.	Yellow River Flood Management (Sector) Project	Others	150.00	2001
	6.	Songhua River Flood Management Project	Others	150.00	2002
	7.	Harbin City Water Supply	Social infrastructure	100.00	2003
		Total		**1,065.00**	
World Bank	1.	Grain Marketing Development	Agriculture	6.30	1994
	2.	Comprehensive Agricultural Development in HLJ	Agriculture	12.00	1997
	3.	Social Welfare System in HLJ	Health, Nutrition and Social Protection	0.25	1999
	4.	Milk Production Base	Agriculture	10.00	2003
		Total		**28.55**	
Technical Assistance Projects					
ADB	1.	Soil and Water Conservation in the Upper Yangze River Basin	Agriculture	0.10	1998
	2.	Provincial Legislation on Environmental Protection and Natural Resources Conservation	Others	0.30	1998
	3.	Policies and Strategies for Sustainable Development of the Lancang River Basin	Agriculture	0.66	1998
	4.	Capacity Building in Ministerial Status Responsibilities in State Environmental Protection Administration	Others	0.81	1999
	5.	Yellow River Flood Management Sector Project	Agriculture	0.93	1999
	6.	Songhua River Flood Wetland and Biodiversity Management	Agriculture	1.55	1999
	7.	Preparing National Strategies for Soil and Water Conservation	Agriculture	0.80	2000
	8.	Global Environmental Facility Partnership on Land Degradation in Dryland Ecosystems	Agriculture	0.10	2000
	9.	Transjurisdiction Environment Management (TA cluster)	Others	2.10	2000
	10.	Ningxia Shapoutou Water Resources	Agriculture	0.93	2000
	11.	Strategic Planning Study for the Preparationof the Yellow River Law	Agriculture	0.97	2001
		Total		**9.24**	

* Sector Classification for ADB projects are based on PPIS record. Others may be considered as environment.

THE ROLE OF THE GLOBAL ENVIRONMENT FACILITY (GEF) IN THE PROJECT

A. Broad Development Objective

1. Northeast PRC is one of the last areas in this huge and biologically rich country to be drained and converted to agriculture. Because of this late development, threats and risks are high on some of the last remaining tracts of wetland and native forests, and with it the associated biological diversity, including many endangered and rare species.

2. The PRC gives high priority to wetland biodiversity conservation, watershed protection and sustainable management of natural resources. By the end of 2000 the PRC had established 1,276 nature reserves covering a total of 123 million hectares (ha), or 12.4% of the national land area. Some 12 million ha of the total protects wetlands, representing nearly half of the estimated total of 25 million ha of natural wetlands in the PRC. The PRC ratified the Ramsar Convention on 31 July 1992, and three wetland NRs (Honghe, Sanjiang, and Xingkaihu NRs) in the Sanjiang Plain are listed as wetlands of international importance (i.e., Ramsar sites). It subsequently ratified the Convention on Biological Diversity on 5 January 1993, followed by notification of participation in the restructured GEF on 16 May 1994. Conservation of the Sanjiang Plain is identified in the PRC's Biodiversity Conservation Action Plan as having the highest priority.

3. Sanjiang Plain wetlands formerly extended over ten million ha, but are now reduced to one-fifth of their original area, mainly due to expansion of agriculture. Key wetlands and globally threatened species are now primarily found in NRs, but management of these areas is beset with challenges. Given the presence of key populations of globally important species in the Sanjiang Plain, the Project is expected to have significant global environmental benefits.

B. Rationale for GEF Involvement

4. The Sanjiang Plain (or Three Rivers Plain) is located in Heilongjiang Province in the far northeastern part of the PRC. Extending over 108,900 square kilometers (km^2) on the alluvial plain of the Heilong, Songhua and Wusuli Rivers, it includes some of the PRC's most important and largest (almost one million ha) floodplain wetlands. Twenty-eight of Heilongjiang's 58 wetland Nature Reserves (NRs) are located on this plain, of which 6 key NRs will be targeted by the Project. These six reserves support key populations of 23 species listed by IUCN as globally threatened (i.e., endangered or vulnerable), including breeding populations of Oriental Stork, Red-crowned Crane, White-naped Crane, Baikal Teal and Chinese Softshell Turtle. These NRs support unique wetland habitats that have largely disappeared in the region, nowadays.

5. In 1998, Heilongjiang Provincial Government (HPG) issued a decree suspending wetland development in the province and preventing further conversion to farmland; this was reinforced in June 2003 with the adoption of the Regulation on Wetland Conservation of Heilongjiang Province. To address losses, HPG developed plans for restoration of >150,000 ha of farmland to wetlands within wetland NRs in the Sanjiang Plain, and in 2003 the provincial Forestry Department began implementation of the restoration program.

6. The Project aims at sustainable management of natural resources to protect globally significant species and promote economic development. The Project's global biodiversity objective is to protect the Sanjiang Plain wetland ecosystems and their associated globally significant biodiversity by relieving threats and associated root causes of their decline. Globally significant biodiversity in the Sanjiang Plain faces four main threats, namely, (i) changes in

hydrology/desiccation, (ii) conversion to farmland, (iii) inappropriate land use practices, and (iv) limited conservation awareness and capacity of NR staff and adjacent communities. These threats and their underlying causes will be targeted by four inter-dependent Project components:

(i) Component 1. *Outcome: NR watershed management improved*. The Project will increase forest cover, improve forest management (for reducing surface runoff, and increasing soil water retention and groundwater recharge), and enhance watershed-level water resource management.

(ii) Component 2. *Outcome: Biodiversity protection in wetland NRs enhanced*. The Project will develop models and capacity for wetland NR conservation management, and embed component outputs in NR Management Plans.

(iii) Component 3. *Outcome: Alternative livelihoods developed and sustained*. The project will develop and implement programs for sustainable livelihood in villages affected by the reforestation program (under component 1) and farmland-to-wetland restoration (under component 2)[1]. This is to ensure that these restoration programs have a lasting beneficial effect.

(iv) Component 4. *Outcome: Conservation awareness and capacity for sustainable management of wetland NR biodiversity increased*. The Project will develop and implement conservation education at local schools, public awareness programs for State Farms and communities in/around NRs; and a targeted training program for NR staff and other stakeholders. This will be directly linked to component 2; for example, development of the NR management plan and species recovery plans will be incorporated into the long-term training program.

7. The Project is fully compliant with the GEF Operational Strategy in the focal area of biodiversity and consistent with GEF's Operational Program 2 (OP2) aimed at conservation and sustainable use of the biological resources in coastal, marine, and freshwater ecosystems. The project may further have linkages with the other OPs as sustainable development activities. However, efficiencies are achieved in the project by combining complementary baseline and incremental activities together as an integrated package. Individual program alone would only contribute to local and national benefits. But when integrated, these linkages provided by sustainable development activities will further enhance the global incremental benefits, which largely contribute to the objectives of OP#2.

- OP#3 Forest Ecosystems, as a total of 10,000 ha of new forest plantations will be planted on degraded, unproductive farmland and deforested/eroding areas. In addition, 36,900 ha of existing forestry plantations will be subjected to improved management and upgrading.
- OP#12 Integrated Ecosystem Management, as it takes an integrated, basin wide approach to the management of water and other natural resources, and will establish an institutional framework (based on existing structures) to achieve this, and
- OP#15 Sustainable Land Management, as management of catchments will be upgraded and vastly improved via the forestry program (see point above), and also assist with identifying, developing, and promoting sustainable land management in areas adjacent/near the wetland protected areas.

[1] No physical resettlements of peoples are involved, but the compensation for the loss of access to farmland in the NRs. Due to re-adjustment of village's remaining land, village collectives rather than individuals are affected.

8. The Project aims at developing models for replication that provides much needed examples for ongoing provincial programs. This approach is fully compatible with the objectives of GEF's Strategic Priority BD-1, aimed at Catalyzing Sustainability of Protected Areas; BD-2: Mainstreaming biodiversity in production landscapes and sectors; and BD-4: Generation and dissemination of best practices for addressing current and emerging biodiversity issues. The project will significantly contribute to BD-1, BD-2 and BD-4, as is outlined in Supplementary Appendix H2.

9. Sustainability of benefits and achievements beyond the completion of the GEF Project will be positively affected by: (i) Promulgation the "Regulation on Wetland Conservation of Heilongjiang Province," which took effect on 1 August 2003, and lays a solid foundation for long-term improvement in wetland conservation in the Sanjiang Plain; (ii) Financial commitments confirmed by the HPG for the implementation of the farmland-to-wetland and farmland-to-forest restoration programs; (iii) Availability of already on-going financial assistance by NDRC for affected communities from farmland-to-wetland program, rather than the simple provision of funds directly as compensation; (iv) Strong commitment of the PRC Government to improve water resource management, among others, by improving watershed management; (v) Development of practical/ workable models for wetland restoration (including restoration of local livelihoods) that are targeted to the local situation in the Sanjiang Plain; (vi) Strong emphasis of the Project on capacity building; this is included in each of the components, especially Component 4, which is entirely focused on education, awareness education, and training, along with development of training modules and curricula; (vii) Emphasis placed on inter-agency collaboration under a single provincial government, and all project areas under the jurisdiction of Heilongjiang province, close at the fields, increase sustainability.

10. HPG has agreed to utilize wetland restoration models (including livelihood restoration) developed by the Project in its farmland-to-wetland restoration program, under which over 150,000 ha will be restored in wetland NRs in the Sanjiang Plain alone. Funds have been allocated for this replication by NDRC. The Project will facilitate this program by providing much-needed examples of how this can be achieved successfully, and maximizing benefits to biodiversity conservation. The watershed-level water resources management approach will provide a model for water resources management (and allocation for conservation) to the Song-Liao Water Resources Commission, allowing replication in subcatchments throughout the entire Songhua River basin and much of northeast PRC. The production of training manuals and development of training curricula will facilitate the further replicability of the model framework. In particular, the Project will be led by one provincial government, facilitating inter-agency coordination of water, forestry, agriculture, and environmental protection departments. Thus, lessons learned will be of great value in the course of replication in other contexts under the broader framework of river basin management.

C. Quantification of GEF Contribution

11. The GEF funds the incremental costs of activities required to secure global environmental benefits, that would not normally be undertaken as part of national sustainable development (SD) intervention. Therefore, GEF involvement is justified for the activities aimed at achieving global environmental objectives (OP2) over and above national SD costs.

12. Global benefits from the Project will be derived from (i) protection of endangered species, (ii) conservation of ecosystems that are under threat, and (iii) improved watershed management and wetlands habitat quality, leading to increased number of wildlife. Replicability

of the project model framework throughout the Sanjiang Plain will enhance these global environmental benefits.

13. **Business as usual (BAU) Baseline.** The BAU baseline assumes continued investment by the Government and donor agencies in watershed and water resource management, nature conservation, and further expansion of the protected area system. It also assumes a continued (but modest) investment by the Government in wetland restoration and reforestation. There will be an established network of wetland nature reserves and annual government allocations of funds to manage them. (a) They would, however, continue to operate without management plans and use approaches that have proved to be less effective at stemming the decline of globally important species. (b) Recovery of globally threatened species would not be accelerated unless projects specially designed for that purpose. (c) Existing programs would restore some farmlands to wetlands, but compensation payments to displaced farmers would not be designed to yield long-term economic benefits, nor would there be any incentives for adopting environmentally friendly approaches compatible with wetland protection. (d) Water resources would be allocated first to municipalities, then to industry and agriculture, and then, if a surplus remained, it would be available for NR use. (e) Commercialized tourism facilities would be developed in experimental zone of NRs due to incorrect interpretation of regulations, but this would come at a cost in terms of disturbing wetland habitat. (f) NR personnel would continue to be hampered in performance of their duties by lack of training and education. (g) Communities surrounding nature reserves would not be aware of the importance of conservation management. (h) Populations of globally threatened species would continue to decline or at best show only marginal recovery. (i) In the baseline situation, sufficient funds would not be allocated and trained personnel would not be available to fully protect wetland biodiversity or carry out the mandates of the various conservation action plans. The cost of the baseline scenario has been calculated at US$ 39,850,000 (Table A.5).

14. **Sustainable Development (SD) Alternative.** The SD alternative adds to the BAU baseline investments by the government (including the ADB loan) in reforestation, and investments in economic development in villages affected by both the farmland to forest and the farmland to wetland restoration programs. These investments will improve environmental management and conditions, but will be mainly of national benefit. Implementation of the SD alternative over the five years of the Project is expected to cost approximately US$ 79,495,000.

15. **GEF Alternative.** The GEF alternative scenario adds to both the BAU baseline and SD alternative activities that are designed to achieve the Project's global biodiversity objectives, and that are expected to generate significant global benefits. Implementation of the GEF alternative scenario over the five years of the Project (July 2005 – June 2010) is expected to cost approximately US$90,540,000.

16. **Incremental Cost of GEF Alternative**. The estimated cost of the BAU baseline is US$ 39,850,000, that of the SD alternative US$79,495,000, and that of the GEF alternative US$ 90,540,000, resulting in an incremental cost of US$11,045,000 (Table A.5). If contingencies are included, the amount requested from GEF is US$12.14 million.

Table A5. Incremental Cost Matrix

Area Relevant to the Project	Cost Category	Cost ($ million)	Domestic Benefit	Global Benefit
Component 1: Watershed management improved for NRs.				
A. Reforestation under present program, and	Business as usual (BAU)	29.960	Increase in area under trees, and increased	Increase of carbon storage in wood and

Area Relevant to the Project	Cost Category	Cost ($ million)	Domestic Benefit	Global Benefit
flood management.	baseline		employment. Flood and drainage management.	forest soils.
B. Added investment in reforestation, and water resources management.	Sustainable development (SD) alternative	52.638	Better watershed protection. Technological & profit improvement. Replenished ground and surface water.	Some increase in biodiversity; limited effect on wetland water resources.
C. Local level (NR) and watershed water resources management incorporating wetland protection.	GEF alternative	53.168	Reduced risk of flood and drought. Improved water allocation and planning.	Water resources ensured for wetlands supporting globally significant biodiversity.
	Increment	**0.530**		
Component 2: Biodiversity protection enhanced in wetland NRs.				
A. Network of wetland NRs and annual government allocations of funds to manage them. No management plans, and applying ineffective approaches.	BAU baseline	6.300	Conservation efforts yield some national and economic benefits.	Losses of globally significant species occurs at slower rate than if network did not exist.
B. Reducing unsustainable resource use.	SD alternative	7.168	Economic benefits are more sustainable.	Rate of decline of globally significant species is reduced.
C. Models management of wetland NRs, embedded in management plans. Monitoring programs, pilot restoration, & guidelines for future restoration; species recovery programs.	GEF alternative	11.698	No change.	Rate of loss of migrant and globally significant species reduced. Prerequisites for rebounding of significant populations.
	Increment	**4.530**		
Component 3: Sustainable alternative livelihoods provided.				
A. Direct compensation payments to displaced farmers in farmland to wetland restoration program.	BAU baseline	3.050	Incomes are guaranteed, but economic benefit limited.	No change.
B. Investments for economic development programs (NTFPs, intercropping; village development funds).	SD alternative	17.340	Incomes guaranteed, along with increased economic development.	No change.
C. Stimulation of 'green investments' and appropriate forms of ecotourism	GEF alternative	18.806	No change.	Reduction of negative impacts on globally significant species.
	Increment	**1.466**		
Component 4: Conservation awareness and management capacity of NR strengthened.				
A. NR programs for staff training, extension and	BAU baseline	0.540	Conservation efforts yield some national	Losses of globally significant species

Area Relevant to the Project	Cost Category	Cost ($ million)	Domestic Benefit	Global Benefit
education continue.			social and environmental benefit.	occurs at slower rate than if this program did not exist.
B. Increased extension, to reduce inappropriate use of agrochemicals.	SD alternative	1.001	Environmental and economic gains, due to improved water quality and reduced pesticide use.	Losses of globally significant species occurs at slower rate than if this program did not exist.
C. Education, awareness, outreach and extensive training programs.	GEF alternative	4.173	Limited gains.	Significant improvement of management of key wetlands; reduction of impacts on/ recovery of populations of globally significant species.
	Increment	**3.172**		
Project Management				
	SD alternative GEF alternative **Increment**	1.348 2.695 **1.347**		
	Total			
	BAU baseline	39.850		
	SD alternative	79.495		
	GEF alternative	90.540		
	Increment	**11.045***		

Note: * Excludes US$ 0.33 million Project Development Fund Block B grant for project preparation. This does not include $1.10 million for 10% contingencies

PROJECT COMPONENTS BY LOCATION

	Components							
	1.1.1	1.1.2	1.2	2.2	3.1	3.2		3.3
Project Sites	(ha)	(ha)		(ha)	(ha)	**Villages**	**Persons**	(entity)
A. County Base								
1. Hegang Prefecture								
a. Hegang City	1,000	5,000						
b. Luobei City	1,000	3,000			230[a]			
2. Shuagyashan Prefecture								
a. Jixian County	1,000	2,000				1	45	
b. Baoqing County	1,000	3,000			230[a]	3	45	
c. Raohe County	500	1,000				2	544	
3. Jiamusi Prefecture								
a. Huanan County	500	4,000			667[a, b]			
b. Fuyuan County	500	1,000						
4. Jixi Prefecture								
a. Mishan County (Xinkaihu)	1,000	3,000				1	136	
b. Hulin County	1,000	3,000			230[a]	1	50	
c. Jidong County	500	3,000						
5. Qitaihe Prefecture								
a. Quitaihe County	500	2,000						
b. Boli County	500	3,450			667[b]			
6. Mundanjiang Prefecture								
a. Linkou County	1,000	3,450			202[a]			
B. Watershed Base								
1. Anbang (part of Songhua)			x					
2. Naoli-Qixinghe watershed			x					
3. Muling river watershed			x					
4. Zhenbaodao watershed			x					
5. Dajiahe watershed			x					
C. Nature Reserves Base								
1. Anbanghe PNR				259				x
2. Qixinghe NNR				400				x
3. Naolihe PNR (160,000 ha)[c]				2,000				x
4. Xingkaihu NNR				333				x
5. Zhenbaodao PNR				100				x
6. Dajiahe PNR				350				x
Total	**10,000**	**36,900**		**3,442**	**2,226**	**8**	**820[d]**	**6**

ha = hectare, NNR = national nature reserve, PNR = provincial nature reserve.
Component 1.1.1 = Forestry Development (New Forest Plantation).
Component 1.1.2 = Forestry Development (Treatment of Existing Forestry).
Component 1.2 = Local (NR) water resource management
Component 2.2 = Pilot Wetland Restoration.
Components 3.1 = Agroforestry Intercropping and Non-Timber Forestry Product.
Component 3.2 = Village Development Fund.
Component 3.3 = Ecotourism.

[a] Farmlands to be reverted back to its legally required forest use and all part of the area proposed under Component 1.1, except 667 ha newly proposed forest lands in Boli County.

[b] Non-timber forest product.

[c] Initial proposal for restoration in Naolihe NR was 24,000 ha. Since 4,000 ha out of 24,000 ha farmlands were already abandoned from farming, the Project took bigger size (2,000 ha) to test its restoration impacts. The rest half will be tested for restoration under state farm program. Naolihe NR has a high potential for waterbirds recovery.

[d] About 260 families; mostly requiring land compensation rather than physical relocation. Only 43 families in Xiankaihu requires compensation on the relocation of physical assets, such as temporary cottages used during farming season.

Note: Forestry workers will be paid for salaries under Component 1.1, while those engaged in Component 3.1 will pay a nominal rental fee of CNY6.7 per mu per year to State Forestry Farms.

Source: Asian Development Bank estimates.

PROJECT COSTS
Table A7.1: Whole Project Cost Summary

Component	CNY Million			$ Million			Foreign Exchange (%)	%Total Base Costs
	Foreign	Local	Total	Foreign	Local	Total		
1. Watershed Management								
1. Forest Improvement	0.31	183.51	183.82	0.04	22.17	22.21		
2. Local Watershed Resource Management		2.74	2.74		0.33	0.33		
3. Watershed Level Resource Management		5.53	5.53		0.67	0.67		
Subtotal	0.31	191.78	192.09	0.04	23.17	23.21	16.00%	45.78%
2. Wetland Nature Reserve Management								
1. Habitat Conservation Management	4.46	10.29	14.75	0.54	1.25	1.79		
2. Pilot Wetland Restoration	4.89	11.29	16.18	0.59	1.36	1.95		
3. Wildlife Species Recovery	3.68	8.50	12.18	0.44	1.03	1.47		
4. Reduction of Overuse	0.47	1.09	1.56	0.06	0.13	0.19		
Subtotal	13.50	31.17	44.67	1.63	3.77	5.40	30.22%	10.65%
3. Alternative Livelihoods								
1. Agroforestry and NTFPs		35.92	35.92		4.34	4.34		
2. Village Development Fund (NRs)		86.40	86.40		10.44	10.44		
3. Ecotourism	2.74	5.35	8.09	0.33	0.64	0.97		
Subtotal	2.74	127.67	130.41	0.33	15.42	15.75	2.15%	31.08%
4. Education and Capacity Building								
1. Conservation Education	1.25	2.50	3.75	0.15	0.30	0.45		
2. Public Conservation Awareness	0.67	1.34	2.01	0.08	0.16	0.24		
3. Wetland Management Training	8.08	16.22	24.30	0.98	1.96	2.94		
Subtotal	10.00	20.06	30.06	1.21	2.42	3.63	33.27%	7.17%
Project Management Office	2.52	19.80	22.32	0.30	2.39	2.70	12.71%	5.32%
Total Baseline Costs	**29.07**	**390.48**	**419.55**	**3.51**	**47.17**	**50.69**	**6.93%**	**100.00%**
Contingencies	4.46	15.68	20.14	0.55	1.89	2.44	19.76%	5.44%
Total Project Costs	**33.53**	**406.16**	**439.69**	**4.06**	**49.07**	**53.13**	**8.21%**	
Interest During Implementation	9.52		9.52	1.15		1.15		
Commitment Charges	0.93		0.93	0.11		0.11		
Total Costs to be Financed	**43.98**	**406.16**	**450.14**	**5.32**	**49.07**	**54.39**		

Source: Asian Development Bank estimates.

Table A7.2: Expenditure Accounts Project Costs
Whole Project

	CNY Million			$ Million		
Item	**Foreign**	**Local**	**Total**	**Foreign**	**Local**	**Total**
Investment Costs						
1. Civil works	0.00	136.05	136.05	0.00	16.44	16.44
2. Equipment	1.14	49.92	51.07	0.14	6.03	6.17
3. Materials	0.00	57.10	57.10	0.00	6.90	6.90
4. Training	9.65	17.96	27.62	1.17	2.17	3.34
5. Consulting Services	18.27	43.03	61.30	2.21	5.20	7.41
6. Village Development Funds	0.00	86.33	86.33	0.00	10.43	10.43
Total Baseline Costs	**29.06**	**390.48**	**419.55**	**3.51**	**47.18**	**50.69**
Contingencies	4.46	15.68	20.14	0.55	1.89	2.44
Total Project Costs	33.53	406.16	439.69	4.06	49.07	53.13
Interest During Implementation	9.52		9.52	1.15		1.15
Commitment Charges	0.93		0.93	0.11		0.11
Total Costs to be Financed	**43.98**	**406.16**	**450.14**	**5.32**	**49.07**	**54.39**

Note: Figures might not add up due to rounding

Table A7.3: Project Expenditure Accounts by Financiers
($ Million)

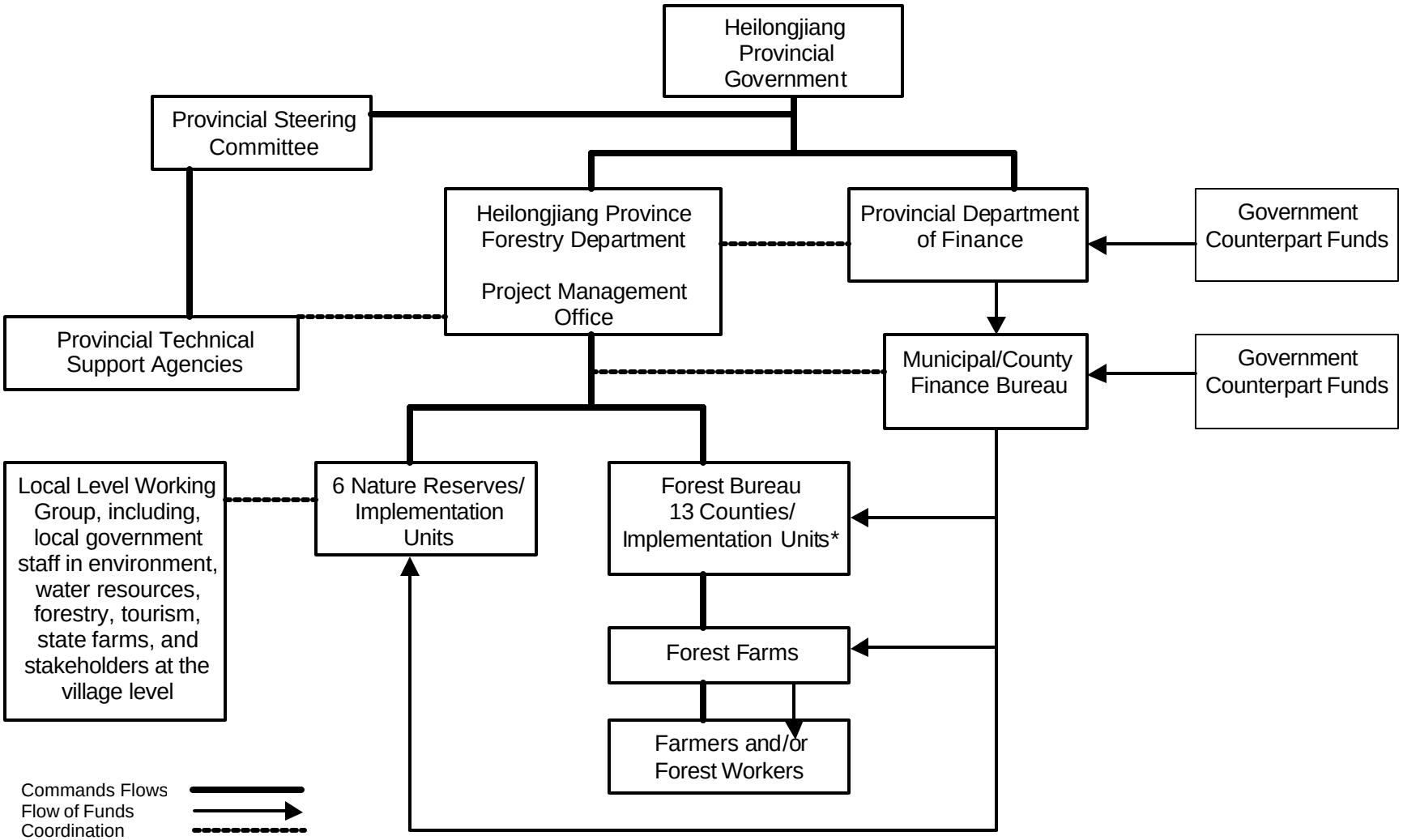
Items	ADB		GEF		State Forest Farms		Government		Total	
	Amount	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**	**Amount**	**%**
Investment Costs										
A. Civil Works	8.45	51.40	0.00	0.00	2.88	17.50	5.11	31.10	16.44	100.00
B. Equipment	2.84	46.00	0.79	12.76	0.93	15.10	1.61	26.14	6.17	100.00
C. Materials	2.19	31.70	0.72	10.37	0.63	9.20	3.36	48.73	6.90	100.00
D. Training	0.01	0.35	2.78	83.24	0.00	0.00	0.55	16.41	3.34	100.00
E. Consulting Services	0.19	2.60	6.28	84.80	0.00	0.00	0.93	12.60	7.41	100.00
F. Village Development Funds	0.00	0.00	0.48	4.63	0.00	0.00	9.95	95.37	10.43	100.00
Total Baseline Costs	**13.68**	**26.99**	**11.04**	**21.79**	**4.44**	**8.77**	**21.52**	**42.45**	**50.69**	**100.00**
Contingencies	1.34		1.10						2.44	
Total Project Costs	**15.02**	**28.30**	**12.14**	**23.48**	**4.44**	**8.37**	**21.52**	**40.55**	**53.13**	**100.00**
Interest During Implementation							1.15		1.15	
Commitment Charges							0.11		0.11	
Total Costs to be Financed	**15.02**	**27.65**	**12.14**	**22.94**	**4.44**	**8.18**	**22.78**	**41.93**	**54.39**	**100.00**

Table A7.4: Components by Financier
($ million)

Component	Financier				
	ADB	GEF	Government	State Forest Farms	Total
A. Watershed Management	11.67	0.53	7.53	3.44	23.21
B. Nature Reserve	0.00	4.53	0.87	0.00	5.40
C. Alternative Livelihood	1.41	1.47	11.91	1.00	15.75
D. Capacity Building	0.00	3.17	0.46	0.00	3.63
E. Project Management	0.60	1.35	0.75	0.00	2.70
Total Baseline Cost	**13.68**	**11.04**	**21.52**	**4.44**	**50.69**
Contigencies	1.34	1.10			2.44
Total Project Cost	**15.02**	**12.14**	**21.52**	**4.44**	**53.13**

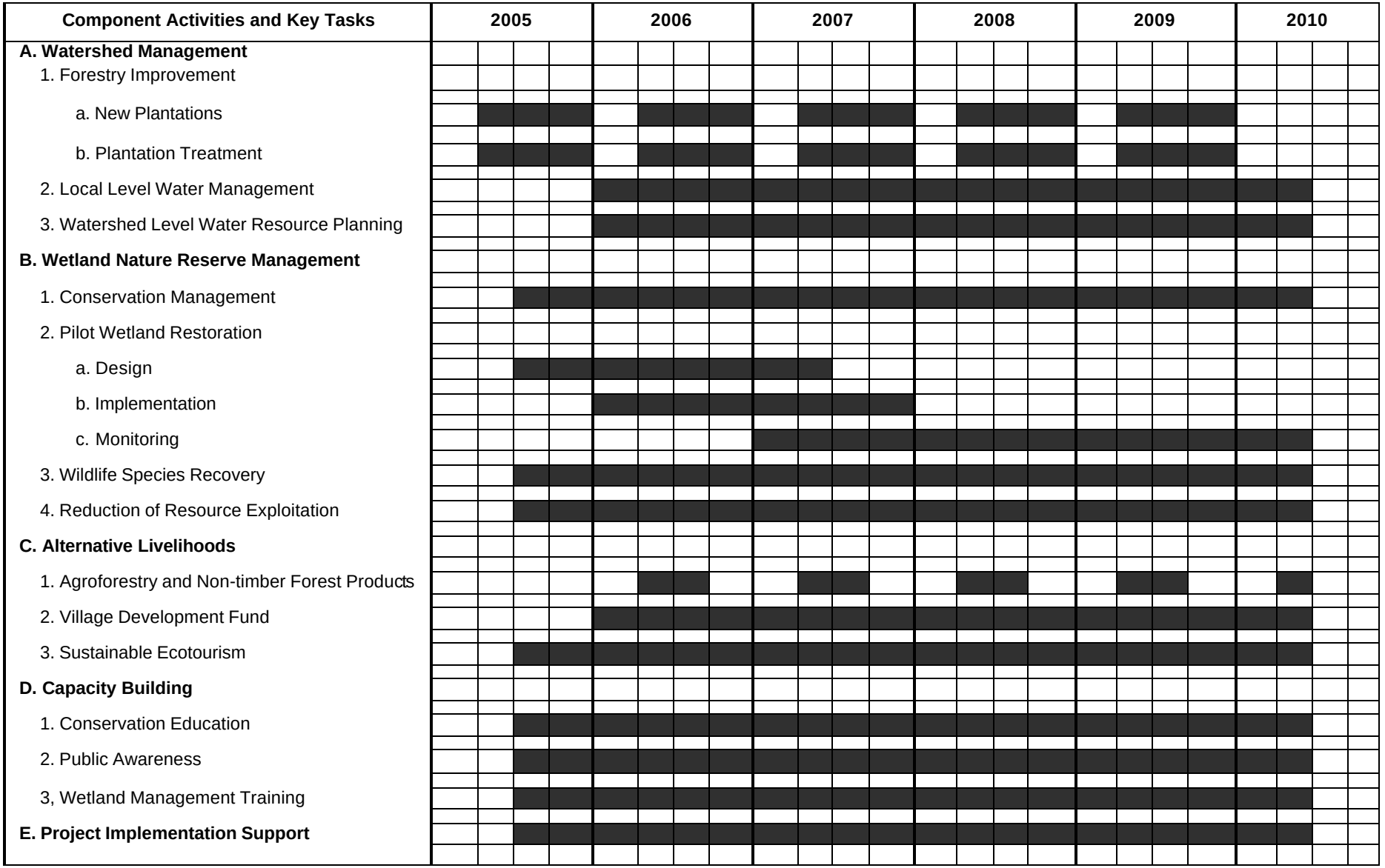
Note: Interest during implementation, and financial charges are not included.

PROJECT ORGANIZATION CHART AND FUND FLOWS



* PIU at Baoqing county as a field coordination office.

IMPLEMENTATION SCHEDULE



SUMMARY OF RESETTLEMENT FRAMEWORK

A. Scope of Resettlement Impacts

1. The Project will finance a range of wetland protection and forest plantation in projects in Sanjiang Plain, covering 13 counties[1] in 6 prefectures[2], and involving 6 Nature Reserves[3]. The Project will include 4 components, which are watershed management, wetland nature reserve management, alternative livelihood program and education, and capacity building. Environmental policies in Heilongjiang Province require restoration of the ecological conditions, especially in the Sanjiang Plain. Environmental policies, in general, have substantial impacts on farming activities in wetlands, and involve significant costs implication on resettlement compensation. This has delayed the Government's environmental programs for wetland and forest restoration. The project will pilot a livelihood development approach that ensures income opportunities restored or improved at lower costs to the Government, and will benefit community relations with the Nature Reserve (NR) management. The success of this approach depends upon participation of affected people and NRs in the planning, consultation, and implementation of viable and sustainable alternative livelihoods options.

2. The resettlement impacts induced by this project are mainly associated with those sub-components that involve farmland to wetland restoration. Out of the total 3,442 ha to be converted from farmland to wetland, about 1,442 ha of farmland will be in 5 Nature Reserves, including 1,183 ha in core zones and 250 ha in experimental zones, and will affect 820 persons, of which 192 are State Farm workers. Along with land acquisition, 1,950 square meters of seasonal cottages owned by the State Farm will be demolished; this will necessitate the physical relocation of about 43 households or 136 individuals. The other 2,000 ha of farmland in Naolihe NR had been already abandoned but the wetland still needs to be restored. About 308 workers from the Honqiling State Farm were affected and provided replacement farmland in nearby villages in 2001. An assessment of this situation found that the State Farm has already restored the livelihoods and incomes of these people. Under the project, the abandoned land would be restored to wetland, and the State Farm (or villages affected) would be eligible for compensation funding for alternative livelihood development. In 5 counties, 5,000 ha of land will be reverted to its original legal use of commercial forest, of which 4,300 ha is currently being farmed by 1,770 forest workers in 29 State Forest farms and 446 farmers in 12 villages; these workers are employees of State Forest Farms and contracted to attend the lands with salary payments. No minority villages or groups are affected under the Project. However, the resettlement plans will identify individual ethnic minority people affected by resettlement.

B. Legal Framework

3. People are strictly prohibited from living in the core zone of the wetland nature reserve. Those who presently live in the core zone of the wetland reserve will be relocated immediately and all productive activities should stop. Those who live in the buffer zone should move out step by step[4] According to *Chinese Land Administration Law*, for land acquisition caused by an infrastructure project, the developer should pay land compensation to the current land owners/users. For this project, the impacts are caused by ecological restoration in accordance with the wetland protection regulation whereby the land use rights are restricted but there may

[1] The 13 counties include Baoqing, Boli, Fuyuan, Hegang, Huanan, Hulan, Jixian, Luobei, Linkou, Mishan, Ningan, Qitahe, and Raohe.
[2] The six (6) prefectures include Hegang, Jiamusi, Jixi, Mudanjiang, Qitaihe, and Shuangyashan.
[3] Anbanghe NR, Dajiahe NR, Naolihe NR, Qixinghe NR, Xingkaihu NR, and Zhenbaodao NR.
[4] *The Heilongjiang Provincial Wetland Protection Regulation (2003)*

be no transfer of land ownership, and thus no compensation payments. The *Nature Reserve Protection Regulation of PRC*, Article 27: states, "For those people who live in the core zone of nature reserve, the local government should resettle them appropriately". But there is no detailed regulation of land compensation rates about farmland restoration to wetland. According to ADB's Policy on Involuntary Resettlement, if any project causes individuals or a community to lose all part of their land, housing, infrastructure, resources, income sources, and services, in cash or kind, so that their economic and social circumstance will be at least restored to the pre-project level. All compensation is based on the principle of replacement cost[5].

4. For the farmland to forest restoration there is potential for loss of incomes only during the years that the trees are growing. The standard practice in the PRC is to provide a subsidy of 100 kg of grain and CNY20 in cash would be provided to the local farmers for each mu (1/15 ha) of farmland conversion to forestland annually for 8 years for natural forest or 5 years for commercial forest[6]. This practice is considered costly and welfare oriented, and may not fully restore lost incomes during initial seedlings. Therefore, under this project, a different approach has been taken whereby the project will finance the planting of non-timber forest products for people affected by the conversion. They will receive replacement forestland, will receive wages for tree planting, and simultaneously implement intercropping for 3 to 5 years on the newly planted forest area at a nominal fee of CNY6.7/mu/year (or without paying land contracting fees). In this manner, the affected people will be able to maintain or even increase their incomes from the land. The project will finance the non-timber forest product for these people, which is estimated to cost total CNY35.92 million (US$4.34 million).

C. Eligibility for Compensation

5. All affected people, regardless of their legal status, will be provided compensation and rehabilitation. Lack of legal paper of their customary rights of occupancy certificates shall not be a bar to obtain compensation for them. The resettlement policy would apply to all components under the project regardless whether or not they are directly financed by ADB. Particular attention will be paid to the needs of vulnerable groups among those affected, especially the poor, the elderly, women and children. Based on replacement cost principle, the annual income loss from land will be the annual net output value. The dry land compensation rate is 2,500 CNY/mu, and the paddy compensation rate is 3,500CNY/mu. The compensation rates for houses will be 700CNY/m^2.

D. Rehabilitation Measures

6. After land acquisition, the affected villages or state farms will readjust the farmland within the village or the farm, thus ensuring that the affected persons obtain the same quantity and quality farmland as the other farmers. Meanwhile the village or State Farm will use part of the land compensation as Village Development Fund[7] to finance development alternative livelihood programs to increase the incomes of villagers. The affected persons will be given the priority to receive the Village Development Fund. The villages and State Farms will be encouraged to invest in production activities that enhance or at least compatible with wetland protection.

7. People affected by house demolition and relocation will be paid for the building and moving compensation at replacement value. In addition, a transfer and transportation allowance

[5] ADB *OM Section F2/OP –Involuntary Resettlement (2003)*
[6] *Farmland to Forestry and Grassland Restoration Notice (2000).*
[7] Tentatively estimating 30% to be utilized for livelihood development.

and cash compensation for loss of other private properties will be provided to each household. The project will pay for site preparation, electricity connection, water supply, and road construction. If the affected houses belong to the farm, such as the 29th group of Xinkaihu Farm, the house compensation will be paid to the farm directly, and the farm will select the new site outside the nature reserve, rebuild the new houses, and then distribute them to those affected families.

8. For those who will be affected by farmland conversion to forestland, the land ownership will not be transferred. The forestry farm or the village will readjust the farmland to ensure the affected forestry workers or villagers obtain the same quantity and quality farmland as other workers or villagers. The affected workers or villagers will receive wages for tree planting and maintenance and can share the profits of forestry. Due to the long period for trees to mature, the affected people will be permitted to do intercropping between the seedlings for 3 to 5 years. Also, the project will develop 860 ha of non-timber forest products for the affected people to ensure incomes will be maintained or increased. In addition, villagers could benefit from the policy of the central government and the provincial governments.

E. Institutional Arrangement for Resettlement

9. A county-level project implementation office under the Forestry Department will be set up and be responsible for Resettlement plan (RP) preparation and implementation. The county land administration bureaus will assist the county management office to implement the RP, and will be responsible for land inventory and acquisition approvals. The estimated budget for resettlement is CNY82.60 million (US$9.95 million).

F. Consultation, Disclosure and Grievance Redress

10. The consultation with the Affected Persons (APs) will take place in the early process of resettlement planning. The RPs in Chinese language will be made public in the county and township offices and the affected villages. A resettlement information booklet will be distributed to the APs prior to implementation. Such consultation and participation will be continued throughout the implementation process.

G. Monitoring and Evaluation

11. Following the requirements of ADB, both internal and external monitoring and evaluation of both the farmland to wetland and the farmland to forest land programs to ensure all affected people are compensated adequately and timely, and assess whether their income and livelihood are restored after resettlement and rehabilitation. Each county management office will carry out the internal monitoring. For external monitoring and evaluation, the provincial project management office will engage an independent institution such as university or social research institute. The scope of monitoring and evaluation will cover the progress of implementation, compliance with resettlement policies, delivery of compensation funds, allocation of replacement land, changes of income and livelihood among affected people, consultation and participation.

H. Procedural Guidance for Resettlement Plan Preparation

12. The following methods have been and will be applied to collect socioeconomic baseline data, asset inventory and census of affected people during the RP preparation.

(i) Government Statistics: The regional socioeconomic data of project area can be understood through the Socio-economic Statistics Yearbooks in each project county,

the annual summary reports and development plan reports of county forestry bureau and wetland protection bureau, etc. This research forms the premise and basis of questionnaire designing and outline for group discussion and interview.

(ii) Observation and Measurement. In Feb of 2004, two survey groups went to Xinkaihu lake and Baoqing County, and firstly, they observed the present condition on the population density, dwelling condition, identification of project impacts in affected community, and secondly, they measured the affected house area, other affected assets for each households and the affected land area for each community.

(iii) Household Questionnaire: A questionnaire was designed to collect demographic information, family income and expenditure, resources, production activities, tools, and attitude to resettlement, etc. The sample size is about 30% of total amount of affected households in each affected community. The sampling covers the old, the young, women and the poor.

(iv) Focus Group Discussion: Focus discussions with special topics have been held with the help of affected village committee and State Farm authorities. The topics included awareness of resettlement plan, judgment of livelihood level, future plans, difficulties in resettlement, degree of impact, perceptions regarding compensation and attitudes to the wetland restoration and project.

13. For the farmland to wetland restoration component, a resettlement framework and two preliminary RPs have been prepared for ADB approval. The reason for the RF is the need for a community-based process to formulate alternative livelihood schemes as the basis for the resettlement. Further consultation with the affected people and with the NR PIUs will be carried out to formulate village development plans. This approach will ensure that viable and sustainable alternative livelihoods are developed to offset lost income from farming, especially activities that are compatible with wetland protection. It will take time to set up the project implementation units, strengthen the staff of the NRs, and prepare village development plans for the affected village. Consequently, no wetland restoration will take place in the first year of the project. With the assistant of TA consultant, the PMO has drafted two preliminary RPs for Xinkaihu Nature Reserve and Qixinghe Nature Reserve. These draft RPs will require further community consultation and participation of villagers, local officials and NR staff to identify and agree upon alternative livelihood schemes. Village development plans will specify (i) where the compensation funds will be invested, (ii) what activities will be established under the village development fund (VDF), and (iii) how the village collectives and affected farmers will share the benefits from the VDF. The proposed activities should meet environmental and income generation criteria. The detailed village development plans should be approved by the PMO of EA and ADB, before the State Farm or Village Committee receives the compensation. The Project will provide some technical assistance to formulate village development plans and consultation. For the other four Nature Reserves, socioeconomic investigations will be conducted by the county-level project implementation units and based on consultation with the villagers, the village development plans and RPs will be prepared and submitted to the project management office for review and environmental screening. The PIU of Nature Reserves will participate in the review. After acceptance, the RPs will be sent to ADB for approval. Resettlement can commence upon acceptance by the PIUs.

INDICATIVE CONTRACT PACKAGES

Item	Estimated Total Cost ($ million)*	Packages (No.)	Mode of Procurement
A. Civil Works			
1. Forest Improvement	15.54	Multiple	FA
2. Wetland Restoration	0.80	Multiple	FA
B. Equipment and Vehicles			
1. Forest Equipment and Vehicles	5.07	6	LCB
2. Nature Reserves	0.60	1	LCB
3. Materials	6.90	Multiple	IS/DP
C. Consulting and Services Contracts			
1. Training and Study Tours	3.34	3	QCBS/IS/DS
2. Consulting Services	5.42	3	QCBS/ICB
3. PMO Management Staff Team—Individuals	1.99	Multiple	DS

* Excluding village development fund.
DP = direct purchase, DS = direct selection, LCB = local competitive bidding, IS = international shopping, ICB = international competitive bidding, QCBS = quality and cost-based selection, FA = force account.
Source: Asian Development Bank estimates.

