



FAO/GLOBAL ENVIRONMENT FACILITY PROJECT DOCUMENT



PROJECT TITLE: Biodiversity Conservation and sustainable land management in the soda saline-alkaline wetlands and agro-pastoral landscapes in the western area of the Jilin Province (Jilin-BCSLM)	
PROJECT SYMBOL: (GCP/CPR/048/GFF)	
Recipient Country/ies: China	
Resource Partner: GEF	
FAO project ID: 611430	GEF/LDCF/SCCF Project ID: 4632
Executing Partner(s): Department of Water Resources, Jilin Province (DWR Jilin)	
Expected EOD (starting date): June 2015	
Expected NTE (End date): June 2019	
Contribution to FAO's Strategic Framework¹	a. Strategic objective/Organizational Result: SO2 b. Regional Result/Priority Area: Enhancing equitable, productive and sustainable natural resource management and utilization c. Country Programming Framework Outcome: CPF Priority Areas 4: Promoting sustainable agro-ecological development and agricultural heritage conservation and utilization
GEF Focal Area/LDCF/SCCF: Biodiversity and Land Degradation	
GEF/LDCF/SCCF Strategic Objectives: BD-2, LD-1, and LD-3	
Environmental Impact Assessment Category (insert $\sqrt{}$): A B $\sqrt{}$ C	
Financing Plan: GEF allocation	USD 2 627 000
<u><i>Co-financing:</i></u> Water Resource Department, Jilin Province FAO	USD 16 600 000 <u>USD 200 000</u>
Subtotal Co-financing:	USD 16 800 000
Total Budget:	USD 19 427 000

¹ For projects operated by country offices, it is necessary to link projects in FPMIS at OR level. For all other projects, linkage at product/service level is necessary

EXECUTIVE SUMMARY

The Western Jilin Wetlands offer a **unique opportunity to address one of the most disruptive environmental challenges China is facing today**: large-scale land degradation and biodiversity damages caused by decreasing water resources. The challenge is daunting. The naturally uneven distribution of water resources within China, featuring a water-rich South and a dry North, has been plaguing the country throughout Chinese history. In recent times, human actions have severely exacerbated this situation reaching a point where ecosystems cannot compensate for the damages any longer and face the danger of irreversible degradation.

In the large agriculturally used areas of northern China, two mutually reinforcing human-made factors pose a grave threat:

1. **Unsustainable agricultural practices, damaging use of land and water resources**, driven by population growth and rapid economic development. This especially includes the inefficient water use as well as the diminishing of water resources through pollution (e.g. pesticides and chemicals used in agriculture). Both put enormous pressure on water resources in China, causing land and biodiversity degradation.
2. **Detrimental effects of climate change** are fundamentally shifting water resource pattern across China. The northern parts of the country, traditionally already prone to droughts, are becoming even more vulnerable to severe water shortages, exacerbating land and habitat degradation. Climate change increases the urgency for action on unsustainable agricultural practices.

China is quickly approaching a breaking point regarding its land and water use in agricultural lands and the related environmental damages. Across northern China, numerous ecosystems that include agricultural landscapes are at the brink of irreversible environmental damages. China urgently needs solutions for protecting these landscapes while balancing environmental protection with the socio-economic needs of local communities. Diversion of water resources in the context of large irrigation systems will inevitably be part of these restoration efforts. Thus far, water diversion projects in China followed a rather heavy-handed approach, focusing on local agricultural needs while ignoring detrimental effect to the local as well as downstream ecosystems. **Demonstrating a careful and prudent way of environmentally sound water diversion**, featuring a clear understanding of ecosystem impacts and innovative solutions for maximizing environmental benefits, **carries enormous potential to improve biodiversity conservation and land management across China**.

In order to build an environmentally sensitive model for large irrigation efforts, the initiative will have to look at all the interrelated factors at the landscape level. A **model for Sustainable Land and Water Management (SLWM)** in irrigated areas that can insure agricultural productivity, sustainable land use and biodiversity simultaneously needs to address two fundamental issues:

1. **Sustainable design and application of the irrigation system**: The irrigation system cannot be solely targeting maximum and short-term agricultural gains, but needs to take the entire landscape into account. The irrigation system needs to restore an ecological balance between land resource protection, biodiversity conservation and agricultural production. A carefully designed, cautiously applied and closely monitored irrigation system can serve all three objectives at the same time, creating a productive landscape of long-term ecological health and sustained productivity.
2. **Change agricultural practices to serve land and biodiversity protection**: Even the most carefully designed irrigation system will not be able to counterbalance unsustainable agricultural practices for long. Agricultural practices, especially over-use, waste and pollution of water resources, are the part of the fundamental problem that can (in con-

trast to global climate change) be fully solved at the local level. A SLWM Model at the landscape level will have to include alternative agricultural practices that keep productivity, land use and biodiversity in a sustainable balance. In this way, the threefold objective is the same as for the design and application of the irrigation infrastructure.

Both aspects in their combination result in a **comprehensive and integrated SLWM Model at the landscape level. To design and apply this model is the ambitious yet fully feasible objective of this project.** The Western Jilin wetlands offer a unique opportunity to do so. All building blocks are in place to implement **an innovative and pioneering solution:** keen environmental awareness of stakeholders, major government resources and strong political will. The project will build upon a carefully planned initiative for water diversion to improve degraded croplands and rehabilitate wetlands of vital ecological importance. The project will complement the envisioned irrigation system to make it environmentally sound and ensure, that land degradation and biodiversity concerns are adequately addressed. The project will combine this rehabilitation effort with the introduction of sustainable agricultural practices based on the tried and tested principles of Conservation Agriculture (CA) with a strong focus on sustainable and efficient water-use and avoidance of water pollution through agrochemicals. Both aspects, rehabilitation of degraded wetlands plus introduction of sustainable agricultural practices, will in their combination create an integrated SLWM Model.

The severity of the situation makes the Western Jilin Wetlands a perfect test case. The project region of Songyuan prefecture has been bearing the full brunt of water resource degradation. Water flow into the prefecture has been diminished by economic activities and upstream water withdrawal. This leads directly to a vicious cycle of unsustainable pumping of groundwater in the project area, exacerbating the problem to a point close to ecosystem collapse. At the heart of the Songyuan ecosystem lies Chagan Lake, a National Nature Reserve of great biodiversity and with a vital eco-function as a stopover for migratory birds. **The stability of this globally significant ecosystem crucially depends on the health of the surrounding productive landscapes, especially the wetlands.** However, water scarcity and unsustainable land and water management severely degraded these wetlands, putting mounting pressure on the entire ecosystem.

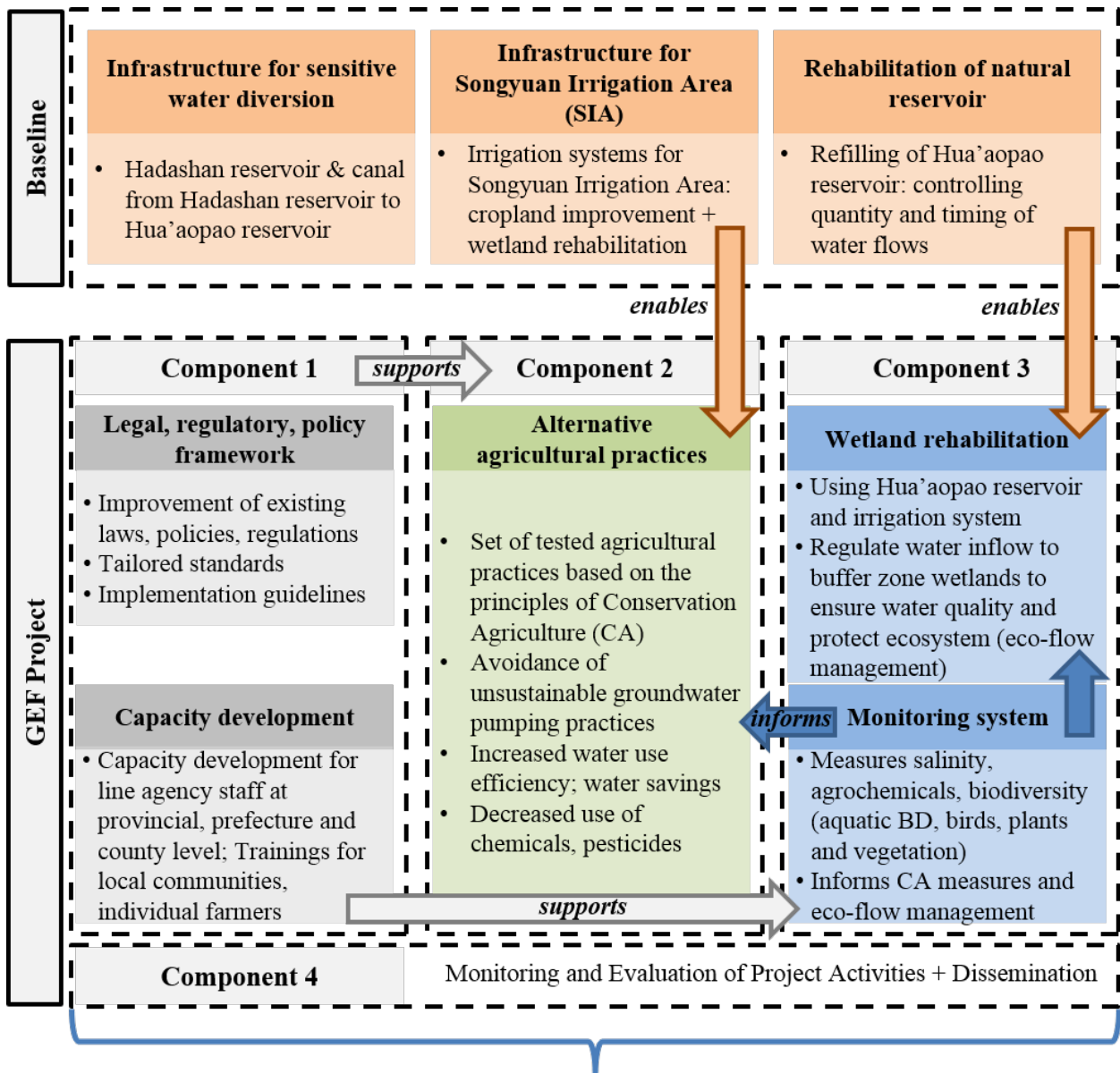
Stakeholders at the provincial and prefecture level recognize the acute threat to the environmental as well as the economic well-being of the region. The ecosystem of Chagan Lake is not only of great environmental importance, but also of high economic value as a tourist location. Next to agriculture, tourism is the main source of livelihood for local communities. Both sources of income depend on the health of the croplands, grasslands and wetlands surrounding the lake. Accordingly, a broad alliance of dedicated stakeholders formed to find an answer to the daunting environmental and socio-economic crisis. An innovative solution emerged from a series of research studies and expert analysis, stakeholder deliberations and thorough impact assessments. The project design has the potential to **illustrate a feasible approach to balance between environmental concerns and economic interests with regard to water resource management.** The potential for replication is extraordinarily high.

The project builds on a strong baseline. A set of large initiatives, enjoying strong political support as well as significant government resources, have been initiated to improve water availability in the **Songyuan Irrigation Area (SIA)**. The existing initiatives already reflect the stakeholders sensitivity for possible environmental damages. The diversion of water from a major river to improve cropland irrigation has been carefully and prudently planned to avoid all detrimental effects on the environment. The scheme includes a comprehensive plan to avoid any negative effects of the water withdrawal downstream, environmental as well as economic. The diversion has been coordinated with and agreed upon by stakeholders along the river. Extensive safeguards are in place to limit water withdrawal to the minimum needed for revitalization of the wetlands. Through innovative use of existing natural reservoirs, unwanted water flow fluctua-

tions are fully avoided. While the baseline project takes care of minimizing all negative environmental effects of the water withdrawal downstream, the **GEF project will synergistically complement the baseline initiatives and address remaining barriers and environmental challenges, thereby creating significant global environmental benefits:**

- 1. Component 1: Improvement of the policy, legal and regulatory framework for an SLWM model in productive landscapes, including capacity development.** The project will build on existing laws and regulations and primarily target the remaining gap of cross-cutting, integrated landscape approaches. It will improve the enabling environment for combining sustainable land and water management in agriculture with rehabilitation of degraded land and long-term biodiversity conservation. This will include implementation guidelines for alternative agricultural practices as well as tailor-made water efficiency and quality standards for the Chagan Lake region. In addition, the component will provide capacity development for local communities and farmers to enable long-term implementation of the SLWM Model. Component 1 will provide the groundwork and support system for the project activities under component 2 and 3.
- 2. Component 2: Design and piloting of sustainable land and water management in agricultural practices in production landscapes around Chagan Lake.** As part of the comprehensive SLWM Model, the project will design and implement a broad spectrum of alternative agricultural practices in the project area. While the baseline irrigation system will already mitigate the unsustainable use of pumped groundwater for croplands, the GEF project will address the root causes of water scarcity and corresponding land degradation in the project area. This includes significant water savings by efficient water use as well as countermeasures to address the excessive use of chemicals and pesticides. The comprehensive water quality monitoring system to be established as part of component 3 (see below) will continuously and precisely measure pollutant levels and serve as an early-warning system. This will enable stakeholders to adjust and intensify SLWM practices if needed to stay within pollution standards.
- 3. Component 3: Rehabilitation of wetlands and grasslands leading to improved land resource protection and biodiversity conservation in the productive landscapes around Chagan Lake.** The baseline projects will provide the starting point for wetland and grassland rehabilitation by flooding the relevant areas with fresh water. However, the high salinity of the soil in Western Jilin complicates the endeavor: the saline levels of the water in the rehabilitated wetlands and the runoff into Chagan Lake could potentially rise too high, causing ecological damages. The project will avoid these negative effects. First, it will use the existing system of newly flooded natural reservoirs (also used to avoid water flow fluctuations downstream; see above) to tightly control the quantity and timing of water flows into the wetlands. Second, it will establish a monitoring system constantly controlling salinity levels at checkpoints across the project area (also used to monitor levels of agrochemicals; see above). The combination of both instruments gives stakeholders full control over the flooding and revitalization process and ensures that excessive salinity levels cannot occur. More broadly, the monitoring and flow control systems will provide powerful instruments to manage the rehabilitation of wetlands and ensure the long-term sustainability of this rehabilitation.

A fourth component provides the monitoring and evaluation of project activities, dissemination of knowledge and information and public awareness raising. The combination of all components works towards the **project's global environmental objective: demonstrate and replicate an integrated model for Sustainable Land and Water Management (SLWM) in saline-alkaline productive landscapes including rehabilitation and BD conservation in wetlands.**



Integrated model for Sustainable Land and Water Management (SLWM) in saline-alkaline productive landscapes including rehabilitation and BD conservation in wetlands

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GLOSSARY OF ACRONYMS

AWP/B	Annual Work Plan and Budget
BCSLM	Biodiversity Conservation and Sustainable Land Management (Abbreviation of the FAO GEF Project)
BH	Budget Holder
CA	Conservation Agriculture
BCSLM	Biodiversity Conservation and Sustainable Land Management (BCSLM) in Soda Saline-Alkaline Agro-Pastoral Landscape Area in West Jilin
CEO	Chief Executing Officer (GEF)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLNNR	Chagan Lake National Nature Reserve
CLNRA	Chagan Lake Nature Reserve Administration
DWRJP	Department of Water Resource, Jilin Province
ECA	Ecological Agriculture
EP	Executing Partner
ESP	Exchange Sodium Percentage of Soil
FAO	Food and Agriculture Organization of the United Nations
FPMIS	Field Project Management Information System
GDP	Gross Domestic Production
GEBs	Global Environmental Benefits
GEF	Global Environment Facility
GEFSEC	GEF Secretariat
HDS	Hadashan Hydro Project
HHPA	Hadashan Hydro Program Administration
ILWMP	Integrated Land and Water Management Plan
IUCN	International Union for Conservation of Nature
LTO	Lead Technical Officer
LTU	Lead Technical Unit
M&E	Monitoring and Evaluation
PIF	Project Identification Form (GEF)
PIR	Project Implementation Review
PPG	Project Preparation Grant (GEF)
PPR	Project Progress Report
PRODOC	Project Document
PSC	Project Steering Committee
PY	Project Year
SFA	State Forestry Administration
SIA	Songyuan Irrigation Area
SIP	Songyuan Irrigation Project
SLWM	Sustainable Land and Water Management Model
STAP	Scientific and Technical Advisory Panel
TCI	Investment Centre Division (FAO)
TOR	Terms of Reference
UNEP	United Nations Environmental Program
USD	United States Dollar
WBC	Wetland Biodiversity Conservation
WHSPI	Water and Hydraulic Survey and Planning Institute, Jilin
WI	Wetland International

SECTION 1 – RELEVANCE

1.1 GENERAL CONTEXT

a) General development context related to the project

In the course of more than three decades of fast social and economic development, China has encountered the challenges of ecosystem degradation and severe land resource degradation often related to scarcity of water resources. About 56.2% of land resources in China are degraded². Natural grassland degradation and soil as well as erosion of farmland caused by improper water use and land management practices make up about 66.26% of the total degraded land³. The land degradation affects land productivity, and challenges national food security.

Land salinization and alkalinisation in coastal regions and dried up inland lakes, wetlands and native grasslands represent a particularly challenging problem, threatening entire ecosystems, putting severe pressure on biodiversity while at the same time constraining local socio-economic development. Rapid economic growth and population increase exacerbates detrimental farming practices, further increasing pressure on land resources and accelerated the degradation of arable and pastoral lands.

China has large saline and alkaline land areas in coastal and inland regions including Tianjin, Hebei, Shandong, Jiangsu, Jilin, Heilongjiang, Ningxia, Gansu, Inner Mongolia, Xinjiang, etc. The total saline land area in China is about 99.13 million ha, making up about 10% of the world total saline land area. Since 1970s, the central and local governments have implemented saline and alkaline land control programs, which cover 50 to 60% of the total saline and alkaline land areas in the country.

Land degradation in China is closely related to scarcity of water resources, natural as well as human-made. The naturally uneven distribution of water resources within China, featuring a water-rich South and a dry North, has been plaguing the country throughout Chinese history. In recent times, human actions have severely exacerbated this situation reaching a point where ecosystems cannot compensate for the damages any longer and face the danger of irreversible degradation.

In the large agriculturally used areas of northern China, two mutually reinforcing human-made factors pose a grave threat:

1. **Unsustainable agricultural practices, damaging use of land and water resources**, driven by population growth and rapid economic development. This especially includes the inefficient water use as well as the diminishing of water resources through pollution (e.g. pesticides and chemicals used in agriculture). Both put enormous pressure on water resources in China, causing land and biodiversity degradation.
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China is quickly approaching a breaking point regarding its land and use in agricultural lands and the related environmental damages. Across northern China, numerous ecosystems that include agricultural landscapes are at the brink of irreversible environmental damages. China urgently needs solutions for protecting these landscapes while balancing environmental protection with

² Soil and Water Conservation Research Institute, Chinese Academy of Sciences, 2013. www.amuseum.cdstm.cn

³ Zhang Kefeng, Li Xianwen, et al. 2006, Journal of Environmental Sciences, Vol. 27, No.6 2006

the socio-economic needs of local communities. Diversion of water resources in the context of large irrigation systems will inevitably be part of these restoration efforts. Thus far, water diversion projects in China followed a rather heavy-handed approach, focusing on local agricultural needs while ignoring detrimental effect to the local as well as downstream ecosystems. **Demonstrating a careful and prudent way of environmentally sound water diversion**, featuring a clear understanding of ecosystem impacts and innovative solutions for maximizing environmental benefits, **carries enormous potential to improve biodiversity conservation and land management across China.**

Ecosystem characteristics of West Jilin Province (including Project Area)

The western part of Jilin Province in North-Eastern China is characterized by saline and alkaline soils, extensive temperate wetlands and rich grasslands exposed to seasonal flooding created in the flat Song-Nen Plain in the rainy season in July and August. Western Jilin is in the converging area of Songhua River and Nen River in the southwestern part of the Song-Nen Plain. Other main rivers crossing the area include Tao'erhe River, Huolin River, and Second Songhua River. At the heart of the West Jilin ecosystem lies Chagan Lake, a large water body rich in biodiversity and fishery resources, a famous tourist destination and natural reserve. The wetlands surrounding Chagan Lake, used for agriculture, is the focus of the project activities.

The area is in the semi-arid temperate continental monsoon climate belt, with an average temperature of 4.4 °C varying from average 23.4 °C in July to -18.0 °C in January. The annual average precipitation in the region is about 400 mm/year, much lower than the annual evaporation rate, which is more than 1030 mm/year. This makes the area dependent on water inflow from the mountain areas and higher plateaus north and west of the Song-Nen Plain and vulnerable to changes in temperatures. **Especially the fragile water and salt concentration balance is easily affected by human land-use practices. Accordingly, unsustainable land-use in combination with changes in water availability severely upset the natural balance of the entire ecosystem surrounding Chagan Lake, creating massive environmental pressures.**

The wetlands provide important ecosystem services of global and local importance. They are habitats for a variety of waterfowls, freshwater fishes, and wetlands mammals and serve as important resting and feeding areas for migratory water birds on their migrating route between Siberia and the southern part of China and further south. Many of these water birds in particular the cranes are on the red-list of International Union for Conservation of Nature (IUCN), for instance, white-nape crane and hooded crane are classified as vulnerable species, Siberian and red-crowned cranes as well as Ciconia Nigra or Black Stork are classified as endangered. Table 1.2 illustrates the population size of national and global important water birds observed in the Project's pilot site, Songyuan Irrigation Area including its wetlands buffer zone, and nearby region and their categorization according to IUCN and CITES (Convention on International Trade on Endangered Species of Wild Fauna and Flora) threat status standards.

Table 1.2: *The population size of water birds in the project area and nearby regions and their status according to the China national list of protected species, the IUCN red-list, or in appendices 1 and 2 of CITES.*

Scientific name	English name	Grade China list	IUCN	CITES Grade	Date	Site	Population size
<i>Podiceps grisegena</i>	Red-necked Grebe	Secondary			2010.9.25	Chagan	2
<i>Ciconia boy-</i>	Oriental	First	EN	I	2011.11.2	Xinmiao	48

<i>ciana</i>	White Stork						
<i>Platalea leucorodia</i>	White Spoonbill	Secondary		II	2009.4.19	Yunzi pond	5
<i>Cygnus cygnus</i>	Whooper Swan	Secondary	NT		2010.9.25	Chagan	12
<i>Cygnus columbianus</i>	Tundra Swan	Secondary	NT		2009.10.4	Qianan	7
<i>Anser cygnoides</i>	Swan Goose		VU		2009.4.19	Chagan	6
<i>Anser albifrons</i>	White-fronted Goose	Secondary			2009.4.19	Chagan	35
<i>Aix galericulata</i>	Mandarin Duck	Secondary	NT		2011.4.4	Lianhua pond	4*
<i>Anas Formosa</i>	Baikal Teal		VU	II	2011.4.4	Chagan	32
<i>Grus leucogeranus</i>	Siberian Crane	First	CR	I	2009.4.19	Yunzi pond	13
<i>Grus vipio</i>	White-naped Crane	Secondary	VU	I	2009.10.6	Changling	4*
<i>Grus monacha</i>	Hooded Crane	First	VU	I	2009.10.2 2	Changling	6*
<i>Grus japonensis</i>	Red-crowned Crane	First	EN	I	2009.4.19	Chagan	7

CR: Critical endangered; EN: Endangered; NT: Near endangered; VU: Vulnerable endangered;

*Sites in Western Jilin but outside the project area.

Source: Wild bird survey conducted in 2011 and 2012

The wetlands' aquatic sub-ecosystem and aquatic biodiversity also provide important ecological services to the whole wetland ecosystem as well as food chains for native and migratory birds. In a survey conducted in 2012, 85 phytoplankton aquatic species and 35 zooplankton species were found in the Chagan Lake area.

The wetlands have also traditionally included meadow steppe grasslands with one of the highest productivity in China because of the suitable local temperature and natural precipitation. In 1950s the grassland area in the western Jilin was about 1.9 million ha, suitable as natural pasture for grazing and providing forage for over-winter of cattle and sheep. The diversity of grass species is high with about 29 families, 127 genera and 343 species of grasses and gramineous forage accounts for more than 90% and legume and cyperaceae forage account for more than 70%. The grass plains and swampland, with thousands of small ponds and lakes scattered throughout the plain, have traditionally supported local livelihoods based on artisanal freshwater fishery and livestock production. Finally, the wetlands also serve as a buffer for downstream flood control.

Socio-economic context of Western Jilin

Western Jilin is divided into two prefectures (Songyuan and Baocheng) and 11 counties with a total territory area of 51,801.5 km² and 4.94 million residents (Jilin Provincial Statistic Yearbook, 2011) of which 3.31 million (67%) are rural residents. In 2011, the total population of the project pilot sites (see below), located in Songyuan Irrigation Area (SIA – Qian'guo, Qian'an and Da'an counties) was about 368,300 of which 67,100 are urban residents and 301,200 (82%) are rural

residents. The 82% rural population is a much higher percentage than the average 67% in Western Jilin.

Table 1.3: Population structure of West Jilin Region, Baicheng and Songyan Prefecture (2011)
Unit: 10,000

Total	By gender		By sector		By rural and urban	
	Male	Female	Agriculture	Non-agricultural	Urban	Rural
494.68	250.53	244.15	331.43	163.24	201.98	292.69
Percentage	50.64%	49.36%	67.00%	33.00%	40.83%	59.17%

Source: Statistic Yearbook Jilin, 2012

Compared with other prefectures of Jilin, western Jilin ranks as the poorest region in the Province. According to the statistics in 2011 farmer's per capita net income in Baicheng Prefecture was 5500 Yuan RBM (USD 853), ranked as the lowest in the Jilin Province. There are three counties classified as "poor" under national level classifications in Western Jilin (Tongyu, Zhenlai and Da'an County in Baicheng prefecture) with a total of 579,000 poor people, accounting for 41.3% of the total poor population in the Jilin Province. In 2012, per capita GDP in Baicheng Prefecture ranked as the lowest in the Province.

There are four ethnic minorities in Songyuan and Baicheng, namely Manchu, Mongol, Hui and Korean, with a total population of 167,000. The average annual population increase in the western Jilin area ranges between 0.35 to 0.75%. Qian'guo County in Songyuan Prefecture is classified as a *Mongolian Ethnic Minority County*. The total Mongolian population in this county is about 58,000, making up 10% of the total population.

Due to the lower income in agriculture and lack of local employment opportunities, about 40% of rural workers⁴ in Western Jilin left their homes as migrant workers working in non-agricultural sectors and urban areas for cash income. By the year end 2012, the migrant workers of Baicheng and Songyuan reached 368,000 and 470,200, respectively, accounted for about 60% of total workers. More than 80% of migrant workers are males at age from 17 to 45 years old. Most of agricultural production and farming activities and household care are therefore done mainly by women staying behind at home.

Land uses and composition of agricultural GDP in Western Jilin

The total land area of Western Jilin is about 4.33 million hectares. In 2012, 2.39 million ha (55%) was cultivated farm land, 608,700 ha grassland (14%), 304,000 ha forest land (7%), 322,000 ha water bodies including wetlands (7%), and 699,300 ha unused degraded wasteland⁵ (land that is too degraded, saline and alkaline to be used for any productive purposes). In the past decade, land development in western Jilin has been rapid. According to official statistics, from 2005 to 2012 the average annual increase of newly developed arable land area for crop production was about 10,000-150,000 ha, representing 0.4-0.5% in annual increase.⁶ The newly developed Songyuan Irrigation Area (equals the GEF Project Area) attached to the Hadashan Hydrological and Irrigation Program represents a major effort to rehabilitate degraded saline wasteland into cultivated farmland as well as rehabilitated grasslands and wetlands. **This rehabilitation strives to create economic as well as environmental benefits, revitalizing lost biodiversity and eco-**

⁴ Workers with age from 16 to 60.

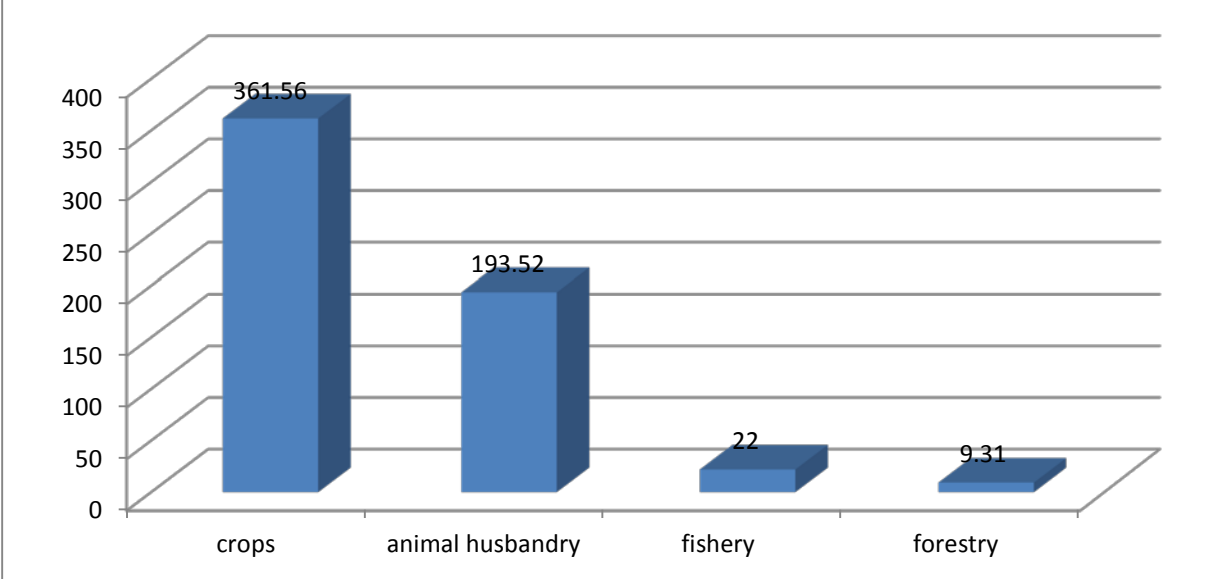
⁵ Jilin Provincial Statistic Yearbook 2012 and Songyuan and Baicheng Statistic Yearbooks 2012

⁶ Jilin Provincial Statistic Yearbook 2012

system services. This larger effort within the Songyuan Irrigation Area will serve as the basis and backbone for the envisioned GEF Project.

The total agricultural GDP of Western Jilin in 2011 was 59.2 billion Yuan RMB (USD 9.2 billion), of which 36.2 billion Yuan RMB (61.5%) is from crop production; 19.4 billion Yuan RMB (32%) is from animal husbandry; 991 million Yuan RMB (16.7%) is from forestry; and 220 million Yuan RMB (only 3.6 %) is from aquaculture and fishery.

Figure 1.1: The structure of Western Jilin agricultural GDP, 2011 (unit: million RMB)



Source: Jilin Statistic Yearbook, 2012

Crop production contributes the largest share of total agricultural GDP in Western Jilin Major crops grown include rice, corn, millet, sorghum, potato, sweet potato, soya bean, cotton, rape-seeds, sugar beets, sesame, peanuts, sunflowers, tomato, cucumbers and watermelons as well as medicinal herbs. Paddy rice is the major crop grown in the irrigated area of Qian’guo County, while other crops are mainly cultivated in the rain-fed arable land. Irrigation infrastructure improvements can contribute to the increase of the land productivity of the rain-fed arable land, which is an important reason for the construction of Songyuan Irrigation Improvement in the Project pilot site, which will also enlarge the irrigated areas of Qian’an, and Da’an counties (see section 1.1.1a below).

Animal husbandry is the second largest sector in Western Jilin constituting about one third of the agricultural GDP. Pigs, cattle, goats, sheep are the major livestock raised in the pilot project areas of Qian’guo and Qian’an County of Songyuan Prefecture. Due to grassland degradation, ruminant animals (cattle, goats and sheep) are mainly in-door fed. The stock number of broiler and laying chickens is also large.

b) Degradation, salinization and alkalization processes reducing wetlands ecosystem services in the western Jilin area

The severity of the situation makes the Western Jilin Wetlands a perfect test case. The project region of Songyuan prefecture has been bearing the full brunt of water resource degradation. Water flow into the prefecture has been diminished by economic activities and water withdrawal upstream. This leads directly to a vicious cycle of unsustainable pumping of groundwater in the project area, exacerbating the problem to a point close to ecosystem collapse. At the heart of the

Songyuan ecosystem lies Chagan Lake, a National Nature Reserve of great biodiversity and with a vital eco-function as a stopover for migratory birds. **The stability of this globally significant ecosystem crucially depends on the health of the surrounding productive landscapes, especially the wetlands.** However, water scarcity and unsustainable land and water management severely degraded these wetlands, putting mounting pressure on the entire ecosystem.

Over the last six decades, the Western Jilin wetlands witnessed dramatic water- and land-use changes (see table 1.3 below), shifts in water availability as well as climatic changes negatively affecting their ability to provide ecosystem services. **The severe impacts include drying up of swamps, ponds and lakes reducing habitats for global important wetlands biodiversity, disappearance and degradation of native diverse and highly productive grasslands, and desertification and salinization processes leading to emissions of greenhouse gasses and significant degradation of soil organic material turning land into unproductive “waste-land”.** The fish habitats have gradually disappeared including degeneration of reed communities and likewise summer nesting and feeding habitats for the IUCN red-listed migratory birds and other native wildlife have been reduced. This degradation of ecosystem services also has adverse impacts on local communities, food security and livelihoods of farmers and restricting the socio-economic development of the region.

Recorded data on land typology indicate that the lake, swampland and wetland area in Western Jilin slightly increased during the period of 1950 - 1970, and then shrank dramatically from 1970 to 2000 including the significant water area reduction of the Chagan Lake starting in the 1970s. During the period of 2000-2010, approximately 25% of Chagan Lake and the surrounding wetland areas were restored through governmental integrated river-lake management projects (see section 1.1.1 below). **Overall, the wetlands area (not including rivers, lakes and beaches) has suffered an average annual decrease of 1.2% in the period 1950 – 2011 and a total reduction by 462,700 ha. The grassland area decreased more than 50% in the same period (0.9% average annual decrease) with severe species and productivity degradation consequently (see table 1.3 below).**

Land salinization in Western Jilin shows significant acceleration in salinization processes in the past three decades (see table 1.4 below). Alkaline and saline land area developed from 1.079 million ha in 1950 to 1.966 million ha in 1970, to 2.3717 million ha in 1985, and further expanded to 2.4895 million ha in 2000. The results of the Soil Survey in 2010 states that about 37% of land in western Jilin area is degraded to alkaline land with very low vegetation cover. The land area with severe saline soil increased from 290,300 ha in 1950 to 925,500 ha in 2011 with an annual increase rate of 3.56%. Mild saline-alkaline land area has increased about 95,900 ha from 1950 to 2010, with an average annual increase by 0.3%. Moderate saline-alkaline land area increased about 683,800 ha during the same period, with an average annual increase of 4.29%. According to observations in selected survey points, total salt quantity, alkalinity, ESP and PH of saline and alkaline meadow soil and white alkaline crust showed a significant increase from the 1950s to the 1980s (see table 1.5 below).

Table 1.4: Area changes in land use types in western Jilin from 1950 to 2011

Land use type	Land use / cover type area	Area in 1950 (10 ⁴ hm ²)	proportion of total area (%)	Area in 2011 (10 ⁴ hm ²)	proportion of total area (%)	total change area (10 ⁴ hm ²)	Annual change (%)
Cultivated Land	Paddy field	2.632	0.6	20.70	4.4	18.07	11.4
	Dry land	241.573	51.5	211.55	45.1	30.03	0.2
	Total	244.205	52.1	232.25	49.5	-11.96	-0.1
Grassland	High coverage grassland	6.742	1.4	25.91	5.5	19.16	4.7
	Moderate coverage grasslands	121.667	25.9	25.32	5.4	-96.35	-1.3
	Low coverage grassland			9.51	2.0	9.51	
	Total	128.409	27.4	60.73	13.0	-67.67	-0.9
Forestland	Forest land	0.117	0.0	9.31	2.0	9.19	130.9
	Shrub Land	0.423	0.1	4.07	1.0	3.65	14.4
	Open Forest Land	2.942	0.6	11.45	2.4	8.51	4.8
	Total	3.482	0.7	24.83	5.3	21.35	10.2
Water	River	4.592	0.9	2.09	0.5	-2.50	-0.9
	Lake	9.791	2.1	14.89	3.2	5.10	0.9
	Beach	1.262	0.3	8.44	1.8	7.18	9.5
	Total	15.645	3.3	25.43	5.4	9.78	1.0
Non-agricultural land	Urban land	0.469	0.1	2.01	0.4	1.55	5.5
	Rural Residential Area	3.585	0.8	15.00	3.2	11.42	5.3
	Construction land			0.12	0.0		
	Total	4.054	0.9	17.14	3.76	13.08	5.4
Unused land	Sandy land	1.380	0.3	0.05	0.0	-1.33	-1.6
	bare saline land	9.666	2.1	92.55	19.7	82.88	14.3
	Wetland	62.096	13.2	15.83	3.4	-46.27	-1.2
	Slash	0.036	0.0				
	Total	73.178	15.6	108.42	23.1	35.25	0.8
Total		468.973	100.0	468.80	100.0	-0.17	

Source: Calculated based on data from Statistic Yearbook of Songyuan and Baicheng, 1980s-2012

Table 1.5 Evolution of soil salinization degree observed from the 1950s to 1980s

Soil types	Depth of Soil layer	Total salt quantity/kg		ESP ⁷ (%)		PH	
		1950s	1980s	1950s	1980s	1950s	1980s

⁷ Exchangeable Sodium Percentage in the soil

	(cm)						
Meadow sol- onchaks	0-20	0.13	0.21	10.11	15.6	8	8.8
	20-40	0.09	0.12	4.58	7.3	8.2	9.1
White crust alkaline soil	0-20	0.56	0.78	51.25	61.12	10	10.2
	20-40	0.41	0.55	75.36	78.64	9.6	10.1

Source: Study on West Jilin Land Salinization carried out in 1980s

The overall degradation of ecosystems in Western Jilin is dramatic and a cause for immediate and decisive action. It severely endangers the biodiversity and causes degradation and decrease in habitats for native and migrant birds and other wild life. According to biodiversity research carried out in Western Jilin the fish habitats have gradually disappeared including degeneration of reed communities and likewise summer nesting and feeding habitats for the IUCN red listed migratory birds and other native wildlife have been reduced by about 20-35%⁸. This decrease in habitats has directly caused significant number reduction of native and migrant water birds. Recent survey results revealed that severely endangered bird species, such as black-headed Ibis (*Threskiornis melanocephalus*), Red-faced Cormorant (*Phalacrocorax urile*), Black-faced Spoonbill (*Platalea minor*), might have already disappeared. This degradation of ecosystem services also has adverse impacts on local communities, food security and livelihoods of farmers and restricting the socioeconomic development of the region.

Causes of degradation process and loss of ecosystem services

The main causes of these degradation processes include natural shift in water pattern, global climate change as well as local socio-economic dynamics resulting in altered land and water use practices:

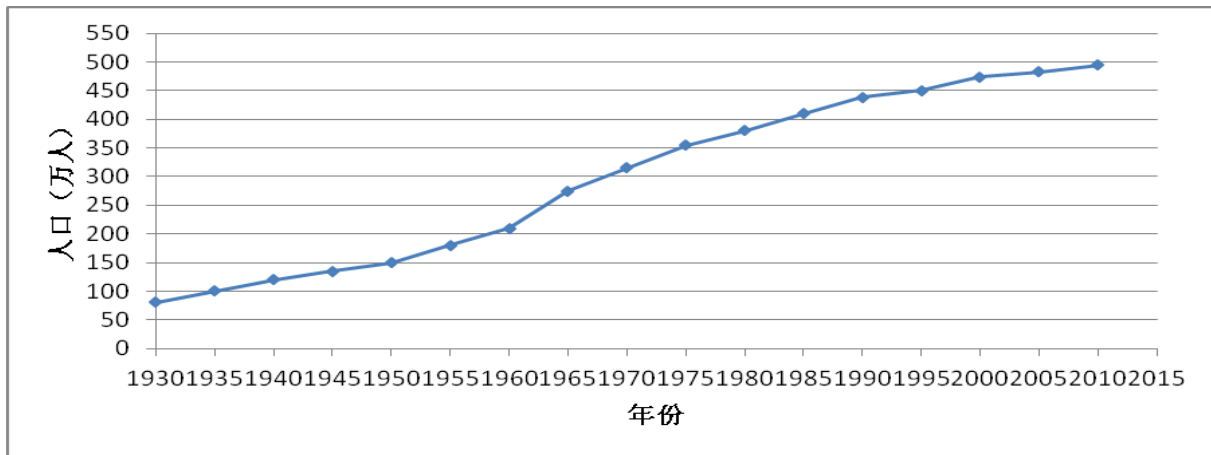
- rapid population increase and land-use changes for socioeconomic development;
- distortion in the hydrological cycle (climate change and decreasing water inflows from upstream areas);
- non-sustainable land and water management practices in crop production (conversion to cropland without considering carrying capacities of soils and groundwater resources, and vegetation cover, water demands and other ecosystem needs and boundaries); and over-grazing.

(1) Rapid population increase and land-use changes for socioeconomic development have created high pressure on the vulnerable ecosystem

Fast population growth and rapid economic development are among the major causes for ecosystem degradation in Western Jilin. As Figure 1.2 indicates fast population growth starting from the mid-1950s. The population increased from 1.5 million in 1950 to 4.5 million in 2010.

Figure 1.2: Population growth 1930-2010 in the western Jilin Province Unit: x 10,000

⁸ Estimated by the PPG biodiversity specialist based on the survey and research results carried out from 2010 to 2012



Source: Jilin Provincial Statistic yearbook 2012; Songyuan and Baicheng Statistic Yearbook

This rapid growth of the population, with increasing economic activities and consumption demands not accompanied with adequate resource use planning and management practices, has led to the overuse of land and water resources. This tendency was reinforced by the shift from cooperative to contract farming with the agricultural reform in 1982⁹. One of the objectives of the reform was to give individual farmers incentives for intensive farming and bursting productivity. However, the reform was not sufficiently accompanied with policies and planning of the use of available resources incorporating the concept of regeneration capacity of renewable natural resources and sustainable land and water management practices to avoid the degradation of the fragile ecosystems. After the rural reform, the local governments gave high priority to the land development and further increasing agricultural production. Ecosystem carrying capacity, wetland and habitat biodiversity and resource sustainability were neglected at the county and township levels.

Extensive farming and traditional land management practices have constantly demanded more cropland. This has led to fast conversion of grassland to farmland. At the same time, an increase in the number of livestock (sheep stock increased by 112.98% from 1985 to 1995) has caused overgrazing of grassland resources and consequently led to natural vegetation degradation, alkalization and desertification (see below). From 1958 to 1981, within only 23 years, 1/3 of the grassland in western Jilin was converted into cropland, and about 1/3 of the grassland was severely degraded to wasteland. From 1985 to 1995, the cropland area in western Jilin increased by 4.9%.

In the past 60 years, the non-agricultural land use for human settlement, urban development as well as local industrial development has also increased from 40,000 ha to 130,800 ha with a high average annual increase of 5.38%. These converted lands lost the natural vegetation and therefore ecological functions.

(2) Climate change accelerating the wetlands ecosystem degradation

Global and regional climate change in the past 60 years has accelerated the process of land and ecosystem degradation. According to monitoring data, the last 60 years the average temperature in western Jilin has increased by 1.9 °C and average annual precipitation has decreased by 64 mm (14%). The increased temperature, increase of annual evaporation and decrease of annual precipitation further exacerbates drying of surface soil, worsens the alkalisation of soils and

⁹ In 1982 China abolished the so called “rural collective ownership” by introducing the “Family Responsibility System”. Without changing the land ownership, land use right are now contracted to individual households.

reduces wetlands areas. Figure 1.3 shows the development in average annual temperature from 1950 to 2005 and table 1.6 illustrates the decrease of average annual precipitation and increase of the annual evaporation from 1950 to 2000 in western Jilin.

Figure 1.3: Average annual temperature (red bars) and historic trend (blue line) 1950-2005 in western Jilin Province

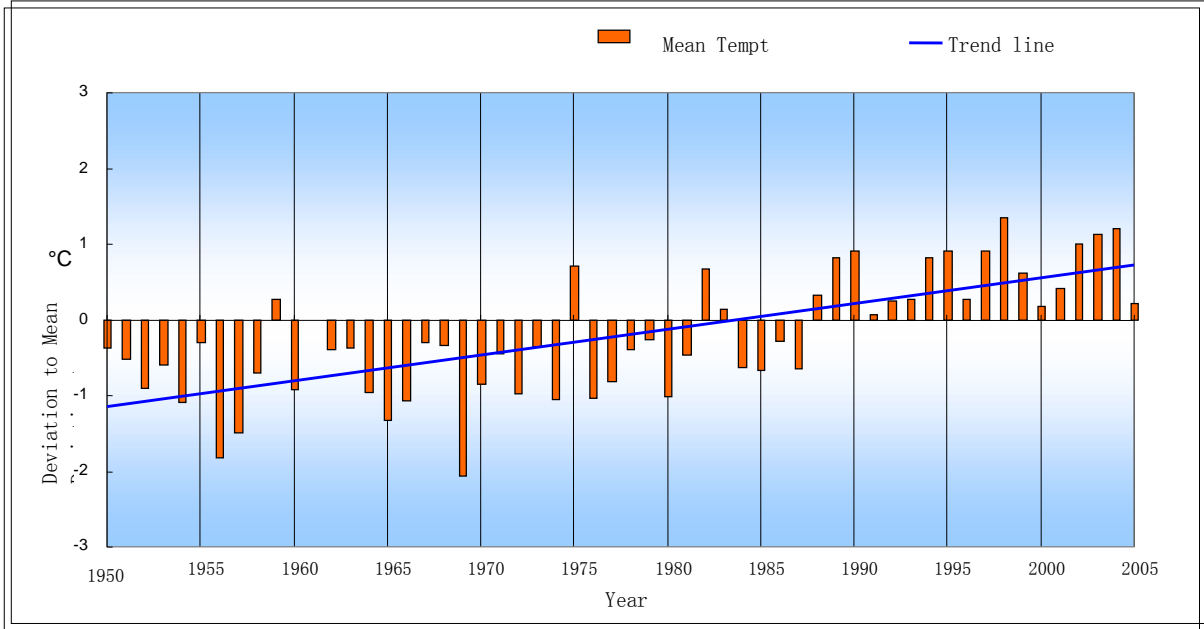


Table 1.6: Variation of annual precipitation and evaporation in western Jilin from 1950 to 2000

pro- ject region	Precipitation (mm)						Evaporation (mm)					
	1950	1960	1970	1980	1990	2000	1950	1960	1970	1980	1990	2000
Bai Cheng	439.7	416.5	365.8	367.4	260.5	271.4	1590	1844	1987	1272	1724	1854
Song Yuan	494.6	443.3	397.9	450.8	331	394.8	1415	1599	1605	1140	1908	1645
average	467.2	429.9	381.8	409.1	295.8	333.1	1502	1721	1796	1206	1816	1750

Source: Songyuan and Baicheng City Meteorological Statistic Data from 1950s to 2000

While the trends in temperature increase are more clear, the trends of precipitation and in particular evaporation are more uncertain as a result of the more complex relationships in water weather cycles also influenced by local and regional water uses changing water flow from upstream into the wetlands plain.

(3) Decrease in water flow from upstream areas distorting wetlands flood recession cycle

Reservoir construction in the upstream of Huolin and Tao’erhe rivers is another factor for dried up wetlands and grasslands, and resulting in salinization and alkalization processes particularly in the project pilot site. Tao’erhe River and Huolin River are tributaries to the Songhua River. Originated from Inner Mongolia, the Huolin River became a seasonal continental river due to the construction of water reservoirs from 1980s to 1990s in the upper reach region of Inner Mongolia. Further, due to drought and water shortage in the upper reach region in western Jilin and In-

ner Mongolia, Cha’ersen Reservoir and Xianghai Reservoir were built in the 1990s for stopping the water outflow of Tao’erhe and Huolin River. The reservoir constructions have directly affected the ground water recharge and blocked the surface water flow in downstream area in western Jilin in particular in the project pilot site.

(4) Overuse of groundwater resources

Since the 1980s, significant decline of groundwater tables has been observed in the pilot project site. Major reason for this decline is the overuse of groundwater resources as the cropland development increased after the agricultural reform in 1982. Table 1.7 shows the changes in land areas with different groundwater tables.

Table 1.7: Chronological evolution of underground water table reduction measured by affected land areas. Unit: km²

Water Table	1987	1993	2000	2004	2006
3-5 meter	30616.84	24746.08	10260.33	10095.78	7917.53
5-7 meter	12761.13	15863.52	15691.16	16162.78	17627.80
>7 meter	5428.12	8196.49	22854.60	22547.53	23260.77

Source: underground water table measurement report data collected from 1980s to 2007

From 1987 to 1993, the underground water table in Western Jilin declined 80 cm. The average annual decline rate was 13.3 cm/year. From 1993 to 2000, it declined 97 cm with the average annual decline rate 13.9 cm/year, whilst from 2000 to 2004, it declined 61 cm, with an average annual decline rate reaching 15.3 cm/year. In the past 20 years, the underground water table in western Jilin continuously declined with an increased annual decline rate.

(5) Improper water and soil management and salt and agrochemical pollution of wildlife wetlands habitats with irrigation drainage water

As western Jilin is located in the lower basin region of Song-Liao Plain, during the rainy season in July and August the flooding water cannot flow out and causes natural secondary soil salinization process. In the course of evaporation the salt in the soil moves up to the soil surface and finally forms the saline and alkaline crusts. This natural process has been accelerated by the large-scale reclamation of mild saline meadow soil into rain-fed arable land and long-term cultivation of meadowland without applying soil conservation practices. This has led to severe degradation of the soils. Some typical problems encountered are compaction and salinization of surface soils, which is the major reason for secondary salinization of dry land in western Jilin.

Salinization of the paddy rice field in western Jilin is mainly caused by improper irrigation management. In the construction of water and irrigation projects priority has mainly been given to the irrigation and water supply system, but drainage facilities were neglected. Consequently, the underground water table in the lower area was raised and further accelerated the salt accumulation process known as the secondary salinization and alkalization of irrigated paddy rice field.

In the cultivated dry land area and paddy rice cultivation areas, salt accumulation is not only a challenge for sustaining the crop production but also for sustaining the wider ecosystem including wildlife wetlands habitats. Due to lack of effective irrigation and drainage management systems and high uses of agrochemicals the outflow water from the irrigated area contains higher salt concentrations than natural levels as well as residues of chemical fertilizers and pesticide. **This constitutes a pollution pressure on the wetland ecosystem and habitats for migrant birds in western Jilin. In consultations with communities in the project area undertaken**

during the project preparation farmers stated that the volumes of chemical pesticides used are increasing every year. The pesticides are used systematically regardless of the presence of pests. No alternative pest management practices are applied.

Inefficiency of water use in irrigation management and loss of water resources due to leakages in badly maintained irrigation infrastructures leaves less water for ecological purposes such as rehabilitation and maintenance of flood recession schemes of wetlands and rehabilitation and maintenance of natural grasslands.

(6) Overgrazing

Overstocking is the major cause of the grassland degradation. Grassland grazing carrying capacity was never considered during the rapid increase of livestock numbers in the past six decades. In 1950, livestock stock number in Baicheng was 348,000; the figure in 1980 increased to 770,000, among which cattle stock number increased by 3.4 times, from 83,000 to 369,000. According to pasture resources survey in 1980, the livestock grazing overstocking number in Baicheng already reached 1.5 million sheep units. It is estimated that the current overstocking number in Western Jilin already reached 7.79 million sheep units, 5 times beyond the carrying capacity of grassland.

c) Institutional and policy framework

Institutions, roles, responsibilities

Part of the difficulty of developing a cross-cutting, inter-sectoral model for sustainable land and water management (SLWM) as well as corresponding instruments at the landscape level, integrating agricultural benefits as well as wetlands biodiversity conservation, is due to the many line ministries, department and bureaus involved:

The Jilin Provincial Government Legislative Affair Office is responsible for law approval and enacting processes, and is therefore an important entity in any initiatives that is looking at adjusting laws and regulation for sustainable land and water management of Jilin province.

Ministry of Water Resource (MWR) and its line agencies at provincial and local levels. MWR is responsible for construction of large water engineering projects, large irrigation projects and planning and managing water resources, control of water pollutions, etc. conservation of water resources from rivers, lakes and reservoirs. It is also responsible for formulating regulations and policies related to water resource management. The provincial Department of Water Resources (DWR) together with City and County level bureaus for water resources are responsible for supporting the implementation of policies and regulations and water infrastructure and management projects on the ground. In Jilin province, the DWR is also responsible for the management of Chagan Lake National Nature Reserve (CLNNR), whilst in other provinces in China management of National Nature Reserves is under the responsibility of the provincial Forestry Department.

Ministry of Agriculture. Agriculture and Animal Husbandry are important sectors and users of the land (arable land and pastoral land) and water resources and therefore are the crucial stakeholders related to land degradation, salinization and degradation of the ecosystem. The Ministry with its provincial department and City and County Bureaus are responsible for cropland development affecting land function conversion, and land use model for agriculture and livestock production. Jilin Provincial Agricultural Committee, agricultural and livestock bureau, relevant agricultural extension services are responsible for providing information and training to farmers in

irrigation management affecting (de)salinization processes, pest and soil fertility management, and promote improved agriculture and livestock practices and technologies at provincial, prefecture and county levels. In relation to the FAO/GEF BCSLM project the Agricultural and Animal Husbandry Bureau of Baicheng Prefecture, Qian'guo and Qian'an County are important for the pilot activities of Conservation Agriculture (CA), Ecological Agriculture (ECA) and grassland rehabilitation.

Ministry of Land Resources: is responsible for conducting land inventory, land resource zoning and functional planning; formulating and implementing the land laws, land management regulations; supervising the enforcement of the relevant policies and regulations; investing and implementing the land reclamation programs for enhancing the land productivity; formulating and implementing land protection and conservation programs. In relation to the FAO/GEF BCSLM Project, the Department of Land Resources of Jilin is a key partner line agency for replicating the SLWM model piloted by the project.

Ministry of Environmental Protection. The ministry and its provincial department are in charge of formulating environmental protection laws and regulations, set up and conduct environmental and pollution monitoring and supervision. Monitoring covers soil pollution, water pollution, air pollution, etc. The Provincial and City and County Bureaus are also responsible for the actual implementation of laws and regulations for environmental and biodiversity protection.

Provincial Science and Technology Department. The department is responsible for community outreach campaign and provision of extension services promoting natural resource management and agriculture technologies and practices such as practices for biodiversity conservation, conservation agriculture, organic and environment friendly agriculture. The Science and Technology Association at the city and county level, as well as affiliated civil society, are also involved in community education and technical training.

Hadashan Hydro Program Administration (HHPA). The project pilot area irrigation program is an annex project of Hadashan Hydro Program. The administration is responsible for the administration of the water intake, including monitoring of the water diversion quota from Second Songhua River and the management of the irrigation water flows.

Chagan Lake Natural Reserve Administration (CLNRA). The newly established administration is the only natural reserve administration directly affiliated with the Provincial Department of Water Resources. The administration is responsible for administrating the natural reserve protection, including the wetlands protection and conservation of habitats of migratory birds. It also started to pilot habitat and wetland co-management mechanism with communities in adjacent areas of the lake. In addition, the CLNRA has set up water quality monitoring points. **These will be connected to and closely coordinated with the GEF project's comprehensive monitoring system.**

The division of roles and responsibilities between all these institutions is not always clear when it comes to the management of land and water resources addressing degradation issues in the western Jilin province, also because of the cross cutting nature of these resources. To improve the coordination among these line institutions a Project Steering Committee (PSC) was established. However, coordination is still weak and conflicting policies and plans exist such as promoting increased production versus ecosystem conservation.

Policy and legal framework

Since the beginning of the 1990s, Chinese central and provincial governments accelerated legislation and policy formulation to combat land and biodiversity degradation. Until 2013, the Na-

tional People’s Congress, the State Council and different national ministries formulated and enacted 71 national laws and regulations relating to land management, biodiversity conservation and environmental protection. Table 1.8 illustrates relevant laws and regulations and their relation to the project.

Table 1.8: National laws and provincial regulations relating to SLWM

Categories	Laws and regulation	Relation to the project
National laws and regulations		
1. Laws related to farmland use and management right	<ul style="list-style-type: none"> - Agriculture Law of PRC by National Peoples’ Congress (NPC) - Land contract laws of PRC by NPC - Regulations for protection of basic farmland, the State Council - Regulations for land use right transfer and circulation, The Ministry of Agriculture (MOA) 	<ul style="list-style-type: none"> - Land use model by farmers; - Land conversion and change of land use purpose - Users’ obligation to conserve the land resources
2. Laws for Anti-land desertification	<ul style="list-style-type: none"> - PRC Desertification Prevention and Control Law by NPC - Regulations for monitoring desertification and sedimentation by State Forestry Administration (SFA) - Regulations for promoting private incentives to control desertification by SFA 	<ul style="list-style-type: none"> - Rehabilitation of degraded grassland (component 2)
3. Laws for Grassland management	<ul style="list-style-type: none"> - PRC Grassland Law by NPC - Regulation for balancing the grassland carrying capacity and stock rate by MOA - Grassland Fire Prevention Regulation by State Council 	<ul style="list-style-type: none"> - Rehabilitation of degraded grasslands (component 2) - Control the pasture grazing (component 2)
4. Land Management	<ul style="list-style-type: none"> - PRC Land Administration and Management Law by NPC - Regulation for implementing Land Administration and Management Law by State Council - Regulation for Land Reclamation by State Council 	<ul style="list-style-type: none"> - Land conversion from grassland to irrigated farmland; from grassland to wetlands (component 2 and 3) - Replication of the SLWM models (component 1)
5. Water Resource Management and related environmental protection	<ul style="list-style-type: none"> - PRC Water Law by NPC - PRC Flood Control Law by NPC - National Water Resources Protection plan, Water Allocation Plan and Water Function Zoning - Management Procedures for Water Use Quota Certification by Ministry of Water Resources (MWR) - State Council’s Decision on Strict Water Resources Management (2012) with three “Red Lines” that all water management must stick to: 1) to limit total water use by strict demand management; 2) to achieve higher water use efficiency in industry and agriculture by minimum of 60%; 3) to improve water quality by a 	<ul style="list-style-type: none"> - Water diversion and accounting from Second Songhua river to the Songyuan Irrigation Area (component 2) - Setting up water quota for irrigation and eco-water to keep the wetlands (component 2 and 3) - Replication of the SLWM model (component 1) - Requirements for water use efficiency in the irrigation system (component 2) - Insuring that water pollution levels with salt and ag-

	<p>cap on pollution loading within water functional zones¹⁰</p> <ul style="list-style-type: none"> - In 2013, Jilin Provincial Government approved the Guidelines for Implementing State Council's Decision on Strict Water Resource Management. The guidelines also sets the three red lines based on water resource endowment in the province. 	<p>rochemicals are kept to a minimum in drainage waters from the irrigation system (component 3)</p>
6. Environmental Protection Laws	<ul style="list-style-type: none"> - PRC Environmental Protection Law by NPC - PRC Water Pollution Prevention Law by NPC - Rules for Implementing Pollution Prevention Law by State Council - PRC Environmental Impact Assessment Law by NPC - National Regulations of Natural Reserve Protection by State Council and Ministry of Environmental Protection (MEP) 	<ul style="list-style-type: none"> - Control and monitoring emission of chemical pollutants to the buffer zone (component 2, 3) - EIA of dam and irrigation system construction including downstream impacts. Approval of maximum water intake limits and minimum flows - Community Co-Management Pilot (component 3) - Community outreach education (component 4) - Replication of the biodiversity conservation best practice (component 1)
7. Wildlife Protection	<ul style="list-style-type: none"> - PRC Wildlife Protection Law by NPC - Rules for Protection of Wild Animals and Plants by State Council 	<ul style="list-style-type: none"> - Habitat co-management (component 3) - Community outreach education (component 4)
Provincial decrees and regulations		
1. Wild animal and plant protection, Banning of wild animal hunting	<ul style="list-style-type: none"> - Jilin Provincial Regulations for Protecting Wild Animal and Plants (1886) - Decision on Banning Wild Animal Hunting by Jilin Provincial Government in 1996, updated in 2001 	<ul style="list-style-type: none"> - Component 3: conservation of biodiversity of wild life
2. Wetland Protection	<ul style="list-style-type: none"> - Regulations for Strengthening Wetland Protection by Jilin Provincial Government in 2005 - 	<ul style="list-style-type: none"> - Component 1, 2 and 3. Wetland conservation and rehabilitation
3. Natural Reserve Protection	<ul style="list-style-type: none"> - Chagan Lake Natural Reserve Management Regulations by Jilin Provincial Government (1989) - Regulations on Xianghai National Natural Reserve Management by Jilin Provincial Government - Regulations on Three Lakes Natural Reserve of Songhua River Catchment Region by Jilin Provincial Government - Momoge National Natural Reserve Man- 	<ul style="list-style-type: none"> - Component 1 and 3: Natural reserve protection, protection of water resources and conservation of ecosystems of natural reserves

¹⁰ This document sets national targets for each of the three Red lines including 80% of water function zones shall meet standards by 2020, and 95% by 2030. Each province is required to set its targets according to the national requirements and prepare its action plan to meet those targets contributing to environmental conservation and protection in water management.

	agement Regulations by Provincial Government	
4. Saline-Alkaline Land Rehabilitation	<ul style="list-style-type: none"> - 11th Five Year Plan for Rehabilitation of Saline-Alkaline Land in West Jilin by Jilin Provincial Government (2006) - West Jilin Ecological-Economic Zone Master Development Plan-2015-2030 (Drafted in 2014, but not yet approved by the Provincial Government) 	- Component 2, rehabilitation and sustainable management of saline and alkaline land

As table 1.8 illustrates, China has a comprehensive legal framework for land and water management and biodiversity conservation, both at national and provincial levels. However, at the provincial level gaps exist in terms of integrated management at a landscape level. The existing laws and regulations covers most intervention areas of the Project, i.e. land resource management, grassland management, water resource management, natural reserve management, biodiversity conservation, environmental protection, etc.