OUTLINE TERMS OF REFERENCE FOR CONSULTING SERVICES

1. Consulting services will be provided to the PMO through an international consulting firm in accordance with ADB's Guidelines on the Use of Consultants and other arrangements acceptable to ADB for selecting and engaging domestic consultants. The consultant services required under the Project total 601 person-months: 133 international and 468 domestic. The international consultants will be recruited through an international consulting firm selected and engaged using ADB's quality- and cost-based selection (QCBS) method. Below are brief descriptions of the Project positions that will be filled by consultants. Table A12 summarizes costs associated with consulting services.

A. Project Management Office (PMO) Consultants

2. **Wetlands Expert Advisor** (22 person-months international). The specialist will be employed for 5 person-months in years 1–2 and 4 person-months in years 3–5 of the Project to (i) provide technical guidance and supervision to international and national consultants; (ii) advise the Project on the design and implementation of all nature reserve (NR) initiatives; (iii) assist the project director and coordinator to complete their reporting responsibilities in a timely and effective manner; (iv) provide technical input on all Project matters as requested; (v) provide training inputs as required; and (vi) review the project design periodically to ensure that it is consistent with a changing environment and that lessons learned during implementation are being incorporated.

3. **Monitoring & Evaluation Specialist** (28 person-months national). The specialist will develop and implement a monitoring program for (i) social and economic parameters; (ii) survey instruments, sampling frameworks, preparation and execution of surveys in the field (including training programs for surveyors) and the analysis and reporting of all results; (iii) a geographic information system (GIS) and database for tracking the progress of project investments in forestry, non-timber forest products and wetland conservation; (iv) a user-friendly database and analysis package for required biological and hydrologic monitoring data in the NRs; tracking Project inputs and activities; and (v) input to a mid-term evaluation of project progress, the results of which will contribute to the Mid-term Report. The specialist will be supported by Monitoring Field Teams of national personnel who will be employed for a total of 120 person-months.

4. **Financial Management Specialist** (8 person-months national). The specialists will (i) track the financial implementation of the project on a quarterly basis; (ii) report quarterly and annually to the PMO; and (iii) advise the Monitoring & Evaluation Specialist on financial tracking mechanisms for the Project monitoring system.

5. **Resettlement Specialists** (6 person-months national). The specialists will (i) review the resettlement plans prepared for each of the wetland restoration pilot projects; (ii) monitor the implementation of the plans by the Government and the Project; (iii) report to the PMO and PIUs as necessary on the design and implementation of the resettlement plans; (iv) establish a system for assessment of alternative livelihood proposals submitted to village committees for funding; and (v) contribute to the production of farmland-to-wetland restoration manuals to be published by the Project.

B. Project Implementation Consultants

6. **Conservation Social Scientist** (10 person-months national). The specialist will (i) identify and describe the roles of stakeholders in wetland biodiversity conservation management, including NRs, land and water administrations, State Farms, local governments and villages; (ii) develop terms of reference for local working groups; (iii) support Project consultants to form local working groups; (iv) schedule and coordinate working group agendas and meetings; (v) compile and disseminate working group statements of conclusions and recommendations to stakeholders; and (vi) provide training inputs as necessary.

7. **Conservation Hydrologist** (14 person-months national). The specialist will (i) participate in watershed working groups; (ii) design and implement hydrology monitoring programs for NRs; (iii) advise working groups, NRs, State Farms, water and land administrations on ecological water requirements of NRs; (iv) support the Hydraulic Engineer in designing and implementing ecologically-friendly pilot wetland restoration projects; and (v) compile and arrange the publication of wetland restoration guideline manuals.

8. **Hydraulic Engineer** (7 person-months national). The specialist will (i) advise the Wetland Specialist and Hydrologist in the development of the pilot wetland restoration projects; (ii) cooperate with State Farm or FDHP personnel assigned to the farmland-to-wetland restoration projects to design an ecologically-friendly water supply to the restoration sites; (iii) support the Conservation Hydrologist in representing the Project in local working group functions; and (iv) and provide technical input to compilation of the wetland restoration guideline manuals.

9. **Protected Area Specialists** (42 person-months national, 24 person-months international). The specialists will (i) design and implement procedures for biodiversity and ecosystem inventories and monitoring to be undertaken in NRs; (ii) advise on the management of inventory data within the management information system (MIS), (iii) define and prioritize monitoring and research agendas for biophysical resources; (iv) design an outsource support as needed for monitoring and research projects; (v) lead in the development and revision of NR management plans; and (vi) provide training inputs as required.

10. **Wetland Restoration Specialists** (48 person-months national, 24 person-months international). The specialists will (i) lead the review of government farmland-to-wetland restoration plans with respect to the six focus NRs; (ii) lead the development of pilot wetland restoration plans at each of the six focus NRs; (iii) supervise implementation of wetland restoration plans; (iv) lead development and implementation of monitoring plans for restored wetlands and their biodiversity; and (v) supervise data analyses and reporting on pilot wetland restoration projects, including development and publishing of guideline manuals.

11. **Wildlife Biologists** (42 person-months national, 20 person-months international). Three national and two international wildlife biologists (WBs) will assist NRs to design and implement species recovery plans to remove threats to the survival of globally threatened species. The WBs will (i) update lists and protection status for species at each of the six focal NRs and assess threats to globally threatened species; (ii) produce a working paper on species recovery projects at wetland NRs in the Sanjiang Plain; (iii) describe all stakeholder groups that undertake or coordinate species recovery at regional scales; (iv) select target species for recovery and design and implement the recovery plans; and (v) cooperate with stakeholder groups at local, provincial, national, and international levels in all recovery and monitoring initiatives.

12. **Natural Resource Specialists** (78 person-months national). Three national specialists will (i) identify and list biological resources that are exploited within the six focus NRs; (ii) design and undertake evaluation of the protection status, distribution and productivity of exploited resources, and the portion of the annual productivity that is removed (24 person-months for (i) and ii); (iii) assess the impacts of exploitation on the resources and the cumulative impacts on each of the six focus NRs; (iv) use a participatory approach to design and implement plans to reduce exploitation to levels that are legally permissible and ecologically benign (18 person-months); (v) develop monitoring programs to track the impacts of such plans and report the results to the PMO (18 person-months); and (vi) produce guideline manuals describing technologies for reduction of resource exploitation in NRs (18 person-months).

13. **Ecotourism Specialists** (33 person-months national, 23 person-months international). The specialists will (i) review all preliminary tourism development plans written by the six focus NRs; (ii) assess environmental, social, and financial performance of tourism developments at each of the six focus NRs and ensure compliance with Environmental Management Plan requirements; (iii) based on those assessments, lead the preparation of revised ecotourism plans at the six focus NRs; (iv) prepare background materials, design and lead overseas ecotourism study tours; (v) develop ecotourism monitoring programs for NRs; (vi) prepare materials for and deliver the long-term ecotourism training course; (vii) train academic and other training personnel to deliver this and other ecotourism related courses; and (viii) participate in the review and assessment of village development fund applications for tourism ventures.

14. **Public Awareness & Education Specialists** (20 person-months national, 8 person-months international). The specialists will (i) develop in-school education strategies for the school systems at each of the six focus NRs, including local schools, teachers, and school administrations; (ii) develop and deliver conservation awareness programs for State Farm administrations and local village communities; (iii) develop and implement strategies for public communications using various media; (iii) develop materials for dissemination; and (iv) provide training inputs at farms, villages, and schools.

15. **Training Specialists** (12 person-months national, 12 person-months international). The specialists will (i) conduct a training needs analysis; (ii) evaluate the current course structure, delivery arrangements, curricula, and effectiveness of the Heilongjiang Provincial forest Department and other training programs available to NR personnel; (iii) evaluate other conservation-oriented training programs in China including those offered by NGOs; (iv) prepare a report recommending improvements and possible synergies between training programs based on the review; (v) assist the PMO in Harbin to plan and schedule all short-term and long-term training programs, workshops, conferences, study tours and other training opportunities for the Project; (vi) identify training venues including the site for the long-term professional education program; (vii) organize and coordinate delivery of the training programs; and (vi) deliver training courses

.

Table A12. Consultants Requirements

	Consultants by Component	Domestic [PM]	Int'l. [PM]	TOTAL [PM]	Domestic [000 $]	Int'l. [PM]	TOTAL [000 $]
1.2.1	**Local Watershed Management**						
	- Stakeholder working Group	10		10	25.0		25.0
	- Water Studies at Reserves	6		6	15.0		15.0
	- Watershed Hydrologic Studies	3		3	7.5		7.5
	- Policy Development	5		5	12.5		12.5
	- Hydraulic Engineering	7		7	17.5		17.5
2.1	**Habitat conservation Management**						
	- Nature Reserve Management Consultant	42		42	126.9		126.9
	- Nature Reserve Management Consultant		24	24		480.0	480.0
2.2	**Pilot Wetland Restoration**						
	- Wetland restoration Specialist	48		48	145.0		145.0
	- Wetland restoration Specialist		24	24		480.0	480.0
2.3	**Wildlife Species Recovery**						
	- Species Recovery	42		42	126.9		126.9
	- Species Recovery		27	27		540.0	540.0
2.4	**Reduction of Overuse**						
	- Resource Productivity	24		24	58.0		58.0
	- Evaluation and Planning	18		18	43.5		43.5
	- Monitor & Modify Plan	18		18	43.5		43.5
	- Produce Guidelines	18		18	43.5		43.5
3.3.1	**Tourism Master Plan**						
	- Tourism Consultant		11	11		275.0	275.0
	- Tourism Consultant	11		11	33.0		33.0
3.3.2	**Develop Tourism Guidelines**						
	- Tourism Specialist		7	7		140.0	140.0
	- Tourism Specialist	6		6	18.0		18.0
3.3.3	**Pilot Ecotourism Development**						
	- Tourism Consultant		5	5		100.0	100.0
	- Tourism Consultant	16		16	28.8		28.8
4.1.3	**Outreach to School System**						
	- National Consultant	10		10	30.2		30.2
	- International Consultant		4	4		80.0	80.0
4.2.1	**Increase Awareness on State Farms**						
	- National Consultant	5		5	15.1		15.1
	- International Consultant		2	2		40.0	40.0
4.2.2	**Increase Awareness in Villages and Farms**						
	- National Consultant	5		5	15.1		15.1
	- International Consultant		2	2		40.0	40.0
4.3	**Wetlands Management Training**						
	- Professor	12		12	42.9		42.9
	- Professor		12	12		177.5	177.5
	Project Management Office						
	- Wetlands Expert Advisor		15	15		300.0	300.0
	- Monitoring & Evaluation Specialist	28		28	84.0		84.0
	- Monitoring Field Teams	120		120	60.0		60.0
	- Financial Management Specialist	8		8	24.0		24.0
	- Resettlement Specialists	6		6	18.0		18.0
	TOTAL	468	133	601	1,033.8	2,652.5	3,686.3

CAPACITY BUILDING REQUIREMENTS

Number of Training Courses and Trainees Per Course By Year and Course Title

Capacity Building Course	Course Duration	2005		2006		2007		2008		2009		Total	
		Courses	Trainees	Courses	Trainees	Courses	Trainees	Courses	Trainees	Courses	Trainees	Courses	Trainees
A. Short-course National (Activity 4-3-2)													
1. Habitat and vegetation mapping using GPS, GIS	10 days	1	10	1	10	1	10	1	10	1	10	5	50
2. Biodiversity survey, monitoring, and data management (GPS, GIS)	10 days	1	10	1	10	1	10	1	10	1	10	5	50
3. Conservation law, enforcement, and patrolling	10 days	1	10	1	10	1	10	1	10	1	10	5	50
4. Wetland restoration	10 days	1	10	1	10	1	10	1	10	1	10	5	50
5. Protected area management	10 days	1	10	1	10	1	10	1	10	1	10	5	50
6. Methods in education, public awareness, and outreach	10 days	1	10	1	10	1	10	1	10	1	10	5	50
Subtotal		**6**	**60**	**6**	**60**	**6**	**60**	**6**	**60**	**6**	**60**	**30**	**300**
B. Long-course International (Activity 4-3-3)													
1. Wetland science	45 days	1	1	1	1	1	1	1	1	1	1	5	5
2. Wildlife management and species recovery using GIS	45 days	1	1	1	1	1	1	1	1	1	1	5	5
3. Watershed management and GIS	45 days	1	3	1	3	1	3	1	3	1	3	5	15
4. Community relations and participation	45 days	1	3	1	3	1	3	1	3	1	3	5	15
5. Nature reserve management and conservation law and regulation	45 days	1	1	1	1	1	1	1	1	1	1	5	5
6. Tourism in protected areas	45 days	1	3	1	3	1	3	1	3	1	3	5	15
Subtotal		**6**	**12**	**6**	**12**	**6**	**12**	**6**	**12**	**6**	**12**	**30**	**60**
C. Language for International Training													
1. English language	45 days	6	12	6	12	6	12	6	12	6	12	30	60
D. Long-course National/University (Activity 4-3-4)													
1. Wetland science	45 days	1	2	1	2	1	2	1	2	1	2	5	10
2. Wildlife management & species recovery using GIS	45 days	1	2	1	2	1	2	1	2	1	2	5	10
3. Watershed management and GIS	45 days	1	4	1	4	1	4	1	4	1	4	5	20
4. Community relations and participation	45 days	1	4	1	4	1	4	1	4	1	4	5	20

Capacity Building Course	Course Duration	2005		2006		2007		2008		2009		Total	
		Courses	Trainees	Courses	Trainees	Courses	Trainees	Courses	Trainees	Courses	Trainees	Courses	Trainees
5. Nature reserve management and conservation law and regulation	45 days	1	2	1	2	1	2	1	2	1	2	5	10
6. Tourism in protected areas	45 days	1	4	1	4	1	4	1	4	1	4	5	20
Subtotal		**6**	**18**	**6**	**18**	**6**	**18**	**6**	**18**	**6**	**16**	**30**	**90**
E. Conference, Workshop, Seminar, Study Tour (Activity 4-3-5)													
1. National	14 days	2	12	2	12	2	12	2	12	2	12	10	60
2. International	14 days	2	12	2	12	2	12	2	12	2	12	10	60
Subtotal		**4**	**24**	**4**	**24**	**4**	**24**	**4**	**24**	**4**	**24**	**20**	**120**
F. Exchanges and Internships													
1. National	90 days	3	6	3	6	3	6	3	6	3	6	15	30
2. International	90 days	3	6	3	6	3	6	3	6	3	6	15	30
Subtotal		**6**	**12**	**6**	**12**	**6**	**12**	**6**	**12**	**6**	**12**	**30**	**60**
G Unallocated	90 days	1	3	1	3	1	3	1	3	1	3	5	15
Total		**35**	**141**	**30**	**142**	**30**	**141**	**30**	**141**	**30**	**139**	**155**	**704**

GIS = geographic information system, GPS = global positioning system.
Source: Asian Development Bank estimates.

FINANCIAL AND ECONOMIC ANALYSES

A. Introduction

1. The objective of this analysis is to evaluate Sanjiang Plain Wetland Protection Project based on both financial and economic benefits and costs. The financial cash flows and economic value flows are estimated on an incremental basis. The Project includes five main components: (i) Watershed Management, (ii) Wetland Nature Reserve Management, (iii) Alternative Livelihoods, (iv) Education and Capacity Building, and (v) Project Implementation. Wetland Nature Reserve Management component is largely associated with global environmental benefits, while subcomponents of the Watershed Management (Forest Improvement) and subcomponent of the Alternative Livelihoods (intercropping non-timber forestry products (NTFP)), will generate financial returns under Asian Development Bank (ADB) loan and domestic funds. The financial and economic analyses are conducted mainly based on the benefits and costs associated with national benefit aspects only.

2. It is proposed that 49,326 hectares (ha) of lands will be used for forestry improvement, among which, 10,000 ha will be for new plantations, 36,900 ha for treatment of existing stands, and 2,226 ha will be dedicated to non-timber forest products (NTFPs). About 25% of forestry improvement is through poplar, while the majority is for larch trees. Total project costs by activity type are CNY 55 million for plantations, CNY 130 million for treatment, and CNY 23 million for NTFPs. The total costs for the proposed project amount to CNY 420 million without contingencies. The construction period for this project occurs over 5 years (from mid-2005 to mid-2010).

3. The sources of funds for this project come from ADB, GEF, government, and labor inputs from forest farm workers. The sources can be classified into three categories: debt (ADB loan), equities (GEF and labor input) and government funds. The reason that GEF and labor input are treated as equities is that those fund sources are assumed to have the same required rates of return. Thus, the estimation of the WACC is the weighted sum of estimates of cost of debt, cost of government funds and cost of equity. The weighted average cost of capital is calculated as 6.1%

B. Least Cost Analysis of Alternatives

4. The project has provided a major opportunity for examining the possibility of reduced tree planting density thereby improving the economic efficiency over current forest plantation practices. This issue went though a very thorough series of reviews of both provincial and county reports, as well as numerous discussions with technical staff of the Forestry Department of Heilongjiang Province (FDHP). Forest plantation practices in Heilongjiang Province are based on traditional standards, which in this particular case involve narrow spacing with one thinning for larch and no thinning for poplar. More specifically, provincial standards require spacing distances

of 2m x 1.5m for larch (3,330 stems/ha), and of 2m x 4m for poplar. Under these standards there are no thinning for poplar and less opportunities for intercropping and NTFPs. Thus, Alternative One would be to pursue plantations according to provincial standards, i.e., with narrow spacing, no thinning for poplar, one thinning for larch in year 12, and no intercropping consideration of NTFPs. Alternative Two is Wider Spacing with One Thinning for Both Larch and Poplar. The second option is to include a forestry plantation program with wider spacing for larch (and therefore a lower cost) than that required by provincial standards. In addition, this wider spacing provides opportunities for NTFPs, which are explicitly considered in this second option. Specifically, the second alternative is to have a spacing distance of 2m x 2.5m for larch (2,000 stems/ha), and the same density for poplar (1,250 stems/ha). The single thinning at age 12 for larch remains and a thinning at age 6 is added for poplar. Additionally, the second option specifically includes NTFPs. The second option has lowered plantation and tending costs, and has added the opportunity for NTFPs, on which financial and economic analyses are based.

C. Financial Analysis

5. The incremental cash flow for the financial analysis includes sales revenue from commercial forestry and NTFP development. Final harvest volume projections per hectare are based on a 20-year rotation (with a thinning at age 12) for larch, and a 10-year rotation (with a thinning at age 6) for poplar. Faustmann model (see Box 1 at the end of the section) was used to estimate optimal rotation years of popular and larch trees respectively[1], using WACC as a discount rate for maximum NPV with a single rotation during the project. Net thinning volumes removed are $9m^3$/ha for larch and $22m^3$/ha for poplar, while final harvest net volume removals are $115m^3$/ha for larch and $99m^3$/ha for poplar. These volume parameters are applied to both new and existing plantations. New forest plantations and stand treatment operations will take place in all 13 Project counties.

6. Of the total net volume, it is assumed that most of the larch and poplar volume will be sold to pulp mills, while some will be sold as mine pit props and as raw materials for other wood products. Based on county reports and additional surveys larch prices are estimated at CNY 400/m^3 for final harvest and CNY 300 /m^3 for thinnings, while poplar price estimates are CNY 380 /m^3 for final harvest and CNY 350/m^3 for thinnings. On a per hectare basis, cost structures for new forest plantations add up to CNY 5,200 and CNY 4,600, respectively for larch and poplar; and treatment costs for existing plantations add up to CNY 3,500 Yuan/ha for both larch and poplar. Additionally, the cost of goods sold includes logging and transportation costs. Logging cost is assumed at: CNY 170 /m3 for larch thinning, CNY 140 /m3 for larch felling, CNY 140/m3 for poplar thinning, and CNY 110 /m3 for poplar felling. Transportation cost is assumed at: CNY

[1] The Faustmann analysis shows that larch trees can reach maximum NPV at 20 years as the optimal rotation year. For poplar trees, optimal rotation year is chosen at 10 years from the analysis, since historical record data has not been accumulated enough to show the maximum output level yet.

12.5 /m3 for both species. Additional financial charges include a Plantation fund surcharge and a sales tax. The plantation fund surcharge is estimated at 10% of the total sales revenue, which is the effective rate currently in the PRC. Sales taxes for timber raw materials and surcharges estimated at 5% of the total sales revenue. Price contingencies and interest during the construction period are excluded from the financial analysis calculations.

7. In addition to timber products, three NTFPs (berry fruit, wild grape, and potherbs) will be planted to the commercial forestry plantations. While forestry operations will take place in all 13 project counties, only those counties with new plantations will participate in NTFPs. These are: Boli for berry fruit; Huanan for wild grape; and Baoqing, Hulin, Linkou and Luobei for potherbs. NTFP sales are subject to a 7% sales tax on agricultural products. The economic life is 10 years for the three types of NTFPs. Economic life is 10 years for the three NTFP. Salvage value will be zero and no working capital will be released at the end of the project life for the commercial forestry and NTFP development.

8. The overall FIRR was calculated based on the above assumptions. The calculations are shown on Table A14.1. Since the FIRR is 20.52%, which is higher than the WACC, the proposed project is financially viable under the above assumptions. Since the NPV evaluated at the WACC is CNY451 million, and is greater than zero, again the proposed project is financially viable according to the NPV criterion. FIRR and NPV by Component and by County are shown in Table A14.2. This table shows that if calculations are conducted by type of operation, the FIRR for treatment of existing plantations is higher than that for new plantations. The main reasons for this are that existing plantations have the advantage of a sunk cost from their original planting, that treatment costs are lower than plantation costs, that volume outputs from treatment are assumed to be the same as those from new plantations, and that benefits from treatment are reaped after a shorter period than those of new plantations. Additionally, the FIRR for poplar treatment is higher than that for larch treatment, mainly due to a shorter rotation. Regarding the three NTFPs, these also show highly profitability based on the current market data analysis.

9. The results of sensitivity analysis for the major components are summarized in TableA14.3. Overall, forest improvement components are maintaining its FIRRs above WACC level after unfavorable changes in price, volume investment capitals.

D. Economic Analysis

10. The economic evaluation of the Project is from the view point of national benefits. Except for forestry plantations, other components of the Project are expected to generate either global environmental benefits or unquantifiable economic benefits. The forestry improvement operations that form the central part of the project’s revenue-generating activities will generate non-market benefits in addition to timber benefits and costs (e.g., soil conservation, regulation of water flows, biodiversity protection, and carbon sequestration). Additionally, the GEF-supported activities emphasize the global environmental values such as the protection of globally

endangered species. For both non-market benefits derived from the Project's forestry operations and the wetland conservation activities, the estimation of their economic values rely on its incremental contribution to national environmental benefits, not to global environmental benefits in the case of GEF-supported activities. For wetland protection, the major activities would focus on removing threats to globally threatened species through expenditures on technical assistance, education and training, and thus considered mostly for global environmental benefits.

11. Incremental economic costs for this project include the expenditures expressed in economic values for the forestry plantations component but not the GEF-supported investments. Economic costs for this forestry activities and NTFPs include initial investment costs and subsequent cash outflows. The analysis was conducted for the project life span of 25 years, including the construction period, which is conservative for the types of environmental benefits. The costs and benefits were expressed in CNY constant 2004 prices. The economic prices for tradable goods such as wood from larch, poplar, and equipment in the Project are estimated at border prices and are adjusted by transportation cost and handling cost (3% of border prices) from the port to the site. A standard conversion factor (SCF) of 0.99[2] has been used for adjusting the financial prices to economic prices for the Project. The shadow wage rate for unskilled labor was estimated at 0.8. The economic costs exclude taxes, duties and surcharges. The most important opportunity cost for the biodiversity protection components is the lost production due to land acquisition inside the natural reserves. The marginal loss of crop production in the Sanjiang Plain area has been estimated at approximately CNY 938/ha, or 63 RMB/mu. Since 157,630 hectares of cropland inside the wetland nature reserves are acquired, the lost value added will be CNY148 million per year. This represents a major opportunity cost of lands removed from agricultural production as a result of the project.

12. **Economic Benefits Related to Forestry and NTFP Investments.** The major benefits for forestry plantation include cash inflow related to timber expressed in economic prices. Additional economic benefits will flow from the presence of plantation, new seedlings and maturing trees as improved tree cover on the soil. Economic benefits derived from NTFPs are also assumed to be equal to the financial benefits, but valued at before-tax prices. Other than timber-related benefits include watershed improvement, flood control, soil erosion and other potential non-timber products. Those benefits are not easily quantified and have not been included in the economic analysis. Even though these environmental benefits would be quantifiable, the impact of the project size is too small to substantially attribute to the domestic benefits estimation. The benefits related to flood control may be estimated based on the avoidance of expected flood damages, especially those to public and private infrastructure and reduced losses of industrial and agricultural outputs. In the proposed project, they can be derived from the reduced losses of agricultural output. Like any other trees, larch and poplar or sequester carbon dioxide from the atmosphere during their natural growth. The proposed

[2] According to the methodology recommended by ERD Technical Note No.11 (Feb 2004), and the estimation circulated internally in June 2004.

plantation will help the PRC reduce greenhouse gas emissions while supporting watershed and wetland biodiversity protection. It has been estimated that forest can sequester more than 0.5 million tons of carbon over their rotation periods. However, the value of sequestered carbon is highly variable since the market for this commodity has not been established, therefore, not used in this analysis.

13. **Economic Benefits Related to GEF-Supported Investments.** The other five components are designed to improve global environmental values. This objective is accomplished through various interventions, including those that will produce marketable products as well as secondary benefits. Biodiversity/critical habitat benefits are not easily valued, especially since they are based on non-use values and can only be estimated through very costly and time-consuming surveys. After the GEF-supported activities are implemented, the Sanjiang Plain could become the most important wetland resort region in China. The recreational activities will include nature observation, bird watching, and camping. Re-hydration of wetlands includes groundwater recharge, moderating stream flows (mitigating floods and drought), reversing the change in the microclimate, protection of water supply, and others. These benefits can also be substantial but again, not easily quantified. Despite that both economic benefits from forestry plantation and GEF-supported investment are substantial, only economic benefits related to plantation, treatment and NTFP are incorporated in this economic analyses.

14. **EIRR and ENPV Calculations.** The Overall EIRR is derived from the economic benefits and costs related to the project, which are converted from the respective financial inflow and outflow as discussed above. 5% of sales tax and 10% of plantation fund imposed on the total timber revenue and the 7% sales tax on NTFPs are excluded from the economic estimation. The EIRR for the project as a whole is calculated at 36.15%, which is higher than economic opportunity cost of capital (12%). The net present value is CNY817.37 million, which is positive. Therefore, we can conclude that the project is viable from economic point of view.

15. **Labor and Impact on Poverty:** In addition to the above economic benefits, the project also provides employment opportunities to farmers in tree planting, stand treatment, logging and wood transportation. Once the plantations are mature there will be further employment opportunities in the harvesting, conversion and use of forest products, especially wood. Assuming the 47,110 ha of forestry operations (both plantation and treatment remain under tree cover and labor intensive methods are used for forestry operations), it is estimated that approximately 26,000 full-time jobs can be created in planting, treatment, logging and transport to woodyards (for 7 months for about 36,000 forestry workers on larch plantations, and for 6 months for about 10,000 forestry workers on poplar plantations).

Table A14.1: Overall FIRR and NPV Calculation

Year	Total Plantation	Total Stand Treatment	Total NTFP	Logging Rev. for	Total Transp.	Plantation Funds (10%)	Sales Taxes (5%)	Costs for Plantation	Costs for Treatment	Costs for NTFP	Total Forestry	Net Cash Flow
2005				0.00	0.00	0.00	0.00	(2.50)	(6.49)	(1.11)	(10.10)	(10.10)
2006		2.71		1.08	0.10	0.27	0.14	(7.51)	(19.48)	(3.32)	(30.31)	(29.19)
2007		8.12		3.25	0.29	0.81	0.41	(12.52)	(32.46)	(5.54)	(50.52)	(47.16)
2008		13.54		5.41	0.48	1.35	0.68	(12.52)	(32.46)	(5.54)	(50.52)	(44.91)
2009		26.68	1.78	9.22	0.92	2.85	1.42	(12.52)	(32.46)	(5.54)	(50.52)	(36.47)
2010		52.96	7.12	16.83	1.78	6.01	3.00	(2.50)	(6.49)	(1.11)	(10.10)	22.35
2011	1.24	71.93	16.01	22.40	2.47	8.92	4.46					50.43
2012	3.71	76.27	24.91	25.93	2.80	10.49	5.24					58.94
2013	6.19	83.31	33.80	30.53	3.23	12.33	6.17					68.57
2014	6.19	30.75	35.58	15.32	1.50	7.25	3.63					42.35
2015	12.20	17.61	35.58	11.51	1.27	6.54	3.27					38.59
2016	19.26	3.52	33.80	2.30	0.81	5.66	2.83					39.28
2017	30.83	0.00	28.47	0.00	1.03	5.93	2.96					40.16
2018	32.42	0.00	19.57	0.00	1.10	5.20	2.60					32.84
2019	34.01	60.70	10.68	24.28	3.35	10.54	5.27					50.66
2020	9.99	182.10	1.78	72.84	6.89	19.39	9.69					80.71
2021	3.98	303.50	0.00	121.40	11.03	30.75	15.37					126.33
2022	0.80	303.50		121.40	10.88	30.43	15.21					125.85
2023	0.00	303.50		121.40	10.84	30.35	15.18					125.74
2024	0.00	60.70		24.28	2.17	6.07	3.04					25.15
2025	13.71	0.00		0.00	0.49	1.37	0.69					5.68
2026	41.14	0.00		0.00	1.47	4.11	2.06					17.04
2027	68.57	0.00		0.00	2.45	6.86	3.43					28.41
2028	68.57	0.00		0.00	2.45	6.86	3.43					28.41
2029	68.57	0.00		0.00	2.45	6.86	3.43					28.41
2030	13.71	0.00			0.49	1.37	0.69					5.68
		IRR (%)=20.52		NPV=451.24								

Table A14.2: Summary of FIRR and EIRR by Investment Type and by County

Components	FIRR (%)	Financial NPV (million)	EIRR (%)	Economic NPV (million)
Plantation	9.63	50.14	16.20	18.06
Larch	6.19	32.64	8.04	-16.44
Poplar	19.02	32.45	29.25	24.67
Treatment	19.78	277.77	38.95	211.63
Larch	12.22	175.93	17.19	66.65
Poplar	83.36	101.84	87.60	128.63
NTFP	42.92	123.52	47.11	62.45
Berry Fruit	57.77	88.88	62.63	46.36
Wild Grape	30.12	24.60	33.75	11.62
Portherb	25.01	10.04	28.41	4.47
Total	20.52	451.24	33.83	292.14
Counties				
Baoqing	36.00	41.75	71.52	37.91
Boli	33.37	110.91	38.33	55.67
Fuyan	30.39	14.86	59.84	14.03
Hegang	10.92	(1.09)	17.39	12.81
Huanan	60.24	74.56	96.21	51.03
Hulin	28.89	40.37	53.59	33.66
Jidong	11.10	18.82	17.64	7.79
Jixian	18.06	22.40	34.15	16.69
Linkou	12.15	27.54	18.50	11.31
Luobei	13.21	26.42	19.92	11.88
Mishan	30.02	35.17	63.98	33.33
Qitaihe	10.68	12.98	17.04	5.03
Raohe	29.61	15.84	38.87	18.72
Total	20.52	451.24	33.83	292.14

Table A14.3. Summary of the Results of Sensitivity of the Major Activities

Variables	New Plantation		Treatment		NTFP	
	FIRR (%)	NPV (million)	FIRR (%)	NPV (million)	FIRR (%)	NPV (million)
Price +10%	11.08	67.98	23.10	356.13	45.34	137.80
Price -10%	7.91	31.92	16.20	199.42	40.31	109.23
Volume +10%	10.42	59.32	21.53	316.90	45.34	137.80
Volume -10%	8.76	40.58	17.96	238.65	40.31	109.23
Inv +10%	8.84	32.64	18.13	266.43	40.56	121.58
Inv -10%	10.51	45.58	21.73	289.12	45.59	125.45

Box 1. Analysis of Optimal Rotation for Larch and Poplar

A. Criteria for Choosing Optimal Rotation: In Faustmann approach, there are basically two types of criteria in choosing rotation age for plantation forests: one is biological criteria and one is economic criteria. The biological criteria calls for maximizing mean annual yield for the forest stand, and the economic criteria calls for maximizing net economic revenue of the forest operation. The biological criteria have been used by Chinese forestry authority to determine the level of allowable cut in the system of logging quota management. There has been increasing voice advocating for increased use of economic criteria in forest management decision.

B. Optimal Rotation Age based on Biological Criteria: Assuming timber volume grown on certain stand is Q(T), where T is the age of the forest. To use biological criteria, the basic problem is to choose rotation age T in order to maximize Q(T)/T. Optimal rotation is when Q'(T) = Q(T)/T, which means to gain maximum sustained yield (MSY), condition of marginal yield equaling mean annual yield has to be met.

C. Optimal Rotation Age based on Economic Criteria: There are two scenarios in utilizing economic criteria. One is that the land user would only consider forest operation for one rotation. Another is that the land user wants to manage forest forever. The conditions to reach optimal rotation age for the two scenarios are different and so are the lengths of the optimal rotation.

Single rotation problem, Max: NPV = PQ(T)e(-rT) – C, where P is the price of wood upon harvesting and C is startup cost for the forest, r is discount rate. Optimal condition for the problem: Q'(T)/Q(T) = r, which means to maximize NPV, when should choose a rotation such that annual growth rate equals discount rate. Infinite rotation problem is, Max: NPV = PQ(T)e(-rT) – C + NPV e(-rT). The problem can be converted into: Max: NPV = [PQ(T)e(-rT) – C]/[1- e(-rT)]. First order C for the problem is: PQ'(T) = r [PQ(T) – C] / [1- e(-rT)].

D. Rotation analysis for Larch and Poplar in the Sanjiang Plain Wetland Protection Project: In the Sanjiang Plain Wetland Protection Project under preparation, there are 6,800 ha of larch and 3,200 ha of poplar to be planted in order to enhance forest resources and ecological function of Sanjiang Plains. Wood produced from the plantation will supply Jiamusi Paper Mill for fiber production based on a contract between the mill and the provincial Department of Forestry. Technical parameters, including rotation length of the plantation, usually have to be agreed upon between the paper mill and the wood supplier, also in conformity with the national plantation standard.

E. Economic analysis of forest harvesting schedule. To conduct economic analysis of harvesting schedule, sufficient data on forest yield is necessary. In this case, there is good data on forest yield for larch (forty years of data). Forest growth and yield data for poplar plantation is of short time period due to the limited practice in industrial poplar plantation. We only have data on the poplar species for 15 years. The project is to be funded with an ADB loan. Thus, the single rotation decision problem is more relevant to the project. It is assumed the range of discount rate is from 3% to 6%, the Faustmann formula gives net present value for larch and poplar for each potential harvesting age. Other assumptions are listed as follow: (i) Price for larch: 400 yuan, roadside; (ii) the estimated investment cost for larch is 5200 yuan, to simplify calculation, assuming the investment cost all occurs at the beginning of the project, (iv) Price for poplar: 380 yuan, roadside, (v) Investment cost: 4620 yuan. Net

present value (NPV) for different rotation length and different discount rate are shown on Figure 1 and F. Results and Conclusion: From figure 1: NPV for larch, we can see the optimal rotation is around 30 years when discount rate r=3%; rotation is between 20 to 25 years when r=4%. Rotation is around 20 years when r=5% and r=6%. Using WACC (~6%) as the reference discount rate, the proposed rotation age of 20 years is optimal in economic sense. From figure 2: within the 15 years period that we have data, NPV keep growing for all four different discount rate, indicating that for the case we are analyzing, the optimal rotation age is over 15. Due to the nature of limited data and limited experience in the PRC, the results are not conclusive for poplar trees. One rationale for paper mill to prefer 10 years old poplar and 20-25 years ole larch is that they reach similar breast diameter at these two ages (around 14-18 cm, see table 1 and 2). To use two different species, similarity in diameter will reduce the cost of processing in the paper mill, which is economically sensible considering fiber cost is the major part of the paper mill cost.

Figure 1: NPV for Larch

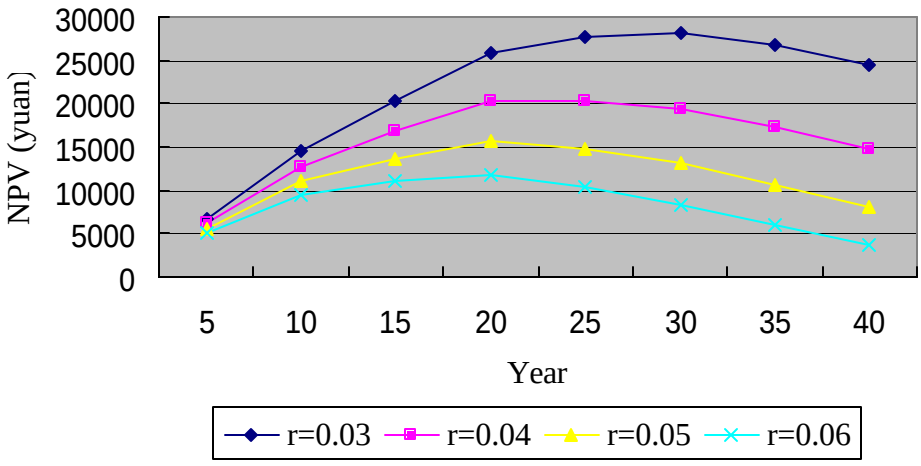


Figure 2: NPV for Poplar

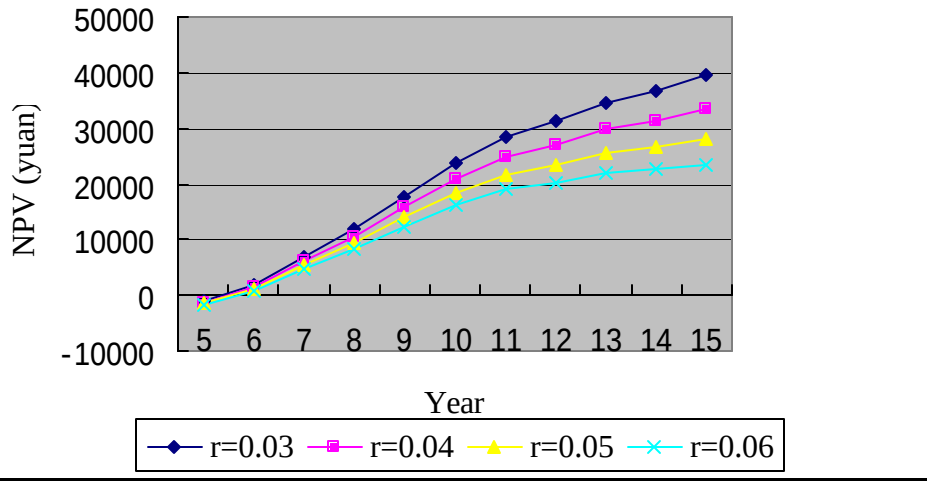


Table 1: Growth Table and NPV Calculation for Larch

	Height	Diameter	Volume	Average Growth	Marginal Growth	Gorwth Rate	NPV (Single Rotation)			
Year	(m)	(cm)	(m3/ha)	(m3/ha)	(m3/ha)	(%)	r=0.03	r=0.04	r=0.05	r=0.06
5	4	4.6	34.60	6.92	6.92	0.2000	6712	6131	5579	5053
10	8.8	8	66.80	6.68	6.44	0.0964	14595	12711	11006	9464
15	12.5	11.2	100.00	6.67	6.64	0.0664	20305	16752	13695	11063
20	15.3	14.2	141.60	7.08	8.32	0.0588	25885	20250	15637	11860
25	18	17	174.00	6.96	6.48	0.0372	27677	20404	14741	10330
30	20.5	19.8	204.70	6.82	6.14	0.0300	28090	19462	13070	8335
35	23.9	23.5	228.60	6.53	4.78	0.0209	26798	17349	10690	5997
40	25.3	25.1	246.10	6.15	3.5	0.0142	24450	14675	8122	3730

Table 2: Growth Table and NPV Calculation for Poplar

	Height	Diameter	Volume	Average Growth	Marginal Growth	Gorwth Rate	NPV (Single Rotation)			
Year	(m)	(cm)	(m3/ha)	(m3/ha)	(m3/ha)	(%)	r=0.03	r=0.04	r=0.05	r=0.06
4	5.70	5.60	4.20	1.05	1.05	0.2500				
5	7.20	8.10	10.50	2.10	6.30	0.6000	-1186	-1353	-1513	-1664
6	9.00	10.40	20.70	3.45	10.20	0.4928	1950	1568	1207	868
7	10.90	12.70	37.80	5.40	17.10	0.4524	7023	6236	5502	4818
8	12.40	14.50	55.20	6.90	17.40	0.3152	11880	10612	9441	8360
9	13.40	16.60	76.95	8.55	21.75	0.2827	17702	15781	14025	12420
10	14.20	18.50	100.50	10.05	23.55	0.2343	23672	20980	18543	16339
11	14.70	20.00	120.45	10.95	19.95	0.1656	28286	24858	21788	19037
12	15.10	20.90	135.00	11.25	14.55	0.1078	31171	27124	23534	20350
13	15.70	21.70	152.10	11.70	17.10	0.1124	34513	29742	25553	21875
14	16.10	22.40	165.90	11.85	13.80	0.0832	36802	31390	26686	22596
15	16.50	23.20	182.25	12.15	16.35	0.0897	39539	33388	28094	23537

SUMMARY POVERTY REDUCTION AND SOCIAL STRATEGY

Linkages to the Country Poverty Analysis

Sector identified as a National Priority in Country Poverty Analysis? Yes	**Sector identified as a National Priority in the Country Poverty Partnership Agreement?** Yes

Contribution of the sector/sub-sector to reduce poverty in the PRC: Through plantation, treatment of existing plantations, development of non-timber forest products, many employment opportunities and diversified and more sustainable livelihood opportunities can be accorded to the poor forest workers and farmers, as well as the minority groups and women. The development of alternative livelihoods will also help the poor shift to sustainable use of the natural resources while generating income, thus reducing the pressure for wanton cultivation of environmentally fragile areas of the Sanjiang Plains by poor households. In the medium - to long-term, they can also benefit from the high returns of forest plantations when these reach maturity. With farmland conversion to wetland and the establishment and rejuvenation of natural reserves, the local vulnerable environment will be improved, which in turn will reduce the occurrence of natural disasters such as flooding, and will improve the yield performance of poor households who are producing non-timber products. The proposed project's good practices on the development of sustainable livelihood options, plantation of forest products, treatment of existing plantations, and sustainable development of nature reserves can serve as models that may be replicated in the PRC's other environmentally fragile areas with a poor population base.

Poverty Analysis **Proposed Classification: None Poverty Intervention**

The national-level official rural poverty lines for Heilongjiang Province are RMB1,300 per capita net annual income for the poverty villages and RMB1,000 RMB per capita net annual income for the poverty households (which is comparable to the ADB's poverty threshold for the country). Of the 13 cities and counties of the Project in the Sanjiang Plain, there are three nationally designated counties (Raohe, Huanan, and Fuyuan). The rural poverty population in these Counties is 388,692 persons, accounting for 15% of the total poverty population of the Province. The poverty incidence is 9.7% in Heilongjiang, and is 9.19% in the directly affected project area. Therefore, there are not severe poverty issue in directly affected project areas, and, this project is classified as the "none poverty intervention."

In comparison with the average household in the province, poor households in the poverty villages of the Project area obtain their income from farming and have less income from livestock and migrant labor. Many of the poor farmers in the Project area live in and around the nature reserve. They depend primarily on earnings from the cultivation of land from the nature reserve that have been converted to farmland or from work in the state forestry/agricultural farms that are located in or adjacent to the nature reserves. Some of these farmers (referred as permanent residents) have obtained long-term user rights of arable land that have been allocated to them by the village committees. Other farmers (or contract farmers) who are not recognized by the local governments as local residents of the area obtained short-term contracts to farm land plots owned by state forest and agricultural farms. Aside from these poor farm households, there are about 10% of the total households in the state forestry and agriculture farms that can be considered as poor. The income sources of these poor households are 60% from farming, 10% from collecting agarics, mushrooms and wild vegetables gathered from the nature reserve area, 10% from forestry/agriculture farm salaries, and 20% from other sources such as animal husbandry and fruit trees. Because of the various national and provincial policies to protect the forestry and wetland resources, incomes of forest workers have declined through the years as their tasks have been limited largely to tending the trees and to tree planting. Underemployment is high among them, with a typical farm worker providing about 3-4 months a year of work and earning RMB 2,500 for these work services.