A Wetland Protection Law or Wetland Management Regulation or a Wetland Conservation and Rehabilitation Regulation have not yet been enacted. The wetland management issues have been separately highlighted and tackled in couple of laws and regulations, such as *PRC Water Law*, *the Law of Land Contract and The Law of Land Administration and Management*, *Wildlife Protection Law*, *Environmental Protection Law* as well as *Natural Reserve Protection Regulations*. In 2013 State Forestry Administration (SFA) has drafted a National Regulation for Wetland Management and conducted a public hearing and expert review meeting for finalization, it is expected that the regulation will be enacted in the second half of 2014 or beginning of 2015.

Chinas government also signed three international conventions related to land resource management and biodiversity conservation, namely “*The United Nations Convention to Combat Desertification (UNCCD)*”, “*The United Nations Convention on Biological Diversity (UNCBD)*”, and “*The Convention on Wetlands Protection (Ramsar Convention)*”. The government committed to fulfil relevant obligations and responsibilities to manage these natural resources in a sustainable manner and make contribution to increase the global and regional environmental benefit.

Major constraints and remaining problems in the current legal and policy framework to ensure sustainable land and water management in western Jilin can be summarized as follows:

- **Policies and regulations are fragmented by sectors and fail to provide standards and regulations for integrated natural resource management at a landscape level.** The necessity of conserving and sustainably use natural resources and ecosystem services at the landscape level is not represented in the regulatory framework. This results in the failure to fully recognize and manage the crucial linkages between different ecosystems and their services and how these services are affected by their use by different sectors and actors at the landscape level. This problem in the case of the Jilin province is aggravated by the lack of horizontal coordination between province line departments and in some cases also vertical coordination between provincial departments and prefecture and county bureaus.
- A policy framework for land resource management and biodiversity conservation is principally in place. However, the performance of **policy enforcement and implementation at local level are suboptimal** and even unsatisfactory due to lack of inter-institutional coordination and unified implementation and supervision mechanism;
- **Conflicts of different interests between sectors and stakeholders** in implementing the resource management policies. As mentioned above, land resource management and conservation of biodiversity are systemic and cross-cutting issues related to departments of agricul-

ture, animal husbandry, water resource, land administration, environmental protection, etc. In achieving the common objective, different sectors and stakeholders have their own sectoral agendas which determine their manner to use the natural resources. There is therefore a great challenge for the government to coordinate the diversified sectoral agendas for achieving the common objective and goal.

- **Regional protectionism in implementing the resource management policies affects the policy implementation effectiveness.** The central government has the power to make the decision on policy and laws and control the vertical public investment fund allocation based on the national development goal. However, there are divergences in interests between national, provincial and local governments, which attenuate and distort the intended policy signal. “Regional or local protectionism” affects the policy implementation at local levels and sometimes even “countermeasures against national policies” exist. In the process of policy implementation local governments and stakeholders attempt to maximum use the available natural resources for benefiting the economic development within their region, but externalizing the possible negative ecological impacts towards other regions.
- **Lack of participation of local communities and resource users in policy making process.** Local communities and resource users as important stakeholders can not engage and participate in the policy formulation. Their social economic features and policy impacts on farmer’s livelihoods are not sufficiently considered in the policies and regulations.

1.1.1 Rationale

- a) *Baseline initiatives, projects and investments (including co-financing investments for the next 3-5 years) addressing the identified causes for degradation, salinization and alkalization processes and loss of biodiversity and ecosystem services in Western Jilin*

The provincial government, Songyuan and Baicheng prefectures and county government in the western Jilin province are planning or already implementing a number of programs to tackle the causes of degradation, salinization and alkalization and to halt the reduction of wetlands ecosystem services in Western Jilin.

The envisioned GEF project can rely on an exceptionally strong set of baseline initiatives. The infrastructural investments within the Songyuan irrigation zone are fully compatible with the environmental objectives of the project, backed by strong political support at all levels and implemented with major government resources. The irrigation scheme provides the backbone for the envisioned GEF activities and will be leveraged to create significant GEBs. The project activities will make strategic and targeted improvements to the existing set of initiatives, turning the irrigation scheme into a showcase example for integrated SWLM at the landscape level. In this way, the comparatively small GEF investment will yield exceptionally high environmental benefits of global significance.

A) Initiatives geared towards the rehabilitation of saline wetlands as well as reversal of degradation processes, thereby benefitting natural habitat and crop and livestock production:

1) Hadashan Hydrological Construction Program: The national government, Jilin provincial government, Jilin DWR, and the Songyuan and Baicheng City Governments will invest 5.8 billion Yuan (USD 945 million) in 2012-2019 for the Hadashan Hydrological Construction Program. This project serves as a platform and overarching umbrella program for a spectrum of activities connected to the improvement of degraded agricultural lands as well as rehabilitation of wetlands and grasslands within the Songyuan Irrigation Area. The other projects described below

are closely connected to this overarching program and provide additional funds from different sources strengthening various aspects already included in the Hadashan Program. **The Hadashan Program provides the backbone infrastructure to be leveraged towards the GEF project's objective.**

The objective of this program is twofold:

- a. Construct an irrigation system (190,000 ha) to supply water for **improving croplands affected by salinization and degradation** in Qian'guo, Qian'an and Da'an in the Songyuan Irrigation Area (SIA).
- b. Construct a system of water channels to **rehabilitate degraded wetlands and dried up lakes** along the Huolin River South and adjacent to Chagan Lake. *(These efforts are partially blended with the Songyuan Water Diversion, Conservation and Control System Project described below.)*

Together, the area served by the irrigation system is called the Songyuan Irrigation Area (SIA), which includes all three initial GEF Project Areas. The water source for this investment program is the Second Songhua River. During flooding season, when water withdrawal is possible without negatively affecting either economic or environmental interests, water is rerouted from the Hadashan Reservoir into an irrigation canal connecting the Second Songhua River and the degraded water bodies and wetlands of Hua'aopao. This aspect of the Hadashan Program receives additional support through the River-Lake Connection Programme presented below. **The related restoration of the Hua'aopao wetlands (GEF Project Area 3) is one of the main objectives of the GEF Project.**

The effects of the water diversion on the downstream ecosystems have been comprehensively studied and evaluated during an Environmental Impact Assessment (see section 3.1). The water quantity of Second Songhua River during flooding season is well above all critical thresholds and the amount of diverted water is kept to a minimum, ensuring that no detrimental environmental effects can occur. **During the dry season, the storage capacity of the Hua'aopao lakes is used to provide a steady supply of irrigation water avoiding any excessive water withdrawal from the Second Songhua River during this period. In this way, irrigation flows can be steady while water diversion is sensible to the seasonal changes of the river flow.** The Hua'aopao lakes are connected to the irrigation system and allow for a fully controlled water flow within the system. This will be of crucial importance for the implementation of the wetland rehabilitation supported by the GEF project.

The irrigation water will flow into two areas:

The first area is a fully degraded and salinized wetland (Xinmiaopao = GEF Project Area 1) which will be rehabilitated through the water flow. Managing this rehabilitation and long-term health of the wetland as well as avoiding the negative effects of increased water salinity levels for the wetlands as well as Chagan Lake will be one of the major objectives of the GEF Project (project component 2).

The second area is an intensely used cropland area (Dakouzipao = GEF Project Area 2), currently supplied with water through unsustainable groundwater pumping. In addition to groundwater use, the farmers in these areas employ a variety of environmentally damaging practices including overuse of chemicals and pesticides. Therefore, this area will be the primary site for the implementation of Conservation Agriculture practices (project component 3). After flowing through the croplands, the water goes through a buffer zone of smaller lakes and wetlands into Chagan Lake. Controlling and improving the pollutant levels of this water will create significant GEBs and is accordingly one of the main objectives of the GEF project.

2) Songyuan Water Diversion, Conservation and Control System in the Songyuan Irrigation Area (SIA): This initiative is blended with the Hadashan Program described above. It provides additional funds primarily focused on the wetlands and grasslands rehabilitation aspects already included in the Hadashan Program. It is implemented by the Jilin DWR, which will invest an additional USD 16.6 million in the next five years for strengthening an integrated water supply approach simultaneously considering water supply needs for agriculture and food security as well as wetlands and grasslands rehabilitation. These funds, being directly connected to the objectives of the GEF project, will provide crucial co-financing to the project: drainage channels from the SIA to secure the water for rehabilitation of wetlands; design of experiments, testing and implementation of water and soil improvement and conservation measures; and technical assistance, equipment, local travel etc. to support project activities and project management.

3) Rehabilitation of Ecosystem in Saline Landscape of West Jilin Program: This program is funded by the Provincial Agricultural Department and pursues similar goals as the initiatives above. Measures include: physical engineering measures for flushing salt in soil by drainage systems, introducing salt resistant shrubs and crops, chemical absorption of soil salt, and sustainable management of rehabilitated land resources. The total planned annual investment is 300 million Yuan (USD 49 million) according to the Provincial Agriculture Commission.

4) River-Lake Connection Programme (RLCP): The program, financed by the national government, Jilin DWR, and Songyuan City government, will introduce the harvesting and storage of flood water during the rainy season to rehabilitate wetland ecosystem and degraded grasslands and saline-alkaline land. The RLCP project intends to increase the eco-water volume for wetlands and grasslands rehabilitation through diversion of water from Second Songhua River, Nen River and Taoerhe River without negatively impacting water supply to downstream regions (see Hadashan Program above). The investment area covers Qianguo, Qian'an and Changling in Songyuan City and will restore 40,000 ha of wetlands. The total confirmed governmental investment for RLCP is 10 million Yuan RMB (USD 1.6 million) to be used from 2015 to 2020. This investment will serve as cofinancing for the GEF component 3 allowing for the replication of the piloted Sustainable Water Management Model in the wider Songyuan Irrigation Area (Qian'an'guo and Qian'an) and in Da'an (Tao'erhe River) and Zhenlai (Ecosystem rehabilitation through diversion of water from the Nen River).

B) Initiatives geared towards the introducing suitable practices for use of land, water and grassland resources in crop and livestock production

In addition to the large infrastructure and irrigation investments described above, a number of initiatives exist that connects more specifically to project component 3, the introduction of CA and other environmentally sustainable farming practices. These initiatives will create an additional basis for the GEF investment to build on and in part receive co-financing from.

1) Baicheng Conservation Agriculture (CA): Baicheng City has initiated a CA project in 90,000 ha farmland. Key technologies and practices include: (i) application of CA Machines of integrating seeding, fertilizing and ploughing in one process to reduce damage on soil structure; and (ii) Anti-weeding by applying environmental friendly herbicides to avoid soil disturbance.

2) Ecological Agriculture in paddy rice production: Songyuan City has been recognized by National Green Food Development Center as Green Food Rice Standard Production Demonstration Base. The green and organic products have been registered as commercial brand "Songyu" for marketing. Green and organic food certification system is in place. Until 2013, fifteen organic and green food products have been certified. A set of technical guidelines for instruction of the production practice was developed by local Agricultural Bureau. Key technologies for green rice

production include: (i) reduced chemical fertilizer application; (ii) adoption of Integrated Pest Management (IPM) in paddy rice and other crops pest control; (iii) application of low residues chemical pesticides in following national standard; and (iv) green processing of products, including package, storage and transportation, etc.

3) Rehabilitation of degraded grassland: A pilot will be conducted in Hongxing Livestock Farm with key rehabilitation interventions: (i) fencing; (ii) rational grazing; and (iii) soil ploughing and seeding with salt and saline resistant native grasses.

4) Hadashan Hydro Programme (HHP): The program has a 70 million Yuan (USD 11.4 million) budget allocated for measuring the irrigation and water flow and demand, including the water demand for irrigation and ecological water demand. The program will be also experimenting and piloting the water saving agricultural practices, water saving irrigation technologies, etc. which will be implemented in the coming 5 years. Piloting of practices will be coordinated and results will be shared for further replication throughout the SIA.

5) Water Saving in Irrigation Agriculture. During 12th Five Year Plan, Jilin Provincial government and local government in Baicheng and Songyuan initiated the Water Saving Irrigation Agriculture Project with a planned intervention area of 670,000 ha (rain-fed farmland) to be implemented from 2011 to 2015.

C) Current studies and monitoring of wetlands water quality and quantity for the protection of its biodiversity and sustaining its natural flood and recession cycle

1) In December 2012, China Water and Hydropower Research Academy and Chagan Lake National Nature Reserve Administration jointly established “**Chagan Lake Hydro-Ecological System Monitoring and Research Center**” in the Chagan Lake Administration for monitoring and studying the hydro-ecological environment of Chagan Lake. The monitoring efforts of the Chagan Monitoring Center, measuring water quality of the lake itself, will be closely coordinated with the monitoring system to be established by the GEF project, which will focus on measurements in the surrounding wetlands. The two systems will be fully complementary and mutually reinforcing.

2) Since 1990s, a number of scientific research studies¹¹ have been conducted on the Chagan Lake Wetland hydro-ecosystem, water quality and water pollutions as well as impacts of drainage water quality from rehabilitated saline land irrigation area on the buffer zone hydro-ecosystem in Xinmiao Lake and other buffer zone areas of Chagan Lake. The findings of these studies will be an important baseline input for the establishment of the buffer zone and the rehabilitation of wetlands with irrigation drainage water to be supported by the project.

D) Additional projects, initiatives and investments in wetland biodiversity conservation

For conserving and rehabilitating biodiversity and wetlands ecosystem habitats the national and provincial governments have established three national nature reserves (NNR) in West Jilin, namely Chagan Lake National Wetland NR (2007), Momoge National Wetland NR (1997) and

¹¹ Li Ranran, et al, Analysis on Hydro-Ecosystem Evolutionary Characteristics of Chagan Lake Wetland, 2013,2014; Ai Jun and Li Liang, et al, Study on Change of Chagan Lake Wetland Hydro-Ecosystem and Protection Countermeasures, 2012; Zhao Shuang, Dong Jianwei, et al, The Effectiveness Analysis for Chagan Lake Ecosystem Protection and Restoration Measures, 2012; Zhuang Guiwen, Jia Zhiguo, Study on the Approaches for Conservation Chagan Lake Wetland, 2005; Dai Xuejing and Tian Wei, Chagan Lake Water Pollutions and Control Countermeasures, 2009.

Xianghai National Wetland NR (1986). Chagan Lake NNR is located adjacent to the Songyuan Irrigation Area and is as such directly connected to and affected by the GEF project intervention areas.

In the past decade, both central and provincial government financed several research and rehabilitation and protection efforts and activities in Chagan Lake, Xianghai and Momoge National Wetland NNR. In 2013 all three wetland NNRs had established rehabilitation and conservation regulations and drafted management plans. Based on these plans, a series of rehabilitation and conservation activities and projects have been implemented in the three NNRs supported by government and international organizations. In addition, they are also conducted biodiversity monitoring and observation activities with focus on migratory birds monitoring changes in number of individuals in the population of each species and in the biophysical status of their habits. Routine protection and management practices were also piloted by the NNR administrations. Table 1.9 summarizes these activities and actors involved in each wetlands NNR in West Jilin.

Table 1.9: Governmental initiatives and international conservation projects implemented in Wetland NNR in West Jilin

Natural Reserve	Initiatives and Projects	Actors involved
Chagan Lake Wetland NNR	<ul style="list-style-type: none"> - Established as Provincial NR in 1986 - In 2004 Jilin Provincial Government approved the Strategic Plan of Chagan Lake NR - In 2007, State Council approved the upgrading of the Chagan Lake NR to a National NR. - Formulated the Chagan Lake NR Conservation and Management Plan in 2013 - In 2013 started to implement the Chagan Lake Ecosystem Rehabilitation and Conservation Program with total 150 million Yuan investment (see below) - Monitoring the migrant bird and habitat restoration 	<ul style="list-style-type: none"> - Chagan Lake Natural Reserve Administration, - Songyuan City Government, - Jilin Provincial Department of Environmental Protection; - Jilin Provincial Department of Water Resource - Provincial and prefecture and Tourism Administration - North China Normal University
Xianghai Wetland NNR	<ul style="list-style-type: none"> - Established as Provincial NR in 1981 and upgraded to National NR in 1998 - Introduced flood water from Huolin River for enlarging and restoring wetland area - Infrastructures improvement projects (3 phases) - Biodiversity restoration and monitoring - Since 2010: Research on migratory birds with Chinese research institutes and international organizations, i.e. UNEP, GEF and Wetland International (WI) for White Crane and Wetland Habitats Conservation and Community Co-Management of Wetland 	<ul style="list-style-type: none"> - Xianghai National NR Administration - Jilin Provincial Department of Forestry - Baicheng Prefecture Government - Tongyu County Government - UNEP, GEF, WI
Momoge Wetland NNR	<ul style="list-style-type: none"> - Established as provincial NR in 1981 and promoted to National NR in 1997 - Water reserving project for enlarging the wetland area and restore the wetland ecosystem - Formulated the NR Environmental Education Plan 	<ul style="list-style-type: none"> - Momoge National NR Administration - Jilin Provincial Department of Forestry - Baicheng Prefecture Government - Zhenlai County Government - UNEP, WI, GEF, WWF, ICU, etc.

	<ul style="list-style-type: none"> - Setting up wounded bird rescue center - Established NR Protection Association - Piloted community co-management mechanism - On-going monitoring of migratory birds - Since 2010 conducted cooperation projects with, UNEP, GEF, WWF, WI and ICU for rehabilitation of the wetland ecosystem and monitoring the white crane migration 	
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Source: Summarized from results of PPG biodiversity consultant interview with Natural Reserves, 2014.

1) Jilin Chagan Lake Ecosystem Rehabilitation and Conservation Program: The program was initiated in 2013 as part of RLC program (see above) and is led by the CLNNR administration. Measures include: restoring and enlarging wetland areas surrounding Chagan Lake through refilling water by use of irrigation drainage water and directly transfer eco-water from Hadashan Hydro Project for rehabilitating the wetland ecosystem; monitoring the hydro-ecosystem dynamic changes, including monitoring agro-chemical pollutions, salt content of the irrigation drainage water to the buffer zone; monitoring migrant bird in terms of number of species and their respective population sizes; rescue of wounded birds, public environmental awareness education, etc. Estimated total investment for the program is 150 million Yuan (USD 24.4 million) for supporting infrastructure construction and carrying out above-mentioned rehabilitation and conservation initiatives.

b) Remaining barriers to be addressed by the project to reverse land degradation processes and conserve wetlands biodiversity

The baseline initiatives provide a stable basis for the GEF project, significantly increasing its chances for success. However, despite the extensive government initiatives, the following technical, social economic barriers remain, hampering stakeholders to adequately address the main causes for land and biodiversity habitat degradation in Western Jilin. These barriers will be addressed by the GEF project:

(1) **Legal, regulatory and policy framework:** Investment resources and political will are ready for taking the next step: more integrated approaches to biodiversity and ecosystem conservation and SLWM at a landscape level including crop and livestock production systems as well as natural grassland and wetlands habitats. Thus far, **these integrated approaches are not reflected in policies and regulations and in inter-institutional and sectoral coordination frameworks** representing an important gap in the enabling environment for further replication and to achieve the full positive impacts these approaches.

→ *This barrier will be addressed by project component 1.*

(2) **Knowledge, information, and capacity:** In order to adjust policy and regulatory frameworks **a good practice model for these integrated approaches needs to be developed** reflecting the specific conditions of saline and alkaline characteristic for the western Jilin wetlands and production landscapes. There is still **a lack of testing and piloting of suitable livestock and crop production practices** for sustainable management and use of land, water and grassland resources and there is a **particular gap in understanding incentives and capacity needs for wider adoption among farmers**. Despite some initial experiences in CA, local communities and individual farmers need to develop capacity for implementation of ecological agriculture reducing the use of agrochemicals and pesticides and employing an integrated approach to biodiversity and wetlands ecosystem conservation and SLWM.

→ *This barrier will be addressed by project component 1 and 2.*

- (3) **Threat of agrochemicals and pesticides:** By adopting conventional intensive farming practice in the new developed irrigation area of Songyuan, cumulated agrochemical pollutants in the buffer zone will threaten the biophysical and biochemical environment of the wetlands as well as Chagan Lake itself. Conventional and intensive farming practices based on chemical fertilizers and chemical pesticides are the major challenges for the water pollution in the drainage buffer zone. Water quality of the wetlands in the buffer zone of the irrigation area will much depending on the outlet water quality from the new developed farmlands used for paddy rice, corn, and other cash crops. Intensive use of chemical fertilizers and agrochemical pesticides will threat the water biophysical and biochemical quality in the buffer zone. The water biophysical and biochemical quality will directly affect the biodiversity of the wetland waters and further impact the food chain for migrant and native wildlife. In addition human being intervention to the habitat environment is also a challenging factor for sustaining the biological environment of migrant and native birds and animals. There is no water environmental protection guideline and water biophysical and biochemical criteria for monitoring the water quality of the wetland and the water emitted to the drainage buffer zone of Songyuan Irrigation Area.

→ *This barrier will be addressed by project component 2.*

- (4) **Threat of salinity level and irrigation water management:** Rehabilitation of degraded and salinized former wetlands carries the risk of increasing salinity level in the water, threatening biodiversity in the wetlands as well as Chagan Lake itself. Addressing this threat requires close monitoring of salinity levels in combination with careful water flow control measures. Irrigation water management and integrated use of flooding water is a crucial factor for both cropland productivity and wetland rehabilitation as well as for the biodiversity conservation. For achieving these two objectives two types of water supplies are needed, namely the irrigation water supply and ecological water supply. This results higher water demand. The total water demand will be supplied from the Hadashan Hydrological Program. Without accurate water supply accounting and modelling based on the land irrigation and eco-water demand pilot there might be risk that the Songyuan Irrigation Area Construction Program will affect the annual and seasonal water flows of down reach regions of Songhua River.

→ *This barrier will be addressed by project component 3.*

c) Incremental reasoning (added value of the project in particular the GEF financing)

The GEF project will leverage the extensive baseline initiatives, making small but targeted adjustments that will create significant GEBs which would not have been realized by the baseline itself. The existing and forthcoming governmental supported land resource management, water resource management, agricultural development and ecological improvement projects are mainly focus on the improvement of land productivities and construction of hydro and irrigation infrastructures. Although ecological rehabilitation and sustainable water resource management are stated in the objectives of these programs, there are, however, lack of pilots and technical guidelines and policy instruments for addressing the abovementioned ecological threats and social economic barriers. GEF project will help Jilin Provincial and local government to address these problems and remove these threats.

These leverage effects can be summarized by component as follows:

Component 1: The gaps in the legal, regulatory and policy framework described in the previous section would continue to seriously undermine all upcoming and future efforts to implement

long-term, sustainable approach to land and water resource management in Jilin and beyond. Making targeted efforts towards introducing integrated approaches based on a landscape perspective into the overarching framework will cause a significant improvement of the effectiveness of all future initiatives. Component 1 will leverage ongoing positive developments with regard to legal, regulatory and policy conditions and improve their positive environmental impact by a comparatively small, but systematic adjustment.

Component 2: Without the GEF project, all efforts to improve the environmental situation around Chagan Lake through the irrigation initiative will be short-lived, as the irrigation efforts by themselves will not address the actual root causes of environmental degradation which lies in the current agricultural practices. Changing these practices, especially by introducing water saving and water quality conservation measures, will put the future development of productive landscapes around Chagan Lake onto a different, more sustainable track. The SLWM model to be introduced by component 2 will provide an alternative to conventional approaches which is feasible, effective and efficient. Component 2 will thereby slightly redirect the current and planned agricultural initiatives, putting them on a path towards reduced water usage and conservation of water quality.

Component 3: Without the GEF project, the Hadashan Program and all connected baseline activities would continue the water diversion and wetland flooding activities without taking into account the immediate threat of water salinity levels as well as the long-term sustainability of the rehabilitation efforts. Long-term environmental recovery requires an integrated SLWM approach for the entire production landscape taking into account the conservation of biodiversity as an intrinsic part of productive landscape management. It will require systematic management of fisheries resources, waterfowl habitats and pollution threats as well as systematic monitoring and management of ecosystem health in contributory channels and buffer zone wetlands. Component 3 will integrate the BD conservation model with the SLWM model of component 2. Ecosystem services and biodiversity valuation will be developed from the beginning of the project and different options for mitigating land degradation processes; salt accumulation (or salinization process) in the soil and water will be analyzed and tested by applying the LADA-WOCAT methodology.

An early warning system for pollution threats will be established to insure the conservation of wetland habitats for waterfowls and migratory birds, and fishery resources will be inventoried, monitored and managed based on water ecosystem carrying capacity. The ecosystem based SLWM model developed in this project will be followed up by adjustment in policies and regulations securing the mainstreaming of biodiversity and soil conservation in planning and management processes in the water, agriculture and livestock sectors and documented for replication in other complex production landscapes integrated by water diversion systems, paddy-fields, dry cropland, grassland and wetlands.

Global Environmental Benefits: The anticipated direct GEBs in the project pilot sites will be: (i) Degradation and desertification processes reversed in 170,780 ha saline-alkaline land with improved vegetation cover resulting in sustainable productivity and reduced vulnerability to climate variability, namely the drought and floods; (ii) 220,000 ha of integrated production landscape under SLWM practices, and conservation and environment-friendly agriculture practices, etc.; (iii) Rehabilitation and conservation of 49,883 ha wetland managed as an integrated part of the freshwater fishery and irrigated crop and grassland production landscape providing important habitats for endangered migratory birds resting and feeding in these wetlands; (iv) Wetland habitat for freshwater fish, mammals, water fowl and endangered migratory birds is conserved leading to: 1) population of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned) maintained or increased in pilot sites by the end of the project (<5% variance); 2) population of wetlands mammals such as the IUCN red-listed Eurasian otter increased in pilot sites.

Further to these direct global benefits in the pilot sites the project will also have indirect benefits in the wider western Jilin wetlands and agro-pastoral landscape (50 000 km²). The valuation of biodiversity and ecosystem services in land use and water planning and management; the mainstreaming of the integrated SLWM and conservation model in policies, programs and regulations in the water, agriculture and livestock sectors within the western Jilin province; and the enhanced awareness of wetland ecosystem services and conservation measures in local land and water management and agriculture activities, will allow for that the global benefits of the project will cover significantly more hectares than the rehabilitated hectares mentioned above.

1.1.2 FAO's comparative advantages

FAO has significant expertise and experience in developing methodologies and practices and providing technical assistance and capacity building in the management of land and water resources, including conservation agriculture and sustainable intensification of production which is among FAO core priorities. Assisting countries to address water scarcity in agriculture and strengthen their capacities to improve water productivity of agricultural systems at national and river basin levels, including transboundary water systems, are other priority areas of work and reflected in the FAO Strategic Framework 2010-2019, Medium-term Plan 2010-2013 and Programme of Work and Budget 2010-2011. In particular, FAO provides water policy services to address water management strategies in support to rural development and agricultural productivity enhancement, and the adoption of effective water allocation under conditions of scarcity. FAO also strengthens national capacity to address irrigation performance and modernization, water use efficiency and productivity enhancement, water quality management and technological development using information and databases, including mapping systems and FAO crop-model (AQUACROP) and guidelines.

As the executing agency for the LADA-WOCAT GEF supported projects FAO has jointly with the participating countries (in China the LADA-WOCAT executing partner was the State Forestry Administration (SFA) – the national focal point for UNCCD supported by the Beijing Forestry University) developed methodologies for analysis, mapping and identification of land use and conservation options for dry-lands vulnerable to land degradation processes. These methodologies and tools will be particular beneficial for the proposed project.

During the GEF-4 cycle, FAO has increased its involvement in China regarding GEF biodiversity projects and has established good working relationships with the Chinese government at the national and the provincial levels that will benefit this project. Until the end of 2013 FAO has been involved in preparation and implementation of GEF financed “Demonstration of Estuarine Biodiversity Conservation, Restoration and Protected Area Networking in China”; “Wetland Biodiversity Conservation Projects in Hunan and Jiangxi”; “Biodiversity Conservation in Huangshan, Anhui”; “Sustainable Forest Management and Biodiversity Conservation for enhancing Resilience to Climate Change” (SFA).

The FAO Regional Office for Asia and the Pacific (FAORAP) has rich experiences and good cooperation relationships with the Ministry of Water Resource, Wuhan University, Chinese National Committee on Irrigation and Drainage, other provincial departments, institutes and irrigation management agencies in both paddy areas and arid regions. In the past six years these relationships has included joint work on irrigation modernization, water saving irrigation and productive, equitable and sustainable water resources management and utilization in the agriculture sector. FAORAP also has close linkage with China Agriculture University working together on integrated plant nutrient management, conservation agriculture and soil and water conservation, Agricultural and Pastoral Disaster Risk Management, Adaptation and Mitigation of Agriculture

to Climate Change. These relationships will benefit the development and implementation of the proposed project.

1.1.3 Participants and other stakeholders

Stakeholders at the provincial and prefecture level recognize the acute threat to the environmental as well as the economic well-being of the region. The ecosystem of Chagan Lake is not only of great environmental importance, but also of high economic value as a tourist location. Next to agriculture, tourism is the main source of livelihood for local communities. Both sources of income depend on the health of the croplands, grasslands and wetlands surrounding the lake. Accordingly, a **broad alliance of dedicated stakeholders formed to find an answer to the daunting environmental and socio-economic crisis.**

This broad alliance is of particular importance with regard to the specifically agricultural dimension of this project, including a number of activities related to sustainable agricultural practices. For these parts of the project, the DWR will **rely on the support from the corresponding agricultural ministries and other stakeholders from the agricultural sector.** The exact responsibilities are spelled out section 4 on implementation arrangements.

The Jilin Department of Water Resources will be the main Project Execution Partner. See section 4.2 for further description of its responsibilities in this role. Water Resource Bureau in Songyuan City and Qianguo, Qian'an and Da'an counties will be also involved in the implementation of project activities in the project area.

Songyuan Municipal Government, Qian'guo and Qian'an county governments are the major local co-executing partners for the implementation of pilot activities and replicating the SLWM and biodiversity conservation practices and model. See section 4.2 for further description of their responsibilities in this role.

Jilin Provincial Agricultural Committee, agricultural and livestock bureau, relevant agricultural extension services at provincial, prefecture and county levels will play very important roles in piloting the conservation agriculture and sustainable pastoral management practices. They can directly be involved in the component 2 designing, providing technical training to farmers in conservation agriculture, integrated pest management, water saving agriculture, integrated pasture management, organic agriculture, etc., required during implementation of the component 2 activities.

The Provincial Environmental Protection Department and local environmental protection bureaus will be involved in the monitoring the water quality in the buffer zone and new formed wetlands to ensure the drained out water in the buffer zones of the project pilot areas will match the water biophysical and biochemical criteria required by wetland habitats for migratory birds. The water quality monitoring points set up by Songyuan City Environmental Protection Bureau might be used by monitoring the water quality of the pilot areas.

Provincial Science and Technology Department: the department will be involved in the community outreach campaign and extension of relevant technologies required in the SLWM and biodiversity conservation, conservation agriculture, organic and environment friendly agriculture. The Science and Technology Association at the city and county level, as affiliated civil society can also be directly involved in the community education and technical training.