Though poverty is not extensive, a key cause of income poverty is the lack of limited livelihood opportunities both at the on-farm and off farm levels. Where there is work in the state forestry/agriculture farms, these are more and more being constrained by public policies that protect and conserve the already fragile and limited forestry and wetland areas of Sanjiang Plain. With limited skills for other income earning activities and constraints to credit access, these poor farm households and workers tend to be risk averse to changing their farming work, which at present provides them secure and stable income, despite the more frequent occurrence of natural disasters (like drought, water logging, flood, early forest, and soil erosion) that adversely impact their farm income.

The other disadvantaged groups in the Project area include women and minority groups. Not only do the women perform the household chores, they are also engaged in productive activities. Women contribute 50%, 70%, and 60% of forest, agarics, and crop production. In crop (mainly rice, corn, and soybeans) production, women take about 60% of workload on land preparation, planting, weeding, fertilizer application, and harvesting. In logging operations, women are responsible for cutting the limbs, preparing the fuel wood, and tending the tress. About two-third of those employed in the paper processing and other agro-processing facilities are women. Because of their huge contribution to farming and forestry-related activities, women have a say in their respective households over the sales of the most of the products.

However, within the villages and the state forestry/agriculture farms, women's participation in the planning and decision-making process is still limited; they are constrained to borrow funds; and they have limited access to skills-enhancing activities.

Raohe is the main county with a small group of ethnic minoriy. Currently, there is no project component in the vicinity of Hezhe minority villages in Raohe County. Korean people in the villages of Yongfeng and Dongsheng in Raohe County might be affected by conversion of 300 ha of farmland to wetland restoration in the Dajiahe Nature Reserve, if the selected areas are confirmed. A total of 37 households would be affected by the loss of land and related income from paddy farming. The adverse impacts on the two Korean villages can be compensated under the resettlement plans and mitigated under the Village Development Fund to develop alternative livelihoods.

Participation Process

Stakeholder analysis: A stakeholder analysis was conducted during the PPTA and roles of each stakeholder are well defined. The stakeholders at each level were consulted during PPTA: government ministries/agencies at the national to local levels, local governments from provincial down to village levels, state-owned and local forest/agriculture farm leaders, workers, women, rural community leaders, the poor farmer households, minorities, and NGOs. Their expectations and needs were identified, the potential project impacts on them were identified, and the resettlement plans, gender development plans, minority development plans, and public participation plans were developed in consultation with the stakeholders.

Participation strategy: To strengthen the project design and enhance the sustainability of the project, a community-based approach to project planning, implementation, monitoring and evaluation will be emphasized during all phases of project implementation. To enhance the sense of ownership, three community level project working groups will be set up: project planning working group, project implementation group, and project monitoring group. These groups will play different roles throughout the project. Each group will include community leaders, women, and the poor.

Gender and Development

Gender Analysis: The division of labor by gender is evident in the project area -- men are more inclined to conduct outside activities, operate as migrant labor and conduct heavy physical activities while women are more responsible and intend to carry out farming and household chores. Women have lower education levels than that of men. Women have also less representation in community affairs. Other features of women participation and involvement in the economic activities have been detailed above.

Gender and development plan: The project will not have significant negative impacts on women, but a gender development strategy has been strengthened in the project design given the fact that local project staff have low gender sensitivities and lack the knowledge and skills for gender analysis and incorporation. The gender development action will ensure the equal participation of women in project activities and from project benefits

Potential Issues

Subject	Significant/ None/ Uncertain/	Strategy to Address Issues	Output
Resettlement	Significant	Resettlement Plan (RP) will be prepared in line with ADB policy.	Full RP
Affordability	None	This project does not provide services in nature. The affected people neither need to buy services that are generated from this project nor will be affected to afford other services.	None
Labor	None	Surplus laborers (working time) are common in the project area. Alternative livelihood projects have been designed in the Project.	None
Minorities	None	The minorities are primarily located in Raohe county, but not directly affected by the Project. Some of the farmland which may have to be converted to wetland in individual cases, will be given the special consideration in employment opportunities in new forest plantations, and treatment of existing plantations, and alternative livelihoods. They can also own the trees to be planted in their contracted land. The local government will also compensate for their land converted to wetland, and will be fully compensated according to resettlement framework.	None
Other risks/ vulnerabilities	None		

PROFILE OF WETLAND RESOURCES AND BIODIVERSITY IN THE SANJIANG PLAIN

1. The purpose of this Supplementary Appendix is to review the wetland and biodiversity resources, and the nature conservation situation in the Sanjiang Plain. This section briefly describes wetlands and nature reserves in China, Heilongjiang Province, and in the Sanjiang Plain. Globally significant biodiversity of the Sanjiang Plain is described, and its conservation status discussed. Also described are relevant international and national plans that have been developed in response to international conventions (Biodiversity Convention and Ramsar Convention).

A. Wetlands and Nature Reserves in China

2. China's natural inland wetlands cover some 25 million ha—roughly 11 million ha are marsh, and some 12 million ha are shallow lakes. The remaining 2 million ha are rivers and streams. Man-made wetlands in China total about 38 million ha, consisting mainly of paddy and fishponds. Inland wetlands in China support abundant and diverse fauna and flora. The Sanjiang Plain alone has recorded 75 species of mammals and 339 species of birds, many of which are wetland species.

3. By mid-2003 China had established 1,757 nature reserves (NR) covering a total of over 130 million hectares (ha), or 13.2% of the national land area. Over 12 million ha of that total, or nearly 10 percent, protects wetlands, representing nearly half of the estimated total of 25 million ha of natural wetlands in China. By 2000 Heilongjiang Province accounted for 115 of China's 1,276 NRs and over 2.2% of the protected area. By 2010 China plans to establish more nature reserves to raise the total land area under NRs to 155 million ha, or 16.1 percent of the national land area (Xinhua News Service, 11 July 2001).

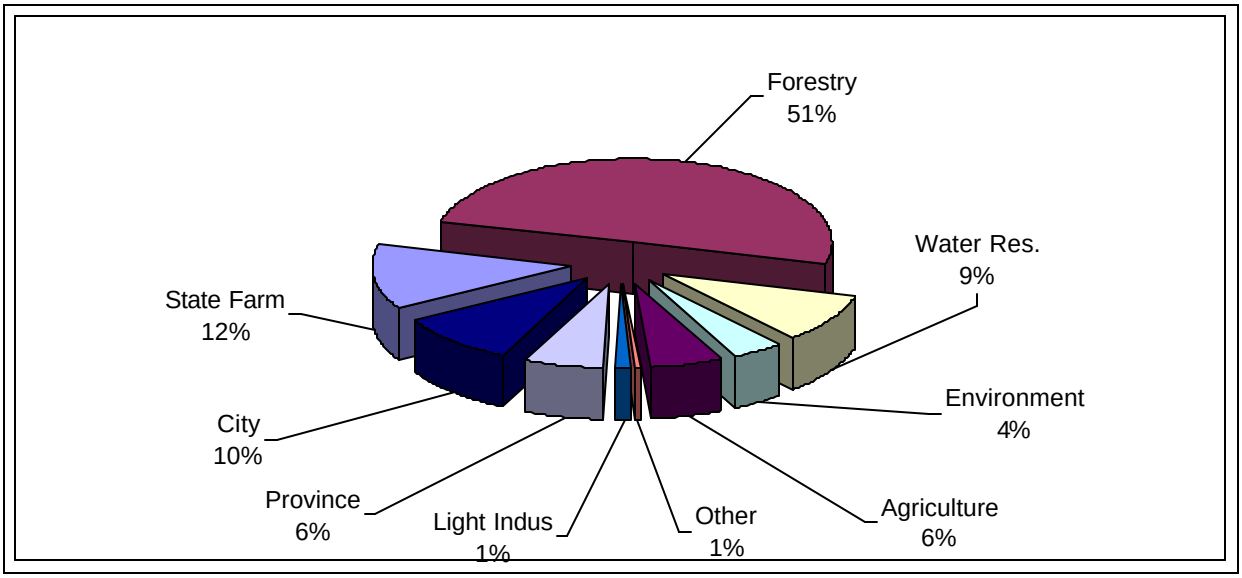
4. Heilongjiang Province supports 4.34 million ha of wetlands **(Table A-1).** By September 2001 Heilongjiang Province had established 58 wetland nature reserves to protect 1,949,000 ha of these wetlands, an area equal to 4.3 % of the total area of the Province (454,800 km^2). Many management authorities are responsible for the wetland nature reserves, with many small reserves, for example, under management of the State Farm General Bureau. In terms of total area of wetland nature reserves, however, the greatest portion is managed by the Forestry Department of Heilongjiang Province **(Figure A-1),** which is directly responsible for over half of the total area of protected wetlands.

Table A-1. Wetland Area of Heilongjiang Province by Four Major and Nine Secondary Wetland Classes

Class	Sub-Class	Area (ha)
Riverine wetlands		
	Permanent river	337,500
	Floodplain	123,500
Lacustrine or lake wetlands		
	Permanent freshwater lake	315,000
	Permanent alkaline lake	112,000
Swamp and marsh wetlands		

Class	Sub-Class	Area (ha)
	Permanent freshwater marshes/pools	132,000
	Non-forested peatlands	3,020,000
	Shrub-dominated wetlands	132,000
	Freshwater, tree-dominated wetlands	35,000
Man-made wetlands		
	Water storage areas and ponds	132,000
Total Wetland Area		**4,339,000**

Figure A-1. Heilongjiang Province's wetland nature reserve area by administrative authority



B. Wetlands and Nature Reserves in Heilongjiang Province

5. Six types of nature reserves have been established in Heilongjiang Province **(Table A-2, Figure A-2).** Of these the greatest land area is covered by inland wetland and aquatic nature reserves. The strong representation of wetland and aquatic habitats reflects the national and international importance of the wetlands in the Sanjiang Plain and Song-Nen Plain (of western Heilongjiang Province) for biodiversity conservation.

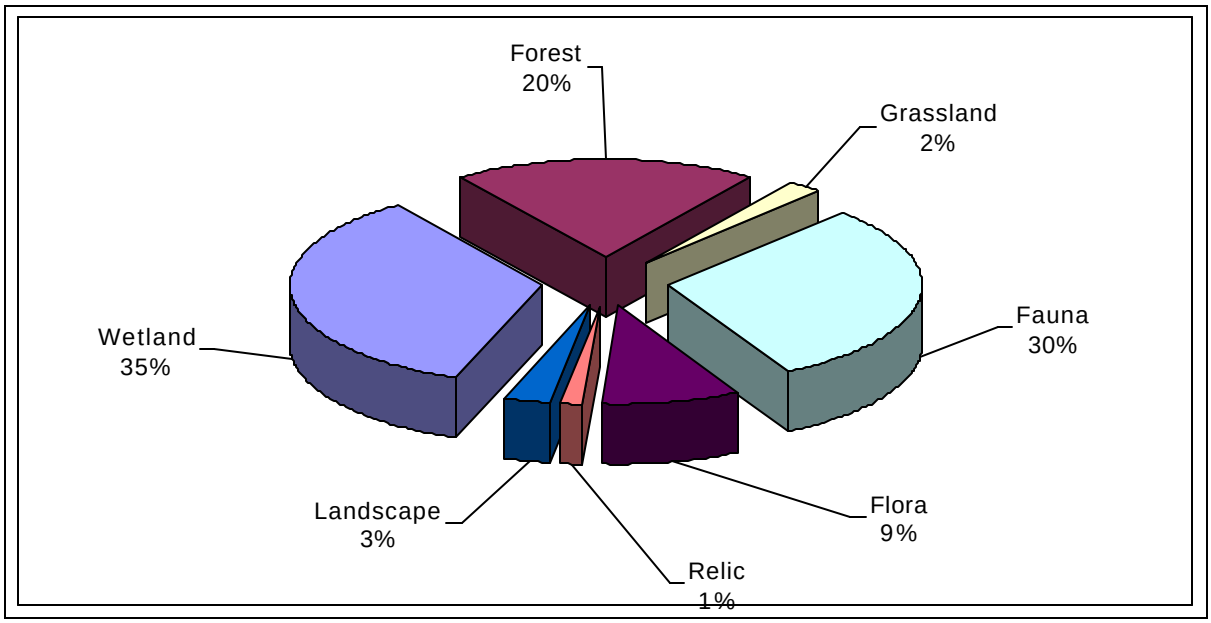
Table A-2. Heilongjiang Province Nature Reserves at Year-end 2001 Listed by Conservation Objective

Type of Nature Reserve	Number	Area (ha)	% of Protected Area
Forest	28	646,731	20%
Grassland-meadow	9	69,933	2%
Inland wetland and aquatic	48	1,150,932	35%
Wild animal	36	1,005174	30%
Wild plant	13	288,394	9%
Natural relic & landscape	8	149,213	4%
Total	**142**	**3,487,255**	**100%**

6. By the end of 1997, all national nature reserves had been assigned managers. However, around one-third of provincial reserves and one-fourth of county reserves had not been assigned any management staff. A target established by the Heilongjiang Environmental Protection Bureau (HEPB) called for installation of "sound managing agencies and personnel" at 90% of the national nature reserves and 70% of all other nature reserves during the period 2001–2010.

7. To meet this management target will require improvement in the employment conditions. Most reserves offer low salaries, sometimes harsh living conditions, and limited career prospects. These factors discourage many talented people from working at nature reserves. In addition most nature reserve managers are not trained in natural resources, much less in protected area management. Thus it will be extremely difficult for nature reserves to establish "sound managing agencies and personnel" unless levels of compensation are increased and opportunities for career development are made available.

Figure A-2. Heilongjiang Province nature reserve land areas at year-end 2001 shown by conservation objective



C. Wetlands in the Sanjiang Plain

8. The Sanjiang Plain is the largest of China's wetland areas. It lies in the farthest northeast region of China and lies entirely within Heilongjiang Province. It covers an area of 108,900 km^2 near the confluence of the Heilong, Songhua and Wusuli Rivers from 43^{o}50'-48^{o}30'north and from 128^{o}30'-135^o east (Liu Xing-tu and Ma Xuehui 2002).

9. The Sanjiang Plain itself actually consists of variable landforms, including a low mountain range, the Wandashan, with elevations up to 1000 meters, which bisects the Plain. Alluvial plains below 200 meters above sea level, including the vast floodplains of the Heilong, Songhua and Wusuli Rivers cover over half of the total area of the Plain. Xingkai Lake (Xingkaihu) or Lake Khanka (in Russia), on the Russian border, is a shallow lake on the southern Sanjiang Plain, and the largest freshwater body in northeast China or the Russian Far East (4,380 km^2). Wetlands

were once found throughout the alluvial plains, across the floodplains, along the Xingkai Lake and into the tributary watersheds of the three major rivers, but undrained wetlands remain now primarily in unaltered sections of river floodplains.

1.1 History of Wetland Biodiversity Loss in the Sanjiang Plain

10. The recent history of resource exploitation in the Sanjiang Plain can be subdivided into five periods. The first record of exploitation was in 1743 when a 4.5 km^2 area of the marsh was converted to croplands to feed soldiers posted at the frontier. From that small beginning the marsh was converted to agricultural uses at a slow pace through 1956. As late as 1949, only some 820 km^2, or less than 1% of the Sanjiang Plain had been converted to croplands. At that time large carnivores including Far Eastern Leopard *Panthera pardus orientalis*, Siberian Tiger *Panthera tigris altaica*, and bears (Asiatic Black Bear *Ursus thibetanus* and Brown Bear *Ursus arctos*) were common.

11. From 1956 through 1978, the second period of exploitation, the pace of wetland conversion accelerated. Some 100,000 troops helped to drain and reclaim 20,490 km^2 of marshland for cropland from 1956-1974, raising the farmland total to over 18% of the Sanjiang Plain area. Most of the population of some 6 million people in 1974 lived near the largest urban areas at Jiamusi, Hegang, and Shuangyashan. Thus the human impact on the remote portions of the Plain was not severe. This was shown by a 1976 survey of rare and endangered fauna in Heilongjiang Province that counted several thousand cranes (including nearly 1,000 Red-crowned Cranes *Grus japonensis*) and thousands of Whooper Swans *Cygnus cygnus* nesting in the Sanjiang Plain. Over 100 Oriental Stork *Ciconia boyciana* nests were occupied at that time in the area that later became Honghe National Nature Reserve. Wild mammal skins sold in 1978 in the Sanjiang Plain represented over 36,000 Siberian Weasels *Mustela sibirica*, 562 Sable *M. zibellina*, 120 deer, 102 Wolves *Canis lupus*, and over 10 bears (probably *U. thibetanus*)[1].

12. The third period of exploitation lasted seven years from 1978–1985, and was characterized by massive conversion of wetland to farmland that degraded the Sanjiang environment. The area of wetland was reduced to less than half of that in the pre-1956 era, and forest cover was reduced by one third from the 1960s. The human population grew to over 7 million by 1978, but was still somewhat concentrated in urban areas. Commercial markets still existed for wildlife skins. Pelts of wolves (132 pelts) and bears (12 pelts) were sold as late as 1983.

13. From 1985–1996, the fourth period of exploitation is considered the peak of human influence on the plant and animal resources of the Sanjiang Plain. As the human population grew beyond 8 million the environment was degraded by continued agricultural development, increasing pollution, and unsustainable taking of wildlife. Sharp declines were observed in numbers of all wildlife, but particularly for waterbirds. Oriental Storks nearly disappeared and, duck and goose numbers declined by 90 percent. Flocks of tens of thousands of ducks and geese seen in earlier years were represented by only tens of breeding pairs by 1996.

[1] ADB Songhua River Flood, *Wetland and Biodiversity Management Project, Interim Report,* March 2001.

14. From 1996–2000, the fifth period of exploitation, protection and restoration of wildlife began. The Wild Animal Protection Law of 1988 was implemented during this period and led to reduced pressure from hunting and egg collecting. Nesting populations of Oriental Storks, Red-crowned Cranes, and White-naped Cranes began to increase slightly, but remain severely depressed from prior levels. Migrating flocks of waterbirds increased, with, for example, a total of over 12,000 Greylag Geese seen in Yanwodao NR in October 2000. Common Pheasant *Phasianus colchicus* numbers began to increase and flocks of ten or more birds once again could be easily seen. Among mammals, roe deer and hare numbers also began to recover in certain protected areas.

1.2 Continuing Decline of Sanjiang Plain Wetland Area

15. Prior to the agricultural and urban developments of the late 20th century, the Sanjiang Plain was the largest tract of wetlands in East Asia outside of Siberia. Changes in wetland and farmland areas on the Sanjiang Plain have been estimated by a number of sources. **Table A-3** shows the TA team's estimates of the decline in wetland area since the founding of the People's Republic of China in 1949.

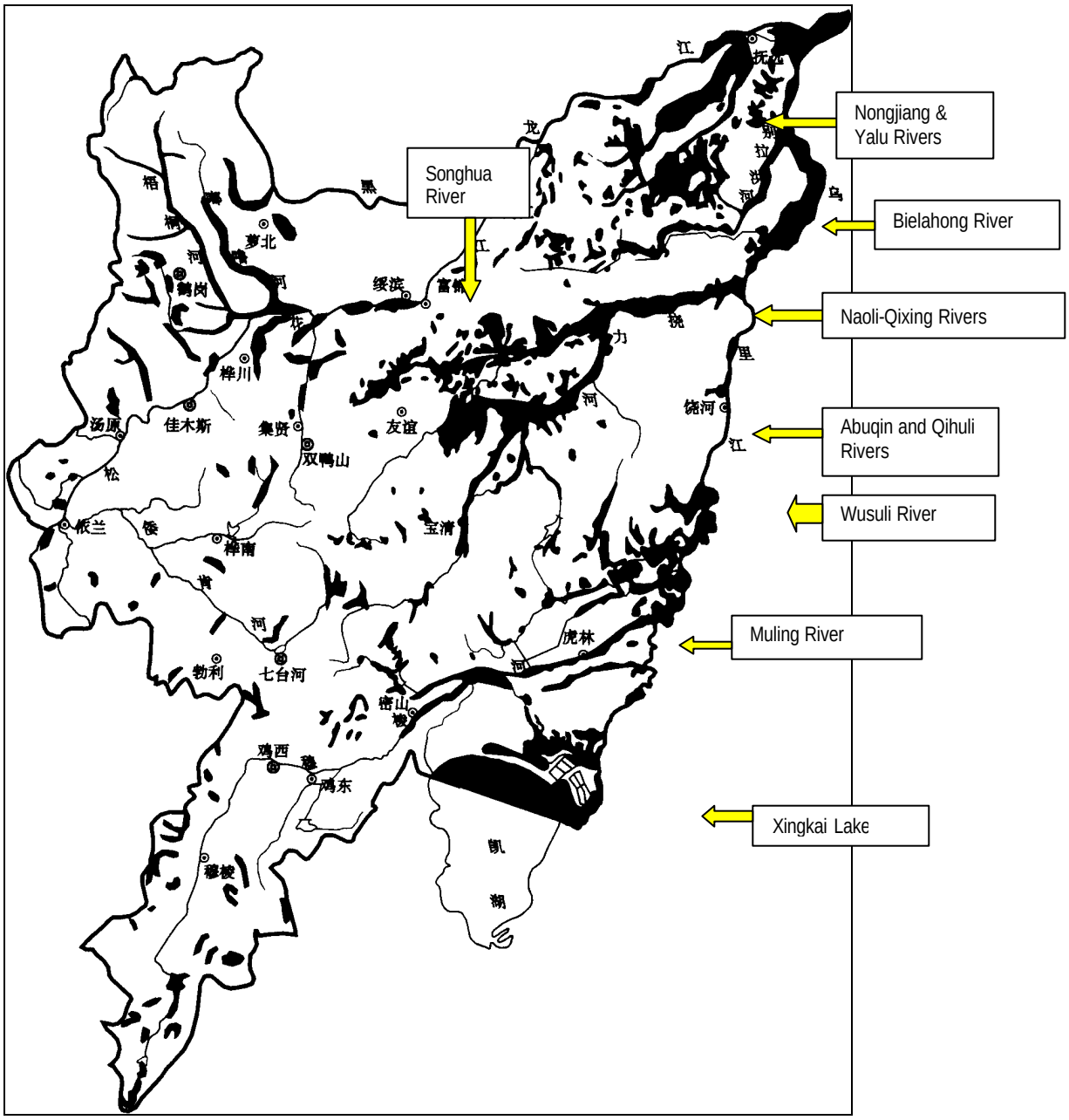
Table A-3. Estimates of Wetland and Farmland Area on the Sanjiang Plain from 1949 through 1994

Year	Wetland on Sanjiang Plain		Farmland on Sanjiang Plain	
	Area (ha)	Percent	Area (ha)	Percent
1949[1]	5,340,000	49.0%	786,000	7.2%
1983	2,275,700	20.9%	3,778,300	34.7%
1994	1,481,600	13.6%	4,572,400	42.0%
2000[2]	889,786	8.2%	5,164,214	47.4%

[1] data from Liu Xingtu and Ma Xuehui 2002 except for year 2000
[2] data source: Center for Chinese Agricultural Policy unpublished data

16. This rapid rate of wetland loss is alarming because it continued during the 1990s when wildlife populations began to recover from severe hunting pressure in the Sanjiang Plain. Reduced hunting pressure may allow partial recovery of wetland wildlife populations, but wetland habitat losses will limit the potential for population recovery, particularly for waterbirds, unless habitat can be restored. If habitat losses continue at the 1949-2000 rate, waterbird populations are likely to suffer irreversibly, and some large species eventually may be reduced beyond viable population levels. Remaining wetland areas in the Sanjiang Plain as of 2001 are shown on Figure A-3.

Figure A-3. Remaining wetland areas on the Sanjiang Plain in 2001[2]



1.3 Status of Sanjiang Plain Biodiversity

17. Wetland vegetation on the Sanjiang Plain is dominated by sedge and grass meadows and reed marshes, with shallow lakes, ox-bow lakes, riparian willow woodlands, and tussock and shrub-dominated wetlands as less important wetland types. Mixed coniferous (*Pinus, Larix, Abies, Picea sp.*) and broadleaf (*Quercus, Betula, Tilia sp.*) forests covered most of the upland and mountain sites in pre-human times. The Sanjiang Plain was more than 50% forested in the late 1800s. This habitat can still be seen in Russia's nature reserves east of the Wusuli River

[2] Liu Xingtu & Ma Xuehui. 2002. Natural Environmental Changes and Ecological Protection in the Sanjiang Plain. China Science Press, Beijing, 355p.

and north of the Heilong River, but not on the China side where it has been overexploited. Forests now account for only 10% of the Sanjiang Plain, most of which are part of managed state forest farms. The few remaining lowland forests are represented by small patches in protected areas and along the upstream reaches of the Wusuli River.

18. Agricultural land, much of it devoted to corn, soybean and rice production, now dominates the Sanjiang Plain landscape. Shelterbelts planted in agricultural areas (primarily poplar species) line the agricultural fields, providing wind erosion control, and some fuel/ fiber. But these areas contribute little to biodiversity conservation because they are planted in narrow strips, typically consisting of one or two tree species, and they lack understory vegetation due to heavy grazing pressure.

19. Losses and degradation of wetland and forest habitats have caused biodiversity declines. For many species the extent of population reduction cannot be estimated because there are no records from the pre-development era. However, declines can be estimated for some species for which data exist or assumptions can reasonably be made (**Table A-4**).

Table A-4 Estimates of declines in Sanjiang Plain populations of globally threatened species from 1950-2004

Species	Global population	Sanjiang Plain status		% Change	Notes on Estimation of Population Change
		pre-1950	2004		
Siberian Crane	3,000	100	accidental	>-95%	Greater than 95% population decline is based on the assumption that at least 100 cranes migrated via the Sanjiang Plain to the Yangtze River pre-1950, as compared to nearly zero today. This compares with annual counts of up to 806 on spring migration in the Song-Nen Plain during the years 1981-1993.
Amur Sturgeon	unknown	abundant	rare	-90%	90% decrease is estimated based on interviews with Chinese and Russian fisheries professionals in 2003-4.
Kaluga	unknown	abundant	rare	-90%	90% decrease is estimated based on interviews with Chinese and Russian fisheries professionals in 2003-4.
Scaly-sided Merganser	4,000	unknown	extinct	-100%	Not recorded in Sanjiang Plain since 1980s.
Swan Goose	50,000	>1,000	<100	-90%	90% population decline is based on estimates from Heilongjiang wildlife conservation professionals in 2004.
Oriental Stork	2,500	1,100	150	-86%	93% population decline is based on an estimated pre-1950 stork density of 1 breeding pair/100 km2 on the non-mountainous portion of the Sanjiang Plain (55,000 km^2), or one tenth the stork density reported for Honghe NNR in 2002.
Red-crowned Crane	3,000	2,600	200	-92%	Pre-1950 estimate is based on half the reported 1998 density of nests at Honghe NNR (10 nests in 210 km2) extrapolated over the non-mountainous portion of the Sanjiang Plain (55,000 km^2).

Species	Global population	Sanjiang Plain status		% Change	Notes on Estimation of Population Change
		pre-1950	2004		
Tiger	300	109	5	-95%	Pre-1950s abundance is based on a density of 1 tiger per 1,000 km2, similar to that found in Primorski and Khabarovski Krais today (see Miquelle et al. in *Riding the Tiger*, 2002).
Lesser White-fronted Goose	50,000			-90%	90% population decline is based on estimates for all duck and goose populations in the Sanjiang Plain..
Baikal Teal	300,000			-90%	90% population decline is based on estimates for all duck and goose populations in the Sanjiang Plain..
Baer's Pochard	20,000			-90%	90% population decline is based on estimates for all duck and goose populations in the Sanjiang Plain..
White-naped Crane	5,300	6,250	500	-92%	Pre-1950 estimate is based on half of the density of 25 pairs nesting at Changlindao and Yanwodao (22,000 ha total area) in 1999 extrapolated over the non-mountainous portion of the Sanjiang Plain (55,000 km^2)

All source data for estimates of bird populations is from BirdLife International (2001) *Threatened birds of Asia: the BirdLife International Red Data Book.* Cambridge, UK: BirdLife International.

20. In spite of the devastating population declines described in Table A-4, the Sanjiang Plain remains noteworthy for its rich biodiversity. Sanjiang Plain wetlands are ranked as globally important in the *Directory of Asian Wetlands*. According to Ni Hongwei et al. (1999)[3], there are about 1,000 species of plants and 37 ecosystem types in this area. The Sanjiang Plain also supports some 528 species of vertebrate fauna **(Table A-5, Annexes C through F).** Larger wild mammals have been virtually eliminated, but a diversity of smaller mammals, birds, amphibians, reptiles, fish, and invertebrates are present. The Sanjiang Plain is world-renowned for its waterbirds, most notable of which are the cranes. Of the 15 species of cranes in the world, nine have been recorded in China wetlands, six have been recorded in the Songhua basin, and four species nest there (Ma Yiqing 1987)[4]. Red-crowned and White-naped Cranes nest on the Sanjiang Plain (**Annex H**). Additionally, the Heilong and Wusuli Rivers support the Huso (Kaluga) Sturgeon *Huso dauricus* and Amur Sturgeon *Acipenser schrenckii*, both of which are globally endangered.

[3] Ni Hongwei et al. 1999. Plant diversity of Honghe Nature Reserve in Sanjiang Plain I. Alnus hirsuta-Betula ovalifolia-Calamagrostis angustifolia marshy meadow. Land and Nature Resource, (3).

[4] Ma Yiqing, Jin Longrong. 1987. The numerical distribution of the Red-crowned Crane in Sanjiang plain area of Heilongjiang province. Acta Zoologica Sinica, 33(1):82-87

Table A-5. Estimates of Species Richness for Heilongjiang Province and Sites in the Sanjiang Plain

	Heilongjiang Province	Sanjiang Plain	Sanjiang Plain
Source	HEPB 1998[5]	Liu Xingtu & Ma Xuehui (2002)	UNDP/GEF(2002a)
Vascular plants	2,114	>1,230	
Mammals	87	71	75
Birds	358	325	339
Reptiles		13	14
Amphibians		11	11
Fish	105	82	89

21. The Sanjiang Plain supports 24 species that are listed in the World Conservation Union IUCN Red List as globally threatened species (see **Annex Ga** for IUCN Red List categories). Of these only the Siberian Crane is critically endangered, 7 species are endangered, and 16 species are vulnerable. Of the 23 "endangered" or "vulnerable" species in the Sanjiang Plain, 21 are wetland species, and the Asiatic Black Bear and Tiger will use wetland habitats. Twelve of these species are waterbirds (cranes, waterfowl, gulls, other wading birds).

22. The distribution of these species across eleven of the nature reserves of the Sanjiang Plain is shown in **Table A-6.** The listing shows that each of the listed nature reserves or areas supports numerous threatened species.[6] Much of the variation in presence of threatened species may be due to the fact that some nature reserves have been studied more intensively over longer time periods show longer lists of globally threatened species. Examples are Xingkaihu, Sanjiang, and Honghe National Nature Reserves. This suggests that newer reserves that have been less intensively studied may prove to support more globally threatened species as survey efforts increase. A summary of the threats to these species and the proposed Project responses is listed in Annex Gb.

23. Based on analysis of maps, interviews, and field trips, the TA team believes that the majority of the remaining high-quality wetland habitat in the Sanjiang Plain is now enclosed within nature reserves. Due to the continuing decline of total wetland area in the Sanjiang Plain, it is clear that a central strategy for conserving its globally threatened biodiversity, especially the waterbirds and other wetland-dependent species, which dominate the list of globally threatened species, is to focus conservation efforts in the wetland nature reserves.

[5] HEPB. 1998. Planning for Development of Nature Reserves in Heilongjiang Province. Harbin: Harbin Environmental Protection Bureau and Planning Committee.

[6] Naolihe NR records were not complete as of this writing.

1.4 Current Status of Sanjiang Plain Protected Areas

24. Twentyeight of Heilongjiang's 58 wetland nature reserves are located on the Sanjiang Plain (**Figure A-4 and Annex A**) and cover 1,027,798 ha or 9.4% of the area of the area of the Sanjiang Plain (10,890,000 ha). Large portions of many of these nature reserves are being farmed, so this total area of wetland nature reserves is not equivalent to natural wetland habitat under protection.

25. Many of the key wetland nature reserves in the Sanjiang Plain have been created only in the last 10 years, and the situation continues to evolve. New nature reserves are being created, management authority for reserves in some cases is being changed, and adjacent reserves have been consolidated. Due to the wide variety of agencies responsible for wetland reserves, there is no single authoritative source of current information on the wetland nature reserves of Sanjiang Plain. In particular, maps showing the locations and boundaries of nature reserves are difficult or in some cases impossible to obtain. Thus it is not possible in this report to provide a Sanjiang Plain map showing the boundaries of all existing and/or proposed nature reserves.

26. Ongoing changes are, however, improving prospects for effective conservation. For example, four established county and provincial nature reserves were combined into a single national nature reserve renamed Naoli River National Nature Reserve (NRNNR) in August 2002 **(Table A-7).** This consolidation of reserves within a single watershed may help in addressing water supply issues to the wetlands and in connecting protected areas to increase the total area of contiguous wetland habitat.

27. In 1998 Heilongjiang Province enacted a temporary ban on conversion of wetlands, although the ban did not stop conversion of wetlands because no implementing regulations were issued. However, on 20 June 2003, the Regulations on Wetland Conservation in Heilongjiang Province were adopted, and became effective on 1 August 2003[7]. This regulation is a major opportunity for strengthened enforcement of wetland protection and management. Critical provisions in the new regulation are the consolidation of authority for wetland management under the Provincial Forestry Department, and the directive to remove agriculture and settlements from within the core zones of existing wetland nature reserves.

28. Another major development in wetland conservation during 2003 has been the Provincial government's development of specific plans for conversion of large areas of farmland back to wetland or grassland within a number of specific wetland nature reserves in the Sanjiang Plain. This is an ambitious project funded by the State Development and Reform Commission, an agency which has also been involved, with the State Forestry Administration, in extensive farmland to forest conversion programs in other areas of China. Details of this program continue to develop at the time of this report.

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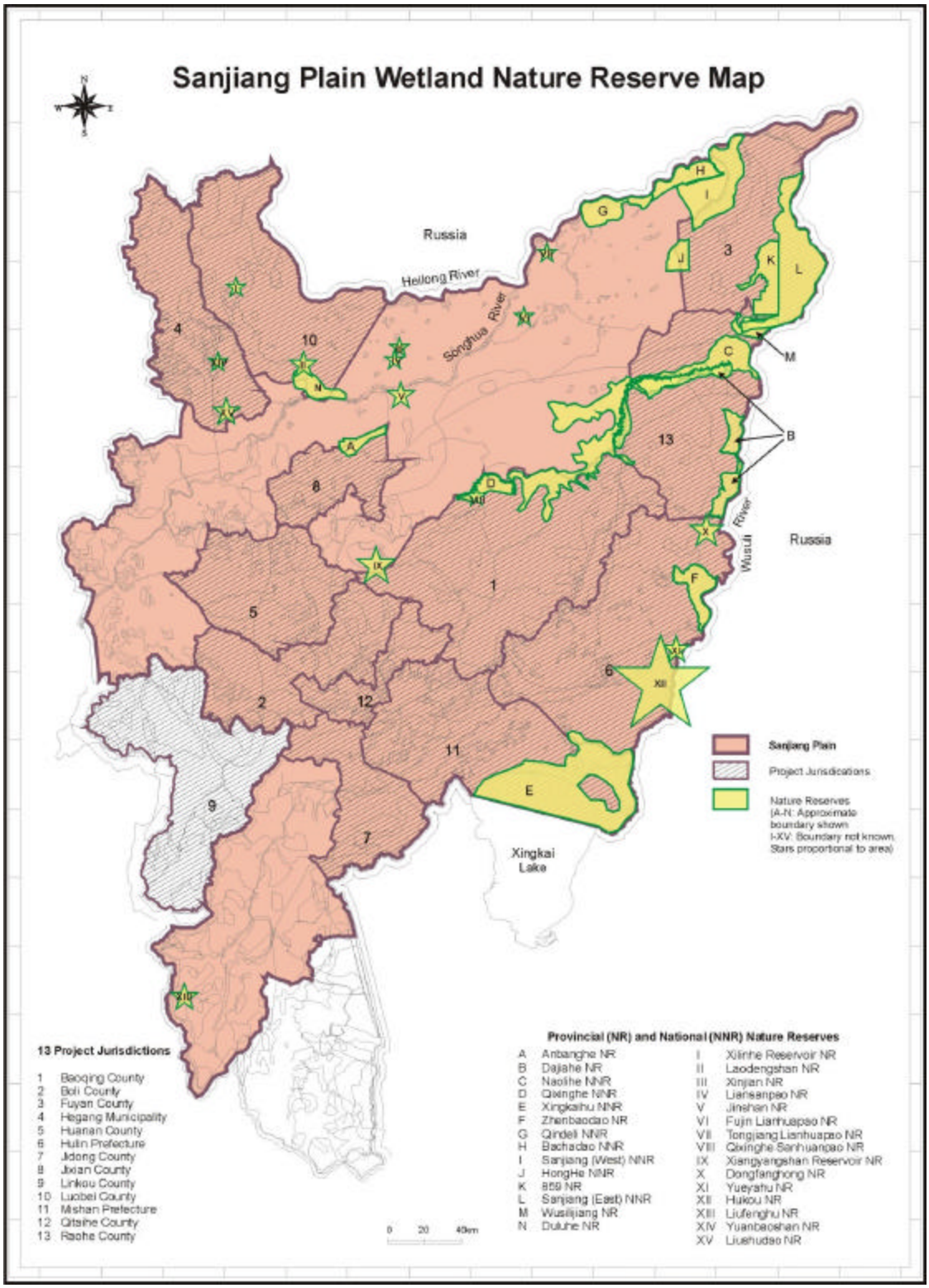
[7] Heilongjiang Provincial Government Regulation on Protection of Wetlands in Heilongjiang Province, issued 20 June 2003, effective 1 August 2003.

Figure A-4. Locations of nature reserves and wetlands on the Sanjiang Plain

[Note that Sanjiang (East) and Sanjiang (West) together comprise Sanjiang NNR.]



1.5 Wetland Reserves Recommended for Inclusion in Project

29. The TA team selected several national nature reserves in the Sanjiang Plain as focus areas for the ensuing Project, based on field visits and other data. These reserves—Xingkai Lake, Zhenbaodao, Qixinghe, Anbanghe, and Naolihe—met several criteria important for the success of future conservation efforts. All these reserves are managed by the Provincial Forestry Department, which is consolidating authority for wetland conservation. These reserves also have substantial numbers of globally threatened wetland species, high-quality wetland habitats, potential for linking watershed management to wetland water supplies, and motivated personnel. According to field visits they also require substantial strengthening to be effective in wetland conservation. (Honghe and Sanjiang National Nature Reserves were not considered because they have received substantial national and international attention and resources in recent years).

Table A-7. Four County and Provincial Nature Reserves Combined into the Single Naoli River National Nature Reserve in August 2002.

No.	Data Source1	Wetland Nature Reserves	Location	Area (ha)	Purpose2	Date	Level3	Agency4
1	SFA	Qiliqin River NR	Baoqing Co.	20,000	WE	1992	C	OT
2	SFA	Yanwodao NR	Baoqing Co.	11,898	WE	1997	P	EP
3	FDHP	Naolihe NR	Raohe Co.	58,922	WE	1998	P	RE
4	HEPB	Changlindao NR	Baoqing Co.	10,000	WE	2001	P	EP
		additional lands		59,779				
		Total		**160,599**				

[1] SFA=State Forestry Administration; HFB=Heilongjiang Forestry Bureau; HEPB=Heilongjiang Environmental Protection Bureau
[2] WE=wetland protection
[3] C=county; P=province
[4] OT=other; EP=Environmental Protection Bureau; RE=Reclamation Bureau (Farm Bureau)

30. The Sanjiang Plain Nature Reserve Map (in the main Project document RRP shows the location of these selected reserves.

C. Progress on National Wetland Conservation Priorities in Sanjiang

31. China's National Wetland Conservation Action Plan[8] lists 40 priority projects for wetland conservation in China, one of which is ***Project 20, Wetland Conservation and Sustainable Use in the Sanjiang Plain***. Actions listed under this project are:

- Investigate wetland resources and evaluate existing wetlands

[8] State Forestry Administration. 2002. National Wetland Conservation Action Plan.

- Establish coordinating organizations for conservation and sustainable use; promulgate needed laws and regulations;
- Prepare comprehensive land use plans considering wetland conservation and use, and social and economic development;
- Study the relationship between wetland conservation and agricultural practices to develop sustainable agriculture;
- Conduct experimental projects for conservation and sustainable use.

32. Action One has been started, but complete baseline biodiversity survey information and current habitat maps are lacking for many established nature reserves and for virtually all wetlands outside nature reserves. Action two is in progress under the guidance of the Heilongjiang Environmental Protection, Forestry, and General Farm Bureaus. Additionally, Heilongjiang Province, 40% of nature reserves had issued their own management regulations, detailed rules, and notices by the end of 1997. The HEPB planning target was to complete the process for 70% of national reserves and 50% of provincial reserves by 2000, and for all reserves by 2010.

33. The extent of progress on Action Three is difficult to determine. Preparation of plans is certainly in process, but a more important issue is the progress made in implementing the plans.

34. An important component of Action Four was completed under the OECF/SAPROF[9] project of 1995-6, prior to issuance of the final NWCAP in 2000. That project made detailed recommendations for ecologically sustainable use of agricultural chemicals by state farms.

35. Action Five has not been fully implemented to date, pending the outcomes of Actions One through Four. However, there is a rich resource of case studies from around the world (including China) demonstrating ways to sustainably harvest resources (e.g. fuelwood, grasses) from inside nature reserves, or develop agriculture while conserving wild habitats and biodiversity. There are also abundant examples where balance has been achieved between regulated harvest of wetland fish and wildlife and long-term conservation.

36. Three of the Sanjiang Plain wetland nature reserves have been listed as wetlands of international importance to waterbird conservation by the Ramsar Convention Bureau. These are Xingkai Lake, Honghe, and Sanjiang NNRs. The Sanjiang Plain Ramsar sites represent 14% of the 21 Ramsar sites in China, and 16% of the total Ramsar site area in China.

9 Special Assistance for Project Formation (Integrated Agriculture Development Project for State Farms in Heilongjiang Province)

Table A-6. Species Listed by World Conservation Union IUCN as Globally Threatened in Sanjiang Plain Wetland Nature Reserves.

Common Name	Scientific Name	Xingkaihu	Dajiahe	Sanjiang	Naolihe	Honghe	Wusulijiang	Qixinghe	Zhenbaodao	Anbanghe	Duluhe	Hukou
IUCN Status: Critically Endangered												
Siberian Crane	*Grus leucogeranus*	1	1	1		1	1	1		1		
IUCN Status: Endangered												
Amur Sturgeon	*Acipenser schrenckii*			1	1							
Kaluga Sturgeon	*Huso dauricus*	1	1	1	1							
Scaly-sided Merganser	*Mergus squamatus*		1	1	1	1		1		1		
Swan Goose	*Anser cygnoides*	1	1	1	1	1	1	1	1	1	1	
Oriental Stork	*Ciconia boyciana*	1	1	1	1	1	1	1	1			
Red-crowned Crane	*Grus japonensis*	1	1	1	1	1	1	1	1	1	1	1
Tiger	*Panthera tigris*		1	1	1				1			
IUCN Status: Vulnerable												
Chinese Soft-shell turtle	*Pelodiscus sinensis*	1	1	1	1				1		1	
Chinese Egret	*Egretta eulophotes*	1						1				
Lesser White-fronted Goose	*Anser erythropus*	1	1		1	1	1	1				
Baikal Teal	*Anas Formosa*	1	1		1		1					
Baer's Pochard	*Aythya baeri*	1	1	1	1	1	1		1	1	1	
Greater Spotted Eagle	*Aquila clanga*		1	1								
Pallas's Fish Eagle	*Haliaetus leucoryphus*			1		1						
Steller's Sea Eagle	*Haliaetus pelagicus*	1	1	1		1	1					1

Common Name	Scientific Name	Xingkaihu	Dajiahe	Sanjiang	Naolihe	Honghe	Wusulijiang	Qixinghe	Zhenbaodao	Anbanghe	Duluhe	Hukou
Swinhoe's Rail	*Coturnicops exquisitus*	1		1		1						
Hooded Crane	*Grus monacha*		1		1	1	1	1		1		
White-naped Crane	*Grus vipio*	1	1	1	1	1	1	1	1	1	1	1
Saunders's Gull	*Larus saundersi*	1										
Manchurian Reed Warbler	*Acrocephalus tangorum*	1										
Rufous-backed Bunting	*Emberiza jankowskii*	1										
Eurasian Otter	*Lutra lutra*	1	1	1	1	1	1	1	1		1	1
Asiatic Black Bear	*Ursus thibetanus*	1	1	1	1	1	1		1			1
24 species total	**TOTAL**	**18**	**17**	**17**	**15**	**14**	**12**	**10**	**9**	**7**	**6**	**5**

ANNEX A

List of protected wetlands in the Sanjiang Plain, showing locations, areas, date of establishment, administrative level and lead management agency (in alphabetical order by location). Shaded entries are Ramsar sites, bold-faced entries were combined into Naoli River National Nature Reserve in August 2002.