The Jilin Provincial Government Legislative Affair Office will be involved in legislative approval and enacting of the SLWM and biodiversity conservation regulations and guidelines and provide an enabling legislation environment for replicating the SLWM, biodiversity conservation and eco-payment regulations in other areas of West Jilin Province.

Hadashan Hydro Program Administration (HHPA) will be involved in the water balancing modelling carried out in component 2 of the project. It will also be involved in the monitoring for complying with the water diversion quota from Second Songhua River. In addition it will also play roles in replicating the piloted SLWM model in the non-pilot areas within the Songyuan Water Irrigation Area.

Chagan Lake Natural Reserve Administration (CLNRA) will be a key partner in implementation of the wetlands biodiversity conservation component 3 including monitoring wetlands ecosystem functions and biodiversity rehabilitation processes and setting up of wetlands and native grasslands co-management schemes and monitoring. CLNRA will also play important roles in replicating the piloted SLWM models and biodiversity conservation best practices outside of Songyuan Irrigation Area.

Coordination with line departments

The project will closely cooperate and coordinate with line agencies to support component 1 in policy development and replication of the SLWM and biodiversity conservation models in other areas of West Jilin as well as component 2 and 3 activities. These stakeholders will all be included in the Project Steering Committee (see section 4.2): Jilin Provincial Development and Reform Commission, Jilin Department of Finance, Provincial Agricultural Committee, Provincial Agricultural Bureau, Provincial Animal Husbandry Bureau, Provincial Environmental Protection Department, Provincial Forestry Bureau.

Other stakeholders

Besides the abovementioned governmental line agencies and authorities, following institutions will be involved in the project implementation:

- 1) **Jilin Water and Hydrological Survey and Planning Institute (WHSPI)**. The institute has been the major partner in GEF project preparation. WHSPI will be involved in the implementation of component 2 as subcontractor.
- 2) **Northeast Normal University**. Northeast China Normal University has strong expertise in water ecology and migratory bird bio-diversity monitoring. Two consultants from the School of Life Science of the university have been involved in the GEF Project preparation. The university will participate in the project implementation for component 3 commissioned by the project as subcontractor.
- 3) **Jilin Provincial Academy of Agricultural Sciences** and its crop, livestock and soil management institutes will provide technical supports and consultancy in piloting conservation farming models with focus on crop cultivation, grassland management, pest management, fertilization, etc., under component 2. These institutes can also provide technical training to farmers and county agricultural extension workers.
- 4) **Jilin Provincial Agricultural Extension Center** is directly affiliated to the Provincial Agricultural Commission with the functions of introducing and piloting crop varieties and adopting crop cultivation, pest management technologies and providing technical training to farmers. The center can be involved in demonstrating conservation agriculture, integrated pest management and introducing new crop varieties under component 2.

Non-governmental organizations (NGOs): Community-based organizations, such as farmers' cooperatives, producers' associations, professional associations, such as Environmental Protection Association at county and city levels, Water Conservation Association, etc., can play roles

in promoting the community awareness building and capacity building for sustainable application of tested SLWM and biodiversity conservation and wetland co-management models. They can also be directly participating in the community campaign and training. Potential NGO for collaboration with the project will be contacted before start-up of the project. Songyuan Environmental Protection Volunteer Association, Jilin Provincial Bird Protection Association, Jilin Wildlife Protection Association and Jilin Water Conservation Association and their branches in Songyuan will be the potential partners. In addition, the project will also cooperate with Village Based Farmer's Cooperatives in the fringe areas of the GEF pilot project sites.

1.1.4 Lessons learned from past and related work, including evaluations

There are already successful cases for rehabilitating wetland ecosystem by diversion of river water and using flooding water in West Jilin. Through piloting integrated water management model in the River-Lake Connecting Project Program, wetland areas of Xianghai National Wetland Reserve and Momoge National Wetland Natural Reserve have been enlarged and wetland water ecosystems are restored, and the number and species of waterfowls and migratory birds start to increase in the recent years. In these programs ecological water demands for sustaining wetland ecosystem were accounted and used as basic criteria for wetland water supply schemes. A water demand, ecosystem and biodiversity monitoring instrument was also developed for managing these important natural reserves.

Previous projects also show that an effective and powerful local governmental coordination mechanism to ensure the participation and commitment of different relevant line agencies (i.e. Water Resource Bureau, Agriculture Bureau, Forestry Bureau, Environmental Bureau, Land Administration, etc.) is crucial for the success of these projects. The governmental funds are allocated to the project area through different channels, which are mainly controlled by different line agencies at provincial and county levels. Although there is a project steering committee set up at the provincial level, however, the inter-institutional mechanism is not effective for mobilizing the participation and contribution from different line agencies. It is therefore crucial for the GEF project to set up an effective multi-institutional collaboration and coordination mechanism.

Community and farmer's participation and capacity building are crucial factors for the sustainability of the SLWM and wetland co-management. In the past, most of governmental supported projects were mainly implemented by the relevant governmental line agencies, communities and farmers were not proactively participating in the project planning and implementation. Therefore farmers and community stakeholders are lack of ownership and commitment in adopting the project recommended best practices. Direct participation, capacity and awareness building of farmers and resource users will be crucial for successful implementation of the designed project activities as well as for long term replication of the recommended SLWM models and wetland co-management modality.

1.1.5 Links to national development goals, strategies, plans, policy and legislation, GEF/LDCF/SCCF and FAO's Strategic Objectives

a) Alignment national development goals and policies

The priorities of the Government of China (GoC) in mainstreaming biodiversity conservation in production sectors, reaching the 2010 biodiversity targets, and linkages to the implementation of other UN conventions are set out in China's Fourth National Report on Implementation of the Convention on Biological Diversity, 2008 and the China National Biodiversity Conservation Strategy and Action Plan, 2011-2030 (NBSAP). The NBSAP identifies 35 priority regions for

biodiversity conservation in China where the Songnen Plain in the western Jilin province is identified as priority area in the Hilly Plain priority Region in North East China. The proposed project will in particular support the implementation of two of the four conservation priorities for this area which are: i) develop plans for wetland conservation and establish transboundary wetland reserves to address issues of water shortage and pollution of wetlands; and ii) establish marsh wetlands, migration and reproduction areas for rare and migratory birds and protected areas for rare fishes and cold-water fishes including in Songnen and Three Rivers Plains. The proposed project will also support the implementation of in particular 5 of the 30 priority actions identified in the NBSAP which are: Action 1 *Develop policies to enhance biodiversity conservation and sustainable use*; Action 2 *Improve the legal system of biodiversity conservation and sustainable use*; Action 4 *Incorporate biodiversity conservation into relevant sectoral and regional planning and programs* (action 1, 2, and 4 will all be addressed in component 1 based on testing and piloting in component 2 and 3 of the proposed project); Action 6 *Reduce impacts of environment pollution on biodiversity* (component 2 and 3 of the proposed project); and Action 29 *Establish mechanisms of public participation* (component 4 of the proposed project).

The Chinese government has integrated the conservation and sustainable use of wetland biodiversity into the priorities of China's Agenda 21(1998). The China Wetland Conservation Action Plan (2000) has the objective to strengthen the conservation and maintain ecosystem services of wetlands and to ensure the sustainable use of wetland resources. The National Project Plan for Wetlands Conservation (2002-2030) sets the target that by 2030, 713 wetland reserves and 80 wetlands of international importance will be established, effectively conserving over 90% of the country's natural wetlands including the wetlands in western Jilin. By the end of 2007, more than 550 wetland reserves of different levels and types had been established in China and about 45% of natural wetlands were effectively protected. The Ministry of Water Resources (MRW) has integrated water ecology conservation during the planning, design, construction and operation of water diversion and conservation projects. In 2004, the MWR issued the Recommendations on Protecting and Restoring Water Ecosystems followed by pilot campaigns in some counties.

In the last decade China has done significant improvements in management of grassland conservation responding to the fact that 90% of grasslands have been degraded by varying degrees according to the NBSAP. A number of major systems, such as the Basic Grassland Conservation System, the Forage-livestock Balance System and the Grazing Ban and Grazing Land Non-use Period System have been developed and implemented. The Ministry of Agriculture is aiming to restore native grassland vegetation and increase grassland productivity by implementing these systems and the project Returning Grazing Land to Grassland and Accommodation of Carrying Capacity. These projects and measures have boosted more balanced development between grassland ecology and animal husbandry. The National Master Plan for Grassland Conservation, Construction and Utilization (2007) sets the overall target to basically control grassland degradation nationwide, to significantly improve the ecological environment of grasslands and to improve the agricultural and animal husbandry structure and economic structure of grassland regions by 2020.

As part of the implementation of UNCCD, China has integrated the reversing of land degradation processes with biodiversity conservation including the rehabilitation of ecosystem functions. The National Plan for Desertification Prevention and Control (2005-2010) was issued in 2005 and the legislative system for protection of desert ecosystems include the Law on the Prevention and Control of Desertification, Forest Law, Grassland Law, Law on Water and Soil Conservation, Land Administration Law, Environmental Protection Law, etc. For biodiversity conservation purposes, grazing, reclamation and logging are forbidden in dry land and deserts, stocking rate is determined according to the carrying capacity of grasslands and the rationally use of water

resources. From 2000 to 2004, China's total area of deserts was reduced by 6,416 km², which was a historic turning point after an annual average expansion of 3,436 km² in the late 1990s.

The National Master Plan for Land Use (1997-2010) formulated and enacted in 1999 defines the overall target of national land use as maintaining the dynamic balance of total farmland while ensuring the conservation of the environment. The plan aims at bringing the land degradation under control and improving land use management capacities. The National Ecological Functional Zoning Plan issued in 2008 provides guidance for regional ecological conservation, ecological construction, sectoral development layout, resources utilization and economic and social development. The Ministry of Land and Resources (MLR) has integrated biodiversity conservation into the overall land use plans where one target is to protect forestland and increase forest coverage and vulnerable ecosystems among other measures through establishment of nature reserves.

b) Alignment with GEF Focal Areas and Strategies

By focusing on conservation of key ecosystem services (wetland habitat for global important threatened species, land and water cycle supporting flood control, soil conservation and agriculture activities for food security, and native grassland supporting livestock production) the proposed project is cross-cutting linking the GEF Biodiversity and Land Degradation focal area strategies.

Regarding the **BD strategy** the project will support the objective 2: *Mainstream biodiversity conservation and sustainable use into production landscapes/seascapes and sectors* through development of institutional capacities of the Jilin province government for spatial land use planning that incorporates the valuation of biodiversity and ecosystem services in wetlands and agro-pastoral landscapes including habitat for migratory birds and rare fish species. Wetlands projects under development or implementation in China including the six projects under the GEF5 Wetlands program are mainly BD-1 projects focused at conservation of wetlands biodiversity in nature reserves (protected areas) led by provincial bureaus of forestry responsible for nature reserves. Most of these projects are truckling with establishing an appropriate dialogue with the water sector, which makes decisions over water usage and flows being the most important factor in the conservation of wetlands and its biodiversity. The proposed project differs importantly from these projects by: 1) being a BD-2 project focusing at the conservation of wetlands biodiversity in an agro-pastoral and artisanal in-lands fisheries production landscape by mainstreaming the conservation in the planning and use of water and land resources; and 2) by having the Provincial Department of Water as the proponent and lead agency behind the project which is the key sector for mainstreaming of wetlands biodiversity conservation. As such, this project offers an opportunity for developing and piloting a new SLWM model for restoration and conservation of ecosystem services and wetlands biodiversity that could be of great importance for wetlands conservation with an ecosystem approach and as integrated in production landscapes and incorporated in fisheries, livestock and agriculture sectors.

To support the GEF BD-2 objective technical assistance and investments will be financed to: (i) support the provincial government in particular the Department of Water and local communities in the development and implementation of integrated land and water management plans incorporating biodiversity and ecosystem services valuations; (ii) develop and test a new management model for restoration and conservation of ecosystem services and biodiversity while pursuing local food security in the western saline-alkaline wetlands and agro-pastoral landscape; (iii) review and renew relevant plans, policies and regulations in accordance with the new management model; (iv) rehabilitate 49,883 ha of wetlands (including buffer zone, ponds and lakes) by constructing drainage channels from irrigation and flooding water diversion system and by develop-

ing and implementing a system for analyzing, monitoring and controlling the water quality improvement capacity and efficiency of the buffer zone as a function of the inflow water quality and quantity, an early warning system for pollution threats from agriculture non-point source, and an operation strategy of the inflow and outflow control structures of the buffer zones; (v) identify and implement management and monitoring measures for wetland hydrobionts species, waterfowl and migratory birds based on biodiversity indicators and zoning and use regulations.

Regarding the **LD strategy** the project will support objective 1: *Maintain or improve flows of agro-ecosystem services to sustain livelihoods of local communities* and objective 3: *Reduce pressures on natural resources from competing land uses in the wider landscape* through: point (i), (ii), and (iii) mentioned under biodiversity above; (iv) building of technical and institutional capacities for SLWM and piloting integrated approaches to conservation agriculture and SLWM in wetlands and agro-pastoral landscapes; (v) establishing pilot water control and measurement system to enable multiple functions (disaster risk management –flooding control, wetlands and grasslands restoration, ecosystem services and biodiversity conservation, and food security) and development and testing of proper operation strategy for optimal adjustment and utilization of flooding water for reversing degradation and desertification processes, increasing vegetation cover on native grasslands, and improving local agriculture activities; (vi) evaluating options for land use models including analysis of local dynamics in climate and water cycles, salt movements in soil and water important for land rehabilitation and degradation processes; (vii) testing and provision of pilot experiences for subsequently up-scaling of SLWM practices including conservation agriculture, management of grasslands, and water saving technologies to increase vegetation cover, minimize soil erosion and use of agrochemicals, and reverse degradation processes. The development of the SLWM model and practices to be applied will be supported by installed capacities in China on LADA-WOCAT¹² (see section B.6) and will aim at balancing competing land uses and mitigating droughts and land degradation processes as part of an ecosystem based climate change adaptation strategy.

c) Alignment with FAO Strategic framework and Objectives, Regional Initiatives, and Country Programme Framework

The GEF project aligns closely with FAO's revised Strategic Framework and corresponds fully with *Strategic Objective 2 (SO2): Increase and improve provision of goods and services from agriculture, forestry and fisheries in a sustainable manner*. Following the FAO mandate to contribute to increased and improved provision of goods and services from the agricultural sector, the project supports the achievement of the defined organizational outcomes under SO2, specifically:

- adoption of sustainable practices by producers and natural resource managers;
- strengthening governance systems at the national, provincial and local level facilitating the transition towards sustainable agricultural sector production systems;
- implementation of internationally recognized mechanisms, e.g. through the mainstreaming of agricultural best practices; and

¹² Methodologies for identification and mapping of land degradation processes in dry lands, their causes and solution options in terms of land use planning and natural resources management responses developed in China supported by the UNEP/FAO/GEF **Land Degradation Assessment in Dryland (LADA)** and the **World Overview of Conservation Approaches and Technologies (WOCAT)** decision-support tool which comprises a global standardized and robust documentation of sustainable land management technologies and approaches in different land-use systems at the community and landscape levels.

- design and implementation of evidence-based decision-making in China’s agricultural sector, e.g. through the establishment of reliable water use and water quality monitoring systems.

Tackling these problems is a core organizational mandate of FAO. It is also the essence of this GEF project, reflecting the project’s close alignment with and significant contribution to the achievement of SO2.

In addition, the project also aligns closely with the regional priority areas for Asia, namely “enhancing equitable, productive and sustainable natural resource management and utilization”. Finally, the project is also reflective of the FAO Country Programming Framework (CPF) for China. Under *CPF Priority Area 4: Promoting sustainable agro-ecological development and agricultural heritage conservation and utilization*, the China CPF lists *Outcome 4.1: enhanced sustainable agro-ecological development programmes, technologies and practices*, directly corresponding to the objectives and activities envisioned for the GEF project.

SECTION 2 – PROJECT FRAMEWORK AND EXPECTED RESULTS

2.1 PROJECT STRATEGY

The strategy of the project to address the above mentioned barriers (see section 1.1.1.b) is to develop a comprehensive **model for Sustainable Land and Water Management (SLWM)** in irrigated areas that can insure agricultural productivity, sustainable land use and biodiversity simultaneously. This environmentally sensitive model for large irrigation efforts will primarily use two levers to fundamentally change the ecological balance within the productive landscape, realizing significant Global Environmental Benefits in the process:

1. **Sustainable design and application of the irrigation system:** The irrigation system cannot be solely targeting maximum and short-term agricultural gains, but needs to take the entire landscape into account. The irrigation system needs to restore an ecological balance between land resource protection, biodiversity conservation and agricultural production. A carefully designed, cautiously applied and closely monitored irrigation system can serve all three objectives at the same time, creating a productive landscape of long-term ecological health and sustained productivity.
2. **Change agricultural practices to serve land and biodiversity protection:** Even the most carefully designed irrigation system will not be able to counterbalance unsustainable agricultural practices for long. Agricultural practices, especially over-use, waste and pollution of water resources, are the part of the fundamental problem that can (in contrast to global climate change) be fully solved at the local level. A SLWM Model at the landscape level will have to include alternative agricultural practices that keep productivity, land use and biodiversity in a sustainable balance. In this way, the threefold objective is the same as for the design and application of the irrigation infrastructure.

Both aspects in their combination result in a **comprehensive and integrated SLWM Model at the landscape level. To design and apply this model is the ambitious yet fully feasible objective of this project.** The Western Jilin wetlands offer a unique opportunity to do so. All building blocks are in place to implement **an innovative and pioneering solution:** keen environmental awareness of stakeholders, major government resources and strong political will. The project will build upon a carefully planned for water diversion to improve degraded croplands and rehabilitate wetlands of vital ecological importance. The project will complement the envisioned irrigation system to make it environmentally sound and ensure that land degradation and biodiversi-

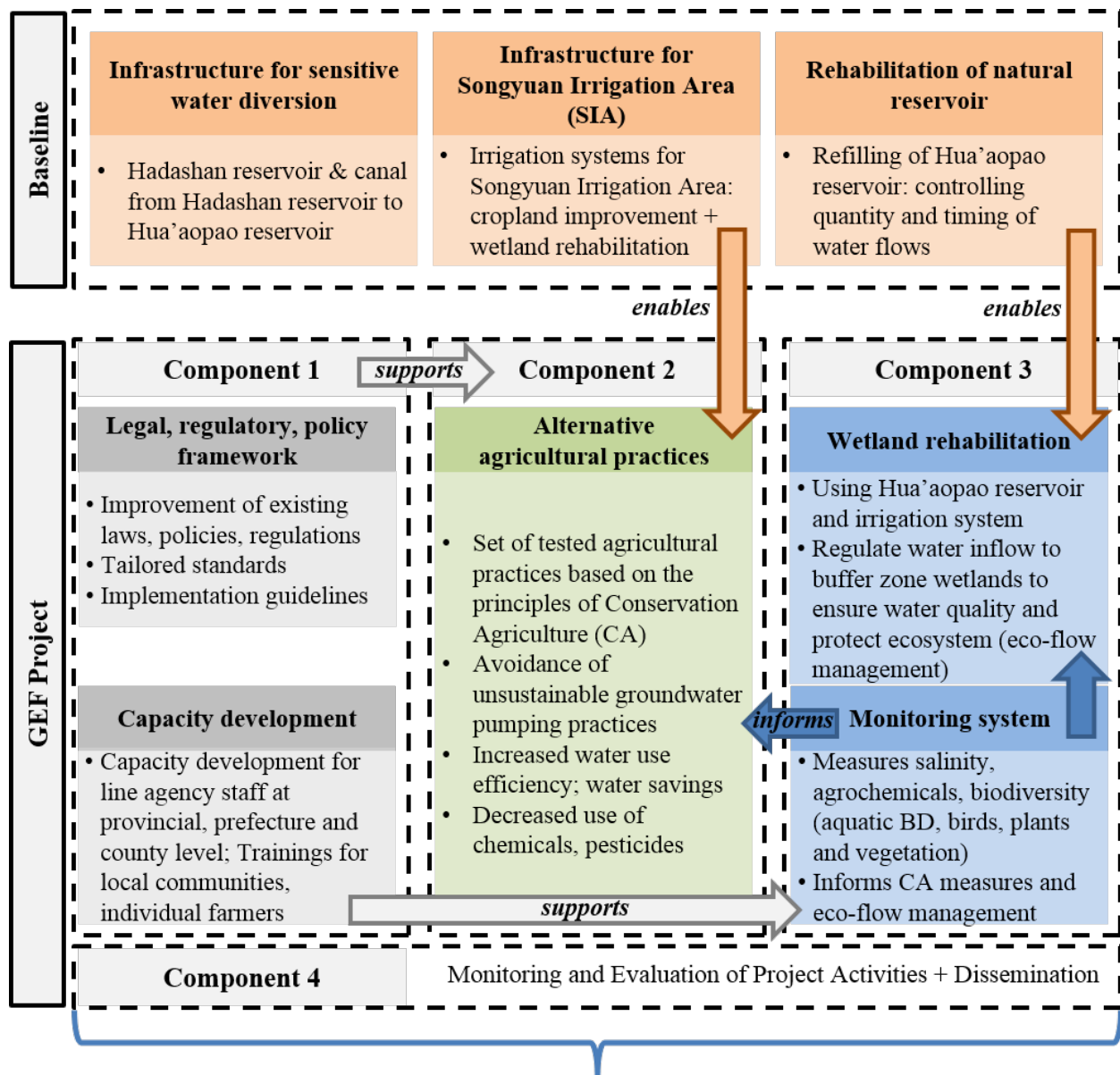
ty concerns are adequately addressed. The project will combine this rehabilitation effort with the introduction of sustainable agricultural practices based on the tried and tested principles of Conservation Agriculture (CA) with a strong focus on sustainable and efficient water-use and avoidance of water pollution through agrochemicals. Both aspects, rehabilitation of degraded wetlands plus introduction of sustainable agricultural aspects, will in their combination create an integrated SLWM Model.

The project builds on a strong baseline. A set of large initiatives, enjoying strong political support as well as significant government resources, have been initiated to improve water availability in the **Songyuan Irrigation Area (SIA)**. The existing initiatives already reflect the stakeholders' sensitivity for possible environmental damages. The diversion of water from a major river to improve cropland irrigation has been carefully and prudently planned to avoid all detrimental effects on the environment. The scheme includes a comprehensive plan to avoid any negative effects of the water withdrawal downstream, environmental as well as economic. The diversion has been coordinated with and agreed upon by stakeholders along the river. Extensive safeguards are in place to limit water withdrawal to the minimum needed for revitalization of the wetlands. Through innovative use of existing natural reservoirs, unwanted water flow fluctuations are fully avoided. While the baseline project takes care of minimizing all negative environmental effects of the water withdrawal downstream, the **GEF project will synergistically complement the baseline initiatives and address remaining barriers and environmental challenges, thereby creating significant global environmental benefits:**

- 1. Component 1: Improvement of the policy, legal and regulatory framework for an SLWM model in productive landscapes, including capacity development.** The project will build on existing laws and regulations and primarily target the remaining gap of cross-cutting, integrated landscape approaches. It will improve the enabling environment for combining sustainable land and water management in agriculture with rehabilitation of degraded land and long-term biodiversity conservation. This will include implementation guidelines for alternative agricultural practices as well as tailor-made water efficiency and quality standards for the Chagan Lake region. In addition, the component will provide capacity development for local communities and farmers to enable long-term implementation of the SLWM Model. Component 1 will provide the groundwork and support system for the project activities under component 2 and 3.
- 2. Component 2: Design and piloting of sustainable land and water management in agricultural practices in production landscapes around Chagan Lake.** As part of the comprehensive SLWM Model, the project will design and implement a broad spectrum of alternative agricultural practices in the project area. While the baseline irrigation system will already mitigate the unsustainable use of pumped groundwater for croplands, the GEF project will address the root causes of water scarcity and corresponding land degradation in the project area. This includes significant water savings by efficient water use as well as countermeasures to address the excessive use of chemicals and pesticides. The comprehensive water quality monitoring system to be established as part of component 3 (see below) will continuously and precisely measure pollutant levels and serve as an early-warning system. This will enable stakeholders to adjust and intensify SLWM practices if needed to stay within pollution standards.
- 3. Component 3: Rehabilitation of wetlands and grasslands leading to improved land resource protection and biodiversity conservation in the productive landscapes around Chagan Lake.** The baseline projects will provide the starting point for wetland and grassland rehabilitation by flooding the relevant areas with fresh water. However, the high salinity of the soil in Western Jilin complicates the endeavor: the saline levels of the water in the rehabilitated wetlands and the runoff into Chagan Lake could poten-

tially rise too high, causing ecological damages. The project will avoid these negative effects. First, it will use the existing system of newly flooded natural reservoirs (also used to avoid water flow fluctuations downstream; see above) to tightly control the quantity and timing of water flows into the wetlands. Second, it will establish a monitoring system constantly controlling salinity levels at checkpoints across the project area (also used to monitor levels of agrochemicals; see above). The combination of both instruments gives stakeholders full control over the flooding and revitalization process and ensures that excessive salinity levels cannot occur. More broadly, the monitoring and flow control systems will provide powerful instruments to manage the rehabilitation of wetlands and ensure the long-term sustainability of this rehabilitation.

A fourth component provides the monitoring and evaluation of project activities, dissemination of knowledge and information and public awareness raising. The combination of all components works towards the **project’s global environmental objective: demonstrate and replicate an integrated model for Sustainable Land and Water Management (SLWM) in saline-alkaline productive landscapes including rehabilitation and BD conservation in wetlands.**



Integrated model for Sustainable Land and Water Management (SLWM) in saline-alkaline productive landscapes including rehabilitation and BD conservation in wetlands

The Western Jilin Wetlands offer a unique opportunity to address one of the most disruptive environmental challenges China is facing today: large-scale land degradation and biodiversity damages caused by decreasing water resources. The project design has the potential to illustrate a feasible approach to balance between environmental concerns and economic interests with regard to water resource management. **Accordingly, the potential for replication is extraordinarily high.**

The strategy for replication and scaling-up well beyond the scope and duration of the project itself will already be embedded into the project's strategy. The primary project area served by the Songyuan and Da'an water diversion and irrigation systems will be used in order to test and adjust approaches and practices and to develop the comprehensive SLWM model for restoration and conservation of ecosystem services and biodiversity. These approaches and practices and the new model will then be **applied in the wider western Jilin province through integration in the policy, planning and regulatory framework of the province** (component 1) and through education and awareness raising (component 1 and 4). The specific area of the pilot sites is among the most seriously impacted in the western Jilin province by the drying up of ponds and lakes, disappearance of wetlands habitats threatening biodiversity and land degradation processes. The area is in the area of influence of the Chagan Lake which has a particular significance for conservation of wetland habitats and biodiversity with global importance because of its role as resting and feeding area for migratory birds which is reflected in its status as a National Conservation Area. Further the lake is an important source for local food security and income generation with more than 5000 tons of fish harvested every year through indigenous practices by the Mongolian ethnic minority. Securing the water inflow to the lake and rehabilitating wetlands in its surrounding will have a beneficial impact on wetlands habitat and its biodiversity including freshwater fish and the vulnerable and endangered migratory birds.