	Name	North Latitude	East Longitude	Mean elev.	Level	Area (ha)	No. Staff	Sci-Tech Staff	Agency
1	Xingkaihu	45 22 30	132 41 00	50	State	222,488	38	6	Forestry
2	Honghe	47 47 00	133 44 30	50	State	21,835	18	4	Environment
3	Sanjiang	47 55 00	134 04 00	50	State	198,000	10	2	Forestry
4	Qixinghe	45 46 00	132 15 00	50	State	20,000	23	6	Light Indus
5	Naolihe	47 15 00	133 45 00	50	State	160,599			Farm
6	Dajiahe	47 00 00	133 30 00	50	Province	72,604			Forestry
7	Hukou	45 41 00	133 20 00	55	Province	15,000			Farm
8	Qindeli	47 56 00	133 09 00	50	Province	36,663			Farm
9	Yueyahu	45 55 00	133 32 00	60	Province	5,130	18	3	Agriculture
10	Anbanghe	46 53 00	131 15 00	70	Province	3,716			Light Indus
11	Wusulijiang	47 40 00	134 20 30	50	Province	39,668			Farm
12	Bachadao	48 20 00	133 32 00	40	Province	21,300			Environment
13	Liufenghu	44 04 00	130 11 00	750	Province	6,190	82	9	Water
14	Zhenbaodao	46 00 00	130 30 00	50	Province	23,750			Forestry
15	Duluhe	47 20 00	131 00 00	65	Province	19,967			Forestry
16	859	47 39 00	134 20 00	50	County	15,300			Farm
17	Tongjiang Lianhuapao	47 41 00	132 45 00	50	County	13,000			Environment
18	Dongfanghong	46 40 00	133 29 00	50	County	10,000			Farm
19	Xilinhe Reservoir	47 35 00	130 19 00	220	County	560		2	Mines
20	Fujin Lianhuapao	47 30 00	132 42 00	50	County	3,333	12		Environment
21	Xinjian	47 14 00	131 45 00	70	County	9,000	19		Mines
22	Liansanpao	47 13 55	131 42 11	55	County	2,000	3		Environment
23	Laodengshan	47 12 00	130 51 00	70	County	5,745	2	1	Environment
24	Sanhuanpao	47 02 00	132 43 00	50	County	4,800			Farm
25	Jinshan	47 00 00	131 45 00	80	County	8,000			Environment
26	Yuanbaoshan	47 08 15	130 08 01	130	County	2,000			Environment
27	Liushudao	46 50 00	130 22 00	75	County	1,100	5		Local Govt
28	Xiangyangshan Reservoir	46 26 00	130 43 00	180	County	86,050	5		Farm
	Sanjiang Plain Wetland Nature Reserve Total					1,027,798	241	34	
	Sanjiang Plain total					10,890,000			
	Sanjiang Plain Wetland Nature Reserve as % of Province area					9.4%			

ANNEX B

Proposed wetland nature reserves in Sanjiang Plain as of end 1997, showing locations, areas, and lead management agency. Shaded entries were formally established after 1997.

No.	Data Source[1]	Wetland Nature Reserve	Location	Area (ha)	Purpose[2]	Agency[3]
1	HEPB	Sanjiangkou NR	Tongjiang City	3,000	WA	AG
2	HEPB	Bachadao NR	Tongjiang City	70,000	WE	EP
3	HEPB	Longtouqiao Reservoir NR	Baoqing Co.	200,000	WE	WC
4	HEPB	Huanfenhe Fish NR	Dongning Co.	3,000	WA	AG
5	HEPB	Liuguafupao NR	Hulin City	25,000	WE	EP
6	HEPB	Luobei Sturgeon NR	Luobei Co.	3,000	WA	AG
7	HEPB	Xinxing *Rana* NR	Luobei Co.	8,000	WA	FO
8	HEPB	Wutonghe-Puyang NR	Luobei Co.	20,000	WE, WA	SF
9	HEPB	Duluhe NR	Luobei Co.	7,600	WE	SF
10	HEPB	Youyi NR	Youyi Co.	12,000	WE	SF
11	HEPB	Qinglonghe NR	Tongjiang City	10,000	WE	SF
12	HEPB	Bawujiu NR	Raohe Co.	6,700	WE	SF
13	HEPB	Daoliuyan NR	Hulin City	22,300	WE	SF
14	HEPB	Bawuba Wusulijiang NR	Hulin City	18,600	WE	SF
15	HEPB	Qihulinhe NR	Hulin City	10,000	WE	SF
16	HEPB	Maoxinghu NR	Zhaoyuan Co.	3,500	WA	AG
17	HEPB	Zhaoyuan NR	Zhaoyuan Co.	50,000	WE	FO
18	HEPB	Sanchahe NR	Zhaoyuan Co.	3,000	WA	AG
19	HFB	Raohe Naolihe NR	Raohe Co.	39,900	WE	FO
20	HFB	Hulin Qihulinhe NR	Hulin City	60,000	WE	FO
21	HFB	Luobei Duluhe NR	Luobei Co.	34,500	WE	FO
		TOTAL AREA		**610,100**		

[1] Data source: HEPB = Heilongjiang Environmental Protection Bureau; HFB = Heilongjiang Forestry Bureau

[2] Purpose: WA = wild animal; WE = wetland

[3] Agency: FO = Forestry; EP = Environmental Protection; WC = Water Conservation; AG = Agriculture; SF = State Farm

ANNEX C
Mammals of the Sanjiang Plain
(Prepared in 2003)

Key to columns (left to right)

Column 1: Vernacular and scientific names. The taxonomy follows Wilson & Reeder (1993).
Column 2: Remarks: Adapted from UNDP/GEF 2002b and other sources as indicated.
Column 3: The character x in this column indicates that the species was recorded in the Sanjiang Plain according to Zhang Yongzu (1997).
Column 4: The character x in this column indicates that the species was recorded in the Sanjiang Plain according to Liu Xingtu and Ma Xuehui (2002).
Column 5: G: Global threat status taken from IUCN (2000).
Globally threatened: CR = Critical, EN = Endangered, VU = Vulnerable
Lower Risk: nt = near threatened.
Column 6: CITES: Convention on the Trade of Endangered Species. Appendices I and II as adopted by the Conference of the Parties, valid from 19 July 2000 (CITES 2000).
Column 7: R: Chinese Red Data Book / Mammalia (Wang Sung 1998a).
Column 8: C: Class of Protection in China (List of the wildlife under special state protection, approved by the State Council on 10 December 1988, announced to the public by the Ministry of Forestry [now SFA] and the Ministry of Agriculture on 14 January 1989; Zhang Lei & Wang Hong Xiang 2001).

Family / English Name / Scientific Name	Remarks	Zhang	Liu & Ma	GT	CITES	R	C
Erinaceidae							
Amur Hedgehog *Erinaceus amurensis*	Synonym: *E. europaeus* var. *amurensis*. SNNR, HNNR, Shuangyashan, Yichun	x	x				
Talpidae							
Large Mole *Mogera robusta*	Wusuli River, Xingkai Lake	x	x				
Soricidae							
Common Shrew *Sorex araneus*	Yichun, Mudanjiang, Zhenbaodao	x					
Laxmann's Shrew *Sorex caecutiens*	Yichun, Zhenbaodao	x					
Large-toothed Siberian Shrew *Sorex daphaenodon*	SNNR, Fuyuan, Suifenhe	x					
Giant Shrew *Sorex mirabilis*	per Liu Xingtu & Ma Xuehui (2002)		x				
Long-clawed Shrew *Sorex unguiculatus*	per Liu Xingtu & Ma Xuehui (2002)		x				
Ussuri Shrew *Crocidura lasiura*	SNNR, HNNR, Zhenbaodao	x					
Lesser White-toothed Shrew *Crocidura suaveolens*	Mishan, Zhenbaodao	x					
Vespertilionidae							
Brown Bat *Eptesicus nilssoni*	Mishan, Zhenbaodao	x					
Serotine (Nothern Bat) *Eptesicus serotinus*	Huanan	x					
Little Tube-nosed Bat *Murina aurata*	Xingkai Lake, Dailing	x					
Great Tube-nosed Bat *Murina leucogaster*	per Liu Xingtu & Ma Xuehui (2002)		x				
Fukien Mouse-eared Bat	Yichun	x					

Family / English Name / Scientific Name	Remarks	Zhang	Liu & Ma	GT	CITES	R	C
Myotis frater							
Ikonnikov's Mouse-eared Bat *Myotis ikonnikovi*	Yichun, Yilan	x					
Whiskered Bat *Myotis mystacinus*	per Liu Xingtu & Ma Xuehui (2002)		x				
Japanese Pipistrelle *Pipistrellus abramus*	Xingkai Lake, Wusuli River, Zhenbaodao	x					
Common Long-eared Bat *Plecotus auritus*	per Liu Xingtu & Ma Xuehui (2002)		x				
Parti-coloured Bat *Vespertilio murinus*	Longjiang, Honghe	x	x				
Eastern Bat *Vespertilio superans*	Longjiang	x	x				
Canidae							
Grey Wolf *Canis lupus*	HNNR, SNNR, Baoqing, Yichun, Tonghe, Zhenbaodao	x	x			V	III
Dhole *Cuon alpinus*	Fuyuan, Wanda Shan	x	x				II
Red Fox *Vulpes vulpes*	HNNR, SNNR, Luobei, Mudanjiang, Zhenbaodao	x	x				III
Racoon Dog *Nyctereutes procyonoides*	HNNR, SNNR, Xingkai Lake, Mishan, Mudanjiang, Baoqing, Zhenbaodao	x	x				
Ursidae							
Asiatic Black Bear *Ursus (Selenarctos) thibetanus*	HNNR, SNNR, Yichun Baoqing, Fuyuan, Zhenbaodao	x	x	VU	I	V	II
Brown Bear *Ursus arctos*	SNNR, Yichun, Zhenbaodao	x	x		I	E	II
Mustelidae							
Wolverine *Gulo gulo*	per Liu Xingtu & Ma Xuehui (2002)		x				I
Yellow-throated Marten *Martes flavigula*	Yichun	x	x			E	II
Sable *Martes zibellina*	SNNR, Raohe, Hulin, Yilan, Yichun	x	x			E	I
Mountain Weasel *Mustela altaica*	SNNR, Shuangyashan, Baoqing, Mishan, Zhenbaodao	x	x		III		
Lesser Weasel *Mustela amurensis*	per Liu Xingtu & Ma Xuehui (2002)		x		III		III
Stoat (Ermine) *Mustela erminea*	Mudanjiang, Mishan, Yichun	x					
Steppe Polecat *Mustela eversmannii*	The subspecies occurring in the area, ***M. e. amurensis* is globally Vulnerable**. Yichun, HNNR	x	x	(VU)			
Least Weasel *Mustela nivalis*	Yichun, Fujin, Mishan, Zhenbaodao	x	x				III
Siberian Weasel *Mustela sibirica*	Yichun, Mishan, Mudanjiang, Zhenbaodao	x	x				
Mink *Mustela vison*	per Liu Xingtu & Ma Xuehui (2002)		x				

Family / English Name / Scientific Name	Remarks	Zhang	Liu & Ma	GT	CITES	R	C
Eurasian Badger *Meles meles*	SNNR, Yichun, Mishan, Yilan, Zhenbaodao	x	x				
European Otter *Lutra lutra*	SNNR, Yichun, Baoqing, Mishan, Zhenbaodao	x	x	VU	I	V	II
Felidae							
Eurasian Lynx *Lynx lynx*	SNNR, Yichun, Baoqing, Mishan	x	x		II	V	II
Leopard Cat *Prionailurus (Felis) bengalensis*	SNNR, Zhenbaodao	x	x		II	V	
Leopard *Panthera pardus*	Mudanjiang	x	x				
Tiger *Panthera tigris*	The subspecies occurring in the area, **the Amur Tiger *P. t. altaica* is globally Critically Endangered**. Occasional sightings along the Wusuli River at Raohe County, mainly during winter. No known resident population.	x	x	EN (CR)	I	E	I
Leporidae							
Cape Hare *Lepus capensis*	Wandashan	x	x				
Mountain Hare *Lepus timidus*	HNNR, SNNR, Hulin, Mishan, Zhenbaodao	x	x				II
Manchurian Hare *Lepus mandshuricus*	HNNR, SNNR, Yichun, Mulin, Zhenbaodao	x	x				
Northeast China Black Hare *Lepus melainus*	Yichun	x	x				
Ochotonidae							
Northern Pika *Ochotona alpina (hyperborea)*	Yichun	x	x				
Sciuridae							
Siberian Flying Squirrel *Pteromys volans*	Raohe, Yichun, Zhenbaodao	x	x				
Eurasian Red Squirrel *Sciurus vulgaris*	HNNR, SNNR	x	x	nt			
Siberian Chipmunk *Tamias (Eutamias) sibiricus*	HNNR, SNNR, Fuyuan, Yichun, Mishan, Zhenbaodao	x	x				
Cricetidae							
Grey Red-backed Vole *Clethrionomys rufocanus*	Yichun, Mishan, Wusuli River, Hulin, Raohe	x	x				
Northern Red-backed Vole *Clethrionomys rutilus*	widely distributed	x	x				
Striped Dwarf Hamster *Cricetulus barabensis*	HNNR, Fujin, Tongjiang, Luobei, Xingkai Lake, Mishan, Zhenbaodao	x	x				
Greater Long-tailed Hamster *Cricetulus (Tscherskia) triton*	HNNR, Yilan, Mudanjiang, Fujin, Zhenbaodao	x	x				
Common Vole *Microtus arvalis*	Fuyuan, Mishan, SNNR, Zhenbaodao	x	x				
Maximowicz's Vole	SNNR, Mishan, Fuyuan,	x	x				

Family / English Name / Scientific Name	Remarks	Zhang	Liu & Ma	GT	CITES	R	C
Microtus maximowiczii	Fujin, Hulin, Raohe, Yichun, Tongjiang, Zhenbaodao						
Reed Vole *Microtus fortis*	widely distributed	x	x				
Wood Lemming *Myopus schisticolor*	Yichun, Raohe	x	x				
Steppe Zokor *Myospalax aspalax*	per Liu Xingtu & Ma Xuehui (2002)		x				
Manchurian Zokor *Myospalax psilurus*	Xingkai Lake, Yichun, Mishan	x	x				
Muskrat *Ondatra zibethicus*	Mishan, Hulin, SNNR, HNNR, Zhenbaodao	x	x				
Muridae							
Striped Field Mouse *Apodemus agrarius*	widely distributed	x					
Large Field Mouse *Apodemus peninsulae*	SNNR, Mishan, Fujin, Yichun, Fuyuan	x					
Large-eared Field Mouse *Apodemus latronum*	Per Liu Xingtu & Ma Xuehui (2002). Formerly *A. speciosus latronum* (see Corbett & Hill 1992), but occurs in Sichuan, Yunnan, E Tibet and N Burma, not in Sanjiang Plain		x				
Eurasian Harvest Mouse *Micromys minutus*	HNNR, SNNR, Fujin, Fuyuan, Xingkai Lake, Yichun, Hulin, Raohe, Luobei, Shuangyashan, Zhenbaodao	x	x				
House Mouse *Mus musculus*	widely distributed	x	x				
Brown Rat *Rattus norvegicus*	widely distributed	x	x				
Zapodidae							
Chinese Birch Mouse *Sicista concolor*	Hulin	x	x				
Suidae							
Wild Boar *Sus scrofa*	HNNR, SNNR, Yichun, Fuyuan, Baoqing, Zhenbaodao	x	x				
Cervidae							
Elk (American: Moose) *Alces alces*	The subspecies occurring in the area, **the Siberian Elk *A. a. cameloides* is globally Near Threatened**. Yichun	x	x	(nt)		V	II
Roe Deer *Capreolus capreolus*	SNNR, HNNR, Yichun, Baoqing, Fuyuan, Hulin, Zhenbaodao	x	x				II
Red Deer (American: Elk)	The subspecies occurring in the area, ***C. e. xanthopygus* is regarded as Vulnerable in China**.	x	x			(V)	II

Family / English Name / Scientific Name	Remarks	Zhang	Liu & Ma	GT	CITES	R	C
Cervus elaphus	HNNR, SNNR, Yichun, Baoqing, Mudanjiang, Wandashan, Zhenbaodao						
Sika Deer	The subspecies occurring in the area, **the North China Sika Deer *C. n. mandarinus* is globally Critically Endangered**.	x	x	(CR)		E	I
Cervus nippon	Apparently disappeared from Sanjiang Plain 40 years ago (ADB 2001a) except possibly in Wandashan post-1976 (Zhang Yongzu *et al*. 1997).						
Siberian Musk Deer *Moschus moschiferus (sibiricus)*	Yichun, Zhenbaodao	x	x				
Bovidae							
Goral *Naemorhedus goral*	Yichun (Shou Zhenhuang *et al*. 1962); Not recorded in recent decades.	x	x				

ANNEX D
Birds of the Sanjiang Plain
(prepared by Consultants combining data from UNDP/GEF 2002b and Liu Xingtu & Ma Xuehui 2002)

Key to columns (left to right)

Columns 1 & 2: Vernacular and scientific names. The taxonomy and order largely follows Beaman, M. 1994. Palearctic Birds. *A Checklist of the Birds of Europe, North Africa and Asia*. Harrier Publications, Stonyhurst, England.
At the end of this Column it is pointed out if the species is covered by the Chinese-Japanese Agreement for the Protection of Migratory Birds (1981) – indicated by a "1" or the Australian-Chinese Agreement for the Protection of Migratory Birds and their Environment (1986) – indicated by a "2".

Column 3: G: Global threat status taken from BirdLife International 2001. *Threatened birds of Asia: the BirdLife International Red Data Book.* Cambridge, UK: BirdLife International (see Appendix 12: The new IUCN Red List categories and criteria
Globally threatened: CR = Critical, EN = Endangered, VU = Vulnerable
Lower Risk: nt = near threatened.

Column 4: CITES: Convention on the Trade of Endangered Species. Appendices I and II as adopted by the Conference of the Parties, valid from 19 July 2000 (CITES 2000). See http://www.cites.org/eng/append/I&II_0700.shtml

Column 5: R: Chinese Red Data Book (Zheng Guangmei & Wang Qishan 1998. *China Red Data Book of endangered animals: Aves.* Beijing: Science Press.) This is a joint publication of China National Environmental Protection Agency (NEPA) and the Endangered Species Scientific Commission, P.R.C(ESSC). For categories are included here: endangered (E), vulnerable (V), indeterminate (i) and rare (R). The categories are basically based on the criteria set out by the IUCN Species Survival Commission for its global Red List. However, there are some important differences. The use of the category "Rare" has been discontinued by the IUCN-SSC. However, it is used here for those species that have always been rare in China are not necessary to be vulnerable or endangered.

Column 6: C: Class of Protection in China (List of the wildlife under special state protection, approved by the State Council on 10 December 1988, announced to the public by the Ministry of Forestry [now SFA] and the Ministry of Agriculture on 14 January 1989; Zhang Lei & Wang Ho ng Xiang 2001).

Family / English Name	Scientific Name + agreements		G	CITES	R	C
Gaviidae						
Black-throated Diver (B.-t. Loon, Arctic Diver)	*Gavia arctica*	1				
Red-throated Diver (Red-throated Loon)	*Gavia stellata*	1				
Pacific Loon	*Gavia pacifica*	1				
Podicipedidae						
Horned Grebe	*Podiceps auritus*	1				
Great Crested Grebe	*Podiceps cristatus*	1				II
Red-necked Grebe	*Podiceps grisegena*					II
Black-necked Grebe	*Podiceps nigricollis*	1				
Little Grebe	*Tachybaptus ruficollis*					
Procellariidae						
Leach's Storm Petrel	*Oceanodroma leucorhoa*					
Phalacrocoracidae						
Great Cormorant	*Phalacrocorax carbo*					
Pelagic Cormorant	*Phalacrocorax pelagicus*					

Family / English Name	Scientific Name + agreements		G	CITES	R	C
Gaviidae						
Red-faced Cormorant	*Phalacrocorax urile*					
Ardeidae						
Grey Heron	*Ardea cinerea*					
Purple Heron	*Ardea purpurea*	1				
Great Bittern	*Botaurus stellaris*	1				
Cattle Egret	*Bubulcus ibis*	1,2				
Little Heron (Striated Heron)	*Butorides striatus*	1				
Great Egret	*Casmerodius albus* (*Egretta alba*)	1,2				
Chinese Egret	*Egretta eulophotes*	1	VU			II
Von Schrenck's Bittern	*Ixobrychus eurhythmus*	1				
Yellow Bittern	*Ixobrychus sinensis*	1,2				
Night Heron	*Nycticorax nycticorax*	1				
Ciconiidae						
Oriental Stork	*Ciconia boyciana*		EN	I	E	I
Black Stork	*Ciconia nigra*	1		II	E	I
Threskiornithidae						
Crested Ibis	*Nipponia nippon*	1	EN	II	E	II
Eurasian Spoonbill	*Platalea leucorodia*	1		II	V	II
Black-faced Spoonbill	*Platalea minor*	1	EN	II	E	II
Black-headed Ibis	*Threskiornis melanocephalus*	1	nt		R	II
Anatidae						
Tundra Swan	*Cygnus columbianus*	1			V	II
Whooper Swan	*Cygnus cygnus*	1			V	II
Swan Goose	*Anser cygnoides*	1	EN			III
Bean Goose Greater White-fronted Goose	*Anser fabalis* *Anser albifrons*	1 1				 II
Lesser White-fronted Goose	*Anser erythropus*	1	VU			
Greylag Goose	*Anser anser*					
Ruddy Shelduck	*Tadorna ferruginea*	1				
Common Shelduck	*Tadorna tadorna*	1				
Mandarin Duck	*Aix galericulata*				V	II
American Wigeon	*Anas americana*					
Eurasian Wigeon	*Anas penelope*	1				
Falcated Duck	*Anas falcata*	1				
Gadwall	*Anas strepera*	1				
Baikal Teal	*Anas formosa*	1	VU	II		
Common Teal	*Anas crecca*	1				
Mallard	*Anas platyrhynchos*	1				
Spot-billed Duck	*Anas poecilorhyncha*					
Northern Pintail	*Anas acuta*	1				
Garganey	*Anas querquedula*	1,2				
Northern Shoveler	*Anas clypeata*	1,2				
Baer's Pochard	*Aythya baeri*	1	VU			
Common Pochard	*Aythya ferina*	1				
Tufted Duck	*Aythya fuligula*	1				
Greater Scaup Ferruginous Pochard	*Aythya merila* *Aythya nyroca*	1				
Steller's Eider	*Polysticta stelleri*					
Harlequin Duck	*Histrionicus histrionicus*	1				
Long-tailed Duck	*Clangula hyemalis*	1				

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Gaviidae					
White-winged Scoter	*Melanitta fusca* 1				
Common Goldeneye	*Bucephala clangula* 1				
Smew	*Mergellus albellus* 1				
Red-breasted Merganser	*Mergus serrator* 1				
Scaly-sided Merganser (Chinese Merganser)	*Mergus squamatus*	EN		R	I
Goosander (Common Merganser)	*Mergus merganser* 1				
Accipitridae					
Oriental Honey-buzzard (Crested Honey Buzzard)	*Pernis ptilorhyncus*		II	V	II
Black Kite (Black-eared Kite)	*Milvus migrans* (*Milvis lineatus*)		II		II
Pallas's Fish Eagle	*Haliaeetus leucoryphus*	VU	II	R	I
White-tailed Eagle	*Haliaeetus albicilla*	nt	I	i	I
Steller's Sea Eagle	*Haliaeetus pelagicus* 1	VU	II	R	I
Cinereous Vulture	*Aegypius monachus*				II
Eurasian Marsh Harrier (Eastern Marsh Harrier)	*Circus aeruginosus* 1 (*C. spilonotus*)		II		II
Hen Harrier	*Circus cyaneus* 1		II		II
Pied Harrier	*Circus melanoleucos*		II		II
Northern Goshawk	*Accipiter gentilis*		II		II
Japanese Sparrowhawk (Besra)	*Accipiter gularis* 1 (*A. virgatus gularis*)		II		II
Eurasian Sparrowhawk	*Accipiter nisus*		II		II
Grey-faced Buzzard	*Butastur indicus* 1		II	R	II
Common Buzzard	*Buteo buteo*		II		II
Upland Buzzard	*Buteo hemilasius*		II		II
Rough-legged Buzzard	*Buteo lagopus* 1		II		II
Greater Spotted Eagle	*Aquila clanga*	VU	II	R	II
Steppe Eagle	*Aquila nipalensis*		II	V	II
Golden Eagle	*Aquila chrysaetos*		II	V	I
Pandionidae					
Osprey	*Pandion haliaetus*		II	R	
Falconidae					
Gyrfalcon	*Falco rusticolus* 1				II
Common Kestrel	*Falco tinnunculus*		II		II
Amur Falcon (Red-footed Falcon)	*Falco amurensis* (*F. vespertinus amurensis*)		II		II
Merlin	*Falco columbarius* 1		II		II
Eurasian Hobby	*Falco subbuteo* 1		II		II
Peregrine Falcon	*Falco peregrinus*		I	R	II
Tetraonidae					
Hazel Grouse	*Tetrastes bonasia* (*Bonasia bonasia*)			E	II
Siberian Grouse	*Dendragapus falcipennis*				II
Willow Ptarmigan (Willow Grouse)	*Lagopus lagopus*			i	II
Black Grouse	*Tetrao tetrix* (*Lyrurus tetrix*)			V	II
Spotted Capercaillie (Black-billed Capercaillie)	*Tetrao pavirostris*			V	I

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Gaviidae						
Daurian Partridge	*Perdix dauurica* (*P. dauuricae*)					
Japanese Quail (Common Quail)	*Coturnix japonica* (*Coturnix coturnix*)	1				
Common Pheasant	*Phasianus colchicus*					
Turnicidae						
Yellow-legged Buttonquail	*Turnix tanki*					
Rallidae						
Swinhoe's Rail	*Coturnicops exquisitus*	1	VU			
Water Rail	*Rallus aquaticus*	1				
Ruddy-breasted Crake	*Porzana fusca*	1				
Band-bellied Crake	*Porzana paykullii*					
Baillon's Crake	*Porzana pusilla*	1				
White-breasted Waterhen	*Amaurorn is phoenicurus*					
Common Moorhen	*Gallinula chloropus*	1				
Common Coot	*Fulica atra*					
Gruidae						
Common Crane	*Grus grus*	1		II		II
Hooded Crane	*Grus monacha*	1	VU	I	E	I
White-naped Crane	*Grus vipio*	1	VU	I	V	II
Demoiselle Crane	*Grus virgo*					II
Red-crowned Crane (Japanese Crane)	*Grus japonensis*		EN	I	E	I
Siberian Crane (Siberian White Crane)	*Grus leucogeranus*		CR	I	E	I
Otidae						
Great Bustard	*Otis tarda*					I
Recurvirostridae						
Black-winged Stilt	*Himantopus himantopus*	1				
Pied Avocet	*Recurvirostra a vosetta*	1				
Glareolidae						
Oriental Pratincole	*Glareola maldivarum*	1,2				
Haematopodidae						
Oystercatcher	*Haematopus ostralegus*	1				
Charadriidae						
Little Ringed Plover	*Charadrius dubius*	2				
Kentish Plover	*Charadrius alexandrinus*					
Common Ringed Plover	*Charadrius hiaticula*					
Lesser Sand Plover	*Charadrius mongolus*					
Pacific Golden Plover (Lesser Golden Plover)	*Pluvialis fulva* (*P. dominica fulva*)	1,2				
Grey-headed Lapwing	*Vanellus cinereus* (*Hoplopterus cinereus*)					
Northern Lapwing	*Vanellus vanellus*	1				
Scolopacidae						
Great Knot	*Calidris tenuirostris*	1,2				
Red Knot	*Calidris canutus*	1				
Long-toed Stint	*Calidris subminuta*	1,2				
Sharp-tailed Sandpiper	*Calidris acuminata*	1,2				
Dunlin	*Calidris alpina*	1				
Curlew Sandpiper	*Calidris ferruginea*	1,2				

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Gaviidae					
Red-necked Stint	*Calidris ruficollis* 1				
Temminck's Stint	*Calidris temminckii* 1				
Ruff	*Philomachus pugnax* 1,2				
Common Snipe	*Gallinago gallinago* (*Capella gallinago*) 1				
Latham's Snipe	*Gallinago hardwickii*				
Pintail Snipe	*Gallinago stenura* 2 (*Capella stenura*)				
Swinhoe's Snipe	*Gallinago megala* 1,2				
Solitary Snipe	*Gallinago solitaria* 1				
Asian Dowitcher	*Limnodromus semipalmatus* 2	nt		R	
Eurasian Woodcock	*Scolopax rusticola* 1				
Black-tailed Godwit	*Limosa limosa* 1,2			i	
Little Curlew	*Numenius minutus* 2				II
Eurasian Curlew	*Numenius arquata* 1,2				
Eastern Curlew (Far Eastern Curlew)	*N. madagascariensis* 1,2	nt			
Spotted Redshank	*Tringa erythropus* 1				
Common Redshank	*Tringa totanus* 1,2				
Marsh Sandpiper	*Tringa stagnatilis* 1,2				
Common Greenshank	*Tringa nebularia* 1,2				
Green Sandpiper	*Tringa ochropus* 1				
Wood Sandpiper	*Tringa glareola* 1,2				
Common Sandpiper	*Actitis hypoleucos* (*Tringa hypoleucos*) 1,2				
Ruddy Turnstone	*Arenaria interpres* 1,2				
Laridae					
Black-headed Gull	*Larus ridibundus* 1				
Black-tailed Gull	*Larus crassirostris*				
Mew Gull (Common Gull)	*Larus canus* 1				
Glaucous Gull	*Larus hyperboreus*				
Saunders' Gull	*Larus saundersi*	VU		E	
Slaty-backed Gull	*Larus schistisagus* 1				
Herring Gull	*Larus argentatus* 1				
Black-legged Kittiwake	*Rissa tridactyla* 1				
Marbled Murrelet	*Brachyramphus marmoratus* 1				
Ancient Murrelet	*Synthliboramphus antiquus* 1				
Sternidae					
Common Tern	*Sterna hirundo* 1,2				
Little Tern	*Sterna albifrons* 1,2				
Whiskered Tern	*Chlidonias hybridus* (*C. hybrida*)				
White-winged Black Tern (White-winged Tern)	*Chlidonias leucopterus* 2				
Pteroclididae					
Pallas's Sandgrouse	*Syrrhaptes paradoxus*				
Columbidae					
Feal Pigeon	*Columba livia* f. *domestica*				
Hill Pigeon	*Columba rupestris*				
Oriental Turtle Dove	*Streptopelia orientalis*				
Cuculidae					

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Gaviidae					
Hodgson's Hawk Cuckoo	*Hierococcyx fugax* 1				
(Northern Hawk Cuckoo)	(*H. hyperythrus*)				III
Indian Cuckoo	*Cuculus micropterus*				
Eurasian Cuckoo	*Cuculus canorus* 1				
Lesser Cuckoo	*Cuculus poliocephalus* 1				
Oriental Cuckoo	*Cuculus saturatus* 1,2				
Strigidae					
Collared Scops Owl	*Otus bakkamoena*		II		II
Oriental Scops Owl (Eurasian Scops Owl)	*Otus sunia* (*O. scops*)		II		II
Eurasian Eagle Owl	*Bubo bubo*		II	R	II
Blakiston's Fish Owl	*Ketupa blakistoni*	EN			II
Snowy Owl	*Nyctea scandiaca* 1		II		II
Ural Owl	*Strix uralensis*		II	R	II
Great Grey Owl	*Strix nebulosa*		II	i	II
Northern Hawk Owl	*Surnia ulula*				II
Brown Hawk Owl	*Ninox scutulata*				II
Northern Long-eared Owl	*Asio otus* 1		II		II
Short-eared Owl	*Asio flammeus* 1		II		II
Boreal Owl (Tengmalm's Owl)	*Aegolius funereus*		II	i	II
Caprimulgidae					
Grey Nightjar (Jungle Nightjar)	*Caprimulgus indicus* 1				
Apodidae					
White-throated Needletail	*Hirundapus caudacutus* 1,2				
Common Swift	*Apus apus*				
Fork-tailed Swift (Pacific Swift)	*Apus pacificus* 1,2				
Alcedinidae					
Common Kingfisher	*Alcedo atthis*				
Coraciidae					
Broad-billed Roller (Dollarbird)	*Eurystomus orientalis* 1				
Upupidae					
Common Hoopoe	*Upupa epops*				
Picidae					
Eurasian Wryneck	*Jynx torquilla*				
Grey-headed Woodpecker	*Picus canus*				
Black Woodpecker	*Dryocopus martius*				
Great Spotted Woodpecker	*Dendrocopos major* (*Picoides major*)				
White-backed Woodpecker	*Dendrocopos leucotos* (*Picoides leucotos*)				
Rufous-bellied Woodpecker	*Dendrocopos hyperythrus* (*Picoides hyperythrus*)				
Japanese Pygmy Woodpecker	*Dendrocopos kizuki* *(Picoides kizuki)*				III
Lesser Spotted Woodpecker	*Dendrocopos minor* (*Picoides minor*)				
Grey-capped Pygmy Woodpecker	*Dendrocopos canicapillus* (*Picoides canicapillus*)				
Three-toed Woodpecker	*Dendrocopos tridactylus* (*Picoides tridactylus*)				
Alaudidae					

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Gaviidae					
Greater Short-toed Lark	*Calandrella brachydactyla* (*C. cinerea brachydactyla*)				
Asian Short-toed Lark	*Calandrella cheleensis*				
Eurasian Skylark	*Alauda arvensis*				
Hirundinidae					
Sand Martin	*Riparia riparia* 1				
Barn Swallow	*Hirundo rustica* 1,2				
Red-rumped Swallow	*Hirundo daurica* 1				
Northern House Martin (Common House Martin)	*Delichon urbica* 1				
Motacillidae					
Richard's Pipit	*Anthus richardi* 1 (*A. novaseelandidae*)				
Olive-backed Pipit	*Anthus hodgsoni* 1				
Pechora Pipit Menzbier's Pipit (Pechora Pipit)	*Anthus gustavi* 1 (*A. g. gustavi*) *Anthus menzbieri* (*A. gustavi menzbieri*)				
Red-throated Pipit	*Anthus cervinus* 1				
Buff-bellied Pipit	*Anthus rubescens*				
Water Pipit	*Anthus spinoletta* 1				
Forest Wagtail	*Dendronanthus indicus*				
Yellow Wagtail	*Motacilla flava* 1,2				
Grey Wagtail	*Motacilla cinerea* 2				
Citrine Wagtail	*Motacilla citreola* 1				
White Wagtail	*Motacilla alba* 1,2				
Campephagidae					
Ashy Minivet	*Pericrocotus divaricatus* 1				
Bombycillidae					
Japanese Waxwing	*Bombycilla japonica* 1	nt			
Bohemian Waxwing	*Bombycilla garrulus* 1				
Cinclidae					
Brown Dipper	*Cinclus pallasii*				III
Troglodytidae					
Winter Wren	*Troglodytes troglodytes*				
Prunellidae					
Siberian Accentor	*Prunella montanella*				
Alpine Accentor	*Prunella collaris*				
Turdidae					
Siberian Rubythroat	*Luscinia calliope* 1				
Siberian Blue Robin	*Luscinia cyane* 1				
Rufous-tailed Robin	*Luscinia sibilans* 1				
Bluethroat	*Luscinia svecica*				
Blue-capped Rock Thrush	*Monticola cinclorhynchus*				
Blue Rock Thrush	*Monticola solitarius*				
Orange-flanked Bush Robin (Red-flanked Bluetail)	*Tarsiger cyanurus* 1				
Daurian Redstart	*Phoenicurus auroreus* 1				
Common Stonechat	*Saxicola torquata* 1				
Scaly Thrush	*Zoothera dauma* 1				III

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Gaviidae					
Siberian Thrush	*Zoothera sibirica* 1				
Grey-backed Thrush	*Turdus hortulorum* 1				
Pale Thrush	*Turdus pallidus* 1				
Eyebrowed Thrush	*Turdus obscurus* 1				
Dusky Thrush	*Turdus naumanni* 1				
Dark-throated Thrush	*Turdus ruficollis* 1				
Sylvidae					
Japanese Bush Warbler (Manchurian Bush Warbler)	*Cettia diphone* (*C. canturians*)				
Asian Stubtail	*Urosphena squamiceps* 1 *(Cettia squamiceps)*				
Chinese Bush Warbler	*Bradypterustacsanowskius*				III
Spotted Bush Warbler	*Bradypterus thoracicus*				III
Pallas's Grasshopper Warbler (Rusty-rumped Warbler)	*Locustella certhiola*				
Lanceolated Warbler	*Locustella lanceolata* 1				
Gray's Grasshopper Warbler (Gray's Warbler)	*Locustella fasciolata* 1				
Black-browed Reed Warbler	*Acrocephalus bistrigiceps* 1				
Manchurian Reed Warbler (Paddyfield Warbler)	*Acrocephalus tangorum* (*A. agricola*)	VU			
Oriental Reed Warbler (Great Reed Warbler)	*Acrocephalus orientalis* 1,2 (*A. arundinaceus*)				
Thick-billed Warbler	*Acrocephalus aedon*				
Eastern Crowned Warbler	*Phylloscopus coronatus* 1				
Pale-legged Leaf Warbler	*Phylloscopus tenellipes* 1				
Greenish Warbler Arctic Warbler	*Phylloscopus trochiloides* *Phylloscopus borealis* 1,2				
Pallas's Leaf Warbler	*Phylloscopus proregulus*				
Yellow-browed Warbler	*Phylloscopus inornatus* 1				
Radde's Warbler	*Phylloscopus schwarzi*				
Dusky Warbler	*Phylloscopus fuscatus*				
Goldcrest	*Regulus regulus*				
Muscicapidae					
Blue-and-White Flycatcher	*Cyanoptila cyanomelana* 1 (*Ficeldula cyanomelana*)				
Dark-sided Flycatcher (Sooty Flycatcher) Grey-streaked Flycatcher	*Muscicapa sibirica* 1 *Muscicapa griseisticta* 1				
Asian Brown Flycatcher	*Muscicapa dauurica* 1 (*M. latirostris*)				
Taiga Flycatcher (Red-breasted Flycatcher)	*Ficedula albicilla* (*F. parva*)				
Mugimaki Flycatcher	*Ficedula mugimaki* 1				
Yellow-rumped Flycatcher	*Ficedula zanthopygia* 1				
Monarchidae					
Asian Paradise Flycatcher	*Terpsiphone paradisi*				
Timaliidae					
Bearded Parrotbill (Bearded Tit, Bearded Reedling)	*Panurus biarmicus*				
Reed Parrotbill (Chinese	*Paradoxornis heudei*	nt		R	

Family / English Name	Scientific Name + agreements	G	CITES	R	C
Gaviidae					
Parrotbill)					
Vinous-throated Parrotbill	*Paradoxornis webbianus*	nt		R	
Aegithalidae					
Long-tailed Tit	*Aegithalos caudatus*				
Paridae					
Marsh Tit Willow Tit	*Parus palustris* *Parus montanus*				
Coal Tit	*Parus ater*				
Azure Tit	*Parus cyanus*				
Great Tit	*Parus major*				
Sittidae					
Eurasian Nuthatch	*Sitta europaea*				
Certhidae					
Eurasian Treecreeper	*Certhia familiaris*				
Zosteropidae					
Chestnut-flanked White-eye	*Zosterops erythropleurus*				
Oriolidae					
Black-naped Oriole	*Oriolus chinensis* 1				
Laniidae					
Tiger Shrike	*Lanius tigrinus* 1				
Brown Shrike	*Lanius cristatus* 1				
Great Grey Shrike	*Lanius excubitor* 1				
Chinese Grey Shrike	*Lanius sphenocercus*				
Corvidae					
Eurasian Jay	*Garrulus glandarius*				
Siberian Jay	*Perisoreus infaustus*				
Azure-winged Magpie	*Cyanopica cyanus*				
Black-billed Magpie	*Pica pica*				
Spotted Nutcracker	*Nucifraga caryocatactes*				
Daurian Jackdaw (Eurasian Jackdaw)	*Corvus dauuricus* 1 (*C. dauurica*; *C. monedula*)				
Rook	*Corvus frugilegus* 1				
Carrion Crow	*Corvus corone*				
Large-billed Crow (Jungle Crow)	*Corvus macrorhynchos*				
Common Raven	*Corvus corax*				
Sturnidae					
Purple-backed Starling (Daurian Starling)	*Sturnus sturninus*				
White-cheeked Starling (Grey Starling)	*Sturnus cineraceus*				
Passeridae					
House Sparrow	*Passer domesticus*				
Eurasian Tree Sparrow	*Passer montanus*				
Fringillidae					
Brambling	*Fringilla montifringilla* 1				
Grey-capped Greenfinch (Oriental Greenfinch)	*Carduelis sinica*				
Eurasian Siskin	*Carduelis spinus* 1				
Common Redpoll	*Carduelis flammea* 1				
Red Crossbill	*Loxia curvirostra* 1				

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Gaviidae						
(Common Crossbill)						
White-winged Crossbill	*Loxia leucoptera*					
Asian Rosy Finch	*Leucosticte arctoa*	1				
Common Rosefinch	*Carpodacus erythrinus*	1				
Pallas's Rosefinch	*Carpodacus roseus*	1				
Pine Grosbeak	*Pinicola enucleator*					
Long-tailed Rosefinch	*Uragus sibiricus*					
Oriental Bullfinch	*Pyrrhula griseiventris*	1				
Eurasian Bullfinch	*Pyrrhula pyrrhula*	1				
Yellow-billed Grosbeak (Yellow-billed Hawfinch)	*Eophona migratoria*	1				
Japanese Grosbeak (Japanese Hawfinch)	*Eophona personata*					
Hawfinch	*Coccothraustes coccothraustes*	1				
Emberizidae						
Lapland Bunting (Lapland Longspur)	*Calcarius lapponicus*	1				
Snow Bunting	*Plectrophenax nivalis*	1				
Black-faced Bunting	*Emberiza spodocephala*	1				
Pine Bunting	*Emberiza leucocephalos* (*E. leucocephala*)	1				
Meadow Bunting	*Emberiza cioides*					
Jankowski's Bunting	*Emberiza jankowskii*		VU			
Chestnut-eared Bunting (Grey-headed Bunting)	*Emberiza fucata*	1				
Yellow-throated Bunting	*Emberiza elegans*	1				
Tristram's Bunting	*Emberiza tristrami*	1				
Rustic Bunting	*Emberiza rustica*	1				
Little Bunting	*Emberiza pusilla*	1				
Yellow-browed Bunting	*Emberiza chrysophrys*					
Chestnut Bunting	*Emberiza rutila*					
Yellow-breasted Bunting	*Emberiza aureola*	1				
Common Reed Bunting	*Emberiza schoeniclus*	1				
Pallas's Reed Bunting (Pallas's Bunting)	*Emberiza pallasi*	1				
Ochre-rumped Bunting (Japanese Reed Bunting)	*Emberiza yessoensis*		nt			

ANNEX E
Amphibians and Reptiles of the Sanjiang Plain
(prepared by Consultant 2003)
Key to columns (left to right)

Column 1: Vernacular and scientific names. The taxonomy follows Frank & Ramus (1995), but some alternative English names are given in brackets.
Column 2: Remarks on distribution
Column 3: G: Global threat status taken from IUCN (2000).
Globally threatened: VU = Vulnerable
Lower Risk: nt = near threatened.
Column 4: R: Chinese Red Data Book / Amphibia & Reptilia (Zhao Ermi 1998).
Column 5: C: Class of Protection in China (List of the wildlife under special state protection, approved by the State Council on 10 December 1988, announced to the public by the Ministry of Forestry [now SFA] and the Ministry of Agriculture on 14 January 1989; Zhang Lei & Wang Hong Xiang 2001).

Family / Scientific Name / English Name	**Remarks**	**G**	**R**	**C**
Hynobiidae				
Dybowski's Salamander *Salamandrella keyserlingii* [Siberian (Manchurian) Salamander]			V	
Gensan Salamander *Hynobius leechii* [Chinese (South Manchurian) (Northeastern) Salamander]			V	
Discoglossidae				
Oriental Bell Toad *Bombina orientalis*				
Bufonidae				
Chusan Island Toad *Bufo gargarizans* (Asiatic (Common) [Chinese] Toad)				
Tengger Desert Toad *Bufo raddei* [Radde's Toad, Siberian (Sand) Toad]				
Hylidae				
European Common Tree Frog *Hyla arborea*		nt		
Japanese Treefrog *Hyla japonica*		nt		
Ranidae				
Khabarovsk Frog *Rana amurensis* (Siberian Wood Frog)	Wild populations threatended by killing of female frogs for removal of oviducts, which are dried and sold as medicine ("ha shi ma you", or frog oil)			
Inkiapo Frog *Rana chensinensis*			V	III

Family / Scientific Name / English Name	Remarks	G	R	C
(a.k.a. Asiatic Grass Frog, North China Wood Frog, Chinese Woodfrog)	Wild populations threatended by killing of female frogs for removal of oviducts, which are dried and sold as medicine ("ha shi ma you", or frog oil)			
Black-spotted Frog *Rana nigromaculata* (Chinese Edible Frog, Common Pond Frog) *Rana rugosa*				
Trionychidae				
Chinese Softshell *Pelodiscus (Trionyx) sinensis* (Chinese Soft-shelled Turtle)	Has been selected as a key flagship species for Amur Freshwater Ecoregion by WWF. Numbers have declined rapidly in recent times.	VU	V	
Lacertidae				
Mongolian Racerunner *Eremias argus*				
Takydromus amurensis *Takydromus wolteri*				
Lacerta vivipara				
Colubridae				
Amphiesma vibakari				
Rabdophis tigrina				
Coluber spinalis				III
Dinodon rufozonatum				III
Steppe Ratsnake *Elaphe dione* [Dione Snake (Pallas's Coluber)] Frog-eating Ratsnake *Elaphe rufodorsata* [Rayed Coluber]				
Russian Ratsnake *Elaphe schrenckii* (Manchurian Black Water Snake)			E	
Viperidae				
Agkistrodon blomhoffii				III
Siberian Pitviper *Agkistrodon halys* (Halys Viper, Central Asian Viper)				

ANNEX F
Fishes of the Sanjiang Plain (prepared by Consultant 2003)

Key to columns (left to right)

Column1: Scientific names. The taxonomy follows ADB (200 1a)

Column 2: Sanjiang: Species recorded in Sanjiang Plain according to ADB (2001a) are marked with a "x".

Column 3: G: Global threat status taken from IUCN (2000).
Globally threatened:VU = Vulnerable
Lower Risk: nt = near threatened.

Column 4: R: Chinese Red Data Book / Pisces (WANG SUNG 1998b).

Column 5: C: Class of Protection in China (List of the wildlife under special state protection, approved by the State Council on 10 December 1988, announced to the public by the Ministry of Forestry [now SFA] and the Ministry of Agriculture on 14 January 1989; Zhang Lei & Wang Hong Xiang 2001).

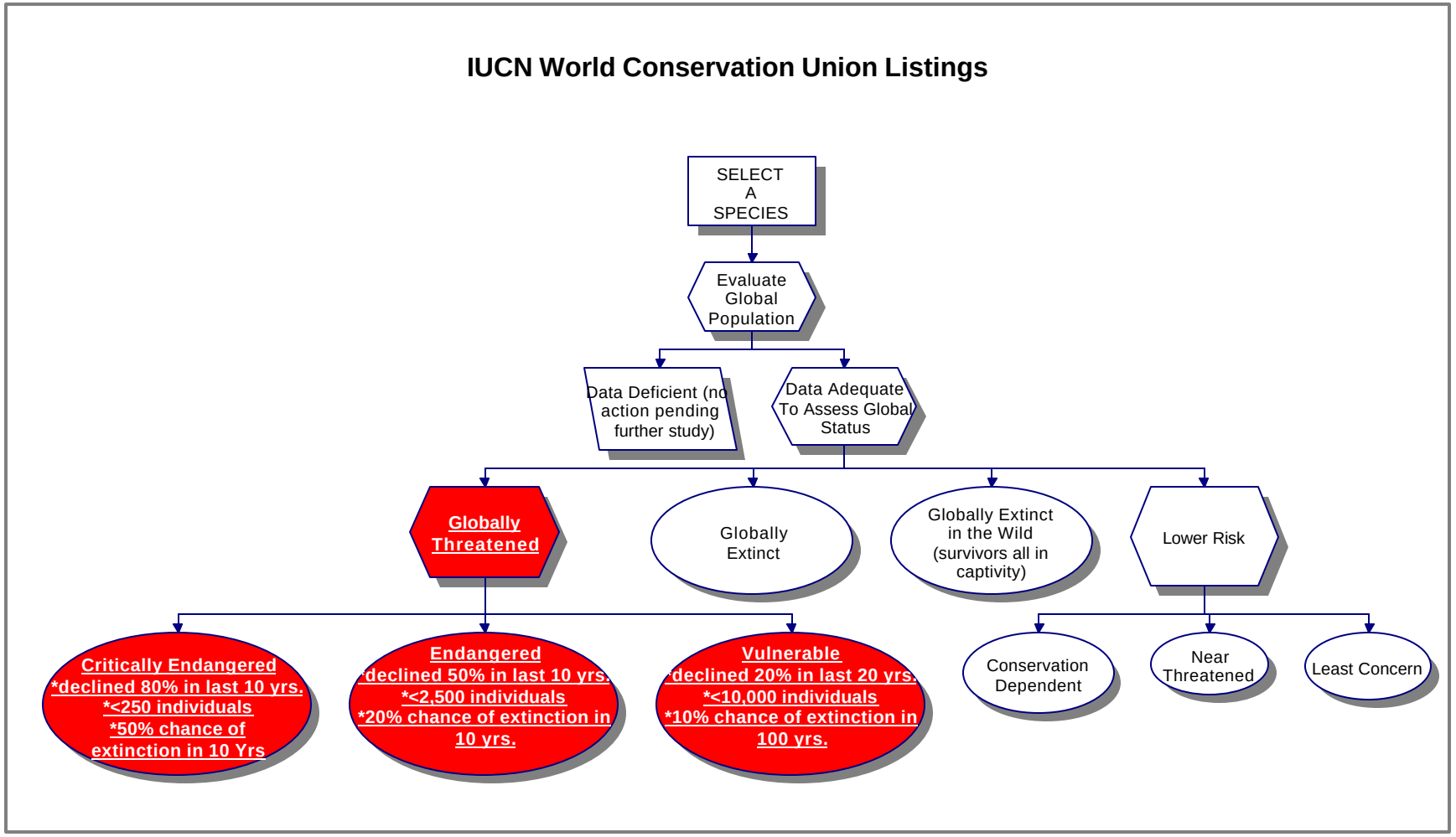
Family / Scientific Name	G	CITES	R	C
Petromyzonidae				
Lampetra reissneri			V	
Lampetra japonica			V	
Acipenseridae				
Acipenser schrenckii *Huso dauricus*	EN EN	II II	V V	
Salmonidae				
Oncorhynchus keta				
Hucho taimen			V	
Brachymystax lenok			V	II
Coregonus ussuriensis *Coregonus chadary*			V	
Thymallidae				
Thymallus arcticus grubei			(V)	
Osmeridae				
Hypomesus transpacificus				
Hypomesus olidus				
Esocidae				
Esox reicherti				
Cyprinidae				
Opsariichthys bidens				
Mylopharyngodon piceus				
Ctenopharyngodon idellus				
Phoxinus phoxinus				
Phoxinus percnurus				
Phoxinus czekanowskii				
Phoxinus lagowskii				
Leuciscus waleckii				
Leuciscus brandti *Pseudaspius leptocephalus*				
Squaliobarbus curriculus				
Elopichthys bambusa				
Hemiculter leucisculus				
Hemiculter bleekeri				

Family / Scientific Name	G	CITES	R	C
Culter erythropterus				
Culter compressocorpus				
Erythroculter ilishaeformis				
Erythroculter mongolicus				
Erythroculter oxycephalus				
Erythroculter dabryi				
Parabramis pekinensis				
Megalobrama terminalis				
Megalobrama skolkoui				
Xenocypris argentea				
Xenocypris microlepis *Rhodeus sericeus*				
Acheilognathus macropterus				
Acheilognathus chankaensis				
Hemibarbus labeo				
Hemibarbus maculatus				
Hemibarbus aculatis				
Paraleucogobio strigatus				
Pseudorasbora parva				
Ladislavia taczanowskii				
Sarcocheilichthys lacustris				
Sarcocheilichthys nigripinnis				
Gobio soldatovi				
Gobio lingyuanensis				
Gobio gobio				
Gobio tenuicorpus				
Gnathopogon mantschuricus				
Squalidus chankaensis				
Squalidus argentatus				
Abbottina rivularis *Rostrogobio amurensis*				
Saurogobio dabryi				
Cyprinus carpio				
Carassius auratus				
Gobiobotia pappenheimi				
Aristichthys nobilis				
Hypophthalmichthys molitrix				
Cobitidae				
Lefua costata				
Nemachilus nudus				
Cobitis lutheri				
Cobitis granoei				
Misgurunus moloity				
Misgurnus anguillicaudatus				
Misgurnus bipartitus				
Parabotia fasciata				
Siluridae				
Silurus soldatovi			V	
Silurus asotus				

Family / Scientific Name	G	CITES	R	C
Bagridae				
Pelteobagrus fulvidraco				
Pelteobagrus nitidus				
Leiocassis argentivittatus				
Pseudobagrus ussuriensis				
Gadidae				
Lota lota				
Gasterosteidae				
Pungitius sinensis				
Serranidae				
Siniperca chuatsi				
Percidae				
Perca fluviatilus				
Stizostedion lucioperca				
Eleotridae				
Perccottus glehni *Hypseleotris swinhonis*				
Gobiidae				
Ctenogobius brunneus				
Channidae				
Channa argus				
Cottidae				
Mesocottus haitej				
Cottus poecilopus				

ANNEX Ga

Procedures and categories for IUCN World Conservation Union listing of threatened species (colored boxes are categories addressed in the ADB-GEF Project).



ANNEX Gb

Sanjiang Plain threats and Project responses to 27 species listed by IUCN World Conservation Union as globally threatened (only 23 species occupy the pilot nature reserves selected by the Project).

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
• **Siberian Crane** *Grus leucogeranus* • 2,900-3,000 in 3 populations, only the eastern population occurs in Heilongjiang Province	IUCN = CE CITES = 1 China = N-1	• Rare on migration passage • Recorded at: Honghe NNR (1997), Naolihe NNR (1999) • Nearly all of global population winters in China	• Russia: oil fields, hunting • China: loss of wetland on winter range and migration routes; human disturbance; hunting on winter range	• loss of reedbeds; • conversion of wetlands to agriculture; • human disturbance	• pilot wetland restoration in NRs; • conservation education & awareness; • capacity building for patrol & enfocement
• **Amur Sturgeon** *Acipenser schrenckii* • no population estimate	IUCN = E	• Occurs only in Heilong and Wusuli Rivers • May be both migratory and non-migratory	• Overfishing • Water pollution	• Overfishing • Water pollution	
• **Kaluga Sturgeon** • no population estimate	IUCN = E	• Occurs only in Heilong and Wusuli Rivers • May be both migratory and non-migratory	• Overfishing • Water pollution	• Overfishing • Water pollution	
• **Crested Ibis** / *Nipponia nippon* • 120-150 birds	IUCN = E CITES = 2 China = N-1	• May have been common in 19th century, but disappeared for unknown reasons by 20th century • no longer a nesting or passage migrant species	• Japan: hunting; agrochemicals • Russia: hunting, conversion of habitats to agriculture; agrochemicals • China: loss of nest trees; feather trade; agrochemicals;	• Unknown, but probably habitat loss due to conversion to farming; • hunting; • agrochemicals	• pilot wetland restoration • capacity building for patrol & enfocement

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
			hunting		
• **Black-faced Spoonbill** / *Platalea minor* • global population 1,270 birds	IUCN = E CITES = 1 China = N-1	• Qixinghe NNR: recorded in 2004, probably also in 2003 • also recorded in Honghe and Sanjiang NNR • may be more common on migration or during breeding season but under-reported because of difficulty of identification • breeding status is not known • migration status is unclear	Not well defined, but probably • hunting of adults; • taking of eggs/chicks from nests; • loss of preferred riparian nesting habitats • over-development of estuarine foraging areas • hunting & netting on winter ranges	• loss of forested wetland habitat that may have been preferred for nesting; • overfishing	• capacity building for patrol & enfocement = reduced hunting • capacity building for NR management & monitoring = improved identification & reporting skills • reduced overuse = greater fish abundance & more prey
• **Scaly-sided Merganser** / *Mergus squamatus* • 3,500-4,000 birds globally; 400-500 in China	IUCN = E CITES = n/l China = N-1	• reported at Naolihe & Qixinghe in 1994 • use of Sanjiang Plain by anatid waterfowl declined by around 90% since 1960s	• loss of old-growth riparian woodland • overfishing of prey base • drowning after entanglement in fish nets • hunting	• loss of old-growth riparian woodland • overfishing of prey base • drowning after entanglement in fish nets • hunting	• capacity building for patrol & enfocement = removal of fish nets; reduced hunting • reduction of fishing pressure in NRs = increased prey base • species recovery plan = increased nest site availability
• **Swan Goose /** *Anser cygnoides* • 30-50,000 birds	IUCN = E CITES = n/l China = P-1	• common nester in 1960s • now uncommon except on migration, but never abundant • use of Sanjiang Plain by anatid	• conversion of wetlands to other land uses • hunting	• conversion of wetland to farmland • hunting (mainly on winter range in Yangtze River basin) • egg collection on nesting grounds	• restoration of farmland-to-wetland = more foraging habitat • capacity building for patrol & enfocement = reduced hunting • species recovery plan

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
		waterfowl declined by around 90% since 1960s		• poisoning • netting	= more focused effort • local and watershed-level water resource management to include ecological requirements = more foraging habitat • capacity building for NR management planning = higher quality, more focused recovery efforts
• **Oriental Stork / *Ciconia boyciana*** • **2,500 birds**	IUCN = E CITES = 1 China = N-1	• nesting in Qixinghe, Naolihe, Xingkaihu, Dajiahe, Zhenbaodao • Sanjiang Plain is the most important nesting area in China: over >100 nesting pairs	• loss of nest trees due to felling • wetland habitat loss • overfishing • hunting on winter ranges • burning of wetland nesting sites	• loss of nest trees due to felling • wetland conversion to farmland • overfishing • burning of wetland nesting sites • human disturbance of nest sites	• restoration of farmland-to-wetland = increased foraging habitat • capacity building for patrol & enfocement = reduced nest disturbance • species recovery plan = more available nest sites • local and watershed-level water resource management to include ecological requirements = more wetland area and more fish • capacity building for NR management planning = better quality & more focused recovery plan
• **Red-crowned Crane /**	IUCN = E CITES = 1	• Nesting in Qixinghe, Naolihe, Dajiahe,	• draining of wetlands suitable as nesting	• draining of wetlands suitable as nesting	• restoration of farmland-to-wetland =

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
Grus japonensis • 2,500-3,000 birds globally	China = N-2	Xingkaihu, Zhenbaodao • Visits all NRs on migration • 150-200 birds nesting in Sanjiang plain	habitats • cattle grazing on drained wetlands • conversion of wetland to farmland • burning of wetland vegetation in nesting habitats • inadequate protection of migration staging areas	habitats • conversion of wetland to farmland • burning of wetland vegetation in nesting habitats • removal of eggs & chicks for captive breeding projects	more foraging and nesting habitat • local and watershed-level water resource management to include ecological requirements = more foraging & nesting habitat • capacity building for NR management planning = higher quality, more focused recovery efforts • capacity building for NR management = reduced fire frequency due to greater ecological knowledge
• **Blakiston's Fish-owl** • **<800 birds**	IUCN = E CITES = 2 China = N-2	• Only recorded from Daxinganling, Xiaoxinganling and Zhangguangcailing mountains but not since 1980s • may have nested in Wandashan in earlier years • currently considered extinct in Heilongjiang	• loss of mature mixed broadleaf-conifer forest due to logging • overfishing in Wusuli-Heilong-Songhua Rivers • drowning due to entanglement in fish nets • river pollution • electrocution on power lines • by-catch in traps set for fur-bearing mammals	• loss of nesting trees due to logging • overfishing in Wusuli-Heilong-Songhua Rivers • trapping	• reduced exploitation of fish stocks = more abundant prey • capacity building = better, more focused species recovery plans • species recovery plans = opportunities to increase availability of nest sites
• **Tiger /** Panthera tigris • **<2,500**	IUCN = E CITES = 1 China = N-1	• Dajiahe, Zhenbaodao NRs during winter when	• killing for Chinese medicine trade • degradation of	• killing for Chinese medicine trade • degradation of	• capacity building for NR management = greater abundance of

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
breeding tigers in the wild; 4-5,000 global population		it crosses the Wusuli on the ice • Possible a resident populatiion of 5-12 tigers in Raohe County	habitat by deforestaton and urbanization • elimination of prey by overhunting and habitat degradation • killing to stop livestock depredation	habitat by deforestaton • elimination of prey by overhunting and habitat degradation • killing to stop livestock depredation	Roe Deer and Wild Boar (potential Tiger prey) • capacity building for NR management = more effective patrol and enforcement, fewer trappers and hunters
• **Chinese Soft-shell Turtle /** *Pelodiscus sinensis* • no global population estimate	IUCN = V	• Occupies Xingkaihu, Zhenbaodao, Dajiahe, Naolihe NRs	• Intensive harvest for food markets	• Intensive harvest for food markets	• capacity building = increased effectiveness of patrol/enforcement, reduced harvest • species recovery plans = opportunities to enable increases in wild populations • restoration of farmland-to-wetland = more aquatic and semi-aquatic habitat
• **Chinese Egret /** *Egretta eulophotes* • 2,600 - 3,400 globally; > 1000 birds in China	IUCN = V CITES = n/l China = N-2	• Reported from Xingkaihu, no date, but presumably on migration • this is a coastal nester, therefore probably not suited to habitation of the Sanjiang Plain	• Plume trade (for hats and other fashion) in late 1800s • coastal development of aquaculture destroys intertidal mud-flat foraging habitat • coastal aquaculture uses chemicals toxic to egrets • conversion of intertidal zone to farmland • urbanization of	• overfishing at Xingkaihu • water pollution at Xingkaihu • hunting/trapping at Xingkaihu	• capacity building = increased effectiveness of patrol/enforcement, reduced hunting/trapping • reduction of overuse = declining fishing pressure, more prey

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
			• coastal zone • egg collection		
• **Lesser White-fronted Goose /** *Anser erythropus* • *30-50,000 birds globally*	IUCN = V CITES = China =	• migrates through Sanjiang plain, mainly Xingkaihu NNR where it uses large bodies of open water • use of Sanjiang Plain by anatid waterfowl declined by around 90% since 1960s	• over-hunting on staging and wintering areas • cultivation of former wetlands • changing water levels on wetlands • construction of dams that flood riparian wetlands	• loss of wetland area due to conversion to farmland • hunting • reduced area of open water due to inadequate allocation for ecological use in wetlands • excessive allocatioin of water resource to urban, industrial and agricultural users	• capacity building = increased effectiveness of patrol & enforcement to reduce hunting • integrated local and watershed-level water resource management = increased habitat availability and quality • farmland restoration to wetland = increased habitat area and quality
• **Baikal Teal /** *Anas formosa* • ***±300,000 globally***	IUCN = V CITES =2 China = provincial listing but not in Heilongjiang	• some 20-30.000 birds on migration in China in 1950s versus 1-10,000 today • recorded in Mudanjiang watershed of Songhua River basin • use of Sanjiang Plain by anatid waterfowl declined by around 90% since 1960s	• over-hunting • habitat loss due to conversion of intertidal zone winter and migrationi habitats to aquaculture • urbanization of coastal zone	• conversion of wetlands to farmlands reduced availability of migration staging habitats	• watershed-level water resource management = increased habitat availability and quality • farmland restoration to wetland = increased habitat area and quality
• **Baer's Pochard** *Aythya baeri* • 10-20,000 globally	IUCN = V CITES = n/l China = provincial listing but not in	• summer visitor and nesting species in Sanjiang Plain wetlands • use of Sanjiang Plain by anatid	• fire damage to nesting sites in wetland reedbeds • drainage of wetland nesting habitats • conversion of	• conversion of wetlands to farmlands reduced availability of migration staging habitats	• capacity building = increased effectiveness of patrol & enforcement to reduce hunting • integrated local and

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
	Heilongjiang	waterfowl declined by around 90% since 1960s	wetlands to farmlands • egg collection • nest desertion due to disturbance by humans and livestock	• conversion of reedbeds and other grassy wetlands to farming reduced availability of nesting habitats	watershed-level water resource management = increased habitat availability and quality • farmland restoration to wetland = increased habitat area and quality • reduced over-use of grass & reeds = increased nesting habitat quality and availability
• **Greater Spotted Eagle /** *Aquila clanga* • <10,000 globally	IUCN = V CITES China	• breeding in Sanjiang Plain • nesting density probably lower than in 19th century due to loss of mature tree stands • preys on ducks	• loss of nest sites due to logging of forested wetlands • conversion of wetlands to agriculture	• logging of forested wetlands reduced numbers of nest sites • declining duck populations reduced Eagle prey base	• capacity building = increased effectiveness of patrol & enforcement to reduce hunting of ducks and increase Eagle prey base • integrated local and watershed-level water resource management = increased habitat availability and quality for ducks as Eagle prey • farmland restoration to wetland = increased habitat area and quality for ducks as Eagle prey • reduced over-use of grass & reeds = increased nesting habitat quality and availability for ducks

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
					as Eagle prey
• **Pallas's Fish Eagle /** *Haliaetus leucoryphus* • *no global estimate*	IUCN = V CITES = 2 China = N-1	• Reported from Honghe and Sanjiang NNRs • May be under-reported at other NRs in Sanjiang Plain • probably a passage migrant, non-nester	• loss of prey base due to overfishing and declining waterbird numbers • destruction of nests • chemical contamination of prey (fish and waterfowl)	• loss of prey base due to overfishing and declining waterbird numbers • chemical contamination of prey (fish and waterfowl)	• capacity building = increased effectiveness of patrol & enforcement to reduce hunting of ducks and increase Eagle prey base • integrated local and watershed-level water resource management = increased habitat availability and quality for ducks as Eagle prey • farmland restoration to wetland = increased habitat area and quality for ducks as Eagle prey • reduced over-use of grass & reeds = increased nesting habitat quality and availability for ducks as Eagle prey
• **Steller's Sea Eagle /** *Haliaetus pelagicus* • <5,000 globally	IUCN = V CITES = China =	• rare passage migrant at Xingkaihu NNR	• logging that removes potential nest trees • coastal development • overfishing of salmon • shooting by fur trappers • lead poisoning	• overfishing of salmon in Heilongjiang, Songhua and Wusuli Rivers	• reduction of overuse = declining fishing pressure, more prey
• **Swinhoe's Rail** *Coturnicops exquisitus*	IUCN = V CITES = n/l China = N-2	• reported from Xingkaihu, Sanjiang and Honghe NNRs as a breeding	• conversion of wetlands to farming • illegal hunting	• conversion of wetlands to farming • illegal hunting	• farmland restoration to wetland = increased habitat area and quality

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
• no global estimate; possibly 5-30 birds/km2 in nesting habitats		species			• capacity building = increased effectiveness of patrol & enforcement to reduce hunting
• **Hooded Crane /** *Grus monacha* •	IUCN = V CITES = 1 China = N-1	• reported from Dajiahe and Anbanghe NRs and Qixinghe NNR on passage	• conversion of wetlands to farming • illegal hunting	• conversion of wetlands to farming • illegal hunting	• farmland restoration to wetland = increased habitat area and quality • capacity building = increased effectiveness of patrol & enforcement to reduce hunting
• **White-naped Crane /** *Grus vipio* • 4,900-5,300 globally	IUCN = V CITES = 1 China = N-2	• possibly >100 pairs nesting in project NRs • migrant in all NRs	• draining of former wetland nesting habitats • cattle grazing on drained wetlands • conversion of wetland to farmland • burning of wetland vegetation in nesting habitats • inadequate protection of migration staging areas	• draining of wetlands suitable as nesting habitats • conversion of wetland to farmland • burning of wetland vegetation in nesting habitats • removal of eggs & chicks for captive breeding projects	• restoration of farmland-to-wetland = more foraging and nesting habitat • local and watershed-level water resource management to include ecological requirements = more foraging & nesting habitat • capacity building for NR management planning = higher quality, more focused recovery efforts • capacity building for NR management = reduced fire frequency due to greater ecological knowledge
• **Saunder's**	IUCN = V	• rare passage	• conversion of	• excessive shoreline	• Farmland-to-wetland

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
Gull / *Larus saundersi* • <10,000 birds	CITES = n/l China = n/l	migrant	estuaries to other land uses • egg collecting • water pollution	development or disturbance at Xingkaihu NNR	restoration program = fewer people in core zone, less disturbance to the shoreline
• **Manchurian Reed Warbler /** *Acrocephalus tangorum* • small but unknown world population	IUCN = V CITES = n/l China = n/l	• recorded at Xingkaihu NNR as a breeding species • probably overlooked at other project NRs as a breeding species	• loss of reed marshes	• loss of reed marshes	• Farmland-to-wetland restoration program = more potential colonization sites for *Phragmites, and more suitable nesting habitat*
• **Rufous-backed Bunting /** *Emberiza jankowskii* • small world population probably <3,000	IUCN = V CITES = n/l China = n/l	• recorded only at Xingkaihu NNR as a breeding species	• habitat destruction on breeding areas: logging of Mongolian Oak • grassland conversion to farmland and pasture	• habitat destruction on breeding areas: logging of Mongolian Oak	• enhanced capacity for patrol and enforcement will help protect Mongolian Oak forests.
• **Eurasian Otter /** *Lutra lutra* • no global population estimate	IUCN = V CITES = n/l China = n/l	• Limited populations remain along the Wusuli River and possibly the remote regions of Naoli River near Changlindao and Yanwodao • No population estimates available	• killing for fur trade • loss and degradation of stream/river habitats	• killing for fur trade • loss and degradation of stream/river habitats	• enhanced capacity for patrol and enforcement = reduced poaching pressure • local and watershed-level water resource management to include ecological requirements = more foraging & denning habitat in wetlands and along streams/rivers
• **Asiatic Black Bear /** *Ursus*	IUCN = V CITES = n/l China = n/l	• Extremely limited numbers use forested uplands in	• killing for trade in animals parts • loss and degradation	• killing for trade in animals parts • loss and degradation	• enhanced capacity for patrol and enforcement =

Species / Global Population Estimate	Listing*	Use of Project Area	Global Threats	Sanjiang Threats	Project Response to Threats
thibetanus • no global population estimate		Raohe County • No population estimates available	of forest, woodland habitats	of forest, woodland habitats	reduced poaching pressure • farmland-to-woodland restoration = increased upland foraging & denning habitat

**CE* = *Critically Endangered*
E = *Endangered*
V = Vulnerable
n/l = not listed

ANNEX H

Summary of nine crane species recorded in China. Boldfaced entries nest in the Sanjiang Plain.

English Name	Scientific Name	Global Population* (IUCN Red Book status)	Breeding in Heilongjiang	Passage in Heilongjiang	Wintering in China
Demoiselle Crane	*Anthropoides virgo*	not threatened	• Zhalong NNR	Song-Nen Plain	few birds in Yunnan Province
Sarus Crane	*Grus antigone*	<10,000	• non-breeder	none	last recorded early 1990s in Yunnan Province
Sandhill Crane	*Grus canadensis*	not threatened	• non-breeder • North American species accidental in Asia	accidental	accidental
Common Crane **Red-crowned Crane**	*Grus grus* ***Grus japonensis***	not threatened **1,700-2,000 (endangered)**	• Zhalong NNR • **Sanjiang NNR (13 birds 1999, annual)** • **Honghe NNR (44 birds 1999, annual)** • **Fujin County (4 birds 1999, annual)** • **Liansanpao NR (breeding; 1998)** • **Qixinghe NNR (15 birds 1995, annual)** • **Changlingdao NR (±30 birds 1999, annual)** • **Yanwodao NR (±30 birds 1999, annual)** • **Naolihe NR (breeding annual)** • **Duluhe NR (6 birds; 1995)** • **Zhalong (346 birds; 1996)**	Song-Nen Plain **Sanjiang and Song-Nen Plains**	Bohai Sea southwest to Guangxi **Yancheng, Jiangsu (1,200)**
Siberian Crane	*Grus leucogeranus*	2,500-3,000 (critically endangered)	• nesting in Russia only • mating documented in the Song-Nen Plain	• Song-Nen Plain • Formerly Sanjiang Plain but not since 1997 at Honghe NNR and 1999 at Changlingdao NR	• Poyang Lake, Jiangxi • Dongting Lake, Hunan • Shengjin Lake, Anhui • Heigangkou, Henan
Hooded Crane	*Grus monacha*	9,150 (vulnerable)	• last nested at Bei'An County (Heihe Municipality) in 1993;	Song-Nen Plain	• Shengjin Lake (350) • Poyang Lake (100)

English Name	Scientific Name	Global Population* (IUCN Red Book status)	Breeding in Heilongjiang	Passage in Heilongjiang	Wintering in China
			• Xingkai Lake (per MacKinnon & Phillipps 2000); • non-breeding birds may be seen in Sanjiang Plain during breeding season		• Dong Dongting Lake (50) • Xinglong Dongsha & Chongming Island (100) • Longgan Lake (250) • Chen Lake (100)
Black-necked Crane	*Grus nigricollis*	5,600-6,000 (vulnerable)	• non-breeder in Heilongjiang	none	Sichuan, Gansu, Xizhang, Qinghai
White-naped Crane	***Grus vipio***	**4,900-5,300 (vulnerable)**	• **Sanjiang and Song-Nen Plains**	**Sanjiang and Song-Nen Plains, Xingkai Lake**	**Hubei, Hunan, Jiangxi, Jiangsu**

*population estimates given only for globally threatened species

INSTITUTIONAL , LEGAL, AND POLICY ANALYSIS

1. This Supplementary Appendix summarizes the legal and regulatory environment for the Sanjiang Plain Wetland Protection Project (SPWPP). This review is based on the results of four field trips undertaken by the project team in 2003 to the Sanjiang Plain, two tri-partite meetings sponsored by the project and convened in Harbin, interviews conducted by project team specialists with representatives of government agencies, and previous work carried out for two Sanjiang Plain projects, the ADB Songhua River Flood, Wetland and Biodiversity Management Project (2000-2001).

A. LAWS, REGULATIONS & INTERNATIONAL COMMITMENTS

1. Wetland, Biodiversity and Environment

2. **National Plans and Policies**. Several important national plans, programs and policies have been adopted in the last decade to provide guidance and direction for implementation of the laws and regulations. The most important of the plans and policies include:

3. **Biodiversity Conservation Action Plan (BCAP)**: The *Convention on Biological Diversity* (CBD) resulted from the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. In 1993, the Government of China ratified the Convention on Biological Diversity. The Convention called for drafting of a national biodiversity conservation strategy. The Standing Committee of the People's Congress approved the Convention in June 1993, and China's Biodiversity Conservation Action Plan (BCAP) was promulgated on 13 June 1994. The BCAP listed priority projects for immediate action, one of which was the development of a nature reserve in the Sanjiang Plain. The Government of China committed to increase the percentage of nature reserve area comprising wetlands and inland water bodies to 12-13% from the 2.3% prevailing in 1995.

4. **National Wetland Conservation Action Plan (NWCAP**): approved in 2002; complements the Biodiversity Conservation Action Plan and is the key guidance document on conservation, use, management, and exploitation of wetlands; establishes the institutional framework; describes current situation; outlines priority actions and 39 projects to be implemented; and lists China’s important wetlands.

5. **Priority Programme for China’s Agenda 21:** adopted in March 1994, in response to the 1992 United Nations Conference on Environment and Development, calls for the development of a national program for sustainable development. In response, the Government of China has produced the *Agenda 21 White Paper on China's Population, Environment, and Development in the 21st Century*. Notably, the White Paper emphasizes the importance of integrated management of drainage basins.

6. **Table B-1** identifies other key national programs that affect wetland and biodiversity conservation management in the Sanjiang Plain.

Table B-1. National Programs on Wetland Management

Year	Institution	Title	Content
1994	NEPA	Decree (HR [1994] No. 184)	Strengthens protection of the wetland ecosystem.
1995	Committee of Environmental and Resources Protection, National People's Congress	Official Document	Requires the concerned central and local governments to protect the wetlands in Sanjiang Plain.
1996	Ministry of Agriculture	Report to State Council (NNH [1996] No. 8)	Stresses the importance of coordinating wetland conservation and agricultural development in Sanjiang Plain.
1999	Ministry of Agriculture	National Agricultural Action Plan	Responds to Agenda 21 and outlines measures for sustainable use of the agro-ecological environment. Stresses conservation of soil and water for the benefit of agriculture and the environment.

Sources:

- State Environmental Protection Agency. *Country Report on China Fulfilling Biodiversity Pacts.* China Environmental Science Publishing House. Beijing. March 1998.
- State Environmental Protection Agency. *Agenda 21 for China Environmental Protection.* China Environmental Science Publishing House. Beijing. May 1995.
- Secretariat of Environmental Protection Commission of State Council, Population, Environment and Development Research Division of Renmin University. *A Complete Work of the Policies, Laws and Regulations Concerning China's Environment and Natural resources.* Zhongxin Publishing House. Beijing. February 1996.
- Ministry of Agriculture. Report to the State Council (NNH [1996] No. 8). Beijing. 1996.
- Ministry of Agriculture PRC. 1999. *Agriculture Action Plan for China's Agenda 21*. Beijing

7. **National Laws and Regulations**. China has established a system of laws, national regulations and programs that are adequate for the protection of biological resources and nature reserves. Within the local legal structure, however, there is a need for to develop or refine regulations that are specific to localities and/or nature reserves to guide the use of natural resources. Within Heilongjiang Province, 40% of nature reserves had issued their own management regulations, detailed rules, and notices by the end of 1997. The target is to complete the process for all reserves by 2010. The condition of the nature reserves however indicates that neither national nor local regulations are being effectively implemented, which may be due primarily to a shortage of qualified personnel, historically inadequate nature reserve budgets, and to the lack or poor quality of nature reserve regulations.

8. Numerous provisions of a wide range of laws and regulations are in principle applicable to wetlands and biodiversity in the Sanjiang Plain. The most relevant to the proposed project may be the following:

- Environmental Protection Law (Articles 1 and 17);
- Water Law (Articles 5, 18 and 31);
- Law on Water and Soil Conservation (Article 13);
- Government of China National Law of Wild Animals Protection (NLWAP); and
- Government of China National Regulation of Nature Reserves.

9. The National Regulation of Nature Reserves specifies the activities permitted within the three zones of nature reserves. The specifications are listed in the "Environment and Natural Resource Protection Legal Handbook" (ISBN7-80056-439-8/D 511; 1998) (see text box below). The range of activities is narrow, and may unduly restrict the ability of the reserve to engage in activities that could enhance the effectiveness of conservation management. Such activities include sustainable fishing, harvest of traditional Chinese medicine products, guided tourism, and conservation education.

Core Zone: Designated for intact and natural ecosystems, or where rare or endangered plant species are concentrated. Any entry of a unit or person into a core area is prohibited. Apart from scientific research approved by the nature reserve authority, any other scientific activity in a core area is prohibited. Entrance to the core area of a national level nature reserve must be approved by the relevant state authority.

Buffer Zone: The buffer area encircles the core area. Only scientific research is allowed within the buffer area.

Experimental Zone: The experimental area is the outer portion of the nature reserve surrounding the buffer zone. Permitted activities include scientific research, education, field trips, tourism, and cultivation of rare or endangered plants or rearing of such animals.

10. **Provincial Regulations.** Table B-2 identifies the key provincial level programs on wetland management in the Sanjiang Plain.

Table B-2. Provincial Regulations for Wetland Biodiversity Conservation and Management

Year	Institution	Title	Content
1996	Heilongjiang Provincial Government*	Regulation of Nature Reserves of Heilongjiang Province	Identifies the establishment and management of nature reserves, responsibilities of local governments, and specifies priority wetland nature reserves.
1998	Heilongjiang Party Committee	Decision on Wetland	Suspends any kind of wetland development project in the Province. To

Year	Institution	Title	Content
	and Provincial Government**	Conservation	enforce this decision, the related government offices are in the process of refining development plans, canceling signed contracts and undertaking the corresponding measures.
1999	Passed by the Standing Committee of Heilongjiang Provincial People's Congress on 8 December, 1999 and came into effect on 1 January, 2000***	Heilongjiang Provincial Regulation of Land Management	Specifies the ownership and user rights of the lands within Heilongjiang Province; specifies master planning of land use emphasizing protection of croplands; specifies lands for infrastructure; specifies trade of land user rights; supervision and inspection; legal responsibilities.
2003	Heilongjiang Provincial Government*	Regulation on Wetland Conservation of Heilongjiang Province	Identifies the Provincial Forestry Department as the authority responsible for wetland conservation. Wise use and sustainable development are mandated. Conversion of wetlands within nature reserves is prohibited. Wetland conservation plans are to be drafted and integrated. Draining of water is prohibited as is digging of channels, building of dams, or cultivating. Use of agricultural chemicals is regulated.
Sources: *Heilongjiang Provincial Government. Regulation of Nature Reserves of Heilongjiang Province. Command # 3 of Heilongjiang Provincial Government. Harbin. 1996. **Heilongjiang Party's Committee and Provincial Government. Decision on Wetland Conservation. Documentation of Heilongjiang Party's Committee (HF [1998] #21). Harbin. 1998. ***Standing Committee of Heilongjiang Provincial People's Congress. Heilongjiang Provincial Regulation of Land Management. Harbin. 1999.			

11. In general, Heilongjiang Province has an adequate body of regulations to implement the relevant laws. Enforcement of regulations in the field, however, is often lax. Because of the inherent difficulty in quantifying success or failure in the implementation of the provincial regulations there appears to be no accountability mechanism at the provincial level to determine adequacy of application.

12. There are several areas where provincial regulations overlap with each other, or with national regulations. Additionally, there are areas in which provincial regulations are absent. This is most apparent for inter-sector water planning, allocation, and use (MWR, State Farms); and reservations of in-stream flows and levels for aquatic life (SFA, Ministry of Agriculture, and SEPA). However, former ambiguities regarding the management authority for wetland nature reserves have been resolved and working relationships have now been forged.

13. **International Conventions and Agreements**.The conventions most relevant to the proposed project are: The Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention); the Wise Use Guidelines of the Ramsar Convention; and the Convention on Biological Diversity (CBD).

14. The Ramsar Convention Bureau has listed over 1,300 of the world's wetlands as internationally important. Of these China accounts for 21, three of which lie in the Sanjiang Plain: Sanjiang, Honghe, and Xingkaihu NNRs.

15. The Ramsar Convention and the Wise Use Guidelines of the Ramsar Convention require preparation of detailed management plans for each of the 21 listed wetlands in China. The Wise Use Guidelines of the Ramsar Convention require China to implement sustainable use of wetlands compatible with the maintenance of the natural properties of the ecosystem. With the intention of safeguarding the integrity of wetlands and the conservation of waterfowl dependent on them, the Convention's definition of wetlands encompasses all river, stream, pond, marsh, sand flat and mudflat habitats upstream of, within, and downstream of core areas, whether natural or artificial.

16. The CBD obliges each signatory country to draft a national biodiversity conservation strategy. In fulfillment of its obligation, the Government promulgated a Biodiversity Conservation Action Plan (BCAP) in 1994, which led to the establishment of the Sanjiang NNR.

2. Convention on International Trade in Endangered Species

17. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, see www.cites.org) , to which China acceded in 1981, bans or restricts trade in listed wild animals and plants. Endangered species listed under CITES Appendix 1 may not be traded under any circumstances. Species listed under Appendix 2 may be traded only under authority of permits issued by government.

18. **Sino-Australian Migratory Bird Treaty**: The Sino-Australian Agreement for the Protection of Migratory Birds and their Environment (1 September 1988) protects birds from sale, over harvest, and habitat destruction.

19. **China-Japan Migratory Bird Treaty**: The Sino-Japanese Agreement on the Protection of Migratory Birds (1981) protects birds from sale, over harvest, and habitat destruction

3. Integrated Basin Management

20. The water law, and subsequently the flood control and other laws, require unified management of water resources for sustainable development at watershed and province levels. The Songhua River Basin flood management plan does not fully satisfy these requirements because of its scope. Integrated basin management would need to account for water allocation, and this cannot currently be accomplished with the existing permit system. The absence of a suitable basin-wide water withdrawal permit system critically compromises the effective implementation of integrated basin management.

4. Planning

21. **Development Plan for Nature Reserves of Heilongjiang Province**. In 1998 the HEPB and the Heilongjiang Development and Planning Commission (HDPC) prepared a Development Plan for Nature Reserves of Heilongjiang Province (1998-2010) based on the Outline of Development Planning for Nature Reserves of China. The plan specifies the establishment of 1.6 million additional hectares of nature reserves in the Sanjiang Plain in the period 2000-2010, and proposes specific objectives in the areas of legislation and regulation, management, infrastructure, scientific research, staff training, publicity and education.

22. The Development Plan is significant to project design insofar as its objectives regarding land use are consistent with or complementary to objectives of the FMP in the context of integrated basin management. In principle the two plans do not conflict, and a case can be made that project involvement in the Sanjiang Plain would complement basin flood management objectives. The Plan also provides a blueprint for project support for the expansion of reserve areas within the Sanjiang Plain; objectives are broad enough to allow for considerable flexibility in the targeting of external assistance. Existing legal support for the enforcement of the Plan, however, may be locally weak, as the following paragraph illustrates. Although national and provincial environmental policies may strongly endorse project involvement in the Sanjiang Plain, local legislation is not likely to promote effective implementation and project outcomes that are sustainable in the long run.

23. **Master Plan of Land Use in Heilongjiang Province:** The Heilongjiang Provincial Government received State Council approval in July 1999 to amend the Master Plan of Land Use in Heilongjiang Province (1997-2010) to include proposals to restore hundreds of thousands of hectares of croplands to wetlands and not to rebuild local dykes damaged by the 1998 flood. However, the text of the Master Plan continues to specify a scheduled conversion of wetland area to farmland. The apparent conflict in policies was clarified in part by the issuance in June 2003 of the Regulations on Wetland Conversion in Heilongjiang Province, and the implementation of the Farmland to Wetland Restoration Program to be implemented by the Forestry Department of Heilongjiang Province beginning in 2004. There remains some conversion of wetland to farmland, but the policy and its implementation are now both directed toward stopping further losses of unploughed wetlands and removing farming from nature reserves to enable wetland restoration.

5. Gaps In Protection

24. **Laws**. China has developed an adequate body of law to enable governments to protect habitats and the biodiversity they support. Laws cover water and its administration and allocation, protection and management of terrestrial and aquatic wildlife, management of habitats including wetlands and forests, and general land use management. Implementing regulations have, in most cases, been approved to enable agencies to integrate management of natural resources in the interest of sustainable use.

25. **Regulations on Habitat Protection**. With the June 2003 approval of the Regulations on Wetland Conservation of Heilongjiang Province a major step was taken toward recovery and

sustainable use of wetland biodiversity. These regulations call for the provincial Forestry Department to work together with the State Farm Bureau to stop losses of wetlands in areas designated as nature reserves and restore water supplies to wetlands where needed.

26. **Regulations on Allocation of Water Rights**.The Water Law makes provision for development of a water rights allocation system. This system functions through planning and negotiation coordinated by MWR within and between government agencies. Wetland nature reserves have not assumed a significant role in the water allocation planning process in the past. The result is that wetlands have typically not received the water allocations necessary to maintain essential watershed functions such as ground and surface water recharge, flood storage, water purification, and biodiversity conservation. The absence of wetland (and other) nature reserves from the water allocation process is an important gap in the institutional framework for wetland biodiversity protection. This gap can result in degradation or loss of wetlands and serious implications for a wide range of issues including:

- Attenuation of floods (loss of life and property) and droughts (damage to agriculture);
- Reduced abundance and diversity of fish stocks (reduced rural quality of life, loss of income);
- Loss of abundance and species richness wildlife populations; and
- National failure to meet international commitments under the Convention on Biodiversity and the Ramsar Convention.