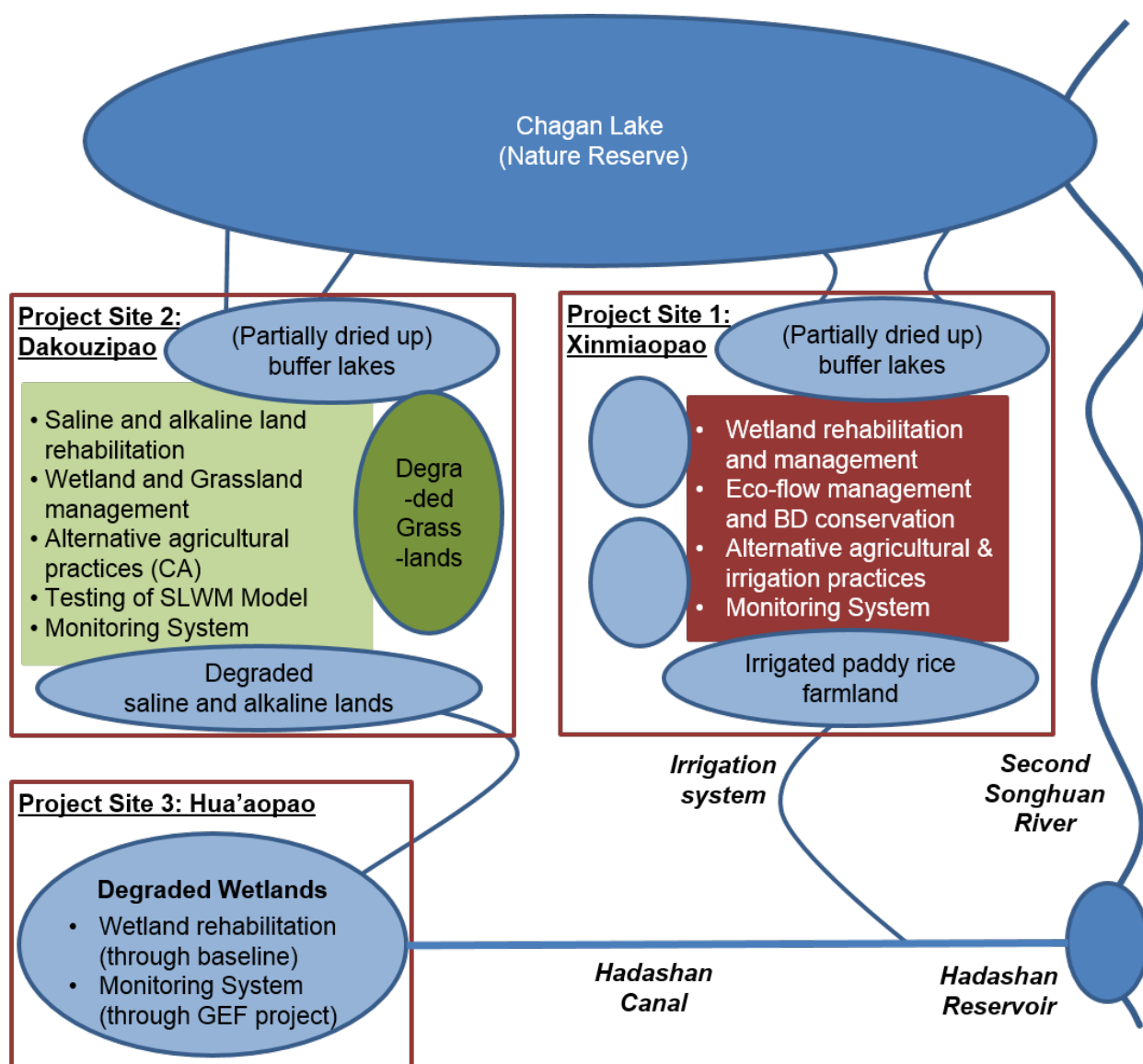


Figure 2.1 Stylized map of project area; summary of project activities per project site

Table 2.1 Summary of Project Areas

Types of location	Description	Area (ha)
Primary Areas	1. Xinmiaopao: Saline land rehabilitation (wetland) and Sustainable Land Management including biodiversity conservation, testing the irrigation water outflow and eco-flow demand for conserving wetland ecosystem	3,130
	2. Dakouzipao: Saline Land Rehabilitation, Alternative agricultural practices based on Conservation Agriculture (CA) principles, Wetland Management, develop and test the integrated and sustainable land and water management model (SLWM)	1,210

	3. Hua'aopao: Wetland rehabilitation (through baseline project complemented by GEF project) and biodiversity conservation and monitoring; also serves as seasonal reservoir for harvesting/storing water during flood season to reduce the water diversion volume from no. 2 Songhuajiang in dry season, and provide balanced irrigation water for the SIA	12,838
Total of primary project area		17,178
Replication Areas	1. Songyuan Irrigation Area: Qianguo, Qian'an, South Da'an counties; replication of integrated SLWM Model	203,012 ¹³
	2. Other replication areas: Zhenlai, Da'an (Tao'erhe)	99,253
Total of direct replication area		302,265

Table 2.2 Summary of project activities in primary project sites

Activity	Component	Description	Area (ha)
1. Design and piloting of set of alternative agricultural practices for sustainable water and land use as well as biodiversity conservation (<i>based on CA principles</i>), <i>Green Paddy Rice Production with reduced chemicals and pesticides for reducing the water pollution in buffer lakes</i>	Component 2, 3	Dakouzi	40
		Xinmiao	30
2. Wetland Rehabilitation (<i>direct rehabilitation through GEF project; baseline restoration in Hua'aopao covers larger area</i>)	Component 3	Xinmiao Dakouzi Total	3,060 1,090 4,150
3. Grassland Rehabilitation	Component 2	Dakouzi	50
4. Rehabilitation of strongly salinized land	Component 2	Xinmiao	70
		Dakouzi	120
		Total	190
5. Monitoring Area (<i>water quality, large set of pollutants, salinity levels, biodiversity e.g. bird populations</i>)	Component 3	Xinmiao	3,060
		Dakouzi	1,090
		Hua'ao:	12,838
		Total	16,988

The primary and replication strategy of the project is summarized in the following diagram:

¹³ Total Area in Songyuan Irrigation Region is 220,000 ha, the pilot area is 17,178 ha, so the replication area is: 220,000-17178=203,012ha

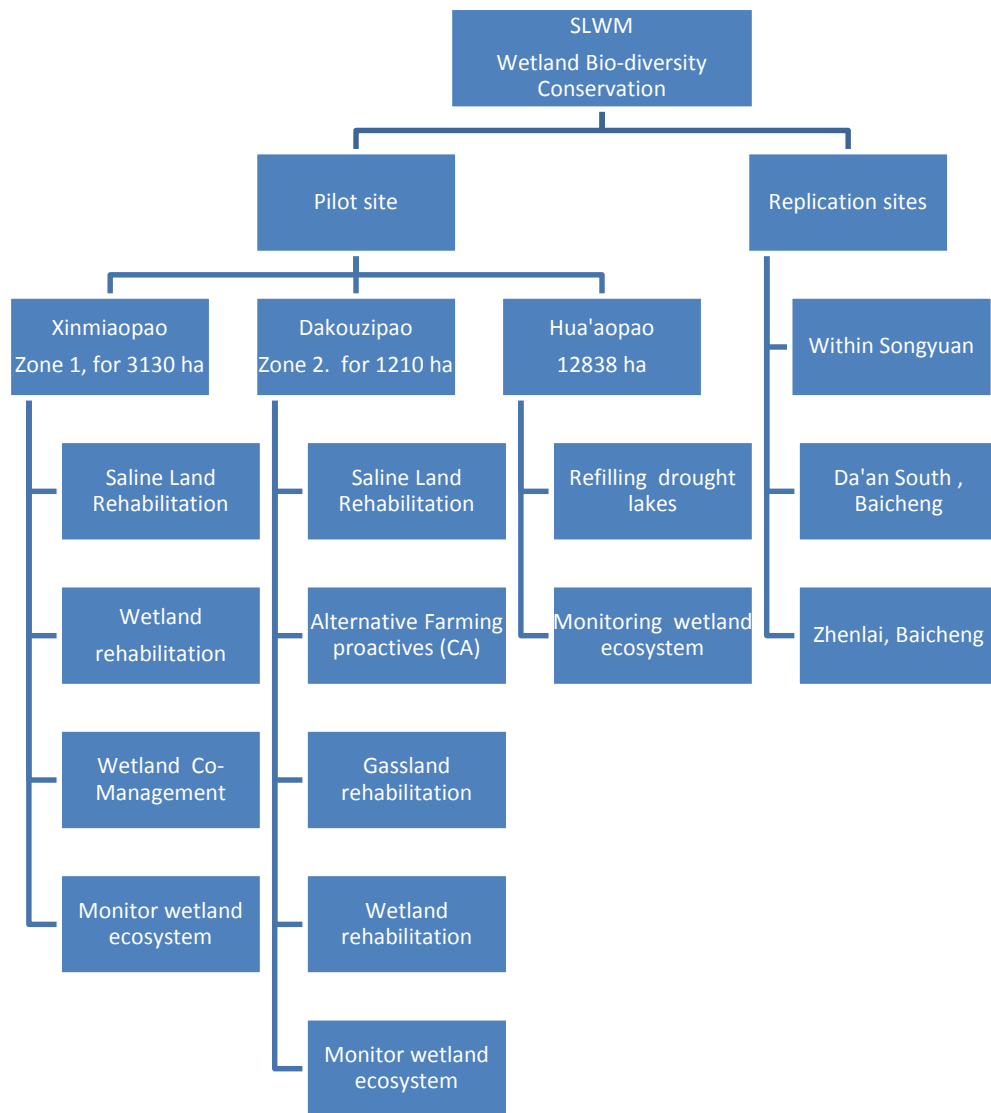


Diagram 2-1: Project Activities in primary and replication areas

2.2 PROJECT OBJECTIVES

The project's **global environmental objective** is to **demonstrate and replicate an integrated model for Sustainable Land and Water Management (SLWM) in saline-alkaline productive landscapes including rehabilitation and biodiversity conservation in wetlands.**

The project's **development objective** is to provide long-term sustainable flow of income to farmer's communities from farming systems (crop, livestock and fish) in western Jilin province by building an ecologically resilient productive landscape.

2.3 EXPECTED PROJECT OUTCOMES

Following the structure of the GEF Project Framework, the description of expected outcomes will be included in the following section 2.4, linked to specific project components and outputs.

2.4 PROJECT COMPONENTS, OUTCOMES AND OUTPUTS

Summary of Components and Outcomes

Component 1: Improvement of the policy, legal and regulatory framework for an SLWM model in productive landscapes, including capacity development

- 1.1 Adoption of integrated SLWM model including biodiversity conservation by local governments and drafting of corresponding policy implementation guidelines
- 1.2 Adjustments of policy plans, legal provisions and regulations to mandate the SLWM model implementation and replication (including location-specific environmental standards for salinity and agrochemical levels)
- 1.3 Training of decision makers, government and technical staff as well as local communities and individual farmers (training in SLWM agricultural practices)

Component 2: Design and piloting of sustainable land and water management and conservation agriculture practices in production landscapes around Chagan Lake

- 2.1 Water management guidelines for agricultural use (based on and flexibly adjustable to the information gathered through the comprehensive water monitoring system)
- 2.2 Design, testing and adoption of sustainable agricultural practices for water and land use in coherence with the overarching SLWM model including the development of technical guidelines for implementation
- 2.3 Local agreement on Integrated Land and Water Management Plans (ILWMP) for agricultural use in coherence with the overarching SLWM model

Component 3: Rehabilitation of wetlands and grasslands leading to improved biodiversity conservation in the productive landscapes around Chagan Lake

- 3.1 Rehabilitation of wetlands in project sites 1&2 leveraging the baseline irrigation infrastructure; water flow management and control informed by monitoring system (see 3.2)
- 3.2 Design and establishment of a comprehensive monitoring system to monitor salinity as well as pollutant levels, water flow quantities, and biodiversity development (*early warning system to inform adjustments of water management and farming practices throughout the project*)
- 3.3 Long-term management system to protect rehabilitated wetlands and conserve wetland biodiversity in project sites of *Xinmiaopao, Dakouzipao and Hua'aopao*; includes a wetland co-management approach for local communities as well as awareness raising efforts wetland biodiversity conservation

Component 4: Monitoring and evaluation of project activities, dissemination of knowledge and information and public awareness raising.

Component 1: Improvement of the policy, legal and regulatory framework for an SLWM model in productive landscapes, including capacity development
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The project will build on existing laws and regulations and primarily target the remaining gap of cross-cutting, integrated landscape approaches. It will improve the enabling environment for combining sustainable land and water management in agriculture with rehabilitation of degraded land and long-term biodiversity conservation. This will include implementation guidelines for alternative agricultural practices as well as tailor-made water efficiency and quality standards for the Chagan Lake region. In addition, the component will provide capacity development for local communities and farmers to enable long-term implementation of the SLWM Model. **Component 1 will provide the groundwork and support system for the project activities under component 2 and 3.**

The project improves and adjusts existing rules to provide a firm and long-term basis for the SLWM model. Existing inter-sectoral and -governmental mechanisms at the prefecture and local level will be used for the promotion of the adoption of the model by counties and prefectures in particular affected by degradation process. The provincial legal, policy planning and regulatory framework for water and land use planning and biodiversity conservation will be adjusted to better support the application and replication of the SLWM model.

In addition, a comprehensive capacity development effort will be conducted under component 1, targeting two levels: 1) political decision-makers as well as ministerial and technical staff in relevant ministries and administration. Trainings will enable them to incorporate long-term land and biodiversity conservation objectives into the overarching policy framework; 2) local communities and individual farmers. Community leaders will be trained in the implementation of wetland co-management schemes to protect the wetlands and their biodiversity after rehabilitation. Farmers will be trained in alternative farming practices based on CA principles, stressing measures for water savings and decreasing use of agrochemicals.

Selection of farmers would follow criteria developed under the project to ensure gender and social concerns are met, however wherever possible would identify innovative and lead farmers. These trainings would serve as a testing forum for content an extension delivery approach for subsequent wider dissemination (see below). The training would be provided to groups of farmers and/or extension workers and be associated with on field demonstrations wherever linked to the pilot activities under component 2 to make training as hands on and relevant as possible. Wherever possible training groups would be selected from existing water user associations and encompass small irrigation units or other existing groups such as green paddy groups.

Outcome 1.1: Adoption of integrated SLWM model including biodiversity conservation by local governments and drafting of corresponding policy implementation guidelines.

Outputs for 1.1:

1.1.1 Adoption of and clear political commitment to the integration of the SLWM model including biodiversity conservation by local governments and relevant line agencies at county level in primary and replication areas (saline-alkaline landscapes with similar ecosystem throughout West Jilin).

1.1.2 Drafting and approval of county level policy implementation guidelines outlining the details of the roll-out of the SLWM model including specific responsibilities of stakeholders.

Indicators and targets: SLWM Model for Western Jilin piloted in primary project areas and adopted for implementation by Da'an and Zhenlai county governments and Baizheng prefecture.

Outcome 1.2: Adjustments of policy plans, legal provisions and regulations to mandate the SLWM model implementation and replication (including location-specific environmental standards for salinity and agrochemical levels)

Outputs for 1.2:

1.2.1 Wetlands biodiversity conservation and SLWM model incorporated into policies, plans, and regulations for the agriculture and water resource management sectors (including land and water use planning and management) in western Jilin province

Indicators and targets: At least a 40% increase in BD-2 TT score; 40-60% in LD AMAT score; incorporation of SLWM and BD conservation recommendations into five years development plans in 4 counties and at least one investment program for western Jilin province (policy recommendations and technical guidance/guidelines for replication of SLWM in West Jilin will be provided by end of Y4 of project duration)

1.2.2 Wetlands biodiversity conservation and SLWM model replicated in saline alkaline landscapes in western Jilin province

Indicators and targets: 4340 ha of saline alkaline landscapes are managed under the application of wet-lands biodiversity conservation and SLWM practices at the end of the project and 302,265 ha 5 years after the end of the project

Outcome 1.3: Training of decision makers, government and technical staff as well as local communities, extension workers and individual farmers (training in SLWM agricultural practices)

Outputs for 1.3:

1.3.1 Decision makers and technicians from water resource, agriculture, forestry, environmental protection bureau at prefecture and county level and Chagan Lake Administration are trained in: a) application of participatory approaches to support the adoption of wetlands biodiversity conservation and SLWM practices; b) Water saving agriculture, Conservation Agriculture, Ecological Agriculture grassland management; c) Biodiversity Conservation, Wetland Management, etc. d) Community biodiversity conservation and co-management, farmer's cooperatives management, etc.

Indicators and targets: 60 technicians and decision makers from relevant line agencies of Da'an and Zhenlai County are trained in procedures and technologies included in SLWM and BDC models; 80 decision makers from provincial, prefecture and county levels attended the SLWM and BDC related policy consultation workshop and built agreement on how to replicate two models into policy, five years plans and government supported projects in West Jilin.

Table 2.3: Training plan for replicating SLWM model into governmental development plans

Training course and workshops	Major contents	No of participants	Duration (day)
Training of governmental officials and decision makers in county line agencies	- Application of participatory approaches to support the adoption of wetlands biodiversity	60 persons selected from Da'an and Zhenlai County: - County agricultur-	2 days

	<ul style="list-style-type: none"> - conservation and SLWM practices; - Water saving agriculture, Conservation Agriculture, Ecological Agriculture, grassland management, Biodiversity Conservation, Wetland Management, etc.; - Community biodiversity conservation and co-management, farmer's cooperatives management, etc. 	<ul style="list-style-type: none"> - al bureau; - County water resource bureau - County grassland stations - County Forest Bureau - County land administration - County Development and Reform Commission - Chagan Lake Natural Reserve, Xianghai Natural Reserve, Momoge Natural Reserve 	
Multi-Stakeholder Policy Consultation Workshop for replicating the SLWM and BDC models into current policies and development plans in West Jilin	<ul style="list-style-type: none"> - Present the SLWM and BDC models and successful cases and practices and other results - Consultation with relevant stakeholders how to replicate SLWM and BDC models into county five year plan, and sectoral development strategy and plans - Approaches and action plan for replication of 2 models into on-going government supported programs - Formulate policy recommendations to provincial governmental line agencies 	<p>80 participants to be invited from:</p> <ul style="list-style-type: none"> - Provincial line agencies - Songyuan and Baicheng Prefecture government line agencies - County line agencies of Qian'guo, Qian'an, Da'an and Zhenlai 	1 day

1.3.2 Extension workers and Farmers trained in application of SLWM practices including green/ecological, conservation, water saving and grassland rehabilitation practices.

Indicators and targets: 400 farmers and 70 extension workers trained.

Table 2.4 Training plan for extension workers and farmers within PAs (Qian'guo and Qian'an)

Training course	Major contents	No. of persons	Duration (day)
Training of county extension workers in SLWM	<ul style="list-style-type: none"> - Saline Land Rehabilitation procedures and technologies - Water saving agriculture 	<p>70 persons selected from:</p> <ul style="list-style-type: none"> - County Agricultural Bureau 	2

	<ul style="list-style-type: none"> - Conservation Agriculture (CA) - Ecological Agriculture, IPM - Grassland Management 	<ul style="list-style-type: none"> - County agriculture extension center, plant protection station - County grassland station - Technicians from Water Resource Bureau 	
Training of farmers in the pilot areas	<ul style="list-style-type: none"> - Water saving agriculture and irrigation technologies and facilities - CA technologies and practices - Ecological and organic farming technologies and practices, IPM - Sustainable grassland management - Provided in farmer's field school 	<ul style="list-style-type: none"> - 60 persons selected from the villages in adjacent areas of Pilot Areas (PA) in Xinmiaopao and Dakouzipao. 1/3 of the trainees will be female workers in the households. - Two courses will be conducted, 30 trainees for each PA course. 	2
Field demonstration and SLWM information leaflets dissemination	<ul style="list-style-type: none"> - Organize CA, ECA, IPM field demonstration to pilot spots - Distribution of technical leaflets of SLWM and technical guidelines to households close to PAs - Design and distribute CA, ECA, etc. posters to villages and households 	<ul style="list-style-type: none"> - 400 farmer's households 	1 day field demonstration, but organized in 4 times
TV and DVD for replicating SLWM practices	<ul style="list-style-type: none"> - Collect successful cases in CA and water saving agriculture - Produce DVD and TV program 	<ul style="list-style-type: none"> - 2000 households 	N/A

Component 2: Design and piloting of sustainable land and water management and conservation agriculture practices in production landscapes around Chagan Lake

As part of the comprehensive SLWM Model, the project will design and implement a broad spectrum of alternative agricultural practices in the project area. The GEF project will address the root causes of water scarcity and corresponding land degradation in the project area. This includes significant water savings by efficient water use as well as countermeasures to address the excessive use of chemicals and pesticides. The comprehensive water quality monitoring system to be established as part of component 3 (see below) will continuously and precisely measure pollutant levels and serve as an early-warning system. This will enable stakeholders to adjust and intensify SLWM practices if needed to stay within pollution standards

The objective of this locally based and driven component is to develop and implement an alternative set of agricultural practices coherent with sustainable land and water management in the primary project areas. The project will pilot the adaptation of conservation agriculture and improved soil and water conservation techniques. Overuse by groundwater pumping will be replaced, water savings realized, and water pollution by excessive use of agrochemicals will be dramatically reduced. For improving the wetland ecosystem in the down-reach buffer zone of Xinmiaopao and Dakouzipao, low pollution and ecological agriculture, conservation agriculture practice will be also piloted in the two pilot areas.

The efficient management of water resources is expected to contribute to improved irrigation productivity, rehabilitation of degraded (or desert) pasture lands, and improve buffer zone hydro-ecosystem for restoring and rehabilitating the wetland ecosystem that will contribute to stabilization of the Chagan Lake ecosystem. As such, the improvement of agricultural practices will be closely integrated with the ecosystem rehabilitation efforts described under component 3.

In close connection with the training and capacity development activities under component 1, the component also aims to strengthen the capacity of land and water management authorities and institutions responsible for monitoring, development and prevention of degradation. It will strengthen the capacity of the County Agriculture Department (CAD), water user associations and farmers to be active participants in the land and water management process.

Detailed description of piloting alternative agricultural practices in two project areas

The project will develop and pilot test strategies for sustainable management and control of water resources in agricultural practices. Properly controlled and measured runoff irrigation water amount by sluices regulation would reduce water pollution and degradation and desertification of land, and to restore degraded wetland (16,988 hectares) and native vegetation and pasture land, which may contribute in improvement of the agricultural production activities.

The experimental station in Songyuan irrigation area has already conducted a number of initial experiments and demonstrations for sustainable land and water management including conservation agriculture, pasture management, water-saving technology, the restoration of vegetation, pollution control of wetlands, ecological agriculture, and reduction and mitigation of land degradation. The GEF project will build on these initial experiences and tests with Conservation agriculture and water-saving irrigation technologies will help local communities to systematically adopt these techniques. Water-saving technology such as drip irrigation may optimize water use efficiency together with other farming practices like plastic film mulching. The results of experiment and demonstration would be analyzed and evaluated for screening the best practices and recommendation in the management guidelines for further socioeconomic and financial feasibility analysis and promotion.

The project will work closely with farmers to analyze and evaluate current land use status to identify the factors which have critical importance in influencing the land degradation and its restoration process such as local climate, hydrological cycle, soil salinization process, etc. The salinization process/mechanism in relation to water and salt movement under field condition and controlled environment would be studied. The analysis would include monitoring and observation of soil salinization process including soil solute transport under the existing ecosystem and land use and its effect on physiological properties of plant (i.e. stress). The same analysis would be conducted for rice production under irrigation (paddy field) to identify appropriate irrigation method in salinization risk areas. The results will be used in the development of the guidelines described below.

Detailed description of piloting alternative agricultural practices in two project areas (continued)

In order to achieve the objectives, the project will review the current strategies on water management and quality control in project site 1 (reclaim saline land to paddy field, measuring the water demand for flushing soil salt, water saving pilot in rain-fed farmland, grasslands rehabilitation) and project site 2 (already existing paddy field, will pilot ecological paddy rice production, IPM, rational fertilization, measuring the pollution reduction to wetland).

Project site 1: Saline land will be first converted to paddy rice field, water demand for flushing soil salt will be measured, salt content of drainage outflow water to the buffer zone will be also measured. Rain-fed areas would be supported for the introduction of conservation tillage techniques, particularly direct seeding and crop residue mulching. These techniques vastly improve rainwater infiltration and retention, which can have a significant effect on improving soil organic matter and yields. For piloting the regeneration of the grassland areas controlled flooding will be applied to flush surface salts, the area will then be seeded with suitable salt resistant pasture species and establishment will be assured by existing sprinkler irrigation.

Project site 2: A number of strategies will be adopted in the paddy producing areas with the dual intention of reducing the impact of irrigation on salinity levels and pesticide contamination in the surrounding environment (groundwater, buffer zones and wetlands). To achieve this a multi-faceted approach will be undertaken. Capacity of stakeholders will be built so that they have an understanding of the basic principles of the salt and water balance, and the impact of various practices on this balance. To reduce outflows in the pilot areas on-farm studies will be undertaken that will allow the flow rates coming into an irrigation unit as pilot to match its water requirement. This will be achieved by using a combination of farmers acquired experience, simple water measurement devices and crop evapotranspiration data. Concurrently farmers in this area would be supported to adopt green/ecological paddy, IPM and conservation agriculture practices and also monitor the groundwater levels, particularly before and after irrigation events. The combination of IPM and reduced outflows will potentially reduce pesticide contamination and potentially allow for more water to be diverted for either ensuring better equity of water distribution among users or more water availability for environmental purposes. Neighboring irrigation units would be used as control areas. In addition other field level water saving technologies will be tested using participatory farmer modalities including (but not limited to) alternate wetting and drying, system of rice intensification, land leveling, and rotational crops in row/bed configurations.

Technical guidelines will be developed for the specific areas described above by reviewing the current agriculture practices and technologies applied and potentially sustainable and ecosystem friendly/low impact rice production systems in the region. The ecosystem friendly/low impact agricultural production technology will be promoted through training and technical guidance/demonstration, following the existing national green food production standard and regulations (i.e. NY/T394-2000, NY/T393-2000). Technical guidelines will be developed that incorporate the existing information with salinity and water management techniques specific to the project area and tested in the pilots areas.

Component 2 will also include the design and local adoption of location-specific **Integrated Land and Water Management Plans** to serve as a backbone of the overarching SLWM Model. The purpose of the ILWMP is to provide the strategic vision for the whole project area in Song-

yuan Prefecture, and as such will include a mid and long term development plan for the area (for example under this project water quality and quantity testing is only planned for pilot areas, the ILWMP would spell out how this would be expanded to the whole area region). The plan would also contain specific information regarding seasons to season and day to day management of the water resources. Lastly the plan would also define the mechanisms by which it would be updated using data collected over time (for example it is possible that a flood event may not occur during the life of the project, however when it does occur, hard data on salinity levels, water flows and levels would be very useful for updating theoretical flood management plans). This plan will be a useful tool for water resource managers, those monitoring environmental indicators and water users (including fishers).

The objective of this activity is therefore to prepare a comprehensive and dynamic ILWMP (see outcome 2.3) for the Project area that integrates agriculture, pasture management, biodiversity conservation and ecosystem service preservation with salinity and water management. The results of the pilot activities, the water monitoring and the guidelines described above would be integrated into the development of this plan.

Features and goals of the Integrated Land and Water Management Plans

- Understand the water and salt balance of the project area, which can be refined as more data becomes available (for example as more water measurement devices are installed, more flowmeters)
- Allocation of realistic volumes of water to the 5 key areas (need to determine the need of each, compare against the availability and a development of a mechanism of prioritization)
- Strategy for low water years (who gets the water and who misses out)
- Flood management plan, particularly if there is danger of flooding risk for certain crops
- Lake stabilization strategy
- Wetland management strategy and operation plan
- Regenerating degraded grass lands and establishing buffers,
- The resultant ILWMP may contain a number of policy recommendations for further investments (water control structures, measurement devices, additional canals (for instance to cope with flood flows or recirculation of irrigation water) and for changing and regulating resource user's behaviors toward sustainable land and water resource management.
- Must also recognize that as the irrigated area develops the level of 'irrigation service' that farmers require (to move to higher value crops) will need to increase.
- Include provision for farmers who depend on the water resources for fishery and live-stock production.
- Include agreement for convergence from various other stakeholders on key synergistic programs/schemes (i.e. Agricultural Department for IPM, Conservation agriculture and green paddy and the Department of Environment for water quality monitoring)
- Include the 3 biodiversity co-management plan for the wetlands and buffer zone developed and under implementation

Outcome 2.1: Water management guidelines for agricultural use (based on and adjustable to the information gathered by the comprehensive water monitoring system)

Outputs for 2.1:

2.1.1 Water management guidelines for agricultural water used as well as use of chemicals and pesticides formulated and implemented in all project sites (closely connected to the water monitoring system to be established under component 3, see below)

2.1.2 Ground water levels stabilized in the project area and positive demonstration effects for the wider irrigation area

Indicators and targets: Groundwater level no lower than 7 meter in the project area, which is the minimum required eco-indicator for sustaining the underground water reserve.

Outcome 2.2: Design, testing and adoption of sustainable agricultural practices for water and land use in coherence with the overarching SLWM model including the development of technical guidelines for implementation

Outputs for 2.2:

2.2.1 Degradation and desertification processes stopped and reversed in saline-alkaline land with improved vegetation cover resulting in increased productivity and reduced vulnerability to climate variability

Indicators and targets: *Degradation and desertification processes reversed in 32,000 ha 170,780 ha rehabilitated saline-alkaline land by the end of the project, 46700 ha will be improved by 2025 depending on the construction process of the relevant irrigation projects*

2.2.2 SLWM agricultural practices adopted in Qian'an and Qian'guo pilot sites and scaled to the total Songyuan irrigation area of integrated production landscape contributing to the conservation of wetlands biodiversity

Indicators and targets: *SLWM practices adopted in 48573 ha in the two pilot sites at end of the project, and scaled to 172,000 ha covering the total Songyuan irrigation area 5 years after the project*

2.2.3 Develop technical guidelines in i) salinity management for irrigated fields (including 'green/ecological' paddy production, irrigation area conservation agriculture and reducing agrochemicals, ii) reclaiming saline irrigation areas (reclaiming saline alkaline wastelands by washing out the salt), iii) rain-fed farmland (conservation agriculture), and iv) rehabilitation of native grassland (irrigation and enclosure).

2.2.4 Farmer's households adopt SLWM practices and benefit from increased land productivity in two pilot sites

Indicators and targets: *27,000 farmer's households (4,000 in Qian'an and 23,000 in Qian'guo) adopt SLWM practices and land productivity increased to:*

- *9,750 kg/ha for ca. 200ha of paddy rice fields (scaled to 45,000ha in PY4 to PY4+5)*
- *10,500 kg/ha and 11760 CNY/ha for ca. 200ha of corn in rain-fed land (scaled to 45,000ha in PY4 to PY4+5)*
- *13,500 kg/ha and 8505 CNY/ha for 2000ha rehabilitated grassland*
- *Fish: 350kg/ha and 800 Yuan /ha net income for 4150 ha in Xinmiaopao and Dakouzipao Pilot Areas; for 12838 ha replicated in Hua'aopao in Y4 and Y5*

Outcome 2.3: Establish and gain local agreement on Integrated Land and Water Management Plans (ILWMP) for agricultural use in coherence with the overarching SLWM model

Outputs for 2.3:

2.3.1 Prepare comprehensive and dynamic ILWMP for the project area that integrate agriculture, pasture management, biodiversity conservation and ecosystem service preservation with salinity and water management.

Indicators and targets: see below

2.3.2 Integrated land and water management plan (ILWMP) for the entire Songyuan Area consulted, validated and agreed with relevant stakeholders.

Indicators and targets: One Integrated land and water management plan (ILWMP) for Songyuan area covering 220,000 ha agreed with stakeholders.

2.3.3 Integration of the ILWMP guidelines and principals into the training programs of the WRB and CAD (measured by the number of training packages updated). Convergence with key programs of the WRB and CAD, namely water saving irrigation, water saving agriculture, IPM, green/ecological paddy production and machinery subsidies for conservation tillage machinery (measured by the number of trainings delivered by WRB and CAD to water user associations (or members)).¹⁴

Indicators and targets: Implementation of ILWMP in 167,000 ha by the end of the project and 220,000 ha 5 years after the end of the project.

Component 3: Rehabilitation of wetlands and grasslands leading to improved biodiversity conservation in the productive landscapes around Chagan Lake

The baseline projects will provide the starting point for wetland and grassland rehabilitation by flooding the relevant areas with fresh water. However, the high salinity of the soil in Western Jilin complicates the endeavor: the saline levels of the water in the rehabilitated wetlands and the runoff into Chagan Lake could potentially rise too high, causing ecological damages. The project will avoid these negative effects. First, it will use the existing system of newly flooded natural reservoirs (also used to avoid water flow fluctuations downstream; see above) to tightly control the quantity and timing of water flows into the wetlands. Second, it will establish a monitoring system constantly controlling salinity levels at checkpoints across the project area (also used to monitor levels of agrochemicals; see above). The combination of both instruments gives stakeholders full control over the flooding and revitalization process and ensures that excessive salinity levels cannot occur. More broadly, the monitoring and flow control systems will provide powerful instruments to manage the rehabilitation of wetlands and ensure the long-term sustainability of this rehabilitation.

The objective of component 3 is to pilot and develop a replicable model for rehabilitation and conservation of wetland ecosystems and biodiversity in project pilot area and to further replicate the model in Songyuan Irrigation Area and whole West Jilin Region. The Wetland Biodiversity Conservation Model (WBCM) will be piloted in three project pilot areas, namely in Xinmiaopao, Dakouzipao and Hua'aopao, covering a total wetland area of 16988 ha within Songyuan Irrigation Area.

¹⁴ The widespread dissemination of the agriculture technologies described in the ILWMP will be primarily led by the Water Resource Bureau (WRB) and CAD, associated with the capacity development and training for WRB and CAD staff described above and by converging with relevant programs/schemes of the WRB and CAD (including fisheries and livestock).

For achieving the objective the project will support to: (i) Develop a set of water quality and quantity requirements for rehabilitating and conserving the wetland hydro and ecological system that will provide a better habitat environment for migrant birds and aqua-organism as food of birds. (ii) Establish a buffer zone water quality and biochemistry and biophysical status monitoring system for collecting dynamic data and information to the WBCM to guiding the wetland biodiversity conservation practice; (iii) wetland biodiversity monitoring system to measure the changes of migrant bird species and the total number caused by wetland ecosystem improvements and community co-management practices. (iv) pilot wetland co-management mechanism in selected sites; and (v) enhancing public awareness on the wetland biodiversity conservation.

A pivotal part of component 3, which will also be closely integrated with component 2, is the **design and establishment of a comprehensive water monitoring system** to monitor salinity as well as pollutant levels, water flow quantities, and biodiversity development. The monitoring system will serve as an early warning system to inform adjustments of water management and farming practices throughout the project duration.