27. **International Commitments**. There are no material gaps in China's suite of international agreements and commitments. There is, however, a gap in terms of China's adherence to the wise use guidelines of the Ramsar Convention Bureau. The number of Ramsar sites has increased in recent years from 7 to 21, which is a strong indication of compliance. However, each of the three Ramsar sites in the Sanjiang Plain suffers from degradation of habitat quality and, for many wildlife species, continued decline in population numbers.

B. INSTITUTIONS

1. Land Management

28. There are 18 counties (or cities at county level) in the Sanjiang Plain, which are administered by seven prefecture governments under the Heilongjiang Provincial Government (**Table B-3**). Of the seven prefectures, the entire areas of Hegang, Jiamusi, Jixi, Shuangyashan, and Qitaihe are located within the Sanjiang Plain. Harbin and Mudanjiang prefectures are each represented by only a single county.

Table B-3. Prefectures, Counties, and Urban Districts in the Sanjiang Plain

No.	Prefecture	Total Area of Prefecture km^2	No.	Counties & Urban Districts	Area of County and Urban District in Sanjiang Plain km^2	Area of Prefecture in Sanjiang Plain km^2	Percent of Prefecture in Sanjiang Plain
1	Harbin	53,664				4,616	9%
			1	Yilan	4,616		
2	Hegang	15,216				15,216	100%
				Urban District	5,119		
			2	Luobei	6,762		
			3	Suibin	3,335		
3	Jiamusi	32,589				32,589	100%
				Urban District	1,875		
			4	Fujin	8,229		
			5	Fuyuan	6,262		
			6	Huanan	4,415		
			7	Huachuan	2,268		
			8	Tangyuan	3,240		
			9	Tongjiang City	6,300		
4	Jixi	22,838				22,838	100%
				Urban District	2,430		
			10	Hulin	9,330		
			11	Jidong	3,235		
			12	Mishan	7,843		
5	Mudanjiang	40,540				6,447	16%
			13	Muling	6,447		
6	Qitaihe	6,212				6,212	100%
				Urban District	1,757		
			14	Boli	4,455		
7	Shuangyashan	23,273				23,273	100%
				Urban District	1,767		
			15	Baoqing	10,836		
			16	Jixian	2,257		
			17	Raohe	6,613		
			18	Youyi	1,800		
		194,332			**111,191**	**111,191**	

2. State Farms

29. The Sanjiang Plain has 52 State owned farms administered by the State Farm General Bureau in Harbin and four State Farm Sub-Bureaus (SFSBs). The State Farm system is an institution within the provincial government. The authority level of the State farm system is reflected in the following of characteristics:

- Each farm is ranked institutionally by the provincial government at the county level and the SFSBs are ranked at semi-municipality level. They are administrated directly by the Heilongjiang State Farm General Bureau (HSFGB), which is a member of the Heilongjiang Provincial Government at full municipality level.
- The administrative offices of the HSFGB function essentially as a self-contained government unit. The farm system is authorized to undertake government functions including planning, finance, foreign trade, public security, environmental protection, water conservation, and others within its territory. The State Farm system, however, has no authority for taxation.
- Four State Farm Sub-Bureaus located in the Sanjiang Plain constitute China's largest commercial agricultural production base. The four Sub State Farms bureaus are: Baoquanling, Hongxinglong, Jiansanjiang, and Mudanjiang Sub-bureaus. They have a population of 953,000 persons and 320,000 households. The cropland under them totals 20.93 million mu (1.39 million ha), of which 9.68 million mu (0.65 million ha) are paddy fields. The croplands and the paddy fields under these Sub-Bureaus account for 67.9% and 92.3% of the total cultivated area by State Farms respectively.

30. Natural wetlands have shrunk more than 40% from what they were in 1975. Currently, there are six Wetland Nature Reserves that have been established in the State Farms in the Sanjiang Plain. As important stakeholders in land use in the nature reserves, State farms controlled 5.43 million mu of established nature reserves. **Table B-4** shows land use by all intuitions involved in the Sanjiang Plain wetland reserves. Within the nature reserves, State farms still have large amount of arable land either in the core, buffer or experimental zones.

31. Taking the initiative of wetland protection, the State Farms Bureau plans to convert 3 million mu (200,000 ha) of cropland, in three years, within and surrounding the nature reserves, back to wetland, which is more than twice as what is proposed in the Provincial Sanjiang Plain wetland restoration report prepared by the Heilongjiang Forestry Department.

32. Nature reserve personnel are normally administered by the State farm on which a reserve is located, and funding for salaries is typically provided by the State farm. Many nature reserve offices are located at or near State farm headquarters. Thus there is a close relationship between nature reserves and state farms.

Table B-4. Land-use Pattern in Wetland Nature Reserve of the Sanjiang Plain (10,000mu)

Reserve Name	Location	Sector Association	Total Area	Area under State Farm	Farmed Area
Sanjiang NNR	Jiamusi	Forestry	297	0	50.55
Honghe national NR	Jiansanjiang State Farm Sub-Bureau	State Farm	34.28	32.75	3.05

Reserve Name	Location	Sector Association	Total Area	Area under State Farm	Farmed Area
	Sub-Bureau				
Naolihe NNR	General State Farm Bureau	State Farm	240.89	41.79	36
Qixinghe N NR	Baoqing	Forestry	34.5	0	3.3
Bachadao NNR	Tongjiang		48.02	0	16.5
Xingkai lake NNR	Jixi	Forestry	333.73	36.1	35.78
Wusuli River PNR	Jiansanjiang State Farm Sub-Bureau	State Farm	59.5	59.5	21.51
Sanhuanpao PNR	Fujin		37.61	0	6.45
Anbanghe PNR	Jixian county	Forestry	15.44	0	10.2
Zhenbaodao PNR	Hulin	Forestry	35.63	0	9.32
Duluhe PNR	Luobei		28.5	0	2.85
Hukou PNR	Mudanjiang State Farm Sub-Bureau	State Farm	22.5	5.75	1.88
Dajiahe PNR	Raohe	Forestry	108.91	0	20.11
Dongsheng PNR	Baoqing		26.77	0	5.2
Huachuan Songhua river PNR	Huachuan		39.3	0	4.65
Hegang Xilinhe PNR	Hegang	Forestry	41.78	0	1.5
Shuilian PNR	Baoquanling State Farm Sub-Bureau	State Farm	13.43	13.43	5.5
Qindeli PNR	Jiansanjiang State Farm Sub-Bureau	State Farm	54.99	25.86	2.1
Total			**1472.78**	**215.18**	**236.45**

3. Water Management

33. **Central Government**. At the central level the Ministry of Water Resources (MWR) is the most important organ for flood control works in the Songhua River basin and the Sanjiang Plain. MWR is responsible for national flood control and drought relief, the drafting of legislation, supervising law (especially Water Law, Flood Control Law, Water and Soil Conservation Law) enforcement, unified management of water resources, the development and formulation of mid to long term policies and plans, organizing water withdrawal permit and fee collection systems, the construction of water and soil conservation structures, multi-purpose projects, structure or non-structure of flood control and rural water development (including irrigation and drainage), ground water administration including urban and coastal groundwater management and protection, city flood control, and review of proposals and feasibility studies for large and medium sized water projects. MWR's original responsibilities for biological measures for water and soil conservation were transferred to the State Forestry Administration. The responsibilities of the Heilongjiang Provincial Water Resources Department are similar to the responsibilities of

MWR. MWR gives instructions for professional operation and implementation of laws to Water Resources Departments in each province.

34. MWR manages the Office of the State Flood Control and Drought Relief. Its main responsibilities are: (1) during normal periods, pre-flood supervision of safety measures, preparing and distributing materials for flood control, assessment of flood damage and supervision of post-flood reconstruction; (2) during flood periods, collection of hydrologic data, and coordination of disaster fighting.

35. The General Institute of Water Resources Design and Planning is part of the MWR and serves as its primary review body. Numerous other research institutes and entities of various kinds (design, planning, manufacturing, etc.) report to the MWR but are not organically part of the Ministry.

36. The Reservoir Resettlement and Development Bureau is organically part of the MWR. Its main responsibilities are: dealing with the remaining resettlement problems in the existing water projects administrated directly by the central government, resettlement in the projects to be constructed which will be invested directly or indirectly by MWR, and the drafting of resettlement regulations.

37. **Regional/Basin Level**. At the regional/basin level, only the Song-Liao Water Resources Commission (SWRC) and Song-Liao Water Resources Protection Bureau (SWRPB) affect Songhua River basin management, but their functions in the Songhua River basin are limited. SWRC serves as the MWR regional office. SWRPB is under the authority of the MWR and SEPA, but financed by the MWR only. SWRPB carries out the instructions of the Song-Liao Water System Protection Leading Group established in 1978 by the approval of the State Council. In addition there are two reservoir dispatch leading groups at the basin level.

38. **The Song-Liao Water Resources Commission** is one of seven existing inter-provincial river basin commissions under direct administration of MWR. It was established in Changchun in 1982. The SWRC is a sole responsible organization for river management in the Songhua basin and the Liao River basin, including international boundary rivers in northeast China, the Wusuli and the Heilong Rivers. Based on the principle of unified management and administration, SWRC is responsible for the construction and management of major water projects, basin planning, water resources and river course management, coordination and supervision for improving water the development, utilization and protection of water resources. The SWRC's main responsibilities include:

(i) Organizing and supervising the implementation of laws and regulations, and formulating basin-wide policies and regulations;

(ii) Formulating a development strategy for the Song-Liao basin and formulating master plans and technical plans in cooperation with other departments and provincial governments, and supervising the implementation of these plans upon approval;

(iii) Organizing monitoring, surveying and evaluating water resources; formulating long term water supply and distribution plans among provinces and supervising implementation; and managing water withdrawal permits and monitoring protection of basin water resources;

(iv) Providing unified management for the rivers and lakes and managing the courses of the key river reaches;

(v) Developing a flood control plan for the basin (including international river basins), reviewing provincial flood control plans, coordinating work in flood control and drought relief, and guiding the safe construction of flood storage and detention areas;

(vi) Handling and solving water disputes among provinces or sectors;

(vii) Organizing prevention, supervision and treatment in major areas of soil erosion, and guiding local efforts in water and soil conservation;

(viii) Reviewing project proposals, feasibility studies and preliminary designs of water projects under the central government and those jointly funded with local governments; formulating the annual investment plan of the central government in the basin; and organizing the implementation of the plan upon its approval;

(ix) Constructing and managing important or inter-provincial/regional water projects; and leading cooperation and foreign affairs concerning international boundary rivers in cooperation with other relevant departments;

(x) Guiding work in rural and urban water management; and guiding hydropower construction and work of rural electrification;

(xi) Undertaking and handling other matters requested by the MWR

4. Wetland Management

a) Existing Administrative Framework of the Wetlands

39. Administration of wetlands in the Sanjiang Plain is complex and simplification would enhance effectiveness and efficiency. However, recent definitions of institutional roles by the June 2003 Regulations on Wetland Conservation of Heilongjiang Province clarify the situation and provide a good foundation for effective administration.

40. Most wetlands in good condition are managed by the nature reserves. The existing wetland nature reserves in the Sanjiang Plain are managed by at least seven government sectors including environmental protection, forestry, agriculture, water resources, geological mines, state farms, and fisheries. Forestry and environmental protection agencies play the most important roles. This is because of the institutional authority assigned by the State Council and provincial regulations to these two sectors.

41. The State Environmental Protection Agency (SEPA) is responsible for national environmental planning, and is charged with supervising and monitoring the environment of

wetlands (SFA 2000). SEPA also manages wetland and other nature reserves, and is designated as the national nature reserve authority under the Regulations on Nature Reserves of 1994.

42. The SFA implements the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention) in China. In that capacity, SFA works closely with the three Ramsar sites in the Sanjiang Plain, i.e., Honghe, Sanjiang, and Xingkaihu NNRs. The SFA is also charged with organizing and implementing wetlands conservation, and took the lead role in drafting China's National Wetland Conservation Plan (SFA 2000). In that capacity, SFA takes the lead role in implementing the Plan and managing wetland nature reserves. Within Heilongjiang Province the Provincial Forestry Department is charged with conservation of wetlands, implementation of UNDP-GEF projects in the Province, and implementation of the June 2003 regulations (in cooperation with the State Farm Bureau). This covers the UNDP-GEF Sustainable Use of Wetlands in China Project at Honghe NNR. The SFA and the International Crane Foundation are jointly executing the UNEP-UNDP-ICF project entitled Conservation of the Globally Significant Wetlands and Migration Corridors Required by Siberian Cranes and Other Globally Significant Migratory Waterbirds in Asia, which began in 2000. SFA is also responsible for forest management and conservation, both of which play important roles in protection of water supplies to wetlands. In that capacity SFA regulates forest harvest, and manages forest nature reserves. Wildlife conservation in China is the responsibility of the SFA, with the exception of aquatic organisms, which are the responsibility of the Ministry of Agriculture.

43. The Ministry of Agriculture (MOA) is responsible for conservation management of aquatic organisms in streams, rivers, lakes, and wetlands. In this role MOA manages wild and domestic fish populations, by regulating harvest seasons, methods, and catch limits. MOA also manages grasslands, many of which lie in the catchments of important wetlands. Because of the fundamental importance of grassland habitats and aquatic biodiversity to overall wetland biodiversity management in the catchment, the role of MOA is important.

44. The key factor for the authority of managing specific wetlands depends mainly on which agency has ownership of the wetlands. In this regard, the authorities of land management and local governments assign wetlands to the various sectors.

b) Coordination of Planning

45. Plans for reclamation of wetlands are typically prepared by development agencies. However, the land development master plan does not include cost-benefit analysis or rigorous assessment of damage to the natural environment, including the loss of habitat for wildlife and the loss of unique ecological areas. This assessment, however, is a requirement of the provincial regulation for master land use planning. This inconsistency was partly resolved by the June 2003 wetland regulation, which banned conversion of wetlands in nature reserves.

46. An integrated master plan for wetland management and biodiversity conservation in the Sanjiang Plain is needed. Preparation of such a large-scale plan must be based on a resources

inventory on both protected and unprotected wetlands, assessment of the development strategies/policies, and the legal foundation. The plan needs to be integrated with plans for land and water use and development of nature reserves.

47. Coordination among the nature reserves, especially neighboring reserves, needs to be enhanced to improve the effectiveness of conservation. This is especially important for nature reserves located within single watersheds. To solve the water shortage caused by drainage or drought, some nature reserves (Qixinghe and Anbanghe) are planning to build dams to store water. This may threaten the water supply to downstream wetlands. Potential effects of these plans have not been studied on a project or watershed basis.

c) Management of Reserves

48. Nature Reserves have been playing a key role in protecting wetlands and biodiversity. However, lack of funding and administrative authority and increasing agricultural development have been obstacles to effective management of Sanjiang Plain nature reserves. More significantly, government and State farm drainage projects have drained water from the reserves. Through drainage for agriculture, some wetland reserves have become isolated dry islands without sources of water (notable is Honghe NNR in the northern Sanjiang Plain).

49. By 1997 21% of the nature reserves had no management institutions and 65% of the reserves were managed by institutions[1] other than those designated as appropriate wetland authorities. Some recently established reserves were former commercial enterprises such as reed companies. At such reserves the management capacity has not been developed, and funding has not been guaranteed. This forces the nature reserves to sell natural resources to fund conservation operations.

50. Professional training of management and technical staff is required to improve the effectiveness of wetland conservation. Some managers of wetland conservation in the provincial agencies have expertise in wildlife, ecology and related sciences. However, of the management personnel at the nature reserves, few have technical backgrounds and most have little direct knowledge of wetlands or biodiversity. Most senior staff are transfers from forestry assignments and others are transferred from farm management, local government or industries.

d) Financial Mechanisms

51. The history of establishment of nature reserves in Heilongjiang Province spans nearly 40 years. However, annual budgets for management and/or infrastructure investment are not yet included in the government regular budget or in the mid-or long-term plan for social and economic development. Most nature reserves have inadequate funding from the government budget to pay salaries, conserve wetlands or protect wildlife. Currently, the main funding sources of the nature reserves are:

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[1] HEPB and Heilongjiang Planning Commission. Development Plan for Nature Reserves of Heilongjiang Province (1998-2010). Harbin. 1998: 22.

(i) Fixed annual payments from the provincial sector authorities that administer the reserves. These may cover 60 to 70% of salaries at the national reserves only.

(ii) Occasional subsidies from the administrative government offices for operation of the nature reserves

(iii) Incomes from businesses run by the nature reserves

(iv) Direct investment for infrastructure upon specific application or project proposal

(v) Grants for research projects.

52. In 1997 the total budget for 90 nature reserves in Heilongjiang Province was 1.25 million RMB, including 412,500 RMB funded by the central government (33%), 500,000 RMB granted by the local governments and sector administrative offices (40%), and 337,500 RMB subsidized by the businesses run by nature reserves (27%). However, funding levels are planned to increase substantially in the period from 2000-2010[2].

e) Biodiversity Management

53. Biodiversity conservation is the responsibility of SEPA at the central level and of the Heilongjiang Environmental Protection Bureau (HEPB) at the Provincial level. SEPA is the implementing authority for the Convention on Biological Diversity (CBD) in China. SEPA is the nature reserve authority at the national level and HEPB is the provincial authority. SEPA and HEPB maintain national and provincial biodiversity records in a national database, and serve as the CITES authorities in China.

54. Wildlife conservation is the responsibility of SFA at the national level and the Forestry Department of Heilongjiang Province at the provincial level. In this capacity SFA and FDHP are responsible for conservation and recovery of endangered species. FDHP undertakes responsibility for wetland management and wetland nature reserves within Heilongjiang Province, and the associated wildlife. As the Ramsar authority in China, SFA is responsible for compliance of Ramsar-listed wetlands with the wise use guidelines of the Ramsar Convention Bureau.

C. INSTITUTIONAL OVERLAPS, GAPS, BARRIERS

1. Nature Reserve Funding

55. In June 2002 22 members of the Chinese Academy of Sciences (CAS) signed a petition calling for increased national government financing for nature reserves in China. The petition noted that average annual funding for nature reserves in China (US$53 per km^2) was 1/3 of the average for developing countries (US$157 per km^2) and only $1/40^{th}$ that for developed countries (US$2,038 per km^2).

[2] HEPB and Heilongjiang Planning Commission. Development Plan for Nature Reserves of Heilongjiang Province (1998-2010). Harbin. 1998:20.

56. The six target nature reserves included in the Sanjiang Plain Wetland Protection Project have requested substantial budget increases for the period 2004-2010, which represent average annual expenditures of $1,072 per km^2. These budgets are approximately 22 times greater than the average for all of China stated in the CAS petition of June 2002, and are unlikely to be approved in full. It is anticipated that nature reserve funding will remain a barrier to effective conservation of wetland biodiversity.

2. Conservation Personnel Are Not Adequately Trained

57. HEPB (1998) noted: "There are few professionals among the present management personnel and their education is lacking as is quality of their work". This situation has improved somewhat since 1998 due to appointment of more trained personnel and greater use of academic and research institution scientists for nature reserve work. However, the career prospects at nature reserves are not yet adequate to attract young university graduates seeking full-time, long-term employment. Most nature reserve management personnel in the Sanjiang Plain are appointed from the State Farm ranks or from other government agencies without regard for qualifications in natural resource science or management. This knowledge gap is a weakness in the institutional framework for conservation management. Although universities are training students for careers in natural resources, on graduation few will work at nature reserves because of the remoteness of the locations, harshness of living conditions, and absence of financial or career incentives. This situation is anticipated to persist until such time as nature reserve employment matches the financial and career advancement opportunities offered to university graduates in other sectors.

3. Nature Reserves Lack Management

58. HEPB (1998) noted that effectiveness of nature reserves was hampered by the absence of any management agency at 19 of the 90 reserves then established. This situation has since been corrected to a large degree for reserves at national and provincial levels. However, some county and local nature reserves have yet to be provided with management personnel. This is an important institutional gap because natural resources are essentially unprotected in reserves without management.

4. Gaps in the Protected Area Network

59. By the end of 1997 Heilongjiang Province had established 90 nature reserves protecting 25,327 km^2, or 5.6% of the provincial land area of 454,800 km^2. HEPB (1998) noted that this level of resource protection was below the national average of 7.7%, and was "not suitable for the vast territory and abundant natural resources in the province". Accordingly, more nature reserves were established. By the end of 2001, four years later, the total number had increased by 52, bringing the total to 142 nature reserves protecting 34,873 km^2, or 7.7% of the Province. This represents an astounding average of 13 new nature reserves established per year from January 1998 through December 2001, or more than one per month. The increase of 9,546 km^2 is larger than the combined area of the five largest wetland nature reserves in the Province.

60. In spite of this impressive gain in number and area of nature reserves, there remain large tracts of unprotected wetland habitat in the Sanjiang Plain. Some of these are protected by

virtue of their designation as “conservation lands” (*baohu di*) or “conservation wetlands” (*baohu shidi*). However, no management office or institution is established for this category of protected land, no management staff is provided, and there are no regulations for resource protection. This is an important institutional gap in wetland protection because the formal protected area network is unlikely to be expanded to include the “conservation lands” yet the protection afforded under the current designation is inadequate. These “conservation lands” are important nesting and foraging habitats for Oriental Storks and Red-crowned Cranes (both globally endangered), White-naped Cranes (vulnerable), and Menzbier’s Pipits (endemic sub-species). During migration, these lands are important staging areas for ducks (Baer’s Pochard and Baikal Teal, both vulnerable) and geese (Swan Goose, endangered; Lesser White-fronted Goose, vulnerable). Therefore, protection of these wetlands is an important global biodiversity conservation priority.

5. Institutional Barriers

61. The most recent government structural reforms began in 1998 and have continued down from central to local levels since. Resulting changes have removed many of the institutional barriers to effective nature conservation. For example, the roles of SEPA and SFA in nature, wetland, and biodiversity conservation and administration have been clearly defined. This removed areas of overlap that were often hotly contested and paved the way for more productive and cooperative interaction. As discussed in previous chapters of this report, SFA, with funding from the State Development and Reform Commission (SDRC), and in its role as management authority for wetlands in Heilongjiang Province, is planning to implement a revolutionary farmland-to-wetland restoration project involving over 150,000 ha of farmlands within the boundaries of wetland nature reserves. This project represents removal of one of the most intractable barriers to effective wetland conservation, which is conflicting land uses within wetland protected areas.

62. The conflict between the Ministry of Agriculture’s “grain first” policy and the Ministry of Water Resources’ mandate to manage catchments and wetlands to prevent repetition of the disastrous floods of 1998 has also been partly resolved. The State Farm Bureau has shifted emphasis to increasing crop yield rather than increasing area under tillage, in recognition of the importance of wetlands in conservation and recharge of surface and ground water supplies. This has reduced the pressure to convert ever more wetland area to farmland and is enabling flood managers in the Song-Liao Water Resources Commission to use previously drained and farmed wetlands as overflow basins for safe storage of potentially damaging flood waters. This is a fundamental shift from crisis management of floods to more stable and integrated management of watersheds: Protected forests and wetlands are being used to ameliorate the threat of damage during both flood and drought.

63. Sustained economic growth at the national and provincial levels has also helped to partially remove the barrier of regional poverty from the path of nature conservation. Although many of the Sanjiang Plain counties remain on the lists of national or provincial poverty counties, in many respects quality of human life in the Sanjiang Plain has improved. Improved transport infrastructure has enhanced access to national and international markets, improved

communication, and increased the flows of outside funds to the Sanjiang Plain through tourism. National prosperity has made it possible for SDRC to allocate billions of RMB to resettlement of farmers from protected wetlands and to ensure that relocated families do not suffer financial hardship in the process.

65. The Sanjiang Plain Wetland Protection Project is well positioned to compound the benefits of the removal of the above institutional barriers to effective wetland biodiversity conservation. Most remaining barriers are found at local levels and can therefore be addressed at the nature reserve and community levels. These include issues such as:

- Integration of watershed management requires communication and cooperation between local agencies including the nature reserves, state farms, farm bureau offices, and water resource, environment and forestry bureaus. This type of inter-agency cooperation for management of land and water is a relatively new concept that will require encouragement. The SPWPP proposes to remove this institutional barrier through formation of local inter-agency working groups whose role will be to ensure that the needs of wetland biodiversity conservation are included in land and water use plans.
- Scientific management of nature reserves will require upgrading of skill levels and technologies through provision of equipment, training and education. Lack of or and arbitrary enforcement of nature reserve regulations must give way to clear explanation and unbiased enforcement. Wildlife species that face the risk of extinction due to the excesses of previous exploitation must be managed for recovery throughout the Sanjiang Plain region.
- Integrating the lives of villagers and farmers into nature conservation will require outreach in the form of community education and awareness programs, in addition to direct involvement of communities in the management and husbandry of biological resources.
- With the assistance of conservation managers, farmers must be encouraged to develop alternative, non-farm incomes. This will help farmers make the transition from declining agricultural incomes to more stable and predictable incomes from other sources.

D. RECOMMENDATIONS

66. The recommendations below are provided in an effort to strengthen the current positive trend of enabling conditions for wetland conservation in the Sanjiang Plain.

1. Integrated Watershed Management

67. **Water Allocation System:** The existing water allocation system does not adequately address water requirements of wetland biodiversity, thus cannot achieve truly integrated watershed management. Natural resources are typically not included in the government planning and negotiation processes for water allocation.

Recommendation 1:	Local working groups should be established to include nature reserve, state farm, government agency, and villager stakeholders in the process of water allocation.

68. **Minimum Water Levels:** At present there is no scientific basis for management of water levels or flow volumes in streams and wetlands. Although the Water Law provides for a water withdrawal permit system, there are no provisions to ensure that flows or levels remain in wetlands for the purpose of wetland and biodiversity conservation. This is particularly important for conservation management and recovery of cranes and storks, both of which rely on shallow water wetlands for nesting and foraging, and would benefit greatly from targeted water management[3].

Recommendation 2: Nature reserves should undertake projects to measure and develop quantitative relationships between precipitation, water levels and flow volumes, and habitat and wildlife distribution and abundance in nature reserves and adjacent wetlands. Watershed management working groups should apply the resulting information to the maintenance of optimum flows and levels in water bodies and wetlands. If necessary, nature reserve regulations should be drafted to ensure maintenance of water supplies to protected wetlands.

2. Scientific Management of Nature Reserves

69. **Adequacy of Agenda Mandates, Capabilities and Facilities**:The existing mandates for function, duty and operation of some agencies are not adequate for cross-sector management of land, water, and biological resources. Many of the mandated activities and duties of basin and provincial agencies are adequate for intra-sectoral operation, but there are gaps, overlaps or conflicting jurisdictions when issues or geographic areas are interdependent.

Recommendation 3: The proposed local working groups should examine the scope and extent of authority, responsibility and accountability of each agency, and identify those areas of exclusive versus overlapping jurisdiction. Where agencies have overlapping jurisdiction, or must cooperate with each other due to the interdependency of the natural resource system, the working groups should make recommendations for institutional reforms to enable effective integration.

70. **Enlarging the Protected Area System**: State farms, commercial enterprises, and municipalities have responded to wetland protection decrees with proposals for development of wetland nature reserves. Some of these organizations may not be qualified to effectively manage nature reserves, and their plans may focus on commercial exploitation. Proliferation of such sites could lead to degradation of pristine wetlands due to fragmentation by access roads, unsustainable tourism, inappropriate planting of vegetation, diversion of water, and other

[3] Harris, J. 1998. Crane conservation in northeast Asia: Overview and key issues. Pages 233-236 in Wetland and Waterbird Conservation: Proceedings of an International Workshop on Wetland and Waterbird Conservation in North East Asia, Beidaihe, August 1998. Wetlands International China Programme. China Forestry Publishing House, Beijing.

causes. Capacity is needed at nature reserves to investigate and evaluate such proposals, and to incorporate them into the overall protected area system where appropriate.

Recommendation 4:	Develop capacity at nature reserves to investigate and evaluate proposals for nature reserve establishment on unprotected wetlands. Establish working groups with the mandate to enhance inter-agency cooperation that would lead to incorporation of unprotected wetlands into the formal nature reserve system.

71. **Availability of Information:** Lacking or inaccessible information on ground and surface water levels and flow rates on one hand, and wildlife use of habitats on the other, is a major constraint to integrating the planning and management of watersheds with wetland biodiversity conservation. The requirements under the existing water law for integrated water management and operation of water allocation systems cannot be met without timely receipt of good data. Similarly, wetland water levels cannot be managed to optimize habitat quality without access to good data on habitat distribution and quality, and animal distribution and abundance. Hydrological data on major rivers and reservoirs are collected rapidly and in great volume, but the process of converting these data into information, and disseminating the information to watershed stakeholders does not happen in a timely fashion.

Recommendation 5:	Establish local working groups to develop institutional capacity and linkages to make data and information readily available to stakeholders.

3. Sustainable Use of Biological Resources

72 **Visitor Access to Core, Buffer and Experimental Areas**: Current laws prohibit virtually all activities in core and buffer zones, and this may unnecessarily restrict development of sustainable uses in nature reserves.

Recommendation 6:	Visitor activities to be permitted in core, buffer, and experimental zones of nature reserves should be evaluated in light of sustainable use and with the benefit of stakeholder participation. Reserve regulations should then be drafted and boundaries of the zones demarcated to advise visitors of regulations.

73. **Reed Harvest**: Reeds are harvested from wetlands mainly for home use as cooking/heating fuel and for paper manufacturing. Some nature reserves are managed by commercial reed companies. Applied research is needed to determine the impacts of reed harvest on wetland biological resources. This is particularly relevant to the management of cranes, which feed and nest in shallow water reedbeds.

Recommendation 7: Reed harvest regimes need to be experimentally evaluated to determine levels that are sustainable in terms of habitat distribution and quality, and ability to support biodiversity. The results should be used to develop regulatory systems. This recommendation complies with Sections 2.16 and 11.48 of the Agenda 21 White Paper (Government of China 1994).

74. **Fishing in Nature Reserves**: Fisheries resources in nature reserves and adjacent wetlands have been depleted through overuse. Fishing must be regulated and restricted to enable fish stocks to recover. This is especially critical for conservation management of storks, which rely on fish as a major part of their diet.

Recommendation 8: A regulatory and permitting system should be developed through co-management involving village and farm stakeholders (see Sections 2.16 and 11.48 of China's Agenda 21 White Paper). Seasonal bans may be needed to protect breeding fish, birds, and other wildlife.

4. Natural Resource Management Capacity

75. **Building Nature Reserve Technical Capacity**: Of the six nature reserves included in the Sanjiang Plain Wetland Protection Project, only the two National Nature Reserves, Qixinghe and Xingkaihu, have wetland specialists on staff, with 1 and 2 specialists, respectively. Wetland nature reserves in the Sanjiang Plain support on average about 25 staff. Assuming about one third (or eight) of these need to be natural resource managers and applying this assumption to the increase of 52 nature reserves in Heilongjiang Province between 1997 and 2001 yields a requirement for some 416 new personnel over the four year period (52 reserves with 8 personnel each), or 104 new hires per year. This exceeds the number of natural resource graduates each year, meaning that only the larger and better-funded national nature reserves will be able to hire perhaps one qualified graduate per year.

Recommendation 9: To compensate for the inability of the formal educational system to supply qualified natural resource managers in sufficient numbers Sanjiang Plain nature reserve personnel should participate in more workshop, short-term, and long-term continuing education programs to acquire natural resource science and management skills.

76. **Building Nature Reserve Operational Capacity**: Effectiveness in nature conservation is often constrained by the lack of equipment, data, and modern research and analytical tools. There is a serious shortage of field and office equipment, transportation and telecommunication tools.

Recommendation 10: Equipment, tools, and training in their proper use should be provided by the Project to remove this barrier to effective nature conservation.

Supplementary Appendix C

SITE SELECTION AND THE SELECTERD SIX NATURE RESERVES

This Appendix provides an overview of the selection process by means of which the six pilot nature reserves were selected, and the process for selecting pilot river basins and sites for forest plantations.

A. Site Selection

1. Nature reserve selection

1. The Sanjiang Plain is the largest contiguous wetland area in China, supporting a wide array of riparian, shallow lake, swamp and marsh wetlands that, given the characteristic species assemblages, are unique to the northeast Asian region. These wetlands seasonally support large numbers of migratory waterbirds and provide a habitat and/or breeding site for at least 23 globally threatened species. Originally, these wetlands extended over 10 million ha, but due to a combination of conversion to agriculture and abstraction of water over the past 50 years this area has declined to just under 900,000 ha.

2. The greatest concentration of remaining intact wetlands occur in nature reserves, of which 28 are found in the Sanjiang Plain. Of these, the 17 reserves located in the eastern half of the plain are the largest and have historically had the greatest concentration of biodiversity. Eight of these reserves were preselected for the SPWPP because they:

(i) support the greatest area of pristine habitats (i.e. they are less damaged than other wetlands);
(ii) support the greatest number of globally threatened species (Supplementary Appendix A);
(iii) have a better protection status (generally they are national level, rather than provincial or county level reserves);
(iv) have a longer history of establishment, which means that administrative structures upon which to base the project are firmly in place; and
(v) have an internationally recognised status: three sites are recognised as wetlands of global importance (i.e. Ramsar wetland sites, namely Honghe NNR, Sanjiang NNR and Xingkai Lake NNR) and three are potential Ramsar sites (Naolihe NNR, Qixinghe NNR and Zhenbaodao NR).

3. Two of these short-listed eight areas – Honghe and Sanjiang – were subsequently dropped during the selection procedure because of already ongoing conservation activities. Honghe NNR is one of the four wetland areas targeted by the UNDP-GEF project *Wetland Biodiversity Conservation and Sustainable Use in China* (2001-2006)[1]. As part of this same UNDP-GEF project, several activities are also to be undertaken at Sanjiang NNR because of its proximity to Honghe. The proposed SPWPP will, however, take an entirely different approach than that of the ongoing UNDP-GEF project. Activities undertaken at Honghe NNR are primarily site focused and do not aim at developing models for replication. Capacity building at Honghe NNR involves provision of training for NR staff, and unlike the SPWPP does not aim at developing training curricula and materials. Wetland restoration at Honghe NNR was subcontracted and carried out by the Jiamusi Agricultural Design and Research Institute, which adopted a strong civil engineering approach. The proposed SPWPP aims at developing models for wetland restoration based on pilot projects at six wetland sites, and will incorporate development of alternative livelihoods for affected villages as part of the model. It has been agreed with the Heilongjiang Provincial Government that this model

[1] The three other sites are located in other parts of the country: Ruoergai marshes in Sichuan and Gansu provinces, Dafeng NNR in Jiangsu Province, and East Dongting NNR in Hunan Province.

is to be used by the ongoing farmland to wetland restoration program. The UNDP-GEF alternative livelihood program originally envisaged for Honghe has largely been dropped, while provision of alternative livelihoods for communities affected by wetland restoration forms a very important thrust of the SPWPP, and will form an integral part of the wetland restoration model.

4. A conservation project currently under development by UNEP-GEF will focus on joint China-Russia interventions to enhance conservation at the Xingkaihu/Khanka Lake transboundary protected area, under GEF's OP8 of the International Waters focal area. This project is expected to improve water quality in the lakes and water management in the catchment. As it does not focus on wetland biodiversity, Xingkaihu NNR was therefore retained as a pilot nature reserve for the proposed SPWPP.

Table 1 Species listed as critically endangered, endangered or vulnerable and recorded in pilot wetland nature reserves on the Sanjiang Plain (shaded entries are peripheral to Sanjiang Plain)

Common Name	Scientific Name	Xingkaihu NNR	Dajiahe NR	Naolihe NNR	Zhenbaodao NR	Qixinghe NNR	Anbanghe NR
Critically Endangered							
Siberian Crane	*Grus leucogeranus*	1	1			1	1
Endangered							
Amur Sturgeon	*Acipenser schrencki*			1	1		
Kaluga	*Huso dauricus*	1	1	1	1		
Scaly-sided Merganser	*Mergus squamatus*		1	1	1	1	1
Swan Goose	*Anser cygnoides*	1	1	1	1	1	1
Oriental Stork	*Ciconia boyciana*	1	1	1	1	1	
Red-crowned Crane	*Grus japonensis*	1	1	1	1	1	1
Tiger	*Panthera tigris*		1	1	1		
Vulnerable							
Chinese Softshell	*Pelodiscus sinensis*	1	1	1	1		
Chinese Egret	*Egretta eulophotes*	1				1	
Lesser White-fronted Goose	*Anser erythropus*	1	1	1		1	
Baikal Teal	*Anas formosa*	1	1	1			
Baer's Pochard	*Aythya baeri*	1	1	1	1		1
Greater Spotted Eagle	*Aquila clanga*		1				
Steller's Sea Eagle	*Haliaeetus pelagicus*	1	1				
Swinhoe's Rail	*Coturnicops exquisitus*	1					
Hooded Crane	*Grus monacha*		1	1		1	1
White-naped Crane	*Grus vipio*	1	1	1	1	1	1
Saunders's Gull	*Larus saundersi*	1					
Manchurian Reed Warbler	*Acrocephalus tangorum*	1					
Rufous-backed Bunting	*Emberiza jankowskii*	1					
Eurasian Otter	*Lutra lutra*	1	1	1	1	1	
Asiatic Black Bear	*Ursus thibetanus*	1	1	1	1		
Totals		**18**	**17**	**15**	**12**	**10**	**7**

2. Forest and watershed site selection

5. Water resources management is critical to sustainable management of the wetland nature reserves, and forms the focus of Component 1 of the proposed SPWPP. The Naoli River watershed has been targeted as the pilot area for developing a model approach to watershed management, as most of the Naoli River floodplain is included in the Qixinghe, Naolihe and Dajihe nature reserves. Focusing activities of sub-components 1.2 and 1.3 on this watershed is therefore likely to improve water resources management and planning in three of the targeted wetlands, and will potentially have the greatest beneficial effect.

6. The thirteen counties selected for establishing new plantations and improving forest management are all located in the watersheds of the six wetland NRs targeted by the SPWPP. New plantations will be established under the farmland to forest program in five counties (4,300 ha), or involve converting secondary scrub ('wasteland') to forest plantation (7,600 ha). Improving forest cover and forest management in these counties will directly contribute to wetland reserve watershed protection. Although the total area of new forest plantations is modest, beneficial effects on watershed protection is disproportionally large as almost two-thirds will involve establishing larch plantations on denuded (moderately) steep slopes.

B. Description of the six pilot Nature Reserves

7. Species are listed by life form in the following table according to the latest survey information available from each of the six pilot nature reserves. Fact sheets for each nature reserve are shown in the Ramsar Convention Bureau format. Each fact sheet is followed by a representation of the best available map for that nature reserve. Fact sheets are listed for nature reserves in alphabetical order.

Life form	Zhenbaodao	Naolihe	Dajiahe	Xingkaihu	Qixinghe	Anbanghe
Fishes & Cyclostomes	59	49 fish +2 cyclostomes	56 fish + 2 cyclostomes	48 fish +1 cyclostome	15 fish	25
Amphibians	8	10	8	6	6	8
Reptiles	8	13	9	7	2	2
Birds	169	191	251	180	116	165
Mammals	41	44	55	39	16	18
Vertebrate Fauna	284	309	381	281	155	218
Invertebrate Fauna		220				
Vascular Plants	500	875	676	423	460	394
Non vascular		172				
Mo./Year of data		8/2003	10/2002	1998-9	2001	
Remark		875 species excluding non-vascular		Higher plants	No info on cyclostomes	

Fact Sheets for Six Pilot Nature Reserves

Site: Anbanghe Nature Reserve	**Establishment date:** June 1996	
Coordinates: 131°14'E / 46°33'N	**Elevation: ±60-75** m	**Area: 10,295** ha

Location: Anbanghe Nature Reserve (NR) is located in eastern Heilongjiang Province in Jixian County 45 km north of Jixian. It lies in the Mudanjiang basin, a major right-bank tributary of the Songhua River.

Importance: The site provides important breeding habitat for a number of bird species protected in China. There are two national Class I protected species and 16 Class II protected species in the reserve. Of these, 1 is a mammal and 17 are birds. Seven species listed by IUCN as critically endangered, endangered, or vulnerable have been recorded in the reserve. Include rare species or regional endemics. Move national importance to end of this box.

Wetland Types: Reeds (*Phragmites communis*) dominate the wetlands, which hold relatively deep water because they lie between two constructed flood control embankments. This is a relatively simple wetland system of reed marshes and open water bodies confined between flood control dykes.

Biological/Ecological notes: The reserve has recorded 18 species of mammals, 165 bird species, 2 reptiles, 8 amphibians, and 25 fish. The total number of vascular plant species is 394.

Hydrological/Physical notes: The reserve is located alongside the constructed Anbanghe channel that was built to drain farmland for agriculture. At the downstream (southwest) end of the reserve lies the Hongqi Reservoir, an body of open water that is important as a staging site for migrating waterbirds and is an important water supply for rice farmers and for the reserve. It is also a potentially important site for tourism development. The Anbang River drains to the Mudanjiang, a tributary of the Songhua River. The topography of the reserve is flat except where raised by construction of embankments to control water flow. Maximum water levels in the reserve are around 3 m.

Human Uses: The main human use is agriculture. The reserve proposes restoration of 1,426 ha of farmland to wetland, of which 250 ha is owned by farmers, and 1,176 ha belongs to the nature reserve. The reserve area was formerly managed by a reed supply company serving the paper industry. Farmers raise ducks and geese and produce honey from lands in the nature reserve. Surrounding farmers support restoration of farmland to wetland to increase options for these types of incomes. Reed harvest in the nature reserve accounts for 7% of the annual production in the province. Reed harvest has declined in recent years due to the low prices offerred by paper mills. This has reduced the intensity of reed harvest. A large visitor's center – including restaurants, watchtower, fishing cabins, and information center is under construction in the experimental zone at the far southeastern corner of the reserve.

Conservation Measures: Nature reserve area increased from 3,716 ha in 2001 to 10,295 ha on 15 November 2002. The reserve includes 3,980 ha of core zone, 2,434 ha of buffer zone and 3,879 ha of experimental zone. The reserve is managed at provincial level. In 1995 a plan was developed to restore 1,220 ha of farmland to wetland. This is now finished, leaving a total of 2,020 ha of wetland (20% of the reserve area) in ther reserve core zone. Near Hongqi Reservoir is a site for proposed conversion of rice paddy to wetland to support tourism development. Previously there were large areas of unprotected wetland in the vicinity of the reserve where livestock grazing, hunting and fishing were practiced. These wetlands have been brought under reserve management through boundary extension.

Adverse Factors: The recent history of farm development in the reserve accounts for a block of 1,196 ha of farmland that remains in the core zone. Most of the buffer and experimental zones are used for agriculture. Hunting and fishing were previously practiced in the reserve area, but are now somewhat under control. Agrochemicals from adjacent farmland enter the wetlands.

On-site management : Anbanghe has 51 staff, including 1 party secretary, 4 directors, 3 vice-directors and 5 general officers. There are four offices: i) wetland restoration; ii) wildlife management; iii) finance and administration; and iv) tourism management. 80% of the staff have a vocational college level education, 6 are graduates from Northeast Forestry University, and 3 are graduates from Northeast Agricultural University. Staff includes former staff of the reed company, plus 4 persons transferred from the county environmental bureau.

Management Authority: Provincial Forestry Bureau, No. 6 Hengshan Road, Harbin, Heilongjiang Province, 150090, China, Tel: +86-0451-234-6437• Fax: +86-451-234-6443.

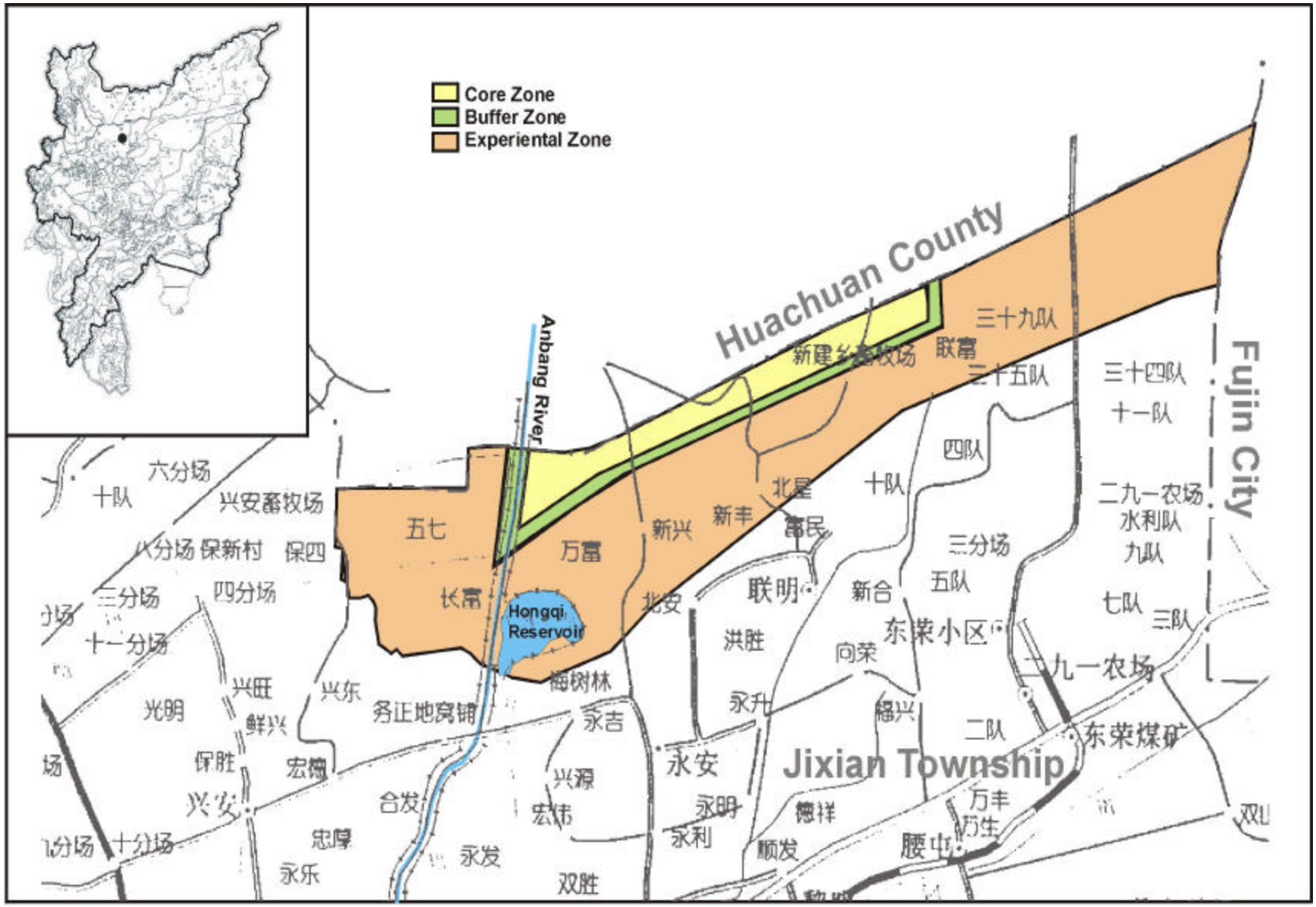

Figure 1 Zoning of Anbanghe NR

Site: Dajiahe Nature Reserve	**Establishment dates:** 1987	
Coordinates: 47°00'N / 133°30'E	**Elevation: ±50-70** m	**Area:** 72,604 ha

Location: Dajiahe Nature Reserve (NR) is located in Raohe County in the easternmost reach of Heilongjiang Province. It lies in the Wusuli River watershed. The NR is split into three portions, two of which drain directly to the Wusuli River. The northern portion of the NR protects the south bank of the Naoli River and includes floodplain wetlands dominated by reeds and sedges.

Importance: The NR provides habitat for a total of 121 protected fauna species, including 14 national Class I and 51 Class II protected fauna species in China. Mammals listed under these categories include *Selenarctos thibetanus, Ursus arctos, Martes zibellina, Lutra lutra, Lynx lynx, Panthera tigris, Lepus timidus, Moschus moschiferus, Cervus elaphus, Cervus nippon, and Alces alces*. Waterbirds listed under these categories include *Podiceps auritus, Podiceps grisegena, Ciconia boyciana, Ciconia nigra, Threskiornis melanocephalus, Platalea leucorodia, Anas albifrons, Cygnus Cygnus, Cygnus columbianus, Aix galericulata, Mergus squamatus, Grus grus, Grus japonensis, Grus vipio,* and *Grus leucogeranus*. One bird species listed by IUCN as critically endangered (Siberian Crane) has been recorded in the reserve, in addition to 2 critically endangered, 11 endangered and 35 vulnerable species. A total of 61 fauna species is listed under CITES. 12 recorded plant species are protected in China, 7 of which are listed in the Checklist of Rare and Endangered Plant in China. They are *Juglans mandshurica, Fraxinus mandshurica, Phellodendron amurensis, Tilia amurensis, Acanthopanax senticosus, Astragalaus membranacens, Glycine soja, Nelumbo nucifera, Sagittaria natans, Aldrovanda vesiculosa, Myriophyllum ussuriense*, and *Boschniakia rossica.*

Wetland Types: Marsh, cropland, forested wetland, upland riparian forest.

Biological/Ecological notes: The reserve is reported to support 55 species of mammals, 251 birds, 9 reptiles, 8 amphibians, 56 fish, and 676 vascular plants.

Hydrological/Physical notes: The three portions of the reserve lie in two catchments. The two southern portions of the reserve lie in the Wusuli River watershed, and the northern portion lies in the lower Naoli River watershed (the largest left-bank tributary of the Wusuli River). Over a hundred lakes were formed due to gentle gradient along the two rivers. However, most of the lakes disappeared due to massive exploitation of wetland in the area. Average annual maximum and minimum temperature is 21ºC and –21.1ºC respectively. Mean annual precipitation is 579.1mm, 52% of which falls between June and August.

Human Uses: The Nature Reserve is zoned in core (16,996 ha), buffer (5,958 ha) and experimental zones (49,650 ha). Grazing, fishing, bee keeping, hunting, farming and other human uses are major threats leading to habitat destruction, fragmentation and invasion of exotics.

Conservation Measures: Dajiahe is part of a complex that is protected at the national level under the Northeast Black Bee National Nature Reserve and the newly established Naoli River National Nature Reserve. Future planning for Dajiahe includes improved transportation and signage, fire control, restoration of farmlands to wetland and forest, scientific research, setting up of animal refuges, and conservation education. A management plan is being drafted (2004)

Adverse Factors: Deforestation is serious on upland areas; wetland conversion to agriculture continues despite the ban; reed harvesting, hunting and fishing are not controlled. Livestock grazing is intensifying in the watershed, particularly on the wetlands along the lower reach of the Naoli River. Agrochemicals from adjacent farmland form a threat.

On-site management :

Management Authority: Provincial Forestry Bureau, No. 6 Hengshan Road, Harbin, Heilongjiang Province, 150090, China, Tel: +86-0451-234-6437• Fax: +86-451-234-6443.

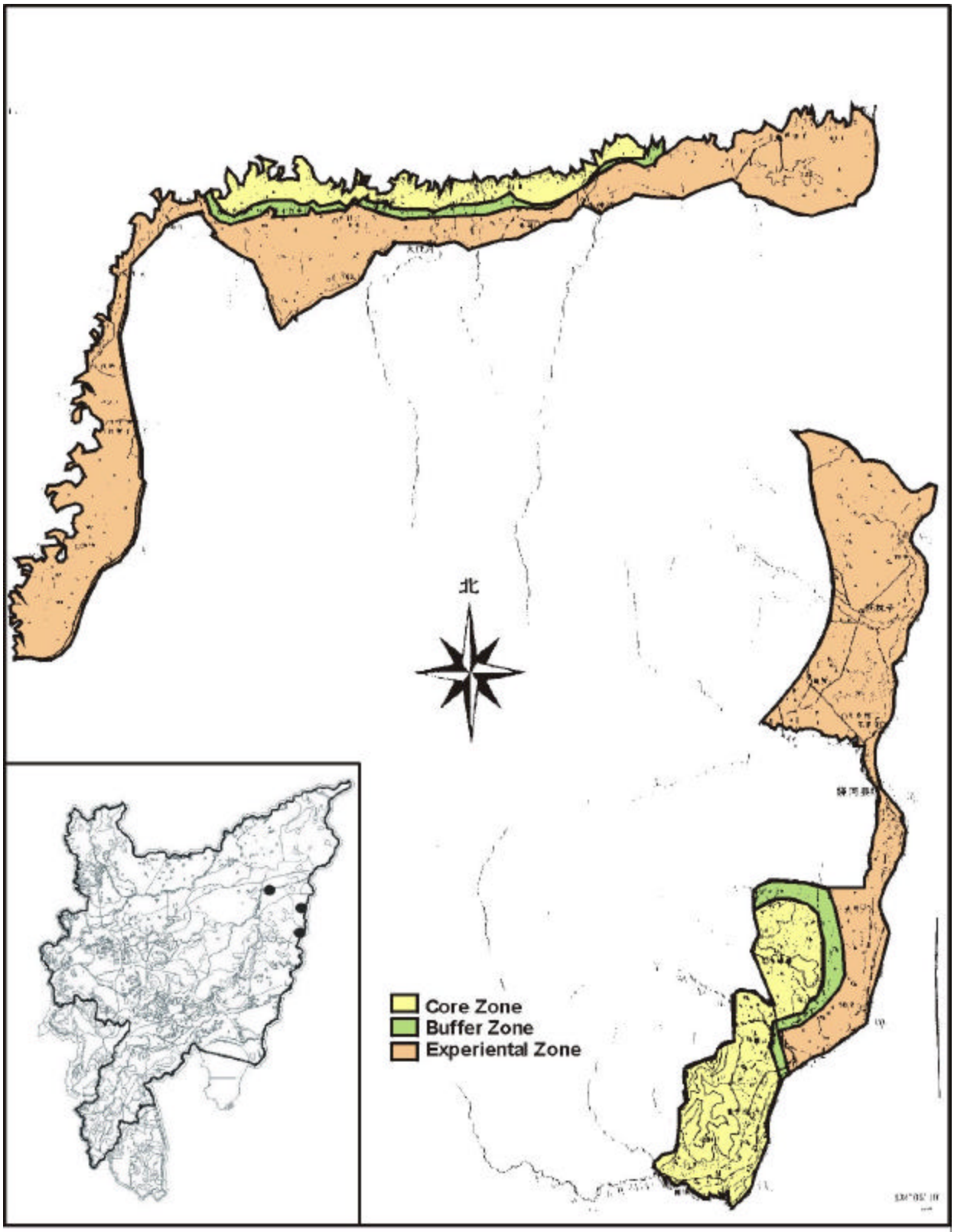

Figure 2 Zoning of Dajiahe NR

Site: Naolihe National Nature Reserve	**Establishment dates:** August 2002	
Coordinates: 46°50'N / 132°22'E	**Elevation:** ±42-834 m	**Area:** 160,599.4 ha

Location: Naolihe National Nature Reserve (NNR) is located in eastern Heilongjiang Province in Raohe, Fujin, Baoqing, Fuyuan Counties. It lies in the Wusuli River basin. The reserve protects much of the floodplain of the Naoli River in its middle and lower reaches.

Importance: The site provides important breeding habitat for a number of bird species protected in China. Fifteen species recorded in the reserve are listed by IUCN as endangered (7 species) or vulnerable (8 species). Ten species of nationally endangered plants are listed, including *Fraxinus mandshurica*, *Phellodendron amurense*, *Tilia amurensis*, *Chosenia arbutifolia*, *Glycine soja*, *Nelumbo nucifera*, *Brasenia schreberi*, *Sagittaria natans*, *Aldrovanda vesicolosa*, *Myriophyllum ussuriense*, *Quercus mongolica* and *Acer motto*. Eleven national Class I and 45 Class II protected fauna have been recorded.

Wetland Types: Riparian reedbeds dominated by *Phragmites communis* and *Carex* species marshes are common in the reserve.

Biological/Ecological notes: The reserve has recorded 44 species of mammals, 191 species of birds, 13 species of reptiles, 10 species of amphibians, 51 species of fish and cyclostomes, and 220 species of invertebrates. The total number of vascular plant species is 875.

Hydrological/Physical notes: The reserve protects the Naoli-Qixing floodplain in the middle and lower reaches of the watershed. This represents one of the first attempts in China to protect a large portion of a watershed by establishing a single nature reserve. The watershed has been altered by construction of reservoirs in the upper reaches. Filling of these reservoirs, combined with pumping of groundwater for irrigation of ricefields, has dried the lower reaches of the Naoli and Qixing Rivers.

Human Uses: Agricultural development led to conversion and drainage of wetlands for farming. Much of this has been done without formal government planning by immigrants from other provinces. Recent development of the livestock industry has escalated grazing pressure on wetlands especially in the lower reaches. Subsistence and market fishing and hunting in the watershed are widely practiced.

Conservation Measures: In August 2002 three provincial level (Naolihe, Yanwodao, Changlindao) and one county level nature reserve (Qiliqinhe), all protecting wetlands in the Naoli-Qixing River basin, were combined into the national level Naolihe NNR. This will unify conservation management of the middle and lower reaches of the basin. From 1983-85 the Wildlife Research Institute of Heilongjiang and the Northeast Institute for Geography and Agricultural Ecology carried out biodiversity surveys. In 1999 Northeast Forestry University, Wildlife Research Institute CAS, Wild Bird Society of Japan, and International Crane Foundation combined efforts in a study of wildlife resources in the watershed. An environmental impact study of the Longtouchao Reservoir was carried out in 1999-2000. A Naoli NNR master plan was compiled.

Adverse Factors: The large protected area is narrow because it follows the floodplain of the Naoli-Qixing Rivers. Surrounding lands have been converted from wetland to agriculture. Pressure from agricultural interests includes hunting, fishing, taking of eggs from wild bird nests, livestock grazing, grass burning (in spring), and water extraction for irrigation. Hydrological studies showed that mid-growing season ground water levels drop significantly, dewatering surface wetlands. Administration of the reserve is under the authority of the State Forestry Administration and the provincial Forestry Bureau, but the lands have historically (after 1960s) been managed by the State Farm Bureau through 11 farms and 4 monitoring stations under two separate State Farm Regional Sub-Bureaus (Hongxinglong and Jiansanjiang). Integrating of these institutions into an effective management organization will require time and effort. Agrochemicals from adjacent farmland form a threat.

On-site management : Naolihe NR has 10 on-site staff.

Management Authorities:
State Forestry Administration, Beijing
Heilongjiang Forestry Bureau, Harbin
Heilongjiang State Farm General Bureau, Harbin
Hongxinglong State Farm Regional Sub-Bureau
Jiansanjiang State Farm Regional Sub-Bureau

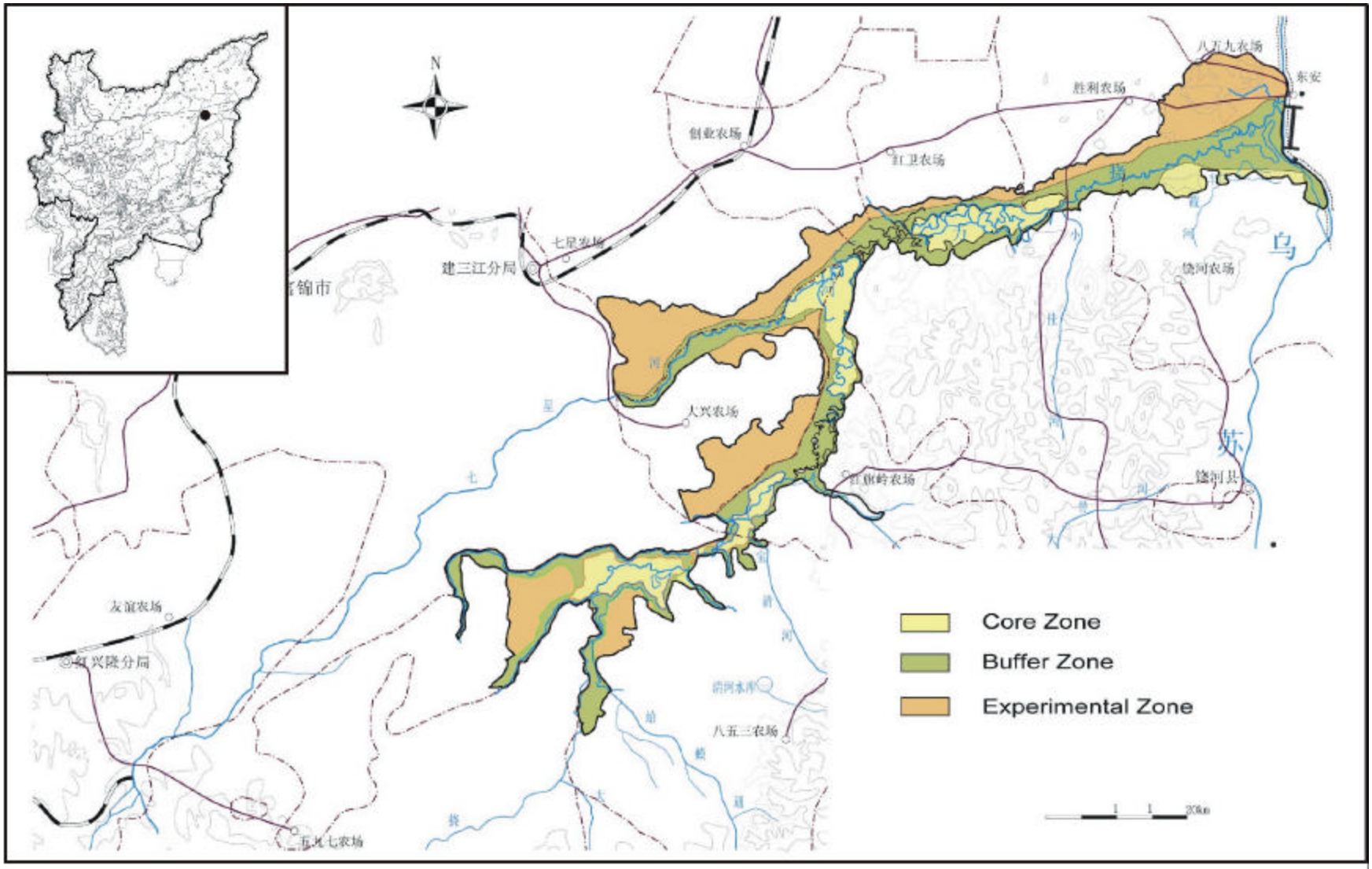

Figure 3 Zoning of Naolihe NNR

Site: Qixinghe National Nature Reserve	**Establishment dates:** 1991 (county level) 1996 = prefecture level Shuangyashan City 1998 = province level 2000 = national level	
Coordinates: 46°45'N 132°15'E	**Elevation: ±**60 m	**Area: 20,000** ha
Location: Qixinghe National Nature Reserve (NNR) is located in eastern Heilongjiang Province in Baoqing County, 40KM from Baoqing City. It lies in the upper Naoli-Qixing basin. Its north border is the Qixing River, across which lies a provincial level nature reserve named Sanhuanpao Nature Reserve. Immediately downstream lies the adjacent Naolihe Nature Reserve, which protects riparian wetlands from the east boundary of Qixinghe NNR to the confluence of the Qixing and Wusuli Rivers.		
Importance: The site provides important breeding habitat for a number of bird species protected in China. The reserve has recorded 4 national Class I (all birds) and 17 national Class II (16 of which are birds) protected fauna species. Qixinghe NNR reports 11 of the 27 Sanjiang Plain species listed by IUCN World Conservation Union as critically endangered (1), endangered (5), or vulnerable (5).		
Wetland Types: The reserve is a complex wetland system including grassland, marshes, lakes and forests. The reserve was designated at the site of the Sanhuanpao, a large shallow lake and reed marsh in the Qixing River riparian zone.		
Biological/Ecological notes: Qixinghe NNR has 386 species of vascular plants. There are 16 species of mammals, 116 species of birds, 2 species of reptile, 6 species of amphibians, and 15 species of fish. *Grus japonensis* and *Ciconia boyciana* breed here but neither biological nor ecological studies have been undertaken due to lack of trained scientific personnel. Due to its pools of deeper water and abundance of aquatic vegetation Qixinghe NNR is an important stopover site during waterfowl migration. Many mammals are very rarely seen after the 1980s, e.g. *Lepus timidus* and *Sus scrofa*, or possibly extinct due to overhunting, e.g. bear and otter.		
Hydrological/Physical notes: Qixing River NNR lies in the middle reach of the Qixing River basin, which is an alluvial plain. The land drains from southwest to northeast at a gradient of approximately 1/10,000. The Qixing River drains to the Wusuli River and ultimately to the Heilong River. Wetlands along the Qixing River have been historically important for flood control, water supply and groundwater replenishment. Average annual maximum and minimum temperature are 21-22ºC and -19ºC, respectively. Mean annual precipitation is 552 mm, 85.3% of which falls between May and September. The long-term range of annual precipitation is 300-827 mm. On average there are 143 frost-free days per year.		
Human Uses: The reserve is used for nature protection and scientific research. It is zoned into core (7,960 ha), buffer (3,600 ha), and experimental zones (8,440 ha). The experimental and buffer zones, and parts of the core zone are occupied by farmlands. The surrounding area is used for fisheries, agriculture and livestock raising. Tourism is not well developed due to lack of infrastructure and interpretive facilities. Watchtowers have recently been constructed and boats are available with guides for tourism. A construction plan for Qixing River Resorts has been made. The rich fauna and flora has made the site a valuable place for education and tourism.		
Conservation Measures: Qixing River Provincial Nature Reserve was designated in 1991 at the county level. It was raised to prefecture level in 1996 under Shuangyashan City. In 1998 it was raised to province level under the Environmental Protection Department, and in 2000 it was designated a National Nature Reserve under the State Forestry Administration. A Master Plan for Qixing River Reserve was prepared in 1996 to guide construction and capital investment. A management plan has not been drafted.		
Adverse Factors: Drainage for agriculture, flood control embankments, and road construction threaten wetlands in the basin. Pollution from agricultural activities in the surrounding area has affected the water quality in Qixing River and adjacent wetlands. Competition with surrounding water users may result in inadequate supply to the wetlands. Illegal fishing, hunting and collecting of birds eggs occurs.		
On-site management : Qixinghe NNR has 15 staff (estimate).		
Management Authorities: Provincial Forestry Bureau, No. 6 Hengshan Road, Harbin, Heilongjiang Province, 150090, China, Tel: +86-0451-234-6437• Fax: +86-451-234-6443.		

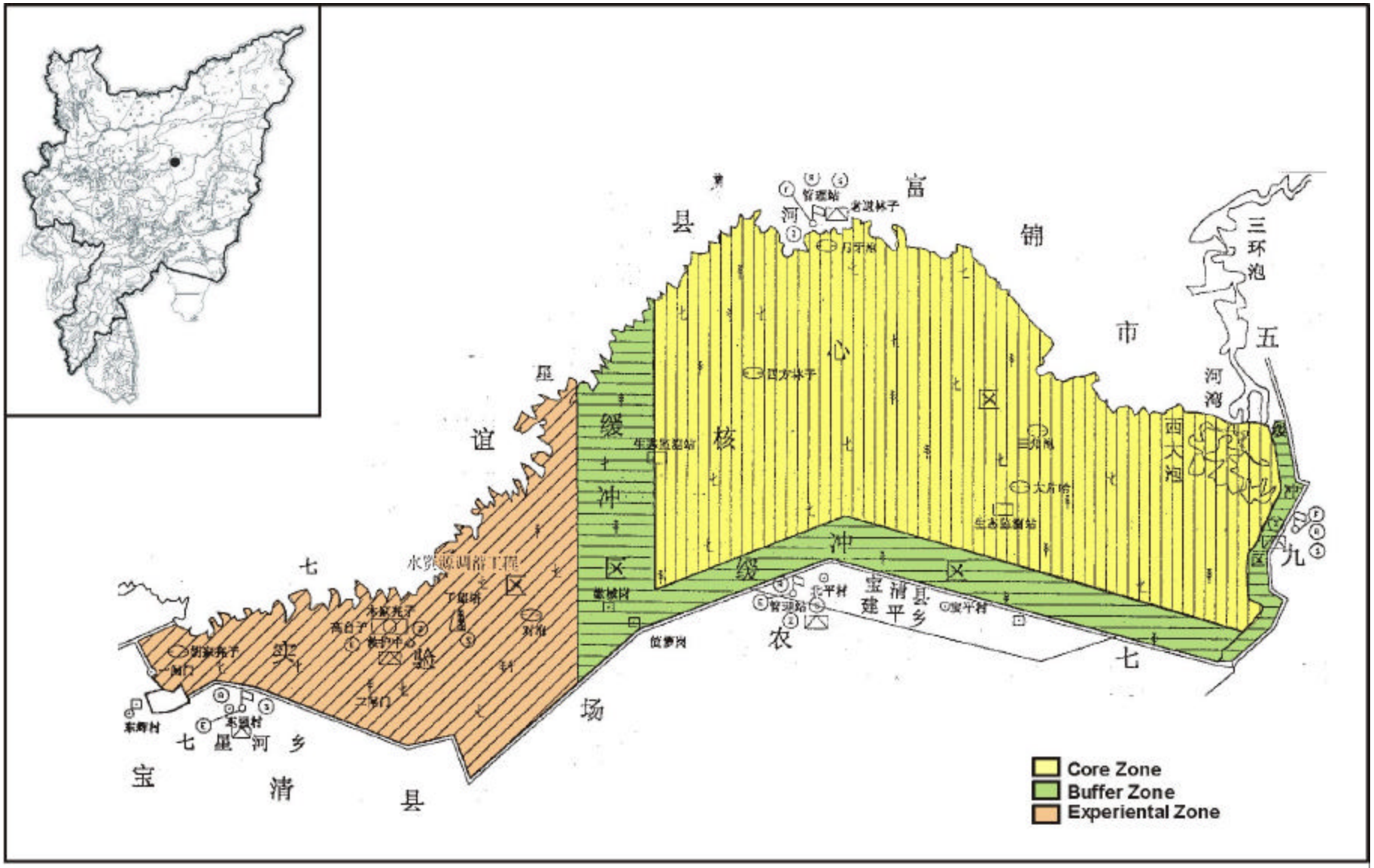

Figure 4 **Zoning of Qixinghe NNR**

Site: Xingkai Lake National Nature Reserve		**Establishment date:** **1986 provincial** **1994 national** **Ramsar designation date:** 11/01/2002
Coordinates: 45°17'N / 132°32'E	**Elevation:** 59 - 81 m	**Area:** 222,488 ha

Location: Xingkai Lake National Nature Reserve (NNR) is located in southeastern Heilongjiang Province, 120 km from Jixi City. It lies adjacent to the Khanka Lake Nature Reserve and Ramsar Site, in Russia.

Importance: The site provides important breeding habitat for a number of bird species protected in China. Some 46 fish species and more than 460 plant species are present. Three national Class I and 46 National Class II protected vertebrate fauna have been recorded. Red List and nationally protected bird species that breed here include *Grus japonensis, G. vipio, Ciconia boyciana, Haliaeetus albicilla* and *Egretta eulophotes*. The total numbers of breeding birds, including *Larus ridibundus, Chlidonias hybrida, Anas platyrhynchos* and *A. poecilorhyncha* reaches 20,000. The numbers of the main migratory species including *Podiceps cristatus, Fulica atra, Bucephala elangula, Vanellus vanellus, Anser fabalis, A. albifrons* and *Anas acuta* also exceed 20,000. More than 60 breeding Red-crowned Cranes have been recorded in the Reserve, representing 2.5% of the total number of these cranes in the world. Fish species include the native *Erythroculter ilishaeformis, Coregonus ussuriensis, Esox reicherti, Carassius auratus gibelio, Hemiculter leucisculus* and *Channa argus.*

Wetland Types: O,2,Tp,1,U,3,4,W,Xf,6,Xp,9 (listed in descending order of dominance using Ramsar Convention Bureau classification system). The Reserve is a complex wetland system including grassland, marshes, lakes and forests.

Biological/Ecological notes: Xingkai Lake has over 460 higher plant species, including woody plants, vine plants, grasses, moss and aquatic plants. There are 39 species of mammals in the Xingkai Lake wetland, in which *Vulpes vulpes, Lepus timidus, Ondatra zibethica* and *Capreolus capreolus* are the predominant species. There are 65 fish species including the native species of *Erythroculter* spp. Amphibians include *Salamandrella keyserlingii* and *Rana amurensis.*

Hydrological/Physical notes: Xingkai Lake NNR consists of two lakes, Greater and Lesser Xingkai Lakes. Xingkai basin is an alluvial plain. The northwest region is higher than the southeast, with a 10 metres high sand hill forming a narrow spit between the two lakes. The Lake is part of the Wusuli River system with 24 rivers supplying the lake. Xingkai Lake is important for flood control, water supply and groundwater replenishment. Average annual maximum and minimum temperature are 21.2ºC and -19.2ºC, respectively. Mean annual rainfall is 750 mm, mostly in the summer.

Human Uses: The land belongs to the government; managerial rights to the land surrounding the area belong to state farms and collective villages. The Nature Reserve is used for nature protection and scientific research. The surrounding area is used for tourism, fisheries, agriculture and livestock raising. *Grus japonensis* and *Ciconia boyciana* have been studied here. The migration of birds has been studied, as well as the breeding ecology of *Cygnus cygnus, Larus ridibundus* and *Haliaeetus albicilla.* There are four eco-tourism resorts. A construction plan for Xingkai Lake Resorts has been made. In 2000, approximately 500,000 national and international visitors came to the Reserve. In the Neolithic Age there was a (well-known) Bohai culture in the Xingkai Lake Basin. This, together with the rich fauna and flora, has made the site a valuable place for education and tourism.

Conservation Measures: The Xingkai Lake Provincial Nature Reserve was designated in 1986. In 1992, a transboundary nature reserve was established with Khanka Nature Reserve of Russia with help of the International Crane Foundation. In 1994, the Reserve was designated as a National Nature Reserve. In 1997, the (joint) Reserve was designated as a network site of the North East Asia Crane Site Network. The reserve has established a union committee for the protection of the lake with local communities. Conservation measures proposed but not yet implemented are the establishment of a Master Plan for Xingkai Lake Reserve, including a conservation plan for biodiversity. Other plans include a construction plan for an Ecological demonstration zone. A sewage treatment project for the Xingkai Lake paper mill is also planned. Other urgent tasks include the establishment of a strong union conservation committee.

strengthening environmental education activities, establishing a police station in the Reserve, developing organic agriculture, stimulating eco-tourism, centralising the management of water resources and strengthening international cooperation.
Threats to Nature Conservation: Pollution from agricultural activities in the surrounding area has affected the rivers and lakes.
On-site management : A research division has been set up with 8 staff, a watchtower and 5 research stations in the Reserve. The Bayi Agriculture University and the Northeast Forestry University conduct the research and training at the Reserve. A joint training program with the Russian Khanka Lake Nature Reserve has been started.
Site Management: Forestry Bureau of Mishan City, Heilongjiang Province. No. 198 Guangfu Road, Mishan City, Heilongjiang Province, 158300, China. Tel: +86-0467-522-3606 • Fax: +86-467-522-2656.

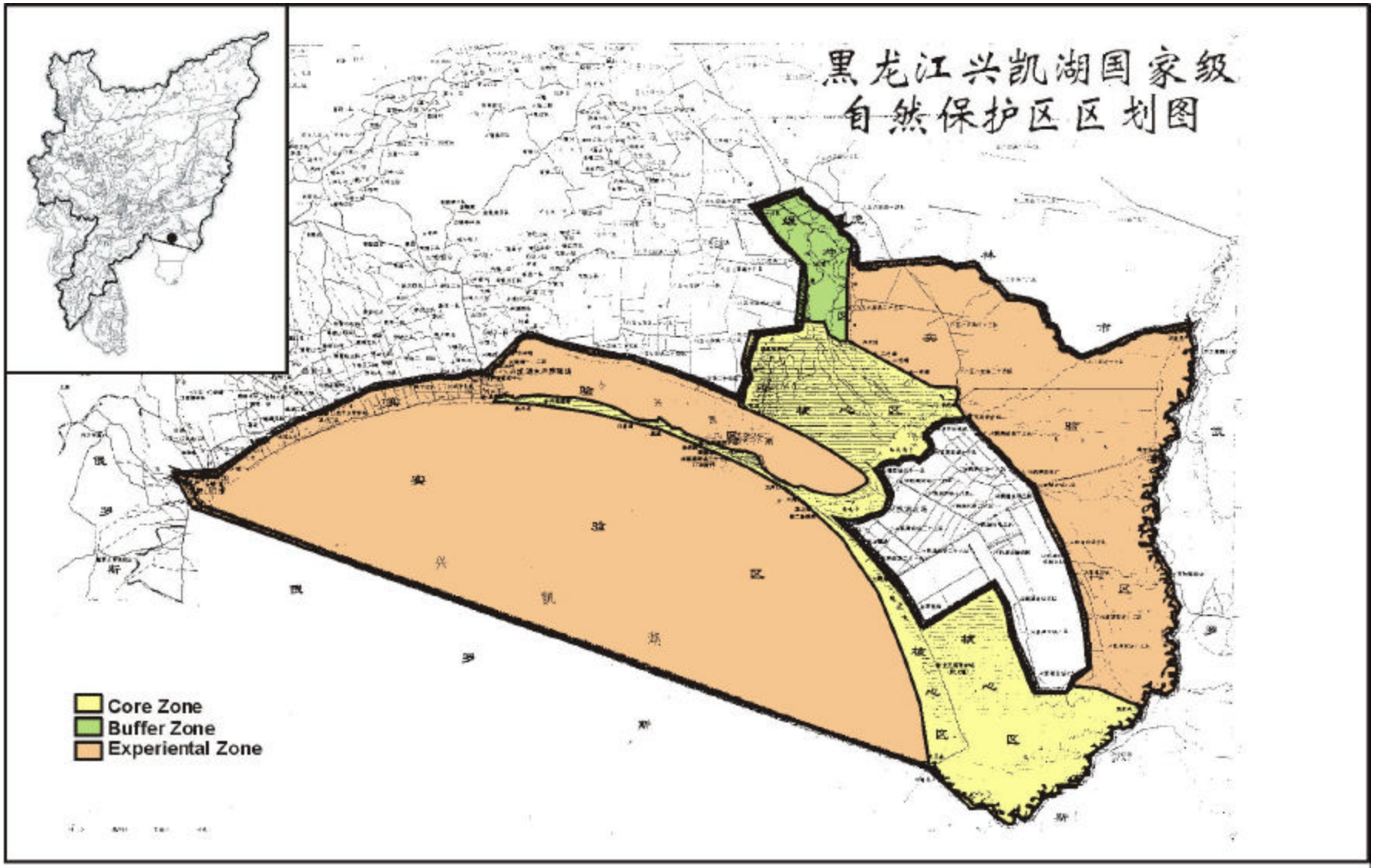

Figure 5 Zoning of Xingkaihu NNR

Site: Zhenbaodao Nature Reserve	**Establishment dates:** 2002	
Coordinates: 46°00'N 130°40'E	**Elevation: ± 50** m	**Area = 95,830** ha Core = 10,200 ha Buffer = 27,800 ha Exper = 57,830 ha
Location: Zhenbaodao Nature Reserve (NNR National Nature Reserve?) is located in the far east of Heilongjiang Province in Hulin County, bordering on the Wusuli/Ussuri River. Zhenbaodao borrowed its name from the island in the Wusuli River where China and Russia engaged in their most recent border conflict (1969). As a border reserve, Zhenbaodao has a military garrison from which patrols are conducted to ensure border security.		
Importance: The site provides important breeding habitat for a number of wetland bird species protected in China as well as 12 species listed by IUCN as globally endangered or vulnerable. Recorded species include *Ciconia boyciana* (breeding), *Anser cygnoides* (summer visitor and passage migrant), *Aythya baeri* (breeding); *Mergus squamatus* (summer visitor and passage migrant); *Aix galericulata* (breeding); Haliaeetus albicilla (summer visitor); and *Tetrastes bonasia* (winter visitor). Three national level-1 and 28 national level-II species have been recorded.		
Wetland Types: Riverine wetlands are dominant because the reserve lies on the floodplain of the Abuqin and Qihuli Rivers where annual flooding is common. Former river channels support sedge wetlands (*Scirpus*, *Carex*) with abundant *Deyeuxia angustifolia* on higher ridges left alongside former river channels. Abandoned river channels support stands of willow (*Salix* sp.) and ash (*Fraxinus* sp.). Adjacent uplands support closed-canopy woodlands dominated by oak.		
Biological/Ecological notes: 41 species of mammals, 169 birds, 8 reptiles, 8 amphibians, 59 fish and cyclostomes, and 500 vascular plants		
Hydrological/Physical notes: The NR lies in two small left-bank tributary watersheds of the Wusuli River, the Abuqin and Qihuli Rivers.		
Human Uses: The reserve is zoned into core (10,200 ha), buffer (27,800 ha) and experimental (57,830 ha) zones. Human use is limited by the presence of the military garrison. 23,539 ha of farmland (25% of the reserve area) in 700 plots are found within the reserve and plans have been made for restoration of 2,000 ha to forest.		
Conservation Measures: Zhenbaodao is a provincial nature reserve established under the Heilongjiang Forestry Bureau in 2002. The nature reserve incorporates two wetlands, one at Hukou and one at Dongfanghong.		
Adverse Factors: Conversion of wetlands to farmlands has affected a large portion of the reserve. Human presence on farmlands causes disturbance to wildlife. Due to the close proximity to the international border, the effectiveness of patrols is high. Thus hunting and other forms of illegal taking of wildlife are not as serious as in other nature reserves.		
On-site management : Zhenbaodao NNR employs 25 personnel, 5 of which are technicians.		
Management Authority: Provincial Forestry Bureau, No. 6 Hengshan Road, Harbin, Heilongjiang Province, 150090, China, Tel: +86-0451-234-6437• Fax: +86-451-234-6443.Hulin Municipality Forestry Bureau, Hulin City, Heilongjiang Province.		

Life form	Zhenbaodao
Fishes & Cyclostomes	59
Amphibians	8
Reptiles	8
Birds	169
Mammals	41
Vertebrate Fauna	284
Invertebrate Fauna	
Vascular Plants	500
Non vascular	
Mo./Year of data	
Remark	

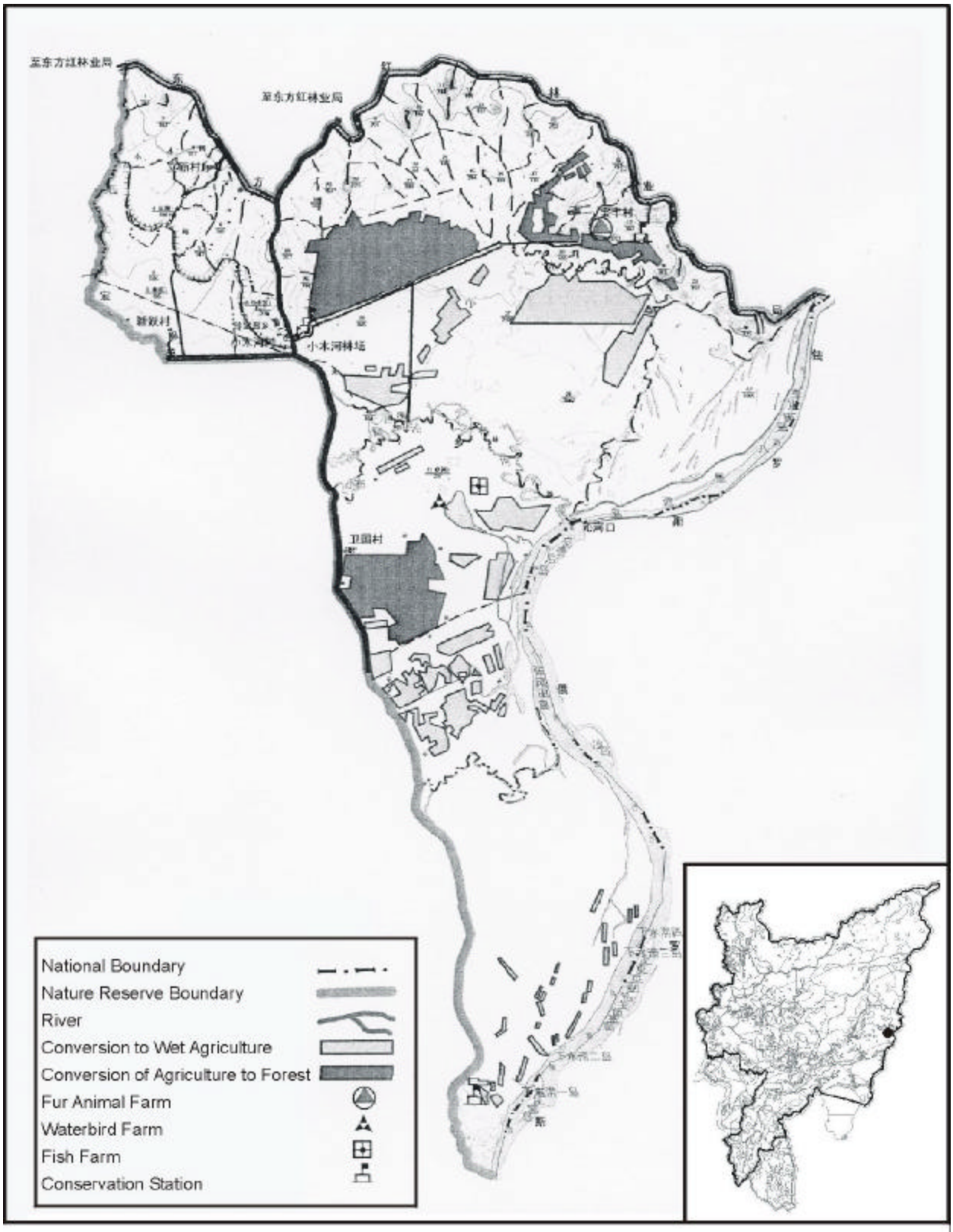

Figure 6 **Zhenbaodao NR Wetland Restoration Plan**

THREATS ANALYSIS

A. Threats analysis

1. The Sanjiang Plain includes some of the People's Republic of China's (PRC's) most important and extensive wetlands (>10 million ha), that are of great significance to biodiversity conservation, and not only nationally but also of international importance. Over the past 50 years, however, these wetlands have been reduced to below one million hectares, mainly due to expansion of agriculture in the region. Remaining wetlands are threatened or deteriorating in quality due to changes in hydrology (owing to abstraction of water and loss of forest cover), desiccation and reduced water quality. As a result of pressures, key wetlands and globally threatened species are now primarily found in NRs, but management of these areas is beset with challenges.

2. Immediate threats to wetland biodiversity in the Sanjiang Plain were determined on the basis of i) literature reviews and assessments of documented problems and issues relating to management and conservation, based on recent biodiversity surveys, nature reserve inventories, and reports by ongoing and past projects in the region (e.g. UNDP-GEF's Wetland Biodiversity Conservation and Sustainable Use in China); ii) consultations with stakeholders at the provincial level (especially Forestry Department of Heilongjiang Province, Heilongjiang EPB, universities); iii) on-site interviews with NR staff and local community members; and iv) direct observations in the field, including in the six NRs targeted by the Project.

3. GEF project formulation determines that sound project design should be based on removing root causes to identified threats. To facilitate project design, an analysis was carried out in which the immediate threats to biodiversity were identified, along with underlying and root causes and possible avenues for addressing them. The outcome of this analysis is illustrated in Figure 1) on Threats to biodiversity and the Project conceptual model.

4. The indicative threats analysis identified the four main threats to globally significant biodiversity in the Sanjiang Plain as: (i) changes in hydrology/desiccation; (ii) conversion to farmland; (iii) inappropriate land use practices (overexploitation of resources, disturbances, and habitat degradation); and (iv) limited conservation awareness and capacity of NR staff and adjacent communities.

5. The indicative threats analysis is provided in Table 1 and summarized below. Following from this analysis and from the logical framework, these four main threats (and their underlying causes) are targeted by four closely linked project components, each with a set of sub-components that address various aspects of the underlying causes.

6. Some of the underlying causes will not be addressed by the present Project, as they are already the focus of another project or beyond the scope of a GEF intervention. One of the unaddressed underlying causes pertains to nature reserve legislation, regulations and zoning, and differences in how these are applied or interpreted at national and provincial levels. This will be the focus of an ADB technical assistance (TA) being developed at present that will address environmental legislation; one of the focal areas of this to-be-developed TA will be legislation related to protected area management. The underlying cause of pressures on natural resources due to increases in the human population is regarded as being outside the scope of a GEF intervention. Other underlying threats and how these will be addressed by the Project are described below. A more extensive account of the history of these threats, and an account of current threats discussed as below.

7. **Immediate threat 1.** Changes in hydrology and desiccation of wetlands. The direct cause of this threat is usually drainage, diversion or storage of water for agricultural purposes, or the loss of forests due to (unsustainable) logging or conversion of forests to farmland. Root causes are: i) a limited understanding by water resource managers of the requirements of the various sectors including nature conservation, and ii) government policies affecting forest acreage and crop production practices. The latter has been reversed by the recent government decision to implement the 'farmland to forest' reforestation program. Although the Project will include reforestation, the crucial part of this component will address water resources management at two different levels. Firstly, water resources planning at the local (NR) level will be promoted by establishing stakeholder working groups that will meet regularly to discuss water resource issues at the NR level, and have the mandate to identify, formulate and implement solutions. This local level working group will liaise with a watershed-level water resources allocation and flood management subcomponent of the Project that will operate on a catchment level and develop a model for water allocation to the various users.