Detailed description of water monitoring system – Salinity and pollutants

The project will set up the procedures and testing sites for collection, analyzing and reporting of water quantity and quality data of the Second Songhua river water resource management areas. Presently there is no water quality or quantity measurement conducted in the project area downstream of the Hadashan water reservoir. The collection is essential for provision of data for establishing baseline levels (salt loads and water distribution to the various areas of importance (irrigation, regeneration of grasslands, cleaning of buffers and restoration of lake) and to guide the preparation of the ILWMP. In the longer term the collection of such data will feed into strategic management, in particular the updating of the ILWMP.

Purpose of monitoring buffer zone water quality and quantity requirement is to provide feedback information and technical guidance to the SLWM model and guiding farmer's and community's land and water management practices for ensuring the wetland ecosystem minimum requirement for achieving the wetland biodiversity. Water quality from the irrigation outflows of existing paddy rice field, new developed saline land for paddy rice, rain-fed farmland, grasslands as well as piloted CA and ECA, will be measured against selected biochemistry, biophysical indicators. The quality measurement results will be also used for determining the quantity requirements on ecological water for diffusing and washing out the pollutants exceeded the biophysical standards required by wetland water quality.

The water quality and quantity data collected from buffer zone will be the basis for water demand modelling both for the upstream paddy rice, rain-fed farmland and grassland as well as for flushing out soil salt in the initiative period of saline land rehabilitation. Water samples will be taken from: (i) outflows of different types of farmland used for paddy rice and other crops as specified in component 2; and (ii) from the wetlands formed in the buffer zones of Xinmiaopao and Dakouzipao pilot areas. Number and time points of water samples will be determined based on the irrigation scheme and flood water inflow during the rainy season.

Monitoring Framework for pollutants and salinity

Sites	Monitoring contents and Arrangement of monitoring points	Indicators	Sampling Methods
1.Dakouzi pond 2. Xinmiao pond 3.Hua'ao & Daozi pond	Water quality sampling and analysis Set four points in inlet and four in outlet at Xinmiao pond Set four points in inlet and four in outlet at Dakouzi pond Set four points in reed growing areas and four points in Wetland buffers at Hua'ao & Daozi pond	pH, COD, BOD, DO, TP(Total phosphate), TN(total nitrogen),TK (total potassium), Salinity	three times a year three days per time take two sets of samples at each point

Detailed description of water monitoring system – Biodiversity monitoring

The water monitoring system will also **monitor wetland biodiversity** covering water birds and aquatic organisms, in terms of change of numbers and species and varieties caused by the project interventions. The ecological requirements and influence of water level and water quality changes on water bird population and habitat utilization; influence of pollutants on the survive and growth of aquatic organisms. The results of wetland biodiversity monitoring will be used for guiding the dynamic modification of land irrigation water outflow and ecological water supply.

Monitored BD indicators will include a) buffer zone and wetlands including indicators for species tolerance to different pollutants and water availability to provide feedback to the inflow and outflow management strategy of the buffer zone (output 3.1.2) and wetlands rehabilitation practices; b) paddy fields with focus on migratory birds; c) grasslands being rehabilitated with native species to inform rehabilitation practices; d) number and species of bird in rehabilitated wetland by refilling water in Hua'aopao and the habitats ecosystem restoration process.

Monitoring Framework for biodiversity

Sites	Monitoring contents	Indicators	Methods	Outcome
1.Dakouzi pond 2. Xinmiao pond 3.Hua'ao & Daozi pond	1. The tolerance of typical wetland plants to pollutants include of nitrogen, phosphorus, salinity, pH etc. 2. Investigation of the Tolerance of Plankton and Benthos in Wetlands against Pollutants. 3. toxicological experiments of agricultural non-point source pollutants 4. Analysis of Populations structure of plankton and benthos 5.Survey of Species of Aquatic Higher Plants & Wild Fish	1.population structure 2.dominated species 3.sensitive species 4.toxicology experiment in lab	Investigation and classify the species of plankton by microscope 5 times through the whole year Monitoring points:5~10 Set up the correlation curve major plankton and tolerable dossiers of PH, nitrogen, phosphate, COD, BOD, etc.	Biodiversity monitoring system for: a) buffer zone and wetlands; b) paddy fields with and c) grasslands

Component 3 will also include the establishment of a **long-term management system to protect rehabilitated wetlands and conserve wetland biodiversity**. These efforts will include a wetland co-management approach for local communities as well as awareness raising efforts on wetland biodiversity conservation. Wetlands biodiversity conservation needs proactive participation and engagement of different resource users, including the farmers in the adjacent areas. Wetland co-management model has been piloted in Momoge and Xianghai Wetland Natural Reserves and accepted as an effective method for biodiversity conservation. The co-management mechanism will be also introduced in Xinmiaopao project area.

Features of the co-management mechanism will include: a) establish wetland co-management committee; b) conduct participatory wetland survey and community consultation for development of co-management plan; c) pilot for reducing bird habitat disturbance by the human economic activities; d) pilot and support alternative livelihood activities.

This will be complemented by efforts to enhance the wetland conservation and protection awareness and knowledge of community resource users and other stakeholders within project pilot areas. The project will support the pilot communities and relevant NGOs including the County Women’s Federation. Planned awareness campaign activities include: (i) organize field demonstration days to show the wetland co-management plans and results of implemented conservation activities; (ii) design the distribute the wetland biodiversity conservation posters with focus on: a) the ecological functions of wetlands, such as function in against floodwater, regulating runoff, storing floodwater to avoid drought, regulating climates, controlling pollution, and the importance of wetland biodiversity in promoting their living environments, as well as their own survive and development. b) wetlands biodiversity conservation countermeasures and actions; (iii) inviting community representatives, including female farmers, to visit Wetland Conservation Education Center in Chagan Lake National Natural Reserve Administration; (iv) Wetland Conservation Education in a partner school, etc.

Table 2.6 Training and community education plan for wetland and biodiversity conservation

Activities	Contents	Participants	Duration (days)
Training on wetland conservation	<ul style="list-style-type: none"> - Importance of wetland conservation - Wetland conservation procedures and technologies - Wetland conservation planning - Wetland co-management - Participatory M&E of the conservation impacts 	40 persons: 20 will be selected from Xinmiaopao PA and 20 from Dakouzipao PA. two course will be conducted	1 for each course
Field demonstration on wetland co-management	<ul style="list-style-type: none"> - Visit wetland co-management area - Introduction of the wetland biodiversity conservation activities 	40 persons selected from communities in the adjacent area of Xinmiaopao and Dakouzipao PAs	1 day
Design community campaign on wetland biodiversity conservation	<ul style="list-style-type: none"> - Posters on wetland conservation - Leaflets for guiding the conservation activities 	400 households in 2 PAs	
Visit wetland educa-	<ul style="list-style-type: none"> - Watch DVD 	40 persons	1

tion center in Chagan Lake Natural Reserve Administration	- Visit the bird and plant specimen room		
Wetland conservation education in school	- Design the contents - organize the school campaign, contest - Visit wetland pilot village	400	1

Outcome 3.1: Rehabilitation of wetlands in project sites 1&2 and improved biodiversity conservation leveraging the baseline irrigation infrastructure; water flow management informed by monitoring system (see 3.2)

Outputs for 3.1:

3.1.1 Rehabilitation and conservation of wetlands managed as an integrated part of the freshwater fishery and irrigated crop and grassland production landscape providing important habitats for endangered migratory birds resting and feeding in these wetlands.

Indicators and targets: Rehabilitation and conservation of 24,100 ha wetland (direct impact pilot area) and an additional 5600ha in Da'an South (indirect impact in whole irrigation area)

3.1.2 Improved biodiversity indicators for: population and number of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned), plus other migratory species mentioned in the baseline table⁴

Indicators and targets: Population and number of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned), plus other migratory species mentioned in the baseline table⁴, maintained or increased in pilot sites by the end of the project (<5% variance)

Outcome 3.2: Design and establishment of a comprehensive monitoring system to monitor salinity as well as pollutant levels, water flow quantities, and biodiversity development (early warning system to inform adjustments of water management and farming practices throughout the project)

Outputs for 3.2:

3.2.1 Establish comprehensive monitoring system measuring pollutants and salinity across the project area.

Indicators and targets: Water quality and quantity measurement system (including protocols, databases and reporting formats) installed in pilot areas of Xinmiaopao and Dakouzipao, will be functioning by the end of PY1 and PY2 respectively and information will be incorporated into the ILWMP by the beginning of PY4

3.2.2 Agricultural non-point source pollution controlled and monitored within the project area.

Indicators and targets: Measurements for agriculture non-point source below required values

3.2.3 Model for water quality requirements and ecological water demand for rehabilitation of wetlands developed based on the data collected from buffer zone inflow and outflow water quality and quantity measurement.

Indicators and targets: One model developed and will be incorporated into the SLWM Model by end of Y4.

3.2.4 Buffer zone inflow and outflow water quality and quantity systematically monitored and analyzed, and pollution risk early warning system and inflow and outflow management strategy implemented.

Indicators and targets: Systematic monitoring, early warning system and inflow and outflow operation strategy in place by Y2 and providing monitoring information and data in Y2, Y4 and Y5.

3.2.5 Establish comprehensive monitoring system measuring biodiversity across the project area.

Indicators and targets: Biodiversity monitoring system operating monitoring at least the species mentioned in outcome 3.1 b) and providing data on aquatic organism biodiversity changes in three wetland pilot areas (Xinmiao, Dakouzi and Hua'aopao) and giving monitoring feedback information and suggestions to modifying the irrigation and water supply strategy

Outcome 3.3: Long-term management system to protect rehabilitated wetlands and conserve wetland biodiversity; includes a wetland co-management approach for local communities as well as awareness raising efforts wetland biodiversity conservation

Outputs for 3.3:

3.3.1 Wetlands co-management committees with local communities and county reed administration and biodiversity co-management plan for the wetlands and buffer zone prepared and under implementation.

Indicators and targets: 3 wetlands co-management committees established, 3 biodiversity co-management plan for the wetlands and buffer zone developed and under implementation

3.3.2 Awareness raising campaign on wetlands biodiversity conservation implemented in rehabilitated and existing wetlands in the area of influence of the Songyan irrigation area

Indicators and targets: Campaign implemented reaching 6 communities and at least 40% of the families are aware of wetlands biodiversity and habitat conservation needs (evaluated through campaign impact survey)

Component 4: Monitoring and evaluation of project activities, dissemination of knowledge and information and public awareness raising.

A PMO will be set up and operational with qualified management and technical staff for guaranteeing the successful implementation of the project and coordinating the participation and contributions from different line agencies.

Output 4.1.1: Project monitoring system is set up and operational for ensuring the effective implementation of the planned project activities and providing six-monthly reports on progress in achieving project outputs and outcomes

Target: 8 six-monthly progress reports and financial reports; regular monitoring missions conducted by PMO M&E staff

Output 4.1.2: Annual review and planning workshop carried out to ensure the achievements of the intended outputs and outcomes; Midterm and final evaluation reports

Target: 2 Evaluations conducted

Output 4.1.3: Project results and best practices disseminated

Target: 1 up-to-date project website and 8 six-monthly project newsletters

2.5 GLOBAL ENVIRONMENTAL BENEFITS

The anticipated direct GEBs in the project pilot sites will be: (i) Degradation and desertification processes reversed in 170,780 ha saline-alkaline land with improved vegetation cover resulting in sustainable productivity and reduced vulnerability to climate variability, namely the drought and floods; (ii) 220,000 ha of integrated production landscape under SLWM practices, and conservation and environment-friendly agriculture practices, etc.; (iii) Rehabilitation and conservation of 49,883 ha wetland managed as an integrated part of the freshwater fishery and irrigated crop and grassland production landscape providing important habitats for endangered migratory birds resting and feeding in these wetlands; (iv) Wetland habitat for freshwater fish, mammals, water fowl and endangered migratory birds is conserved leading to: 1) population of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned) maintained or increased in pilot sites by the end of the project (<5% variance); 2) population of wetlands mammals such as the IUCN red-listed Eurasian otter increased in pilot sites.

Further to these direct global benefits in the pilot sites the project will also have indirect benefits in the wider western Jilin wetlands and agro-pastoral landscape (50 000 km²). The valuation of biodiversity and ecosystem services in land use and water planning and management; the mainstreaming of the integrated SLWM and conservation model in policies, programs and regulations in the water, agriculture and livestock sectors within the western Jilin province; and the enhanced awareness of wetland ecosystem services and conservation measures in local land and water management and agriculture activities, will allow for that the global benefits of the project will cover significantly more hectares than the rehabilitated hectares mentioned above.

2.6 COST EFFECTIVENESS

The project is expected to reach a particularly high level of cost effectiveness as it is based on extensive utilization of existing structures. As described in section 1.1, the project is not only aligned with, but firmly embedded into comprehensive government effort to find environmentally sustainable solutions for irrigation and water diversion schemes. Instead of building cost-intensive own mechanisms, the project leverages the emergence of a pioneering approach to agricultural irrigation combined with degraded land rehabilitation. The significant infrastructure investments have already been provided. The project will make targeted adjustment to the current scheme and will, with a small GEF investment, improve the entire environmental trajectory of the major baseline activities. By instilling pollutant, salinity and biodiversity monitoring into the irrigation scheme, a long-term balance between agricultural productivity and environmental protection becomes possible. By complementing this with the introduction of alternative, environmentally sustainable agricultural practices, a relatively small adjustment will create a new paradigm of Sustainable Land and Water Management. Thereby, the project will realize an exceptionally high GEB return to incremental investment, making this project highly cost effective.

2.7 INNOVATIVENESS

The project offers a unique opportunity to address one of the most disruptive environmental challenges China is facing today: large-scale land degradation and biodiversity damages caused by decreasing water resources. China is approaching a breaking point regarding its land and use in agricultural lands and the related environmental damages. Across northern China, numerous ecosystems that include agricultural landscapes are at the brink of irreversible environmental

damages. China urgently needs solutions for protecting these landscapes while balancing environmental protection with the socio-economic needs of local communities. Diversion of water resources in the context of large irrigation systems will inevitably be part of these restoration efforts. Thus far, water diversion projects in China followed a rather heavy-handed approach, focusing on local agricultural needs while ignoring detrimental effect to the local as well as downstream ecosystems. **Demonstrating an innovative and prudent way of environmentally sound water diversion**, featuring a clear understanding of ecosystem impacts and innovative solutions for maximizing environmental benefits, carries enormous potential to improve biodiversity conservation and land management across China.

All building blocks are in place to implement an innovative and pioneering solution: keen environmental awareness of stakeholders, major government resources and strong political will. The project will build upon a carefully planned for water diversion to improve degraded croplands and rehabilitate wetlands of vital ecological importance. The project will complement the envisioned irrigation system to make it environmentally sound and ensure that land degradation and biodiversity concerns are adequately addressed. The project will combine this rehabilitation effort with the introduction of sustainable agricultural practices based on the tried and tested principles of Conservation Agriculture (CA) with a strong focus on sustainable and efficient water-use and avoidance of water pollution through agrochemicals. Both aspects, rehabilitation of degraded wetlands plus introduction of sustainable agricultural aspects, will in their combination create an integrated SLWM Model.

SECTION 3 – FEASIBILITY

3.1 ENVIRONMENTAL IMPACT ASSESSMENT

Irrigation schemes, especially those involving river water diversion, always carry the risk of negative environmental impacts. **Nonetheless, sensible river diversion for irrigating degraded areas will inevitably be part of China's answer to the environmental crisis unfolding in drought prone Northern China.** The most promising strategy at this point is to devise innovative and careful ways of managing water flows in irrigated areas as to minimize negative economic as well as environmental impacts while maximizing the environmental gains to be earned from increased water ability in degraded areas. Without such solutions, river diversion in China will continue to be heavy handed and purely economically driven, causing irreparable damages to ecosystem across the country. This project explicitly confronts the challenge of water diversion and puts forth a solution that is both effective and environmentally sound. The comprehensive environmental impact assessments conducted throughout the implementation of the Hadashan irrigation and water diversion scheme provide clear evidence for the minimal negative environmental risk connected to the project.

Water diversion from the 2nd Songhuajiang will not only be kept to a minimum, but also the remaining water flow will be smoothed across seasons. The reservoir of Hua'aopao will be used as water storage to be filled during the rainy season when water volume is high and well exceeds the required water volume downstream. **During dry season, when excessive water diversion would potentially become a problem, the stored water from Hua'aopao will be used to feed the Songyuan irrigation system, thus minimizing the strain of water withdrawal from 2nd Songhuajiang.** In this way, water volume will be kept well above necessary levels to satisfy all ecological as well as an economical demand downstream.

The GEF project will be implemented in Songyuan Irrigation District which is built on the Hadashan Hydro-Project completed in 2011. The impact assessment provided in this section is based on the 2nd Songhuajiang hydrological data recorded from 1956 to 2008, and estimated water demand from Songyuan Irrigation Project. Based on this solid data, the PPG Team estimated the ecological effects on water runoff in the 2nd Songhuajiang downstream areas. Following are the results of estimated ecological impacts.

Based on all available data, it can be safely said that the positive effect on the ecosystem surrounding Chagan Lake will significantly outweigh all related environmental risks, thereby fully justifying the project from an environmental as well as a socio-economic perspective. **The overall conclusion of this data is that the downstream effects of the river diversion are in fact minimal and all measures and precautions have been taken to fully control all related environmental risks.**

(1) Estimated water inflow at the water diversion section

Based on the data (1956-2008) analysis the estimated average annual inflow at Hadashan Section is 16.07 billion cube meter, considering the climate change impact, the annual average inflow from upstream is 15.92 billion cube meter. The projected 2030 figures without and with considering climate change is the same as current inflow. However, as the social economic development, the projected water demand in the upstream will be increased from current 4.1 billion cube meter to 4.9 billion cube meter. The current water diversion from Songyuan Irrigation Project for keeping irrigation and eco-flow of wetland is about 617 million m³. This amount accounts for 5.16-5.22% of total flow at HDS section. Whilst for scenario of 2030, both upstream water con-

sumption and diversion will be increased, the diversion rate from Songyuan Irrigation District will be increased to 15%. The average annual available inflow, diversion amount and down-flow amount for downstream region are estimated in table 3.1.

Table 3.1: Water Inflow Volume, Diversion and Outflow Volume for downstream at Hadashan Section of No.2 Songhuajiang
Unit: 100 million m³

Stage	Climate change consideration	Up-stream inflow	Up-stream use	Inflow at HDS	Diverted water	Outflow for downstream	%	Increased diversion	
								Volume	%
Now	No	160.65	40.99	119.66	6.17	113.49	5.16		
	Yes	159.18	40.99	118.19	6.17	112.02	5.22		
Projection for 2030	No	160.65	48.52	112.13	16.54	95.59	14.75	10.37	8.67
	yes	159.18	48.52	110.66	16.54	94.12	14.95	10.37	8.77

Source: Hadashan Hydro Project Design Document, 2011 and hydro data collected from Hydro-Station in Songyuan Prefecture

(2) Estimated water demand of Songyuan Irrigation Project to be diverted from HDS

The increased water demand for irrigation and restoration of wetlands and ecosystem in SIP area will be mainly provided by collecting the flood water in rainy season and diverted from HDS Reservoir. For reducing the diversion amount from No. Songhuajiang River and further reducing the ecological impacts on downstream region, the GEF project will adopt an engineering water reservation model through refilling the existing drought up lakes by diverting water from No. 2 Songhuajiang and collecting flood waters. Three lakes, Youzipao, Hua'aopao and Daozipao in the project area will be rehabilitated by filling water that can regulate the overall water supply for irrigation of land and restoring the large scale wetlands. The total estimated annual water amount to be diverted from No.2 Songhuajiang via HDS for SIP is 785 million m³, accounting for 75.38% of the total diversion volume of 1.037 billion m³ from No. Songhuajiang.

Table 3.2: Total water demand for restoring the existing lakes in SIP area

Lakes and ponds	Water Height	Area	Potential Storage Volume	Average annual demand diverted
	Meter	1000 ha	100 million m ³	100 million m ³
Youzipao	135.85	0.85	0.28	0.4
Hua'aopao	135.2	10.05	8.12	5.68
Daozipao	135.2	2.99	2.53	1.77
Total		13.88	10.93	7.85

Source: SIP Project Design Document, Jia Zhiguo, et al, 2013

(3) Minimum eco-flow required by downstream regions and minimum outflow from HDS

According to the Master Plan for Water Supply of Songhuajiang River Catchment Region-2012-2030 (Ministry of Water Resources, 2012), there are two controllable water flow marginal indicators:

- (i) The required minimum water flow (from May to October) for industrial and household use at Harbin Measurement Section (downstream of both No.2 Songhuajiang and Nenjiang River) is 550 m³/s; minimum eco-flow of 250 m³/s for sustaining river ecosystem in Harbin;
- (ii) For ensuring the downstream minimum water flow in Harbin, the required minimum down-flow from HDS Hydro Project after diversion for ecosystem and irrigation Songyuan Irrigation Project (SIP) is 100 m³/s, the rest is from Nenjiang River, another tributary of Songhuajiang.

Table 3.3: Projected (2030) down-flows from HDS Hydro-Project with and without diversion from SIP

Unit: m³/s

Statistic Year (Probability)	With- out SIP	Cli- mate chan- ge	Jan	Feb	Mar	Apr	Ma y	Jun	Jul	Au g	Sep	Oct	No v	Dec
Wet year (20%)	With- out	No	313.5	361.5	448.1	614.4	239.4	243.1	1008.4	1543.3	291.2	264.2	251.1	248.8
		Yes	309.4	356.8	442.2	606.3	236.3	239.9	995.2	1523.0	287.4	260.7	247.8	245.5
	With	No	305.2	352.6	439.8	608.6	160.9	129.1	881.3	1452.7	178.0	154.1	242.4	240.4
		Yes	301.1	347.9	433.9	600.5	157.7	125.9	868.0	1432.5	174.2	150.6	239.1	237.2
Average year (50%)	With- out	No	266.3	282.5	318.8	403.2	309.0	319.2	595.9	584.5	340.0	292.0	280.7	265.2
		Yes	262.8	278.8	314.6	397.9	305.0	315.0	588.1	576.8	335.5	288.1	277.0	261.7
	With	No	258.0	273.6	310.5	397.3	273.5	220.9	479.3	480.8	226.7	181.9	272.1	256.8
		Yes	254.5	269.9	306.3	392.0	269.5	216.7	471.5	473.2	222.3	178.0	268.4	253.3
Dry year (80%)	With- out	No	259.7	264.7	367.0	414.1	202.4	244.2	157.1	226.9	224.1	210.7	202.3	281.5
		Yes	256.3	261.2	362.2	408.7	199.8	241.0	155.0	223.9	221.1	208.0	199.7	277.9
	With	No	251.4	255.8	358.7	407.8	182.9	137.1	118.3	162.4	110.4	100.2	193.7	273.2
		Yes	248.0	252.3	353.9	402.4	180.2	133.9	116.2	159.4	107.4	97.5	191.0	269.5

Source: HDS Project Design Document and hydrological data recorded from 1956 to 2008

Table 3.4: Change of Monthly Water Flow at Harbin River Section with and without HDS and SIP

Unit : m³/s

Year	With and without HDS and SIP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
90%	Without	440	448	490	686	526	604	771	818	818	758	571	414

frequency	With	436	444	487	682	463	534	678	757	709	683	567	411
	Difference	4	4	4	4	63	70	93	62	109	75	3	3
	Change (%)	0.8	0.8	0.7	0.5	12.0	11.6	12.1	7.5	13.3	9.9	0.6	0.8
75% frequency	Without	461	467	518	763	619	702	978	1326	998	869	611	475
	With	457	463	515	760	540	582	919	1249	923	764	607	472
	Difference	4	4	4	3	79	119	59	76	75	105	4	4
	Change (%)	0.8	0.8	0.7	0.4	12.8	17.0	6.0	5.7	7.6	12.1	0.6	0.8
50% frequency	Without	493	529	646	873	731	949	1814	2884	1655	1167	694	509
	With	489	525	643	859	653	821	1683	2763	1541	1091	690	506
	Difference	4	4	4	13	78	129	132	121	114	76	4	4
	Change (%)	0.7	0.7	0.6	1.5	10.6	13.5	7.3	4.2	6.9	6.5	0.6	0.7
Average year	Without	517	556	639	892	754	940	2156	3260	1556	1139	698	514
	With	513	552	635	888	673	838	2046	3163	1453	1040	695	510
	Difference	4	4	4	4	81	102	110	97	103	99	4	4
	Change (%)	0.7	0.7	0.6	0.4	10.8	10.8	5.1	3.0	6.6	8.7	0.5	0.7

Source: HDS Project Design Document, 2012, data provided by Song-Liao Hydro Commission

(4) Conclusion on the ecological impact on downstream region by GEF project

Calculated water flow results from above tables show that the annual precipitation change has no significant impact on downstream flow volumes. Diversion of water from HDS Hydro Project for restoring and sustaining the ecosystem, biodiversity as well as for irrigation of the newly rehabilitated and saline-alkaline land will to certain extent reduce the monthly down-flow from HDS. However, almost all monthly down-flows can meet the minimum requirement from downstream region (Harbin), even in dry years. It is therefore concluded that the HDS Reservoir and water diversion for ecosystem restoration and irrigation of the SIP Project area will not have negative effects on the downstream ecosystem and industrial and household water demand in downstream region.

3.2 RISK MANAGEMENT

3.2.1 Risks and mitigation measures

A) Ecological risks

The western Jilin province is experiencing the impacts of **climate change** (considered as high) causing desertification and soil salinization processes and drying up of wetlands. The project will mitigate this risk imposed on local livelihoods and ecosystem habitats by increasing the availability of water resources for agriculture, grassland and rehabilitation of wetlands and applying an ecosystem based SLWM approach as an adaptation strategy.

The **risk that the water diversion of flooding water will cause negative impacts downstream** (considered as low) has been mitigated during the design of government investment project including the EIA assessing and setting limits for minimum environmental flow (the minimum quantity, timing, and quality of water flows required to sustain freshwater ecosystem services downstream) and the minimum ecological flow (sufficient flow to sustain aquatic ecosystem and its species). These flows are monitored by the Hadashan reservoir administration and the discharge in different periods is all above the limit that could cause damage to the aquatic environment downstream. One major purpose of the GEF project is to assist the government in better implementing and realize these mitigation measures through the adoption of integrated land and water planning, optimal operation strategy for flooding water diversion and allocation, and proper monitoring and management systems.

The **risk of salt moving to the upper layers of the soil** (considered as medium) making the soil inadequate for crop cultivation as a result of irrigation has been considered in the project (component 2) by accounting the total water demand of cropland and pastoral irrigation and eco-water demand for rinsing salt in soil and diffusing the salt contents in the drained out water. By piloting the total water demands of different land types based on the soil salt movements and predicated local climate change, this risk will be mitigated. Increased eco-water demand will increase the water diversion quota taken from No.2 Songhuajiang River. There are no risks of delays in implementation because of the strong planning and implementation capacities of the Water Resource Department of the Jilin Province combined with stability in technical staff and the government administration.

B) Socio-economic risks

The proposed land management and water irrigation model will change farmers' conventional land and water management model as well as their farming structure. There might be risks that small farmers are not able to adopt the project recommended conservation agriculture technologies, environmental friendly crop production techniques, such as applying organic fertilizers and integrated pest management (IPM) techniques due to lack of skills and financial capacity to afford these technologies. The same risks exist in adopting water saving irrigation techniques and equipment. The project will provide technical training to farmers in the project pilot areas for increasing their capacity of adopting recommended techniques.

The risk for marketing green food in the local market will constrain the adoption of green food production technologies at the farm level. The project will support farmers to establish cooperatives and promote agro-business companies plus associated farmers' households to overcome the market risks.

In government supported agricultural development projects innovative and skilled male farmers, who are capable to be involved in the project pilot and able to manage the pilot risks, are normally selected as pilot households. In this GEF Project, there might be risk of marginalizing women and poor farmers in the pilot projects. The risk will be mitigated by providing special technical training to women and selection certain percentage of poor households as participating households for the pilot activities. In addition women and poor households will be also given the prior-

ity to be invited to attend the project planning workshop and monitoring and evaluation during the project implementation.

C) Institutional risks

The **institutional, administrative and organizational risks** are primarily the risk of insufficient coordination and cooperation between stakeholders, especially across different administrative levels. The project's success requires closely interlinked implementation processes that combine workflows at the national, provincial, county and local community level. This multi-level design of the project is key to achieve the ambitious project goals and to prepare replication and upscaling of project activities beyond the project duration and scope. At the same time, the corresponding coordinative challenges are significant.

The project will be executed by the Jilin DWR. The DWR expertise cannot cover all technical areas required during the implementation of the project activities. Therefore, collaboration with other institutions is necessary. Also, for replicating the SLWM and biodiversity conservation models in a large area of West Jilin Province, an effective multi-institutional and multi-level coordination mechanism needs to be set up. The current line agency based governmental project planning and fund allocation mechanism represents high institutional risk. The expected technical contributions from agricultural department, environmental protection department and co-funding from prefecture and county government cannot be guaranteed by DWR. However, the project activities under component 1, aiming at multi-stakeholder collaboration to firmly embed the project into the overarching policy framework are highly suitable to mitigate these institutional risks.

Table 3.5: Risk and risk mitigation matrix

Risks	Risk rating	Mitigation countermeasures
A. Ecological risks		
Impacts of climate change	High	<ul style="list-style-type: none"> • Introduce water saving irrigation technologies and facilities in rain-fed farmlands; • Straw Mulching
Impact of water diversion on down stream	Low	<ul style="list-style-type: none"> • Assessment and monitoring measures will be considered at project inception.
Salt moving to the upper layers of the soil	Medium	<ul style="list-style-type: none"> • Introduce integrated saline soil improvement technologies, such as physical engineering, chemical absorption, plant salt resistant crops, etc.
B. Social economic risks		
Farmers lack of capacity to adopt water saving agriculture practice and technologies	Medium	<ul style="list-style-type: none"> • Can be mitigated through farmer's training and field demonstration
Market risks for green food products	Medium	<ul style="list-style-type: none"> • Support to farmer's cooperatives • Promote the agro-company plus households marketing modality
Risks of marginalization of rural women and poor farmers in the project	Medium	<ul style="list-style-type: none"> • Provide technical training to women • Give the priority to poor farmers in selecting pilot households • Conduct participatory consultation with women and poor households in planning, monitoring the project activities
Conflicts between farmers' livelihoods and management of wetland	Medium	<ul style="list-style-type: none"> • Support alternative livelihood activities in the community co-management pilot

and habitats		
C. Institutional risks		
Interests conflicts between different sectors and line agencies	High	<ul style="list-style-type: none"> • Set up multi-institutional consultation mechanism at prefecture and county levels during planning and implementation • Incorporate the SLWM and biodiversity conservation models into local government development planning by different sectors • Hold multi-stakeholder policy consultation conference at Y4
Lack of participation of agriculture, animal husbandry and environmental agencies in the policy implementation	Low	<ul style="list-style-type: none"> • Sub-contracting agronomy and pastoral management activities to agriculture and animal husbandry departments
Local government is not able to pay the eco-service compensation to farmers	Medium	<ul style="list-style-type: none"> • Consult with and formulate recommendations to local government
Delayed physical engineering construction of Songyuan Irrigation Area for Dakouzipao Pilot Area	Medium	<ul style="list-style-type: none"> • Jilin Department of Water Resources, PMO will coordinate with the SIA Project implementation unit to give priority to the Dakouzipao

3.2.2 Fiduciary risk analysis and mitigation measures (NEX)

a) Macro analysis

The Jilin DWR is a governmental legal agency and as such is eligible to be entrusted by the provincial government as the NEX-Entity for a GEF Project including the mandate to receive funds from FAO/GEF. In the past Jilin DWR participated in ADB supported Songhuajiang River Flood Control Project, but it has never acted as an independent national executing partner for international cooperation projects. It still lacks experiences in result-based project management, particularly in project planning, personnel recruitment and material procurement, financial reporting and M&E, etc. Therefore, there is a considerable risk for DWR acting as NEX for executing the GEF Project. In order to mitigate this risk, the NEX needs targeted capacity development in financial management and project planning and monitoring and evaluation. Recruiting experienced and qualified PMO staff is also a challenge for the project management.

b) Micro analysis

The DWR PMO staff still lacks experiences in managing international projects, they are not familiar with Result-Based Management(RBM), including result framework, project planning, personnel recruitment and service procurement, financial management, financial reporting, project progress reporting, M&E procedures, etc. This might affect the project implementation in the first year, but the risk can be mitigated through targeted capacity development.