8. **Immediate threat 2.** Wetland conversion. The direct causes of wetland conversion are: i) pressures for arable land; ii) wetlands having been converted before nature reserves were established; and iii) the need for nature reserves to generate an income for NR operations. Some of the pressures have been lifted, as the province has issued a ban on further conversion and begun a program to restore wetlands in NRs. However, examples are lacking and capacity for restoration is limited. The Project will undo (some of) the historical damage by restoring wetlands located in core and buffer zones of wetland nature reserves, while at the same time providing compensation to affected villages by investing in village development funds (VDFs). Development funded by the VDFs will need to meet sustainability criteria developed by the Project and managed via the Project's Environmental Management Plan. NR management will be strengthened, and extra reserve income will be created by stimulating sustainable ecotourism development. Models will be developed of how to restore wetlands, which will include not only technical (physical) aspects, but also address social and management aspects of restoration.

9. **Immediate threat 3.** Overexploitation of wildlife and plants. Overexploitation of wildlife and plant resources in the wetland nature reserves relate to over-fishing, hunting, egg collection, and over harvesting of reeds and hay. At a village level, there are often few alternatives to these resources, and pressures soon lead to over-exploitation. The Project will on the one hand seek to reduce over-exploitation by identifying and quantifying exploitation, imposing and enforcing restrictions, and enforcing existing regulations. Capacity will need to be developed for this at the NR staff level. At the same time, the Project will seek to increase awareness within the local community (predominantly farmers and State Farm staff) and create alternative livelihoods by means of investments in village development funds. Environmentally friendly development will be stimulated by provision of grant support, while funding will be withheld from environmentally unsound development.

10. **Immediate threat 4.** Human disturbance of wildlife during sensitive periods (nesting, rearing, migration). Human disturbance is mainly related to farming within the nature reserves, and to (over-) exploitation of resources within the reserves. The approach taken by the Project will therefore be the same as for the 'wetland conversion' threat and the 'overexploitation of wildlife and plants' threat.

11. **Immediate threat 5**. Habitat degradation (other than related to conversion). These mainly relate to fires caused by humans and overgrazing, but also to smaller incursions such as

duck keeping and (rare) cases of feral animals occurring within wetland nature reserves. These issues will be addressed by the Project by means of awareness raising, creating livelihood alternatives, and enforcement of existing regulations. The fires are mainly associated with farmland occurring within the reserves and will therefore be addressed under the Project's farmland to wetland restoration subcomponent.

12. **Immediate threat 6.** Water pollution is mainly associated with lack of awareness of environmental health issues, and a lack of appreciation of wetland (conservation) values. Local (NR) level water resources planning and management will partly address this, as the capacity of the main local stakeholders for managing water resources (including water quality) will be increased. The awareness raising subcomponent will specifically target farmers and State Farms, and one of the key areas to be addressed will be water quality, and the importance of reducing effects (of effluents, pesticides, fertilizers) on both surface and ground water.

B. History of threats

13. There have been five distinct periods in the recent history of the Sanjiang Plain. The first record of exploitation was in 1743 when a 4.5 km2 area of the marsh was converted to croplands to feed soldiers posted at the frontier. As late as 1949 some 7,860 km2, or less than 7.2% of the Sanjiang Plain had been converted to croplands. At that time large carnivores including Far Eastern Leopard Panthera pardus orientalis, Siberian Tiger Panthera tigris altaica, Asiatic Black Bear Ursus thibetanus and Brown Bear Ursus arctos) were common.

14. From 1956 through 1978, the second period of exploitation, wetland conversion accelerated. Some 100,000 military troops converted 20,490 km2 to cropland from 1956-1974, raising the farmland area to over 18% of the Sanjiang Plain. Most of the population of some 6 million people in 1974 lived in the largest urban areas at Jiamusi, Hegang, and Shuangyashan. Thus the human impact on the remote portions of the Plain was not severe. This was shown by a 1976 survey of rare and endangered fauna in Heilongjiang Province that counted several thousand cranes (including nearly 1,000 Red-crowned Cranes Grus japonensis) and thousands of Whooper Swans Cygnus cygnus nesting in the Sanjiang Plain. Over 100 Oriental Stork Ciconia boyciana nests were occupied in the area that later became Honghe National Nature Reserve. Wild mammal skins sold in 1978 in the Sanjiang Plain represented over 36,000 Siberian Weasels Mustela sibirica, 562 Sable M. zibellina, 120 deer, 102 Wolves Canis lupus, and over 10 bears (probably U. thibetanus).

15. The third period of exploitation from 1978-1985 saw wetlands reduced to less than half of their pre-1956 area, and forest cover was reduced by one third from the 1960s. The human population grew to over 7 million by 1978, but was still concentrated in a few urban areas. Commercial markets for wildlife skins operated at least until 1983.

16. From 1985-1996 the fourth period of exploitation was considered the peak period of human influence. As the human population grew beyond 8 million the environment was degraded by planned agricultural development, pollution and unsustainable taking of wildlife. Sharp declines were observed for all wildlife, but particularly for waterbirds. Oriental Storks nearly disappeared and, duck and goose numbers declined by 90 percent. Flocks of tens of thousands of ducks and geese seen in earlier years were represented by only tens of breeding pairs by 1996.

17. From 1996-2000, the fifth period of exploitation, protection and restoration of wildlife began. The Wild Animal Protection Law of 1988 was implemented during this period and led to

reduced pressure from hunting and egg collecting. Surrender of firearms by villagers in the late 1990s helped to reduce hunting pressure. Nesting populations of Oriental Storks, Red-crowned Cranes, and White-naped Cranes began to increase, as did migrating flocks of geese.

C. CURRENT THREATS

18. Farming is the key conflict with biodiversity and wetland conservation in the Sanjiang Plain.Farmers lease nature reserve lands and the resulting revenues supplement the operational budget of the nature reserves. Achievement of the long-term wetland and biodiversity conservation objectives of the nature reserves is compromised by continued leasing of nature reserve lands for farming. Habitat and biodiversity restoration are not possible on those lands, nor is effective control of use of agricultural chemicals. Surrounding unconverted wetlands may be degraded by runoff of sediment- and chemical-laden waters from farmlands. Wetland conversion was banned by law in nature reserves in Heilongjiang Province in 1999, but the ban was not enforced until the implementing regulations took effect on 1 August 2003. However, conversion of pristine wetlands outside nature reserves continues. The "32-Word Policy" of former Premier Zhu Rongji calls for stopping losses of native habitats and for restoration of farmland to grassland, wetland, and forest. This policy accounts for the recent development of GoC plans for restoration of farmlands to grasslands in the Sanjiang Plain.

19. Although much of the remaining un-plowed wetland habitat is protected within nature reserves, unprotected wetlands also support wildlife species of conservation concern. Numbers of animals are normally small, but potentially important to maintaining regional populations of some species (e.g. nesting Red-crowned and White-naped Cranes). Conversion of these wetlands to farmland, therefore, hinders conservation of some species.

20. Although further habitat loss could be monitored by accurate mapping, periodic fixed-point photography, and frequent patrolling, this would not necessarily stop conversion. Even if conversion were to stop, habitat degradation from existing farms would continue due to disturbance by farmers and their equipment and use of agricultural chemicals. Fertilizer, herbicide and pesticide use is widespread on the state farms. This represents a threat to biodiversity conservation and possibly to the health of farm families due to degraded water quality. Used chemical bottles containing chemical residues are discarded where spray tanks are filled at irrigation channels or in marshes or streams. Thus the chemical residues directly enter the wetland ecosystem. Although there are regulations banning improper disposal of agricultural chemical wastes, and fines can be levied for infringements, enforcement is ineffective, and community participation in environmental clean-up is lacking. Pesticide concentrations in water bodies are not monitored due to the expense of testing.

21. Wetland drainage is a pre-requisite to farming and this degrades wetland ecosystems. Drainage of surface water has resulted in declines of 40 cm in surface water levels and over 1 m in groundwater levels in the Sanjiang Plain. This over-exploitation of water resources degrades wetlands and causes loss of biodiversity.

22. Livestock production is a developing industry in the region. Sheep goats and cattle are grazed on drained and undrained wetlands. There are no controls on grazing intensity, and there is no monitoring of grazing impacts. Grazing is banned by law in nature reserves, but limited illegal grazing may occur where patrolling is infrequent.

23. Throughout the Sanjiang Plain burning of wetland vegetation is a serious threat to plants and animals. Fires are mainly human-caused; lightning fires occur but are rare. Burning is not

permitted by law in any zone of a nature reserve, yet the reserves set fires periodically in an effort to reduce fuel loads, thereby avoiding larger fires that could be more damaging. Repeated burning has affected the native vegetation to the extent that the Carex tussocks and growing sedges have been damaged and some annual species have disappeared. Fires also degrade the foraging value of grasslands for cranes by removing all litter cover and exposing potential prey items to intense predation by competitors of cranes. Human-caused fire has not been controlled in nature reserves because existing policy calls for controlled burning. In most cases cooperation in fire control has not been sought among the farm communities. The biodiversity implications of fire have not been addressed in conservation education programs in the schools or at the state farms.

24. Loss of the mature mixed broadleaved and coniferous forest canopy caused loss of nesting and roosting habitat for many species, primarily birds and bats. Nesting densities of globally and regionally threatened species, such as Oriental Stork, Greater Spotted Eagle Aquila clanga and Black Stork Ciconia nigra, have been reduced on the Sanjiang Plain by loss of mature nest trees.

25. Biodiversity losses due to taking of wildlife have been severe. Most of the large mammalian fauna of the Sanjiang Plain has been lost, including large carnivores and the large ungulates they preyed upon. In the late 1990s GoC directed the public to relinquish all firearms to reduce hunting pressure on wildlife. Anecdotal evidence suggests that some species have since recovered. However, the paucity of large and mid-sized mammals and virtually all waterfowl suggests that illegal taking of wildlife continues. Wildlife population recoveries could be reversed if conversion of wetland to farmland continues.

26. There is no effective licensing system to control fishing intensity. Although major water bodies are occasionally patrolled and fishing gear is confiscated or destroyed, illegal fishing is regarded as a major conservation problem in all nature reserves.

27. Many nature reserves plan to establish wildlife breeding facilities as tourist attractions. This diverts management attention and financial resources from more important functions such as building community relations, enforcing regulations, and monitoring biodiversity. Also, removing animals from the wild for captive breeding typically reduces the productivity of the wild populations, thereby increasing threats. Lack of capacity to ensure proper management of natural breeding, nesting, and foraging habitats is a threat to biodiversity in nature reserves. Construction of hotels, tourist attractions and other infrastructure is not permitted in nature reserves yet most reserves now have plans for the construction of buildings and other infrastructure for tourism and administration. Many reserves already have adequate buildings for nature reserve needs including tourism. If not, tourist lodging is often available in nearby towns together with other facilities such as restaurants and entertainment. Use of facilities outside nature reserves benefits the local tourism industry while limiting the tourism impacts on the protected area. It also promotes the local transition to alternative livelihoods that are less threatening to biodiversity.

28. The protected area network in Heilongjiang Province encompasses nearly 3.5 million ha, or 7.7% of the area of the province. The protected wetland area in the Sanjiang Plain includes 28 nature reserves that cover 1,027,798 ha or 9.4% of the Sanjiang Plain. The existing protected area network covers most but not all known sites of importance for waterbird nesting and migration. Boundary extensions will be required to protect habitats and enable recovery in numbers of nesting and migrating birds (threatened species in particular). Definitions of the

three zones of China nature reserves are listed in the "Environment and Natural Resource Protection Legal Handbook" (1998) as follows:

- Core Area: Designated for intact and natural ecosystems, or where rare or endangered plant species are concentrated. Any entry of a unit or person into a core area is prohibited. Apart from scientific research approved by the nature reserve authority, any other scientific activity in a core area is prohibited. Entrance to the core area of a national level nature reserve must be approved by the relevant state authority.
- Buffer Area: The buffer area encircles the core area. Only scientific research is allowed within the buffer area.
- Experimental Area: The experimental area is the outer portion of the nature reserve surrounding the buffer zone. Permitted activities include scientific research, education, field trips, tourism, and cultivation of rare or endangered plants or rearing of such animals.

29. Experimental zones of nature reserves often have little conservation value, yet they account for nearly 60% of total nature reserve area. Neither farming nor grazing is permitted, yet virtually all reserves allow such activities in their buffer and experimental zones. In some cases it is impossible to distinguish experimental zones of nature reserves from surrounding farm lands. Unauthorized use of protected areas is a threat to wetland biodiversity conservation due to habitat loss and degradation.

30. In a recent publication authored by 22 Chinese Academy of Science professionals a petition was made for increased nature reserve funding (Beijing Environment, Science and Technology Update, U.S. Embassy, Beijing, June 2002). The conclusion of this petition was that annual operating budgets of nature reserves are not adequate to enable reserve personnel to effectively conserve habitats or biodiversity.

31. In 2003-4 SFA-SDRC and the State Farm Bureau proposed programs for restoration of farmlands to wetlands in nature reserves in the Sanjiang Plain. These programs would eliminate farming from nature reserves, simultaneously eliminating farm lease income as a source of funding. While these programs would be an important step forward in wetland conservation, they would compound the funding crisis unless the government adjusts funding to cover the losses of farm lease income.

32. Losses of farm lease income will affect activities such as survey, monitoring, and research, and hiring new personnel to increase management capacity. Purchases of equipment needed to support increased biodiversity survey, monitoring and research, and increased use of computers will also be affected. Inability to increase operating and capital budget allocations, to authorize training for new staff responsibilities, and to obtain required equipment threatens habitats and biodiversity.

33. The level of technical knowledge among nature reserve personnel is low. Most personnel were appointed from local farms or other organizations unrelated to nature conservation. Few personnel have university or other higher education qualifications. As a result biodiversity and other data held by nature reserves are often outdated or inaccurate. Biodiversity surveys are not complete for flora or fauna, and species lists require substantial revision. Technical capacity is not only a function of personnel capability, but is also determined by availability of equipment and reference materials, both of which are lacking.

34. A second result of capacity limitations is that few studies have attempted to link losses of biodiversity to losses or degradation of habitats. Therefore wildlife habitat requirements are not

well studied, trends in population numbers cannot be explained, and remedies cannot be proposed.

35. Binoculars, field scopes, GPS and other field equipment is available only at national level reserves, and is often not used in the day to day work due to lack of training. The result is that data collection is inadequate, sometimes even for rare species.

Table 1. Threats analysis and Project response matrix

Threats/Constraints	Root Cause	Required response	Proposed Project intervention
Increasing wetland dehydration • surface water drainage, diversion and/or storage systems • deforestation changing water balance	• government crop production policy and practice • limited understanding of water requirements of various users, including wetland NR • road construction • flood management • irrigation supply	• forestry investments in watershed • integrated watershed-level water resource planning	• Subcomponent 1.1 reforestation of 11,900 ha • Subcomponent 1.2 for local-level (NR) water management • Subcomponent 1.3 for watershed-level water resources management
Wetland conversion • State Farm cropland expansion • leasing of farmland within Nature Reserves • expansion of road, rail transport corridors	• pressure to increase incomes by expanding crop production • some farmland existed prior to NR establishment • need for lease income for NR operations • incorrect interpretation of legislation regarding experimental zones	• government farmland to wetland restoration with compensation • policy, regulation & enforcement to prohibit conversion & do land use planning • increased financial allocation to NRs • integrated transport development planning & engineering • review of PA legislation (focus of ADB-GEF project on environmental legislation currently being formulated)	• Subcomponent 2.1 Management Planning to 'guide' transport development • Subcomponent 2.2 on pilot wetland restoration, including development of model, & development of manual. • Subcomponent 3.2 establishing of village development funds for maintaining livelihoods of villages affected by wetland restoration program. • Subcomponent 3.3 will stimulate sustainable ecotourism development. • Subcomponent 4.3 wetland management training to include capacity building in wetland restoration.

Threats/Constraints	Root Cause	Required response	Proposed Project intervention
Overexploitation of wildlife & plants • overfishing • overhunting • excessive plant product harvest • excessive medicinal herb harvest • excessive reed harvest	• increase household food supply • income generation • paper production • roofing material needs • fuel needs • construction material needs • few economic alternatives	• alternative income sources • improved enforcement of existing regulations and training • reduce exploitation to sustainable levels • education & training of NR staff in enforcement, management and wildlife conservation	• Subcomponent 2.4 Reduction of overuse, to focus on achieving sustainability and eliminating unsustainable use forms. • Subcomponent 3.2 establishing of village development funds for maintaining livelihoods affected by resource use reduction program. • Subcomponent 4.2 focuses on awareness raising of farmers and State Farm staff
Human disturbance of wildlife during sensitive periods (nesting, rearing, migration) • households in wetlands • farms in wetlands • fishermen in wetlands • hunters in wetlands • tourists in wetlands • capturing wildlife for display in NR visitor centers	• existed prior to NR establishment • to increase crop production • to increase household income • to obtain food supply • recreation • low awareness of wildlife biology and general conservation needs	• enforcement of existing regulations on use of NR zones • resettlement of households & removal of farmland from NRs • development of tourism management plans • conservation education among villagers • education & training of NR staff	• Subcomponent 2.2 pilot wetland restoration, including development of model, & development of manual. • Subcomponent 2.4 Reduction of overuse, to focus on achieving sustainability and eliminating unsustainable use forms. • Subcomponent 3.3 ecotourism development of master plans & guidelines • Subcomponents 4.1 (education), 4.2 (awareness) & 4.3 (training)

Threats/Constraints	Root Cause	Required response	Proposed Project intervention
Habitat degradation (other than related to conversion) • anthropogenic fire • overgrazing	• forage improvement • livestock industry development • "controlled burns" as precaution against catastrophic fire • untrained NR personnel	• relocation & compensation of grazers • husbandry programs for grazing, hay, fire • education & training of NR staff	• Subcomponent 2.4 Reduction of overuse, to focus on achieving sustainability and eliminating unsustainable use forms. • Subcomponent 4.2 awareness of local farmers and State Farms • Subcomponent 4.3 training of NR staff
Water pollution • agricultural fertilizers & pesticides • sedimentation • sewage	• to increase crop production • excessive use of agrochemicals due to poor user practice • no facilities for treatment of effluents	• increase public/ State Farm awareness • water resource planning for water quality • development of best management practice	• Subcomponent 1.2 local-level (NR) water resources management • Subcomponent 4.2 awareness of local farmers and State Farms

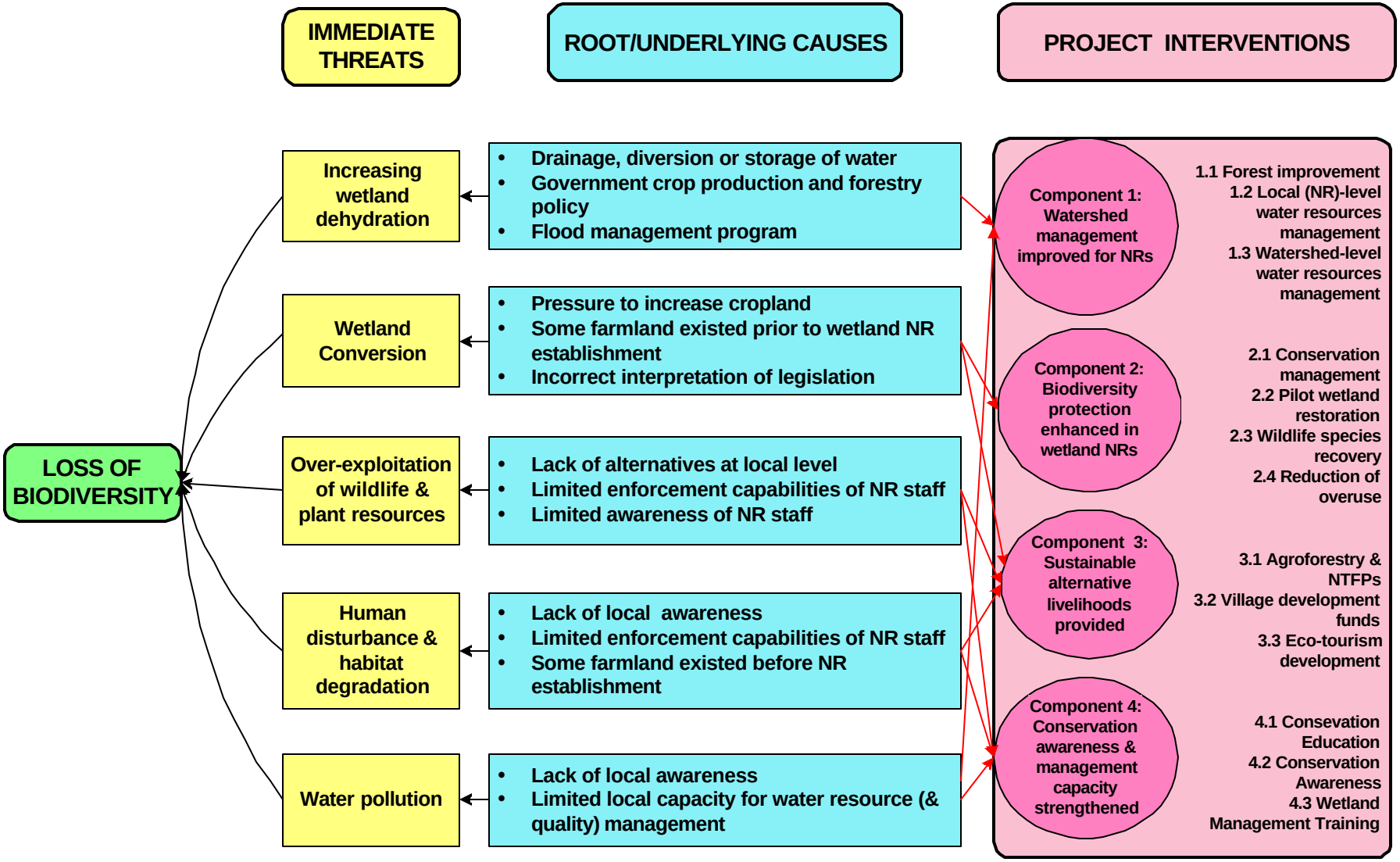

Figure 1. **Threats to biodiversity and the Project conceptual model**

SOCIAL ASPECTS AND STAKEHOLDER INVOLVEMENT

I. OVERALL SOCIAL ASPECTS OF THE PROJECT AREA

A. Overview

1. The Project area includes 13 cities and counties, i.e., Baoqing, Boli, Fuyuan, Hegang, Huanan, Hulin, Jidong, Jixian, Linkou, Luobei, Mishan, Qitahe, and Raohe. Within these counties, upland forest improvement activities will take place in 88 State Forest Farm and wetland management interventions will be implemented in six nature reserves within the area covered by these 13 counties.

2. In 2002, the total population in the 13-county Project area was 4.22 million, accounting for about 11.1% of the total population of the Province. Of the total population in the Project area, women account for about 45.6%; and the rural population is about 52.9% of the total. In the poverty counties of Raohe, Fuyuan, and Huanan, the proportion of rural population is higher (62.8%, 61.7%, and 73.1%, respectively). The natural population growth rate in the Project Area ranges from 1.59‰ (Boli) to 16.7‰ (Baoqing), with the average being 4.90‰. In comparison, the average natural growth rate of the Province is 3.93‰.

3. The GDP for the Project area as a whole was RMB 28.59 billion in 2000. In terms of GDP composition, primary industry accounted for 28.29%; secondary industry 36.64%; and tertiary industry 35.31%. In comparison, the composition of GDP in the Province for the same year was: 11.0%, 57.4%, and 31.6%, respectively. Per-capita GDP ranged from RMB 3,321 in Raohe County to RMB 10,583 in Jidong County, with an average of RMB 6,774 for the 13 counties, compared to RMB 8,562 for Heilongjiang Province and RMB 7,078 for China.

4. Rural workers in the Project Area operate largely in primary production activities, i.e., agriculture, forestry, animal husbandry, and fisheries. There are about one million rural laborers in the Project area, of which 82.7% are in the primary sector, 8.8% in secondary sector, 2.8% in the tertiary sector, and 6.4% in other sectors. This is similar to the structure of rural labor for the Province as a whole.

B. Poverty Aspects and Issues on Resource Use Rights

5. According to provincial poverty standards, the Project area has a total of 999 poverty sub-villages and 102,457 poverty households, accounting for 6.4% and 14.5%, respectively, of the total poverty sub-villages and households of the Province. The poverty population in the project area is 388,692 persons, accounting for the 15% of the total poverty population of the Province. Since the total population in Project area accounts for about 11.1% of the total population of the Province, the poverty is denser in the Sanjiang Plain than it is in other parts of the Province. The poverty incidence is 3.4% for China, 9.19% for Heilongjiang, and 9.7% for the Project area.

6. There are two general categories of farmers who live in and around the nature reserves (NR). The first category includes those farmers who are permanent residents in the villages. They have the official user rights on the arable land, and the user rights are usually valid for several decades. When theses farmers are asked to convert their arable land to the forest land or wetland, they have the legal rights to claim compensation. Another category of farmers includes “contract farmers.” Officially they are not local residents but come to local areas to be

contracted a plot of land for farming. These farmers usually contract the land from the State forest farms and the State agricultural farms of the Province. Their arable land can be taken back without compensation after the contract term has ceased.

7. The site visits in the core zone of the national Xingkahu Lake NR found that most farmers had heard of this NR. However, they do not know the exact boundaries of this NR. They also do not feel the impact of the NR on their lives. They recognize that the environment is getting worse by observing that the wetland area is decreasing, the animal species are increasingly scarce, and there are more and more natural disasters such as drought and flood. However, the environment is not their immediate concern. Their attention is placed on farming so as to earn more income. Many also believe that fertilizers and pesticides they apply in arable land only have limited negative impacts on environment.

C. Farmers' Concerns

8. The top concerns of the farmers are the yield and the price of the grain crops they plant. They even want to expand their farming areas in order to generate more income. As for the alternative livelihoods, they usually do not have many ideas. They are reluctant to take the risks to try something new. They do not always feel comfortable to shift to other ways of living since they cannot afford the inputs and the risks. As farmers, they also would like to pass their land over to the next generations so that these generations have something to rely on to make a living. However, some farmers think that if they can find cash-earning opportunities in non-farming activities, it would be easier for them to convert some of their land. Forest plantations in State forest farms and eco-tourism in wetland nature reserves are perceived as attractive by affected rural populations.

D. Gender Issues

9. Based on field investigations, it has been found that there is a need to increase the gender awareness of local officials. Staff members at local offices have limited awareness aware of the need to integrate the findings of gender analysis into project design and planning. No gender issues have been addressed in local project proposals, and there is nothing specifying in what ways women will be able to participate in, and benefit from the project.

II. HUMAN USES AND SOCIAL PRESSURES AT SIX PROJECT WETLAND NATURE RESERVE SITES

10. In all the six nature reserves considered under the project, agriculture is by far the most important human use of the wetland resource and has been expanding over recent years. Another important and expanding use is major livestock raising, which has increased grazing pressure. Less intense human uses are reed collection, small livestock (e.g. ducks and geese), hunting, and fishing, all of which lead to habitat and/or wildlife population degradation. Additionally, the use of agrochemicals on farmlands adjacent to the reserves is prevalent and constitutes a threat to water quality in protected wetlands.

A. Anbanghe Nature Reserve

11. This NR covers an area of 10,295 ha and is located in Jixian County, 45 km north of the Jixian urban area.

12. The main human use at Anbanghe NR is agriculture. The reserve has proposed restoration of 1,426 ha of farmland to wetland, of which 250 ha are owned by farmers and 1,176 ha belongs to the Nature Reserve. The reserve area was formerly managed by a reed supply company serving the paper industry. Farmers raise ducks and geese and produce honey from lands within the nature reserve. Surrounding farmers support restoration of farmland to wetland to increase options for incomes opportunities of these types. Reed harvest in the Nature Reserve accounts for 7% of the annual production in the Province. Reed harvest has declined in recent years due to the low prices offered by paper mills. It is also a potentially important site for tourism development. This NR already has a large visitor's center – which includes restaurants, a watchtower, fishing cabins, and an information center is under construction in the experimental zone at the far southeastern corner of the reserve.

13. Resulting from the recent history of farm development in the NR, there is a block of 1,196 ha of farmland that remains in the core zone. Additionally, most of the buffer and experimental zones are used for agriculture. Hunting and fishing were previously practiced in the reserve area, but are now somewhat under control. Another adverse pressure of human origin is that agrochemicals from adjacent farmland enter the wetlands.

B. Dajiahe Nature Reserve

14. This wetland reserve, with a total area of 72,604 ha is located in Raohe County in the easternmost reach of Heilongjiang Province. The NR is split into three portions, two of which drain directly to the Wusuli River. The northern portion of the NR protects the south bank of the Naoli River and includes floodplain wetlands dominated by reeds and sedges.

15. The three portions of the reserve lie in two catchments. The two southern portions of the reserve lie in the Wusuli River watershed, and the northern portion lies in the lower Naoli River watershed (the largest left-bank tributary of the Wusuli River). Over a hundred lakes were formed due to gentle gradient along the two rivers. However, most of the lakes disappeared due to massive exploitation of wetland in the area.

16. Grazing, fishing, bee keeping, hunting, farming and other human uses are major threats leading to habitat destruction, fragmentation and invasion of exotics. Deforestation is serious on upland areas; wetland conversion to agriculture continues despite the ban currently in effect; and reed harvesting, hunting and fishing are not controlled. Livestock grazing is intensifying in the watershed, particularly on the wetlands along the lower reach of the Naoli River. Additionally, agrochemicals from adjacent farmland continue to be a threat.

C. Naolihe National Nature Reserve

17. This large wetland protected area (covering 160,599 ha) is located in eastern Heilongjiang Province in Raohe, Fujin, Baoqing, and Fuyuan Counties. It lies in the Wusuli River basin. In August 2002 three provincial level (Naolihe, Yanwodao, Changlindao) and one county level nature reserve (Qiliqinhe), all protecting wetlands in the Naoli-Qixing River basin, were combined into the national level Naolihe NNR. The reserve protects much of the floodplain of the Naoli River in its middle and lower reaches. This represents one of the first attempts in China to protect a large portion of a watershed by establishing a single nature reserve.

18. The watershed has been altered by the construction of reservoirs in the upper reaches. Filling reservoirs, combined with pumping of groundwater for irrigation of rice fields, has dried the lower reaches of the Naoli and Qixing Rivers. Agricultural development has led to

conversion and drainage of wetlands for farming. Much of this has been carried out without formal government planning by immigrants from other provinces. Recent development of the livestock industry has escalated grazing pressure on wetlands especially in the lower reaches. Subsistence and market fishing and hunting in the watershed are also widely practiced.

19. This large protected area is rather narrow because it follows the floodplain of the Naoli-Qixing Rivers. Surrounding lands have been converted from wetland to agriculture. Pressure from agricultural interests includes hunting, fishing, taking of eggs from wild bird nests, livestock grazing, grass burning (in spring), and water extraction for irrigation. Hydrological studies showed that mid-growing season ground water levels drop significantly, dewatering surface wetlands. In addition, agrochemicals from adjacent farmland remain a threat.

D. Qixinghe National Nature Reserve

20. This medium-sized NNR (20,000 ha) is located in eastern Heilongjiang Province in Baoqing County, 40 km from Baoqing City. This NR lies in the middle reach of the Qixing River basin. The Qixing River drains to the Wusuli River and ultimately to the Heilong River. Immediately downstream from the Qixinghe NNR lays the adjacent Naolihe National Nature Reserve. Wetlands along the Qixing River have been historically important for flood control, water supply and groundwater replenishment.

21. The reserve is typically used for nature protection and scientific research. The experimental and buffer zones, and parts of the core zone, are occupied by farmlands. The surrounding area is used for fisheries, agriculture and livestock raising. Tourism is not well developed due to lack of infrastructure and interpretive facilities, although watchtowers have recently been constructed and boats are available with guides for tourism. A construction plan for Qixing River Resorts has been prepared. The rich fauna and flora has made the site a valuable place for education and tourism.

22. Drainage for agriculture, flood control embankments, and road construction threaten wetlands in the Qixing River basin, and pollution from agricultural activities in the surrounding area has affected water quality in the NR and adjacent wetlands. Additionally, competition with surrounding water users may result in inadequate water supply to the wetlands. Other anthropogenic pressures are represented by illegal fishing, hunting, and collecting of birds' eggs.

E. Xingkai Lake National Nature Reserve

23. Another large wetland protected area (222,488 ha) Xingkai Lake National Nature Reserve (NNR) is located in southeastern Heilongjiang Province, 120 km from Jixi City. It lies adjacent to the Khanka Lake Nature Reserve and Ramsar Site, in Russia. Xingkai Lake is important for flood control, water supply and groundwater replenishment.

24. The Nature Reserve is typically used for nature protection and scientific research. The biology and ecology, as well as migration habits of several species of birds have been studied in Xingkai Lake NNR. The surrounding area is used for tourism, fisheries, agriculture and livestock raising. There are four eco-tourism resorts in the NNR, and construction plan for Xingkai Lake Resorts has been prepared. In 2000, approximately 500,000 national and international visitors came to the Reserve. In the Neolithic Age there was a (well-known) Sites related to a well-known Neolithic culture (Bohai) are located in the Xingkai Lake Basin. This, together with the

rich fauna and flora, has made the Xingkai Lake NNR a valuable place for education and tourism.

25. Farming and reed harvesting also occur in the NNR, and there is a paper mill in the vicinity, for which a sewage treatment project is planned. Pollution from agricultural activities in the surrounding area has affected the rivers and lakes.

F. Zhenbaodao Nature Reserve

26. With a total area of 95,830 ha, Zhenbaodao Nature Reserve is located in the far east of Heilongjiang Province in Hulin County, bordering with Russia on the Wusuli/Ussuri River.

27. As a border reserve, Zhenbaodao NR has a military garrison from which patrols are conducted to ensure border security. Human use of the Reserve is limited by the presence of this garrison. 23,539 ha of farmland (25% of the reserve area) in 700 plots are found within the reserve and plans have been made for restoration of 2,000 ha to forest (under another project). Conversion of wetlands to farmlands has affected a large portion of the reserve, and human presence on farmlands causes disturbance to wildlife. However, due to the international border situation, the effectiveness of patrols is high. Thus hunting and other forms of illegal taking of wildlife are not as serious as in other nature reserves.

III. PROJECT PARTICIPATION PLANS

28. The project preparation effort has included the development of approaches to promote public participation in the project cycle so that the local community people can best contribute to and maximize benefits from the project. In the context of this public participation process, public participation planning, as well as participatory monitoring and evaluation approaches are included.

29. Basic to the development of these approaches is the identification of the beneficiaries and their needs and concerns, as well as the potential project impacts on them. Direct stakeholder groups within the Project include, but are not limited to:

(i) Forest workers in the State forest farms;
(ii) Workers in the processing industries;
(iii) Workers in the State agricultural or fishery farms;
(iv) Farmers who live in and around the forest farms and nature reserves;
(v) The poor;
(vi) Minorities; and,
(vii) Women

30. Resulting from national policies to protect natural resources, various programs have been implemented, which will affect the access of the local people to these resources. These programs include: logging bans and quotas; conversion of arable land to wetland and forestland; establishment of nature reserves; and fishing bans. They will prevent or restrict these people from access to the resources such as the forestland, wetland, grassland, rivers and lakes, and farmland. As a consequence, the local people will lose income and livelihood.

31. According to findings from site investigations, the most urgent concern of direct stakeholders is incomes generation. Their particular preferences are reliable, immediate, and predictable incomes generation activities from farming, forest logging, crops, fisheries, and livestock, which have been their major income sources for generations. Therefore, as an

integral part of the Sanjiang Plain Wetland Protection Project, alternative livelihoods opportunities should be provided. Some initiatives such as the development of agarics, herbs, and fruit shrubs, as well as animal farms (such as deer, geese, chicken, sheep, and scalper) have been undertaken. However, these new endeavors are vulnerable to failure from inexperience and market risks.

32. The public in the Project areas generally have low awareness when it comes to participating in development interventions. They are used to taking directions or suggestions from upper level leaders. Like in other parts of China, this top-down approach has dominated the decision-making process in the Project area.

33. The purpose of the Public Participation Plan (PPP) is to promote the active participation of the affected populations (especially the poor and women) in detailed project feasibility studies, design, planning, implementation, monitoring and evaluation, so that their problems, needs, and concerns can be addressed. The public then will be motivated to contribute to the Project and develop a sense of ownership, and they will build up the capacities to continue with the project after external funding has ceased.

34. The proposed PPP approach will be based on establishing set up three project working groups at the grass-roots level to ensure the voices of the affected people and the poor can be heard: a project planning group (PPG), a project executing group (PEG), and project monitoring group (PMG). These working groups should include representatives of community leaders and regular community members, as well as vulnerable people within the community, such as the poor, women, and minorities. The PEG and the PMG should be composed of different members so that the implementation can be independently monitored by another working group. The existing farmers' and women' organizations, such as workers' associations, women's federations and farmers' associations, should be involved in project design, planning, and implementation.

A. Public Participation Plan

35. The Plan is organized by the stages in the project cycle and is summarized in Table H.1. It includes the project stages of preparation, design, planning, implementation, monitoring and evaluation, and post-project follow-up. For each of these stages, the plan lays out the type, purpose, and methods of participation, and assigns responsibilities at each stage.

Table H.1 Public Participation Plan

Project Stage	Types of Participation	Purpose of Participation	Methods of Participation	Responsibility
Preparation	Information sharing	- Inform the public of the upcoming project and the project activities, and the expectations on the public	- Inform project villages and farms - Hold representative meetings with farmers and farm workers	- County and township project officers - Leaders of villages and farms
Design	Consultation	- Understand public's livelihoods, needs - Assess the potential project impacts - Seek public opinions toward project activities and arrangements - Identify the poor and target the project activities to the	- Setting up village and farm project working groups - Participatory rural appraisal - Hold villagers and farm workers plenary meeting - Household visits	- Village and farm leaders - PPG - External consultants - County and township project officers - NGOs

Project Stage	Types of Participation	Purpose of Participation	Methods of Participation	Responsibility
		poor - Identify ways whereby they would like to contribute to the project	-Focus group discussion -Socio-economic survey	
Planning	Decision-making	- Inform the public on what agreements have been achieved - Seek comments from the public on the final project arrangement - Ask what support they need to implement the project - Ensure the welfare of the poor and women are considered	-Participatory rural appraisal -Hold villagers and farm workers plenary meeting -Design pro-poor and pro-women employment mechanism	-PPG -External consultants -County and township project officers -Related agencies such as local finance bureau, planning commission, livestock bureau, etc. -NGOs
Implementation	- Individual capacity building - Organizational capacity building - Networking	- Build up the capacities of workers and farmers to implement the project in the technical as well as management aspects - Organize the workers and farmers in networks so that they can support each other and increase their collective bargaining power - Ensure the access of workers and farmers to more social capital, and better position themselves in the industrial chain	-Provide appropriate training to workers and farmers on technical and management knowledge and skills -Build up workers' and farmers' associations -Help the associations to establish partnerships with other organizations, particularly private sector -Use pro-poor and pro-women employment mechanisms	-PEG -NGOs -County and township project officers -Local technical experts -Local experts or officials who know association management -Local government agencies related to commercial affairs
Monitoring and Evaluation	- Empowerment - Promote ownership and sense of control	Consulting the public on: - Key areas about the project progress - Indicators for these key areas - Convenient approaches of data collection - How to share and use of the information	-Monitoring the operation of pro-poor and pro-women employment mechanisms -Participatory rural appraisal -Hold farmers' and farm workers' representative meetings -Focus group discussion -Socio-economic survey	-PMO -External consultants -County and township project officers -Related agencies such as EPB, local academy of forest research -NGOs
Post-Project Follow-up	- Sustainable improvement of livelihoods and wetlands - Experience-sharing	- Distribute the lessons and experiences of sustainable livelihoods and wetland - Identify and provide necessary follow-up support to the project	-Organize seminars, study tours, and prepare media materials -Participatory rural appraisal -Focus group discussion	-Village and farm project working groups -County and township project officers

B. Participatory Monitoring and Evaluation

36. As part of the public participation process, a participatory monitoring and evaluation plan will be needed. This plan will be carried out by the project monitoring group (PMG) mentioned above. As already discussed, the PEG and the PMG should be composed of different members

so that the implementation can be independently monitored by a separate working group. It is expected that the M&E plan will generate data and information required to assess and quantify the potential social and poverty benefits of the project, as implementation progresses.

37. The objective of the M&E plan is to assess changes in the social and economic conditions of the project areas as a consequence of the Project. The Plan will:

(i) Generate information to identify impacts, including qualitative information to describe social changes;
(ii) Analyze and document the results for future planning of wetland protection, plantation, and poverty reduction interventions;
(iii) Initiate participatory approaches needed to plan and implement complementary activities; and,
(iv) Focus on key-actions and processes learned from the project for replication in other places.

38. The approach proposed is the Participatory Assessment (PA) using participatory methodologies and techniques. Essentially this approach consists of ensuring the participation of the project beneficiaries, i.e., village farmers and workers in the State farms and nature reserves, in the monitoring and evaluation process. The methodology will be planned and implemented in such a manner that the beneficiaries to monitor and document key observations on a continued basis for their own future benefit.

39. The identification of key indicators for monitoring the impact of Project activities is an integral part of the M&E plan. The M&E program will be conducted over the long-term, starting from the beginning of the Project. Once initiated, the monitoring by beneficiaries themselves will continue. A professional M&E survey team under the supervision of the Project Management Office will visit the areas at appropriate intervals and document the key changes and impacts in full participation by people in the project area.

40. The following list provides the broad indicators that are of greatest importance:

(i) Per-capita GDP in each county
(ii) Per-capita net income in selected townships
(iii) Per-capita income in State forest farms by county
(iv) Gender-disaggregated data on per capita net annual income
(v) Per-capita net annual income of the poor
(vi) Employment proportion of men and women
(vii) Average wages of men and women
(viii) Proportion of the poor in the employed labor force
(ix) Change of areas under cultivation by crop by county
(x) Areas of converted arable land
(xi) Selected township income distributions (from which poverty levels can be derived)
(xii) Poverty incidence by county and for Heilongjiang Province
(xiii) Illiteracy rate by county
(xiv) Population needing “minimal insurance programs” in State forest farms or other State farms by county
(xv) Ownership of assets in selected townships
(xvi) Increase in employment by sector of alternative livelihoods
(xvii) Increase of employment and salaries by plantation
(xviii) Number of established industrial enterprises and expansions of existing ones
(xix) Frequency of technical services provided to selected villages and State forest farms

or other State farms

41. In terms of methodology, each assessment exercise will consist of three parts:

(i) Discussion with village officials or farm officials and collection of statistical data. The discussion would focus on any apparent anomalies in the data, and officials' explanation of the changes resulting from the Project, and their overall perception of implementation problems, constraints as well as benefits/ potential negative impacts;

(ii) A participatory assessment session with selected villages and farms. One group would conduct the PA with women and the other group with men. The outcome of the PA conducted for this study will be of critical importance in preparing future development plans; and,

(iii) At the village level, training of a village accountant or other nominated person by villagers to collect and keep record of a set of simple indicators. The purpose is to monitor them on a continuous basis for the benefits of the villages. An important part of this component is to explain to villagers the benefits of results and how they could be used in improving the condition of the village.

42. It is strongly recommended that the results of PA sessions be shared with local and provincial officials so as to help them to identify activities that would have a significant impact on poverty reduction. The activities to be implemented in the villages will come from the outcome of PA sessions.

43. The assessments would initially be carried out immediately before the start of the Project. This would provide the baseline information and also allow a start on community participation. Subsequent assessments would be undertaken semi-annually until Project completion.

44. Surveys should be carried out in villages farms located within or in close proximity to the Project NRs and State forest farms. In selecting the villages to be surveyed, the following principles should be adopted:

(i) The locations should reflect the main Project activities

(ii) The locations should have the main types of beneficiaries by their livelihoods

(iii) Priority should be placed on the poverty counties;

(iv) Attention should be paid to minority areas;

45. The previously mentioned professional survey team should consist of an experienced sociologist/socio-economist assisted by one research assistant and a participatory assessment specialist. One training session is considered to be adequate. This session should be organized by the socio-economist and attended by the participatory specialist, the research assistant, members of the project management office, and village and farm project working groups so that they become aware of the objectives and content of the surveys. These would be described and the survey instruments explained (a checklist for the discussions and a form for the statistical data). Other aspects related to the social studies should also be planned at this time.

46. A consulting firm or academic department, such as the College of Rural Development of China Agricultural University, where trained participatory assessment specialists are available could be engaged for this exercise. A visit by an international expert with expertise in participatory monitoring and evaluation in China is also recommended.