During project preparation, the DWR faced big challenges in recruiting qualified local consultants for designing the project. No systematic selection mechanism was applied in recruiting the PPG consultants. PPG consultant candidates of Agriculture and Soil, Environmental Specialist, Social-Economic were changed and replaced couple of times. No national level technical consultants were recruited from outside of Jilin Province. PMO might face the same challenge in recruiting the consultants for facilitating the project implementation.

The English language competence of PMO staff is weak. PMO staffs are lack of essential English language ability to understand English project documents. Quality of English-Chinese translation cannot meet minimum requirement. This will affect the management efficiency and routine communication with FAO in the whole project implementation.

The GEF project is an innovative but also challenging project since it combines sustainable water resource management, land management and biodiversity conservation together. DWR lacks expertise in wetland biodiversity conservation (component 3) and in conservation agriculture, and environmental-friendly agriculture, etc., for replicating the piloted SLWM and Wetland Biodiversity Conservation Model, multi-stakeholder involvement is needed. **The provincial environmental protection department, agricultural department, forestry department must be added into the Project Steering Committee before the project start.**

PMO has not yet developed an information management and publicity strategy for disseminating the GEF project outcomes and models. PMO needs to prepare the information management strategy and dissemination plan prior to the project start up.

c) Action plan for capacity strengthening of Executing Partner if needed

Strengthening the Project Management Capacity of PMO

As a new executing partner for independently implementing a GEF project, the DWR and PMO personnel capacity building should be a priority in the remaining time of project preparation and throughout the project implementation phase in particular the first two years. Project management procedures and relevant project management knowledge and skills will be the major training contents. Based on the personnel capacity assessment findings, the consultant recommends the project to provide following trainings to PMO and PA staff:

- (1) Training on FAO/GEF Project Financial Management Procedures and Regulations for PMO and PA financial management officers. PIM developed by PMO and FAO can be used as training materials; PPT and handouts for trainees must be prepared in English and Chinese.
- (2) Training the PMO staff and relevant partner institutions, i.e. Qianguo, Qian'an and Da'an Water Resource Bureau and Hadashan Backbone Water and Hydraulic Administration, in RBM with focus on project planning with focus on procedures, methodologies of water & land resource management and biodiversity conservation project planning. Logical framework as an effective planning approach is recommended, since this method can provide an interactive and visualized platform for the trainees. The end results of logical framework planning can also be used as basis for conducting project impact monitoring. FAO will provide trainers for the planning training course.
- (3) Training on methods and procedures of Monitoring and Evaluation (M&E) of Land and Water Resource and Biodiversity Conservation and Management Projects. The contents will focus on: review the targeted technical and social economic indicators; sampling framework for data collection; quantitative and qualitative methods and tools for data and evidence collection; how to analyze the collected data and information to verify the success and impacts of the project; how to prepare the progress reports; approach of sharing and using M&E results, etc.
- (4) Training on project results documentation, information management and dissemination strategy.

- (5) PMO will recruit the consultants and procure the consultancy service and materials strictly following the procedures and criteria stipulated in the PIM which are coherent with National Procurement Law and FAO procurement regulations. FAO Beijing will be involved in the personnel recruitment and material procurement process.
- (6) For further strengthening the daily communication and technical consultation with FAO/GEF project officials and consultants, the newly recruited PMO interpreter will need project management and financial management training in FAO Beijing in order to be familiar with FAO management requirements. CTA will also provide necessary supports to the interpreter.
- (7) A capacity building training plan should be prepared as annex of the Project Design Document. Implementation time of these capacity building training courses should be further given in the plan. At least one training course on FAO project planning and financial management should be provided immediately after the startup of the project implementation. The follow up training will be delivered in the coming project years. The training expenses should be included in the Project Budget specified in the Project Design Document (PDD).

Further Strengthen and Improve the EP's Internal Management

- (1) FAO and DWR/PMO will jointly develop a *Project Implementation Manual* (PIM) in taking reference to the FAO/GEF project management guidelines and existing DWR Fund and Financial Management Regulations. The PIM will specific and systematic describe: (i) financial management procedures, fund allocation flow, fund installment, financial reporting, book keeping, etc.; (ii) Project planning, implementation, M&E, progress reporting, modification and adjustment of the project interventions and activities; (iii) staffing and recruiting the personnel; (iv) Procedures and guidelines for procurement of equipment and consultancy services; (v) Process and time schedule of internal and external financial audit; (vi) Document and information management, information exchange and sharing mechanism among relevant governmental line agencies; PIM will be produced in Chinese and English. Chinese version will be distributed to PAs in Songyuan and Baicheng. The PIM will also be used as training materials for training of project management and financial management officials of PMO and PAs. Time of action: the PIM should be drafted and agreed by the FAO and DWR before startup of the project in the first half of 2015.
- (2) Based on the tasks described in PIM the DWR PMO will prepare job descriptions and qualification requirements for proposed positions of PMO staff and designate these management tasks, responsibilities to each of them. Based on required qualifications training plan of PMO staff will be prepared. Time of action: first half of 2015.
- (3) Recruiting consultants and contracting consultancy service institutions in LOA will strictly follow the procedures stipulated in PIM based on FAO and governmental procurement regulations. PMO will prepare TOR and invite 2-3 candidates for each position. A consultant recruitment evaluation team will be formed for reviewing CVs and interviewing the candidates. Practical working experiences and professional qualification of the candidates will be given high weight in the evaluation scoring. For filling the technical gaps and overcoming the limited expertise within DWR and WHSPI, consultants and consultancy services for component 1 and component 3 must be recruited from other academic institutions and universities in Jilin or even other provinces. Time of action: first half of 2015.
- (4) Further strengthen and improve the capacity of project management and financial management officials in DWR and PMO and PA through financial training and on job practice. DWR and PMO financial officials must clearly understand and be able to apply the man-

agement principles, work procedures and methods. FAO financial report procedures and financial report formats of FAO must be studied by the PMO and DWR officials. Time of action: first half of 2015.

- (5) Further improve the information and document management system and personnel capacity. Project documents and reports must be systematically categorized and managed together for easing the internal users, sharing with outsiders and being available for auditors and mid-term and final evaluators. For systematic retrieve, a list of documents, reports and files should be prepared and shared among PMO officials. Time of action: should be completed first half of 2015.
- (6) An information publicity and dissemination strategic plan will be prepared under support of FAO project preparation consultant for guiding the information dissemination activities during the project implementation. The action plan will specify: what outputs and deliverables should be produced and disseminated; to whom they should be disseminated; how and through which channels these information and knowledge will be disseminated; who will be responsible to disseminate the information and project outputs, etc. Time of action: should be developed in the first quarter of first project implementation year.

SECTION 4 – IMPLEMENTATION AND MANAGEMENT ARRANGEMENTS

4.1 INSTITUTIONAL ARRANGEMENTS

The institutional framework and implementation arrangements including the roles and responsibilities of relevant project stakeholders are described in detail in section 4.2 of this document. FAO will serve as the GEF Agency for this project. The executing partner on the side of the Government of China is the Jilin Department of Water Resources (DRW). Under guidance of the Ministry of Water Resources (MWR) at the national level, the project management offices in the Jilin DRW will play the central role in the coordination of activities at the province level. Ultimate implementation will be led by the county level governments and water bureaus, who will oversee and guide the activities applied by household level farmers and local communities.

In terms of the broader institutional and policy-making environment in China, it should be highlighted that the MWR and its provincial administrations have firmly established themselves as champions for innovative reform of China's water management system. MWR has spearheaded a number of initiatives aiming at an increased quality and sustainability of China's approach to its water resources.

4.2 IMPLEMENTATION ARRANGEMENTS

a) Roles and responsibilities of the executing partners

Jilin Department of Water Resources as NEX institution

The Jilin provincial level DWR will be the project Executing Partner directly responsible for technical implementation of project activities, day-to-day monitoring as well as financial management and purchase of goods, minor works, and services (procurement) in accordance with rules and procedures as established in the Project's Operational Manual (see section 3.8.1 above). DRW will enter into an Execution Agreement with FAO allowing for the purchase of goods, minor works, and services needed to execute the project. FAO will ensure that the rules and procedures set out in the Project's Operational Manual are acceptable in accordance with FAO rules and regulations and GEF minimum fiduciary standards, and DRW will follow in particular rules defined in the Execution Agreement. The Execution Agreement will outline in details the roles and responsibilities of DRW and procedures with respect to financial management, procurement, recruitment, project progress reporting, financial reporting and audit, copyright, and other legal aspects of collaboration.

The institutional arrangements for project implementation provide for the use of the existing structure within the DRW, thereby avoiding the creation of new ones, such as a project implementation unit. The technical implementation of the GEF project will be under the Environment Unit. Regular staff of this Unit and of other Directorates and Units at the executive, advisory, support and operational levels in the DRW will assume specific responsibilities under project execution in compliance with all FAO rules and procedures under the execution of the GEF funds.

DRW will submit four-monthly statements of expenditures, procurement and contract documentation for prior clearance, and cash transfer requests based on the updated AWP/B including a detailed budget for the following four month period, and annual audited financial statements to the FAO Representation in China. Further, DRW will prepare and submit to the FAO Representation Project Progress Reports, annual Work Plans and budgets, and all documentation needed for the preparation of the annual PIR.

Jilin DWR as NEX of the Project will have following roles and responsibilities:

- Preparing, planning and implementing the GEF project, ensuring the effective achievement of planned project components and activities and scaling up and replication of the piloted models.
- Providing qualified project management staff working in PMO for carrying out daily project management;
- Coordinating with other relevant governmental line agencies related to the project and supervising and guiding the project implementation at prefecture and county level; A project steering committee will be set up within the department for fulfilling the coordination functions;
- Setting up an independent bank account for receiving project funds from FAO via provincial department of finance;
- Carrying you financial management, book keeping, fund reimbursement to ensure the project funds will be timely mobilized to finance the planned project activities;
- Preparing project progress reports and financial reports in Chinese and English language according to the requirements of FAO;
- Daily coordination and communication with FAO Beijing and FAO headquarter on the project progress, financial reporting, necessary modifications of the project strategy in case of deviations or change of the institutional and policy framework or natural disasters occurred during the project implementation;
- Preparing Consultancy Terms of Reference (TOR) based on the result framework and implementation plan. Selecting, recruiting and contracting qualified consultants through reviewing CVs and face to face interview; mobilizing the consultants and checking and accepting the delivered consultant reports;
- Preparing materials procurement plan based on the project implementation plan and conducting the equipment, material and consultancy service procurement via transparent tendering
- Conducting regular supervision and on-site monitoring during the project implementation and ensure effective implementation and achievement of project outputs and impacts;
- Conducting internal financial auditing and preparing and receiving the external auditing according to the national financial auditing standards. Safeguarding that FAO project funds are timely and effectively spent on the planned project activities;
- Coordinating and ensuring the co-finance be timely in place; and
- Organizing the multi-stakeholder coordination and policy consultation workshops and conferences to ensure the effective replication of developed and piloted SLWM models in the other areas of West Jilin Province.

Set up of PMO: According to the Jilin Provincial Government Document issued in August 2012 DWR set up a Project Management Office-PMO in September 2012. The PMO started to function in May 2013 and played fundamental roles in project preparation. The major functions of PMO are to coordinate and manage the project preparation and implementation. Four permanent staff members will be nominated by DWR for working in PMO.

Table 4.1: Tasks and Responsibilities of PMO Staff in Management GEF Project

Name	Position/function	Tasks and responsibilities
Mr. Gong Chengquan	Deputy Director General of DWR	National Project Director (NPD) and PMO director with major responsibilities of: <ul style="list-style-type: none"> - Overall coordination of DWR internal divisions and other relevant governmental line agencies in implement-

		<p>ing CBSLM project</p> <ul style="list-style-type: none"> - Signature of Financial Report <p>As part time involved officer will be paid by the government</p>
Madam Cheng Yingqing	Project Coordinator	<p>Full time position paid by GEF project resources responsible for daily management of PMO and overall coordinator:</p> <ul style="list-style-type: none"> - Involving in project preparation; - Daily coordination with FAO/GEF; - Internal coordination with relevant WHSPI - Coordinate for conducting annual planning, monitoring, reporting, financial management, document management, information publicity, etc.; <p>GEF project will pay this position.</p>
Mr. Xue Chengwen	Planning and M&E Officer	<p>Full time position paid by government in-kind co-financing, MSc. in Water Resource Management and technical staff of WHSPI had already involved in the project preparation and will be recruited as PMO staff with following tasks:</p> <ul style="list-style-type: none"> - Project planning; - Conduct monitoring and evaluation - Prepare personnel recruitment and contracting - Material and equipment procurement - Preparing six monthly Project Progress Reports - Other activities designated by the project coordinator
Mr. Zhang Yingbo	Project management and financial management officer	<p>Full time position paid by government in-kind co-financing, MBA, is professional staff of WHSPI, already involved in PPG. He will be responsible for:</p> <ul style="list-style-type: none"> - Preparing budget plan based on the annual work plan-AWP; - Keeping the financial records, reviewing the receipts and financial reports submitted by PA and preparing six monthly financial reports; - Material procurement and personnel recruitment; - Regular review the project account; - Preparing relevant documents for internal and external financial audits
Ms. Chen Xiaogeng	Interpreter and will be in charge of information Management (full time)	<p>Full time position paid by government in-kind co-financing, MSc in English, is a newly recruited staff. She will be responsible for:</p> <ul style="list-style-type: none"> - Project document management; - Interpretation for FAO/GEF international consultants; - Translation of project reports and documents; - Assisting the financial official to prepare financial report to FAO - Planning and organizing training activities; - Preparation of project progress review, final evaluation in English - Communication with FAO and international consultants

Given the fact that all PMO staff lack experiences in managing international project, a national Chief Technical Advisor (CTA) will be recruited and paid by GEF project fund for delivering technical facilitation to the PMO staff. The CTA will regularly pay visits to Jilin for delivering result-based project management training for PMO staff and facilitate preparation of progress and financial reports, etc.

Prefecture/County level governments

The project management units at the county level, i.e. selected staff of the county level government and water bureaus, will supervise and support the actual and concrete implementation of

project activities at the project site level. Using their close relationship with local communities and farmers, county governments will be in day-to-day interaction with the individual water resource managers that will practically apply the SLWM practices to be supported by the project. The framework of existing service contracts and land-use agreements that PFDs have with local communities and farmers will provide a stable structure for supervision and guidance of activities.

Local communities and farmers

Ultimate application of practices to be supported under project component 2 lies with the household level farmers from local communities. In close collaboration with the respective county governments, these farmers will be the recipients of most of the targeted training and capacity development activities supported by the project, empowering them to implement SLWM practices effectively and efficiently and thereby paving the way for broader adoption and mainstreaming of these practices not only within the specific project locations, but throughout the far larger area covered by the baseline initiatives.

b) FAO's role and responsibilities, as the GEF Agency, including delineation of responsibilities internally within FAO

In accordance with its comparative advantage as illustrated in section 1, the Food and Agriculture Organization of the United Nations (FAO) will be the GEF Agency for the project. FAO will provide supervision and technical guidance services during the project execution. Administration of the GEF grant will be in compliance with the rules and procedures of FAO, and in accordance with the agreement between FAO and the GEF Trustee.

As the GEF agency for the project, FAO will:

- Manage and disburse GEF funds in accordance with the rules and procedures of FAO;
- Enter into an Execution Agreement with the Jilin Department of Water Resources (DRW) as the national executing agency for the provision of services to the project;
- Oversee project implementation in accordance with the project document, work plans, budgets, agreements with co-financiers and the rules and procedures of FAO;
- Provide technical guidance to ensure that appropriate technical quality is applied to all activities concerned conservation and sustainable management of the West Jilin/Chagan Lake ecosystems;
- Carry out at least one supervision mission per year; and
- Report to the GEF Secretariat and Evaluation Office, through the annual Project Implementation Review, on project progress and provide financial reports to the GEF Trustee.

The FAO Representative in China, assisted by the FAO Project Task Manager (see below), will be the Budget Holder (BH) and responsible for the management of the GEF resources and all aspects in the Execution Agreement that will be signed between FAO and DRW. As a first step in project start-up, the FAO Representation in China will establish an interdisciplinary Project Task Force within FAO to guide the implementation of the project. The FAO Representative will in particular be responsible for:

- (1) disbursement of GEF funds to DRW based on satisfactory reporting on project progress and statement of expenditures;

- (2) financial reporting and supervision of DRW financial management and use of resources, including clearance of Budget Revisions for submission to TCI/GEF Coordination Unit for approval;
- (3) supervision of contracting and procurement processes executed by DRW; and
- (4) submission of Quarterly Project Implementation Reviews (QPIRs) to the Regional Office for Asia Pacific (RAP) and to the GEF Coordination Unit.

The FAO Representative will in consultation with the LTU and the GEF Coordination Unit give no-objection to Annual Work Plans and Budgets submitted by DRW. Disbursement of GEF funds for the provision of goods, minor works, and services to the project will be carried out by the FAO Representative in accordance with the provisions of the Execution Agreement. The disbursement will be carried out upon submission by the DRW to the FAO Representation of four-monthly financial statements of expenditures, procurement and contract documentation, and disbursement requests based on an updated Annual Work Plan and Budget (AWP/B) including detailed budget for the following four months period to be cleared and approved by the Representative and a Project Progress Report to be approved by the FAO Lead Technical Unit (LTU). The Budget Holder will submit the Project Progress Report to the TCI GEF Coordination Unit for clearance and uploading on the FPMIS.

A Project Task Manager (PTM) will be appointed by FAO in the FAO Office in China, in consultation with the LTU and the GEF Unit. The PTM will, under direct supervision of the FAO Representative in China, support the FAO Representative in the supervision of financial management, project progress, procurement and contracting processes, and in the provision of technical guidance to the project, in close consultation with the LTU, and the Project Task Force. The PTM will be paid from GEF fee resources and will have the following main tasks:

- Review project progress reports from DRW and submit them to the LTU for approval and subsequently to the GEF Coordination in the Investment Centre Division (TCI) for final approval and uploading on the FPMIS;
- Review, provide comments and advise the FAO Representative on giving no-objection to AWP/B in consultation with the LTU and the GEF Coordination;
- Review procurement and contract documentation submitted by DRW for procurement and contracts to be financed by GEF resources and advise the FAO Representative on giving no-objection, in close consultation with the LTU and the GEF Coordination;
- Review DRW project statement of expenditures using GEF resources and Cash Transfer Requests of GEF resources in accordance with the AWP/B and previous Cash Transfer Requests submitted by DRW and advise the FAO Representative on his/her clearance of statements of expenditures and approval of cash transfers in consultation with the LTU and the GEF Coordination;
- Review reports on executed co-financing to be submitted by DRW;
- Conduct periodic supervision missions;
- Prepare quarterly project implementation reviews (QPIRs) to be submitted to the FAO LTU for comments before submitting to the FAO Representative for approval and subsequently to the GEF Coordination for final approval and upload in FPMIS;
- Support the LTU in preparation of the annual Project Implementation Review (PIR) report (Appendix 2);
- Represent FAO in the Project Directive Committee and interview and selection panels for key project positions to be financed by GEF resources; and

- In consultation with the FAO Evaluation Office, the LTU and the GEF Coordination Unit, support the organization of the mid-term and final evaluations, contribute to the development of an eventual agreed adjustment plan in project execution approach and supervise its implementation.

The FAO Lead Technical Unit will provide technical advice and backstopping to the project and support the FAO Project Task Manager in responding to requests from DRW for guidance on specific technical issues during project execution. The LTU will:

- review and give no-objection to TORs for consultancies and contracts to be performed under the project and to CVs and technical proposals short-listed by the DRW for key project positions, goods, minor works, and services to be financed by GEF resources;
- supported by the FAO Project Task Manager, review and clear final technical products delivered by consultants and contract holders financed by GEF resources before the final payment can be processed;
- assist with review and provision of technical comments to draft technical products/reports on request from the DRW during project execution;
- review and approve project progress reports submitted by DRW to the FAO Representation in China in coordination with the FAO Project Task Manager;
- support the FAO Representative in reviewing, revising and giving no-objection to AWP/B submitted by the DRW and to be approved by the Project Directive Committee;
- prepare the annual Project Implementation Review report, supported by the FAO Project Task Manager and inputs from the DRW, to be submitted for clearance and completion by the GEF Coordination (TCI) which will subsequently submit the PIR to the GEF Secretariat and Evaluation Office as part of the Annual Monitoring Review report of the FAO-GEF portfolio. The LTU must ensure that DRW has provided information on co-financing provided during the course of the year for inclusion in the PIR;
- field annual (or as needed) project supervision missions; and
- review and revise TORs for the mid-term evaluation, participate in review mission including the mid-term workshop with all key project stakeholders, development of an eventual agreed adjustment plan in project execution approach, and supervise its implementation supported by the FAO Project Task Manager.

The **GEF Coordination Unit (TCI)** will review and approve project progress reports, implementation reviews and financial reports and budget revisions. The GEF Coordination Unit will review and clear the annual PIR and undertake supervision missions if considered necessary. The PIRs will be included in the FAO GEF Annual Monitoring Review submitted to GEF by the GEF Coordination Unit. The GEF Coordination Unit will also participate in the mid-term and final evaluations and the development of corrective actions in the project implementation strategy in the case needed to mitigate eventual risks affecting the timely and effective implementation of the project. The GEF Coordination Unit will in collaboration with the FAO Finance Division request transfer of project funds from the GEF Trustee based on four monthly projections of funds needed.

The FAO Finance Division will clear budget revisions, provide annual Financial Reports to the GEF Trustee and, in collaboration with the GEF Coordination Unit, call for project funds on a six-monthly basis from the GEF Trustee.

c) Project technical, coordination and steering committees

For steering the project implementation and guiding the project preparation, a Provincial Project Steering Committee (PSC) was set up in August 2012 and headed by the Deputy Secretary General of Jilin provincial government. Concerning the technical features and scope of the project interventions and requirements for rolling out the piloted project models, the membership of the PSC will include following governmental agencies:

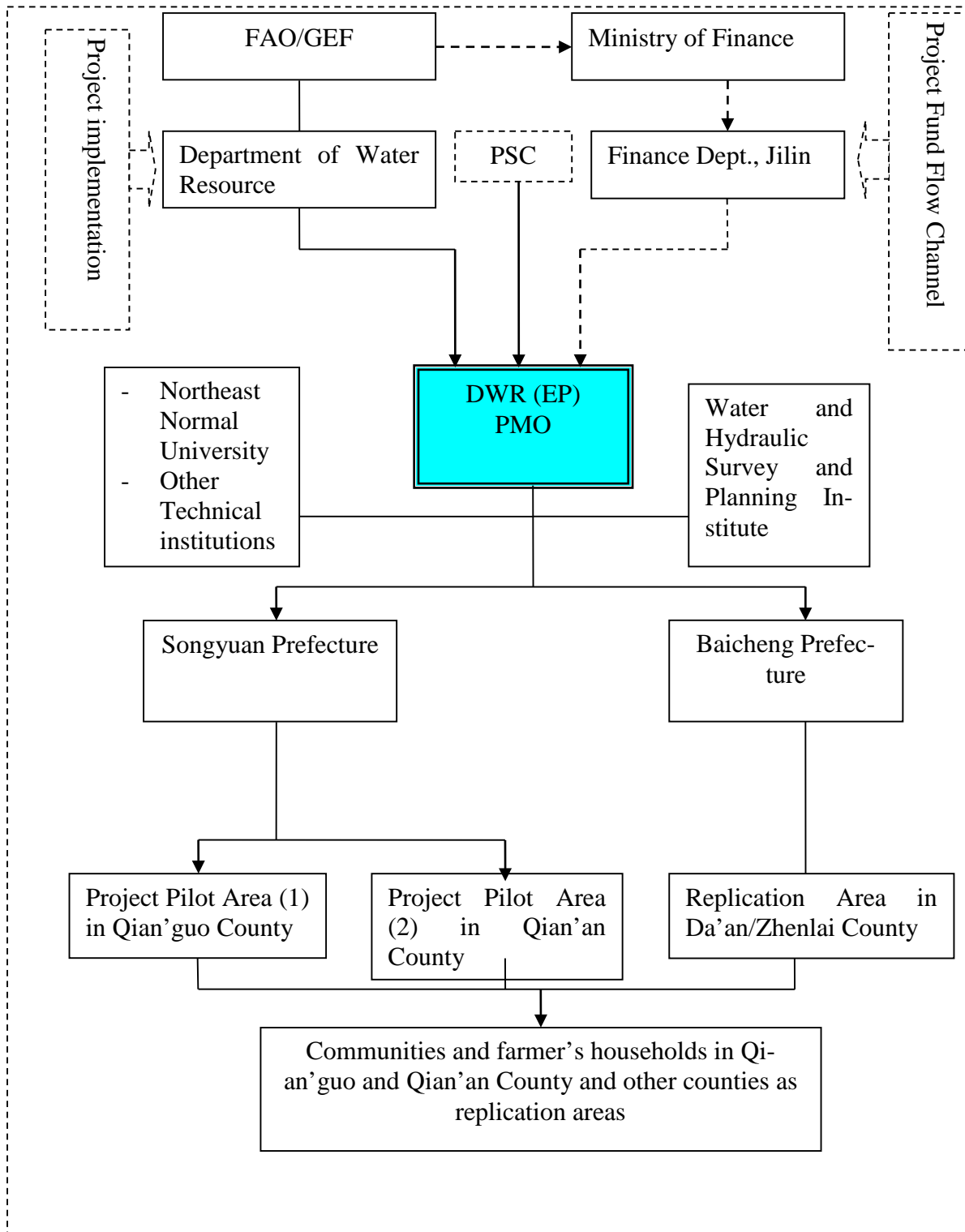
- (1) Jilin Department of Water Resource (NEX, PMO)
- (2) Jilin Provincial Finance Department
- (3) Jilin Provincial Agricultural Commission
- (4) Provincial Environmental Protection Department
- (5) Provincial Animal Husbandry Bureau/Grassland Station
- (6) Jilin Provincial Forestry Bureau
- (7) Songyuan Prefecture Government
- (8) Baicheng Prefecture Government
- (9) FAO Beijing Program Officer in charge of the project

To steer the project implementation and ensure the achievement of the project outcomes and objectives, PSC will hold an annual meeting by the end of each project year to:

- (1) Review the annual work plan and annual budget;
- (2) Review the annual implementation and identify implementation deviations make recommendations for improvements in the coming project implementation years;
- (3) Coordinate and strengthen the inter-line agency cooperation and ensure contributions of other relevant line agencies to the project;
- (4) Review the project result replication strategy and facilitate the scale-up and replication of SLWM and Wetland Biodiversity Conservation Model in counties and irrigation areas in whole western Jilin.

The current PSC does not include the Provincial Environmental Protection Department and Land Resource Department which are relevant to component 3 and component 2 and will play roles in project implementation and replication of the piloted land and water management model and wetland biodiversity conservation model. The consultant therefore suggests add these two line agencies into PSC. FAO Beijing Office should be also invited to attend the PSC annual meeting.

d) Organizational chart



4.3 FINANCIAL PLANNING AND MANAGEMENT

4.3.1 Financial plan (by component, outputs and co-financier)

Component/output	Jilin DWR	FAO	Total Co-financing	% Co-financing	GEF	% GEF	Total
Component 1: Improvement of the policy, legal and regulatory framework for an SLWM model in productive landscapes, including capacity development	800000	0	800000	86%	130000	14%	930000
Output 1.1.1: Adoption of and clear political commitment to the integration of the SLWM model including biodiversity conservation by local governments and relevant line agencies at county level in primary and replication areas (saline-alkaline landscapes with similar ecosystem throughout West Jilin)	46000	0	46000	92%	4000	8%	50000
Output 1.1.2: Drafting and approval of county level policy implementation guidelines outlining the details of the rollout of the SLWM model including specific responsibilities of stakeholders.	41000	0	41000	82%	9000	18%	50000
Output 1.2.1: Wetlands biodiversity conservation and SLWM model incorporated into policies, plans, and regulations for the agriculture and water resource management sectors (including land and water use planning and management) in western Jilin province.	28000	0	28000	93%	2000	7%	30000
Output 1.2.2: Wetlands biodiversity conservation and SLWM model replicated in saline alkaline landscapes in western Jilin province.	86000	0	86000	86%	14000	14%	100000
Output 1.3.1: Decision makers and technicians from water resource, agriculture, forestry, environmental protection bureau at prefecture and county level and Chagan Lake Administration are trained.	257000	0	257000	86%	43000	14%	300000
Output 1.3.2: Extension workers and Farmers trained in application of SLWM practices including green/ecological, conservation, water saving and grassland rehabilitation practices.	342000	0	342000	86%	58000	15%	400000
Component 2: Design and piloting of sustainable land and water management and conservation agriculture practices in production landscapes around Chagan Lake	10000000	0	10000000	88%	1400000	12%	11400000
Output 2.1.1: Water management guidelines for agricultural water use as well as use of chemicals and pesticides formulated and implemented in all project sites.	1159333	0	1159333	89%	140667	11%	1300000
Output 2.1.2: Ground water levels stabilized in the project area and positive demonstration	261333	0	261333	87%	38667	13%	300000

effects for the wider irrigation area								
Output 2.2.1: Degradation and desertification processes stopped and reversed in saline-alkaline land with improved vegetation cover resulting in increased productivity and reduced vulnerability to climate variability.	1759333	0	1759333	88%	240667	12%	2000000	
Output 2.2.2: SLWM agricultural practices adopted in Qian'an and Qian'guo pilot sites and scaled to the total Songyuan irrigation area of integrated production land-scape contributing to the conservation of wetlands biodiversity.	2499333	0	2499333	86%	400,667	14%	2900000	
Output 2.2.3: Develop technical guidelines.	720333	0	720333	90%	79667	10%	800000	
Output 2.2.4: Farmer's households adopt SLWM practices and benefit from increased land productivity in two pilot sites.	631333	0	631333	90%	68667	10%	700000	
Output 2.3.1: Prepare comprehensive and dynamic ILWMP for the project area that integrate agriculture, pasture management, biodiversity conservation and ecosystem service preservation with salinity and water management.	2070333	0	2070333	86%	329667	14%	2400000	
Output 2.3.2: Integrated land and water management plan (ILWMP) for the entire Songyuan Area consulted, validated and agreed with relevant stakeholders.	449333	0	449333	90%	50667	10%	500000	
Output 2.3.3: Integration of the ILWMP guidelines and principals into the training programs of the WRB and CAD (measured by the number of training packages up-dated).	449333	0	449333	90%	50667	10%	500000	
Component 3: Rehabilitation of wetlands and grasslands leading to improved biodiversity conservation in the productive landscapes around Chagan Lake	4000000	0	4000000	83%	800000	17%	4800000	
Output 3.1.1: Rehabilitation and conservation of wetlands managed as an integrated part of the freshwater fishery and irrigated crop and grassland production landscape providing important habitats for endangered migratory birds resting and feeding in these wetlands.	335833	0	335833	84%	64167	16%	400000	
Output 3.1.2: Improved biodiversity indicators for: population and number of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned).	164333	0	164333	82%	35667	18%	200000	
Output 3.2.1: Establish comprehensive monitoring system measuring pollutants and salinity across the project area.	658833	0	658833	82%	141167	18%	800000	
Output 3.2.2: Agricultural non-point source pollution controlled and monitored within the project area.	331333	0	331333	83%	68667	17%	400000	
Output 3.2.3: Model for water quality requirements and eco-logical water demand for rehabilitation of wetlands developed based on the data collected from buffer zone	327333	0	327333	82%	72667	18%	400000	

inflow and outflow water quality and quantity measurement.							
Output 3.2.4: Buffer zone inflow and outflow water quality and quantity systematically monitored and analyzed, and pollution risk early warning system and inflow and outflow management strategy implemented.	253333	0	253333	84%	46667	16%	300000
Output 3.2.5: Establish comprehensive monitoring system measuring biodiversity across the project area.	1518333	0	1518333	84%	281667	16%	1800000
Output 3.3.1 : Wetlands co-management committees with local communities and county administration and biodiversity co-management plan for the wetlands and buffer zone prepared and under implementation.	163333	0	163333	82%	36667	18%	200000
Output 3.3.2: Awareness raising campaign on wetlands biodiversity conservation implemented in rehabilitated and existing wetlands in the area of influence of the Songyan irrigation area.	247333	0	247333	82%	52667	18%	300000
Component 4: Monitoring and evaluation of project activities, dissemination of knowledge and information and public awareness raising.	1200000	0	1200000	88%	165000	12%	1365000
Output 4.1.1: Project monitoring system is set up and operational for ensuring the effective implementation of the planned project activities and providing six-monthly reports on progress in achieving project out-puts and outcomes.	178000	0	178000	89%	22000	11%	200000
Output 4.1.2: Annual review and planning workshop carried out to ensure the achievements of the intended outputs and outcomes; Midterm and final evaluation reports.	790500	0	790500	88%	109500	12%	900000
Output 4.1.3: Project results and best practices disseminated.	231500	0	231500	87%	33500	13%	265000
Project Management	600000	200000	800000	86%	132000	14%	932000
Total Project	16600000	200000	16800000	86%	2627000	14%	19427000

4.3.2 GEF inputs

The GEF contribution to the project will be used to support the described activities (see section 2) supporting the generation of global environmental benefits and cannot be adequately funded by local stakeholders at present. These activities will complement the baseline projects as described in detail in previous sections, leveraging and complementing the existing investments. The GEF incremental investment will be used to implement a comprehensive SLWM model, turning current irrigation efforts into an environmentally sustainable endeavor.

A major part of the GEF incremental funding will be used under project components 2 and 3, supporting the implementation of actual agricultural practices and rehabilitation of degraded wet-

lands in order to demonstrate their feasibility, efficiency and effectiveness, paving the way for subsequent replication and scaling up. Activities will create significant direct global environmental benefits in terms of biodiversity and land degradation.

4.3.3 Government inputs

Government inputs will be made through the Finance Department of Jilin Province and Jilin Department of Water Resources in the context of the baseline initiatives as indicated in section 2. Total co-financing from the Government of China through Jilin DWR amounts to **USD 16 600 000**.

The amounts and the sources provided through the Finance Department of Jilin are as follows:

- (1) The National Development and Reform Committee (NDRC) will provide USD 14 800 000 (through The Finance Department of Jilin) to the project for constructing the field irrigation infrastructures and soda land rehabilitation engineering projects. This will provide baseline infrastructures for implementing Sustainable Land and Water Management (SLWM) and Wetland Biodiversity Conservation (WBC) pilot activities respectively planned under component 2 and component 3 of the project.
- (2) The Water Resource Department of Jilin Province will provide a total amount of USD 300 000 to Water and Hydrological Survey and Planning Institute (WHSPI) for co-financing field pilot activities under Component 2 (SLWM) and Component 3 (WBC).
- (3) The Water Resource Department of Jilin Province will provide USD 1 300 000 to WHSPI for co-financing its water quality and quantity measurement activities required by Component 2 and Component 3 of the project.
- (4) The Finance Department of Jilin Province will provide USD 200 000 to FAO/GEF Project Management Office (PMO) for co-financing its daily project management, coordination, field M&E activities, progress and financial reporting and office expenditures.

4.3.4 FAO inputs

FAO as the project's implementing agency will contribute USD 200 000 in cash and in-kind. In particular FAO support will be provided in the following areas as outlined in the project document:

- (1) Capacity building and institutional strengthening in piloting and replicating the Sustainable Land and Water Management Model (SLWM) and Wetland Biodiversity Conservation Model (WBC) which will have global environmental benefits;
- (2) Technical inputs in key areas such as training and technical consultancy in conservation agriculture, grassland management, saline land restoration, wetland ecosystem restoration and community co-management of wetland habitats ecosystem, etc;
- (3) Assisting the capacity building for the provincial and local governments in formulation, implementation and enforcement of SLWM and WBC related policies, regulations and planning to mainstream SLWM and WBC into Water and Agriculture Sectors;
- (4) Support the capacity building of Jilin Provincial PMO staff in project planning, M&E and reporting, etc.

These contributions will be managed by FAO and assessed and recorded each year by the project team in accordance with GEF policies and procedures for recording and reporting co-financing.

4.3.5 Financial management and reporting on GEF/LDCF/SCCF resources

a) Accounting

DWR will set up a bank account for receiving project funds from FAO via Jilin Provincial Finance Department. The Finance Division of DWR will be responsible for oversight the bank account and ensure the funds will be effectively used in supporting the planned project activities. DWR Finance Division and DWR PMO staff will be responsible for conducting routine financial management for the GEF Project.

According to governmental and internal financial management regulations, the Planning and Financial Management Division of DWR WHSPI already drafted a GEF project financial management regulation. The consultant reviewed this regulation and suggested to strengthen the following aspects:

- a) The payments and transfer to beneficiaries will strictly follow GEF project annual plan and financial planning and fund budgeting;
- b) Should also specify the procedures of fund application and approval;
- c) Approval and signature of fund reimbursement signature procedures to ensure the funds will be paid out for project activities; and
- d) Financial risk control mechanism, etc.

According to these documents, annual financial planning and budgeting and relevant budget modifications and readjustments for the governmental and international cooperation projects must be strictly following the overall project implementation plan and annual work plan (AWP) prepared by PMO based on the overall project design documents. Modified budget and plan must be approved by PLG and NPD and FAO.

The existing financial planning and budgeting mechanism within DWR is set up according to Chinese National Financial Budgeting Regulations which is coherent with the International Standard. The Planning and Finance Division of DWR is in charge of financial planning and budgeting for all governmental institutional operation funds and government supported projects. The division can provide support to PMO in preparing annual budget for FAO/GEF project. PMO staff needs familiar with the financial planning and budgeting procedures. The consultant therefore rates the risk in financial planning and budgeting as low and fully manageable. The existing financial and budget management regulation is good basic document for development of FAO/GEF project financial management regulations.

b) Financial Reporting

The financial reports are prepared in Chinese and English. PMO staff will be involved in preparing the financial reports. Financial report will be six-monthly prepared by PMO and submitted to FAO for fund disbursement. In addition, a monthly financial report will be also prepared by PMO. Monthly financial report includes following information:

- (1) Detailed monthly expenditures of each budget line linked with planned project components and activities;
- (2) Remaining funds from the previous reporting period; budget lines exceeding the original budget plan, explanations for reasons of exceeding the planned budget;
- (3) Estimated budget required in the coming reporting period; and
- (4) Application and recommendation for modifying the annual budget.

The financial report will be prepared based on the daily accounting records and receipts submitted by the provincial project sites and eventually also the subcontracted implementing agencies. Classified budget line and activity based expense sheets will be prepared by PMO and fund using agencies. These documents are kept for internal and external auditing. Both the PMO financial officer and financial officers in the Finance Division have full command of financial management software for keeping the daily expenditure records and for establishing the financial summary and balance sheets which were used for producing the financial reports according to the governmental financial reporting format which is also quite coherent with international standard. PMO and PD financial officers in charge of managing the GEF Project funds still need to be familiarized with FAO financial management procedures and regulations as well as financial report formats through practice and training at FAO CN.

4.4 PROCUREMENT

A. Material Procurement

The GEF project procurement will be implemented in following procedures:

- (1) Preparation of the Procurement Plan: The plan must be prepared in strictly alignment with the project budget approved by the government. For GEF project the procurement plan and procurement document must be prepared by PMO according to the GPL and agreed GEF project procurement guideline. Overall Project Implementation Plan and annual implementation plan are important reference documents for preparation of procurement documents;
- (2) If the equipment and service procurement volume is larger than 500,000 Yuan and the physical engineering construction volume is more than 1.0 million Yuan open tendering procedures are required. The procurers must announce the procurement through newspapers, webpage and other public media for calling offers from suppliers. For small volume procurement the principle of inviting offers from “Three Suppliers ” must be applied in the procurement;
- (3) Evaluating and selecting the offers from three shortlisted suppliers by a tender evaluation team consisting of PMO officials, officials from financial division of DWR. The offer with best quality and lower offered prices will be selected according to the tender evaluation criteria and scoring. Audit and Inspection Division of DWR will be attending to supervise the evaluation procedures.
- (4) The evaluation result will be publicized for certain days before the PMO finally select the qualified suppliers; and
- (5) Organizing the procurement of goods and equipment, inventory registration and handover to pilot areas and other benefited users;
- (6) Supervision of utilization of the purchased goods and equipment to ensure they will be exclusively used for conducting the project actives.

The procurement tender procedures followed both international standards and Chinese governmental procurement standards which ensured the whole procedures were transparent and fair and strictly followed the tender evaluation criteria and guidelines.

B. Personnel Recruitment

For all components of the GEF project outside technical consultants and consultancy services are needed. Once the consultancy TORs in ProDoc are available, PMO will initiate the recruiting process according to following procedures:

- (1) PMO will prepare the consultant recruitment and consultancy service procurement plans according to the consultancy tasks and scope of work specified in the project design document (PDD). The plan will include following information: title and position, major tasks and responsibilities, outputs and deliverables expected and minimum qualification requirements, when service is needed, duration of the assignment, consultant deployment schedule, which component budget lines to pay the salaries, etc.
- (2) Prepare Terms of Reference (TOR) and job descriptions based on the recruitment plan and project design document. Following information will be given in TOR: project background, consultancy tasks, responsibilities and services required, duration of the assignment, expected outputs and deliverables, minimum qualifications and work experience requirements, etc. TOR will be also used as reference document for PMO to pay the consultant honorarium.
- (3) Publicize job vacancy announcement and consultancy service procurement information on website and public media at least for two weeks or directly send to the potential candidates, and invite relevant candidates for CV submission and bidding offers. Consultants who involved in PPG and shown good consultancy performance would be considered and invited as candidates as consultants during the project implementation.
- (4) Interviewing, evaluating and selecting the consultant candidates by the PMO Director, Project Coordinator, Audit and Inspection Division of DWR (to supervise the evaluation procedures), and eventually FAO and outside experts invited to be the interview team. Criteria for selecting management staff, domestic and international consultants and experts are: evaluation scores given by the interview team members, professional qualification and relevant practical working experiences of candidates are in line with TOR requirements; expected salary from candidates; time availability; former project management and consultancy performance shown in CVs. Practical experiences and previous consultancy activities relevant to the position will be the priority criteria for selection of the candidates. The whole interview and evaluating process will be transparent.
- (5) Signing the consultancy contract with recruited consultants with annexed TOR;
- (6) Mobilization of consultant inputs, supervising the consultancy process and reviewing and accepting the consultancy reports and outputs before payments.

These personnel recruitment procedures and criteria will be also specifically described in the Project Implementation Management Manual (PIM) prepared by DWR PMO in consultation with FAO project official in charge.

Concerning the existing personnel recruitment mechanism and PMO lack of experience in personnel recruitment, the consultant rates the PMO personnel recruitment capacity as a significant risk. The risk is manageable through PMO staff capacity building and facilitation by FAO Beijing program officer in charge.

4.5 MONITORING AND REPORTING

4.5.1 Oversight and monitoring responsibilities

Monitoring and evaluation of progress in achieving project results and objectives will be conducted based on the targets and the corresponding output and outcome indicators established in the Project Results Framework (Annex 1). The project's M&E system will be put in place during

the first 6 months of project implementation and will feed back into project implementation. This system will be housed within the Jilin DWR as described in the previous sections. Technical assistance for the design and administration of the project M&E system, training, and procurement of equipment to administrate the information system will be provided by FAO.

The M&E system will be structured in a way that combines traditional on-going monitoring of project activities, external/participatory impact evaluations and social accountability mechanisms. The monitoring and evaluation system will also facilitate learning and generation of knowledge necessary for the subsequent replication and scaling up of project activities. Thereby, the M&E system becomes an integral part of the project and a continuously used tool for realizing adaptive project management.

4.5.2 Indicators and information sources

The project indicators are specifically selected to capture progress in improvements of water quality and water use, land degradation as well as enhanced biodiversity protection. This further highlights the need to closely integrate the project M&E system with the comprehensive water quality and biodiversity monitoring systems to be designed and implemented as integral parts of the project. The monitoring systems to be established as part of component 3 will at the same time serve as the primary information sources to assess project progress and achievements.

To assess and confirm the congruence of outcomes with project objectives, physical inspection and/or surveying of activity sites and participants will be carried out. This latter task will be undertaken by the DWR supported by the FAO Project Task Manager. Under the guidance of the Project Technical Team and with participation of local communities, collection of baseline data will be carried out and compiled into a base document for each sub-project in accordance with the indicators established to monitor on-the-ground impacts of conservation practices being applied. By the end of each sub-project data to monitor the development in the performance and impact indicators will be collected by local communities supported by project staff. However, in some cases it will only be possible to evaluate on-the-ground impacts 1-3 years after project termination.

4.5.3 Reporting schedule

Specific reports that will be prepared under the M&E program are:

- i. project inception report;
- ii. Annual Work Plan and Budget (AWP/B);
- iii. Project Progress Reports (PPRs);
- iv. quarterly project implementation reports (QPIRs);
- v. annual project implementation review (PIR);
- vi. technical reports;
- vii. co-financing reports; and
- viii. terminal report.

Project Inception Report:

After FAO approval of the project and signature of the Execution Agreement an inception workshop will be held. Immediately after the workshop, DRW will prepare a project inception report in consultation with the FAO Project Task Manager and other project partners. The report will include a narrative on the institutional roles and responsibilities and coordinating action of project partners, progress to date on project establishment and start-up activities and an update of any changed external conditions that may affect project implementation. It will also include a detailed First Year Annual Work Plan and Budget (AWP/B) and a plan with all monitoring and

supervision requirements. The draft report will be circulated to FAO for review and comments before its finalization.

Annual Work Plan and Budget (AWP/B):

DRW will submit to the FAO Representation in China an Annual Work Plan and Budget which will be divided into monthly timeframes detailing the activities and progress indicators that would guide implementation during the year of the Project. As part of the AWP/B, a detailed project budget for the activities to be implemented during the year should be included together with all monitoring and supervision activities required during the year. With the support from the PTM the FAO Representative will give no-objection to the AWP/B in consultation with the LTU and the GEF Coordination Unit.

Project Progress Reports (PPR)

DRW will submit to the FAO Representation in China six-monthly project progress reports. The 3rd report should accompany the following year's draft Annual Work Plan and Budget (AWP/B) and the 1st and the 2nd reports should be accompanied by the updated AWP/B, for review and no-objection by FAO. The PPR are used to identify constraints, problems or bottlenecks that impede timely implementation and take appropriate remedial action. PPRs will be prepared based on the systematic monitoring of output and outcome indicators identified in the project Results Framework. The FAO Project Task Manager will review the progress reports and submit them to the Lead Technical Unit (LTU) for approval and subsequently to the GEF Coordination Unit for final approval and uploading on FPMIS.

Quarterly Project Implementation Reports (QPIR)

The FAO Project Task Manager, with inputs from DRW Project Progress Reports and supervision activities will prepare quarterly reports which entail regular review of the project to compare approved work plans with actual performance, and to take corrective action as required.

Project Implementation Review (PIR)

The LTU supported by the FAO Project Task Manager, with inputs from DRW, will prepare an annual Project Implementation Review (PIR). The PIR will be submitted to the GEF Coordination in TCI for review and approval. The GEF Coordination will submit the final report to the GEF Secretariat and Evaluation Office as part of the Annual Monitoring Review report of the FAO-GEF portfolio.

Technical Reports

Technical reports will be prepared to document and share project outcomes and lessons learned. The drafts of any technical reports must be submitted by DRW to the FAO Representation in China who will share it with the LTU and the GEF Coordination Unit for review and clearance, prior to finalization and publication. Copies of the technical reports will be distributed to the Project Directive Committee and other project partners as appropriate. These will also be posted on the FAO FPMIS.

Co-financing Reports

DRW will be responsible for collecting the required information and reporting on in-kind co-financing. DRW will provide the information in a timely manner and will transmit such information to FAO.

Terminal Report

Within two months of the project completion date DRW will submit to FAO a draft Terminal Report, including a list of outputs detailing the activities taken under the Project, "lessons learned" and any recommendations to improve the efficiency of similar activities in the future. This report will specifically include the findings of the final evaluation as described above.

4.5.4 Monitoring and evaluation plan summary

Type of M&E activity	Responsible Parties	Time-frame	Budgeted costs
Inception Workshop – Overall Project Launch (as part of annual project management workshop including M&E system application)	DRW, FAO BH LTO/PTM, LTU	Within two months of project start up	USD 8 000 (annual project management workshop & M&E system application)
Project Inception Report	DRW, FAO BH LTO/PTM, LTU	Immediately after workshop	None (in-kind co-financing and GEF agency fee)
Design and set-up of project monitoring system including training of staff and equipment	DRW, FAO LTO/PTM, LTU	As early as possible after project start up	USD 12 000
Field based impact monitoring including M&E system operating expenses	DRW, PDFs, County level project units, local forest managers	Continually	USD 40 000 (includes M&E specialist fee plus parts of biodiversity monitoring system used for project M&E purposes)
Supervision visits and Quarterly Project Implementation Reports - QPIR	FAO LTO/PTM, FAO FLO (Funding Liaison Officer - TCI) with inputs from DRW	Quarterly	Visits of the FAO LTU/LTO and TCI-GEF to be paid by GEF agency fee. PTM visits to be paid from project travel budget.
Project Progress Reports - PPRs	DRW	four-monthly	None (in-kind co-financing)
Project Implementation Review - PIR	LTU, FAO LTO/PTM; FAO FLO (Funding Liaison Officer - TCI).	Annually	Paid by GEF Agency fee
Co-financing Reports	DRW	Annually	None (in-kind co-financing)
Technical reports	DRW, FAO LTO/PTM, LTU	as appropriate	None (in-kind co-financing and GEF agency fee)
Supervisory visits to project and field sites	FAO LTO/PTM, LTU	Yearly or as required	Paid by GEF Agency fee
Mid-term evaluation	External Consultant, FAO-C , TCI-GEF Unit with the project team and stakeholders	At mid-point of project implementation	USD 30 000
Mid-stage assessment workshop	External Consultant, FAO-C , TCI-GEF Unit with the project team and stakeholders	At mid-point of project implementation	USD 13 500

Type of M&E activity	Responsible Parties	Time-frame	Budgeted costs
Final evaluation	External Consultant, FAO independent evaluation unit in consultation with the project team and stakeholders	At the end of project implementation	USD 40 000
Final assessment workshop	External Consultant, FAO independent evaluation unit in consultation with the project team and stakeholders	At the end of project implementation	USD 10 000
Terminal Report	DRW, LTU, FAO LTO/PTM	At least one month before end of project	None (in-kind co-financing)
Total (GEF funding)			USD 153 500

4.6 PROVISION FOR EVALUATIONS

An independent mid-term evaluation will be undertaken during the third year of project implementation. The evaluation will determine progress being made towards achievement of objectives, outcomes, and outputs, and will identify corrective actions if necessary. It will, *inter alia*:

- a) review the effectiveness, efficiency and timeliness of project implementation;
- b) analyze effectiveness of implementation and partnership arrangements;
- c) identify issues requiring decisions and remedial actions;
- d) identify lessons learned about project design, implementation and management;
- e) highlight technical achievements and lessons learned; and
- f) propose any mid-course corrections and/or adjustments to the implementation strategy as necessary.

An independent final evaluation will take place three months prior to the terminal review meeting of the project partners and will focus on point d and e listed above. In addition, the final evaluation will review project impact, analyze sustainability of results and whether the project has achieved its environmental and development objectives. The evaluation will furthermore provide recommendations for follow-up actions.

Draft Terms of Reference (TOR) for the Mid-term and Final Evaluation will be prepared by DRW and finalized in close consultation with the FAO Project Task Manager in the FAO representation in China, the FAO LTU, the GEF Coordination, and under the ultimate responsibility of the FAO Office of Evaluation, in accordance with FAO evaluation procedures and taking into consideration evolving guidance from the GEF Evaluation Office

4.7 COMMUNICATION AND VISIBILITY

Project component 3 and 4 highlight the importance of communicating the efforts and results of this project broadly for three main reasons. First, to use the project as a catalyst for raising general societal awareness on the importance and value of sustainable land and water resource management and their economic as well as ecologic benefits. Second, to further the ongoing political dynamic towards highlighting the role of sustainable management of water resources for China's sustainably development, bolstering political support and helping the emergence of a long-term political vision for China's land and water use, including biodiversity protection. Third, to prepare the ground for direct and immediate replication and scaling up of project activities in sur-

rounding areas as well as other areas in Jilin or even beyond. Practically demonstrating the effectiveness of alternative agricultural practices remains one of the most powerful instruments for inducing wide-spread adoption. However, broader adoption hinges on good communication and visibility.

For these three reasons, component 3 and 4 envision to communicate the project activities and results actively and widely, including lessons learned, milestones achieved and benefits generated. Especially the innovative character of the project activities, breaking new ground on several aspects (see section 2), will be at centre of the communication efforts. Dissemination of information will happen at the national, provincial and county level, using the full spectrum of communication technologies: dedicated websites, regular newsletters, and comprehensive media engagement will be cornerstones of the project's communication strategy. In addition, the structures established in the context of the M&E plan will be directly used to formulate and disseminate targeted recommendations for the policy-making system to inform the further development of policies and strategies at national and local levels well beyond the actual project.

SECTION 5 – SUSTAINABILITY OF RESULTS

5.1 SOCIAL SUSTAINABILITY

Local communities and individual farmers in their increasing role as stakeholders and managers of productive landscape ecosystems in China are the core addressees and beneficiaries of this project. Almost all project activities are directly geared at farmers, giving them the knowledge and information, tools and mechanisms, to contribute actively to a different model of water and land use in agricultural production. Accordingly, farmers are the main addressee of the comprehensive training and capacity development activities to be implemented under component 1. They are of course the central group to implement the alternative agricultural practices to be promoted under component 2. And they are also the main stakeholder and responsible party of the co-management scheme for protecting wetland biodiversity under component 3. In short: farmers and local communities will carry this project to success.

In return, many of the benefits of the project will directly go to local communities and farmers. Especially in the long term, the more ecologically sustainable approach to water use in agricultural production will ensure long-term productivity and ultimately provide a significant surplus in terms of agricultural production. In addition to this direct agricultural gain, the project will safeguard the ecosystem of Chagan Lake, which is a major tourist attraction of the region. The land degradation that this project addresses is also a danger to the income generated from tourism in this region. Tourism is the second major source of income next to agriculture/fishery of the local communities surrounding Chagan Lake. The project will therefore directly contribute to the economic well-being of local people. Consequently, the project is broadly supported by the affected population, creating an extraordinary social sustainability.

As during project preparation, local communities will be an active participant in the project related decision-making processes ensuring local ownership. Participatory practices will place strong emphasis on the realization of gender equality throughout the project implementation process. Furthermore, the training and capacity development mechanisms that are envisioned to operate well beyond project duration will also serve as knowledge exchange fora to be used for farmers' interaction on past experience. The conscious inclusion of women in these knowledge exchange mechanisms will further strengthen the gender equality focus of the project.

5.2 ENVIRONMENTAL SUSTAINABILITY

The project is geared towards the creation of long-term environmental benefits, aiming at sustainable impact that will improve environmental conditions well beyond the scope and duration of the project itself. The mitigation of environmental risk, especially vulnerability against fluctuations in water availability, is embedded in the core objectives of the project. Reducing the vulnerability of agricultural productive landscapes against threats of water scarcity and land degradation at the same time increases the environmental sustainability of the project itself. As an initiative dedicated to the enhancement of environmental sustainability not only for the project, but for the province of Jilin and for China as a whole, its environmental sustainability has to be categorized as particularly high.

The environmental risks associated with river water diversion have been addressed thoroughly and carefully. Sensible water diversion efforts will have to be part of the solution of wide-spread land degradation in Northern China. This projects offers a pioneering approach to minimize all environmental risks, downstream as well as within the irrigated area, while maximizing the environmental benefits to be gained through the irrigation scheme.

5.3 FINANCIAL AND ECONOMIC SUSTAINABILITY

The project's strong alignment with national and provincial level long-term interests and goals and its inseparable linkage with major water and irrigation investments effectively insulates the project from most, even all, financial risks. The Government of China has consistently demonstrated its ability and willingness to provide the necessary financial means to fulfil not only its co-financing obligations, but also fund the replication and scaling-up activities that will be discussed under section 5.6. In this light, the financial and economic sustainability of the project has to be seen as fully solid.

5.4 SUSTAINABILITY OF CAPACITIES DEVELOPED

The project's significant capacity development efforts (under component 1) are not stand-alone trainings that only produce an impact on the cohort of trainees reached by the project directly. On the contrary, the project's training activities go hand-in-hand with the practical demonstration of the SWLM practices in question. The project design stresses the strong linkage between the trainings and capacity development and its practical application under component 2. Thereby, the developed capacity is applied immediately and concretely, passing knowledge and information to an ever-growing group of individuals well beyond the initial group of trainees.

In addition, knowledge exchange and dissemination mechanisms envisioned to be established by the project are designed as sustainable structures embedded into the local administrative system. Part of the replication and scaling-up activities is to ensure the existence of these knowledge mechanisms beyond project duration. Training structures will also include peer-to-peer learning, including knowledge and experience exchange between farmers and government staff of different project sites within one provinces as well as between different project provinces. The sustainability of capacity developed will be ensured by these peer-to-peer fora for farmers' interaction on past experience and future endeavours.

5.5 APPROPRIATENESS OF TECHNOLOGY INTRODUCED

The set of agricultural practices selected by the local government and farmer communities themselves is based on global expertise and experiences as provided by FAO as a knowledge based organization. The project team provides guidance on the best available and internationally acknowledged agricultural practices, conservation agriculture, water saving, agrochemical reduction etc.. However, the decision on what practices to use lies with the project stakeholders at the local level, ensuring the selection of the most suitable among the qualified approaches given local conditions, needs and challenges. In this way, the project aims to achieve a high level of appropriateness of introduced practices both from a global and a local point of view.

5.6 REPLICABILITY AND SCALING UP

Its replicability and potential for scaling-up are a big advantage and unique opportunity of this project. The Western Jilin Wetlands offer a unique opportunity to address one of the most disruptive environmental challenges China is facing today: large-scale land degradation and biodiversity damages caused by decreasing water resources. The project design has the potential to illustrate a feasible approach to balance between environmental concerns and economic interests with regard to water resource management. **Accordingly, the potential for replication is extraordinarily high.**

The strategy for replication and scaling-up well beyond the scope and duration of the project itself will already be embedded into the project's strategy. The primary project area served by the Songyuan and Da'an water diversion and irrigation systems will be used in order to test and adjust approaches and practices and to develop the comprehensive SLWM model for restoration and conservation of ecosystem services and biodiversity. These approaches and practices and the new model will then be **applied in the wider western Jilin province through integration in the policy, planning and regulatory framework of the province** (component 1) and through education and awareness raising (component 1 and 4).

By consciously leveraging a clear political trends towards more environmentally conscious solutions in China's water and irrigation sector (see section 2.1) the project is not only aligned, but closely embedded in the overarching political context, dynamic and fundamental interests in China. Expanding sustainable land and water management solutions across the country is an explicit goal of China's political leadership. Accordingly, the Government of China is likely to become a strong partner in replication and scaling-up efforts, providing its support to the roll-out of project activities beyond their current scope.

APPENDICES

APPENDIX 1: RESULTS MATRIX

Project outputs and outcomes:¹

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
Component 1: Improvement of the policy, legal and regulatory framework for an SLWM model in productive landscapes, including capacity development								
Outcome 1.1: Adoption of integrated SLWM model including biodiversity conservation by local governments and drafting of corresponding policy implementation guidelines.								
Output 1.1.1: Adoption of and clear political commitment to the integration of the SLWM model including biodiversity conservation by local governments and relevant line agencies at county level in primary and replication areas (saline-alkaline landscapes with similar ecosystem throughout West Jilin).	a) No local adoption of integrated SLWM Model in West Jilin b) Theoretical design of model exist based on limited empirical testing and hydrological and ecosystem modelling in Songyan irrigation system	a) Model adopted by two additional counties and one additional prefecture b) SLWM Model for Western Jilin piloted in primary project areas and adopted for implementation by Da'an and Zhenlai county governments and Baicheng prefecture.				a) a) Model adopted by two additional counties and one additional prefecture b) SLWM Model for Western Jilin piloted in primary project areas and adopted for implementation by Da'an and Zhenlai county governments and Baicheng prefecture.	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 1.1.2: Drafting and approval of county level policy implementation guidelines outlining the details of the roll-out of the SLWM model including specific responsibilities of stakeholders.	a) No local implementation of integrated SLWM Model in West Jilin	a) SLWM Model for Western Jilin piloted in primary project areas and adopted for implementation by Da'an and Zhenlai county governments and Baicheng prefecture.				a) SLWM Model for Western Jilin piloted in primary project areas and adopted for implementation by Da'an and Zhenlai county governments and Baicheng prefecture.	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO

¹ Please insert/delete columns for project years and rows for outputs and outcomes as needed.

² Value in the case of quantitative indicators and description of situation in the case of qualitative indicators. Please insert the year of the baseline

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
						ture.		
Outcome 1.2: Adjustments of policy plans, legal provisions and regulations to mandate the SLWM model implementation and replication (including location-specific environmental standards for salinity and agrochemical levels)								
Output 1.2.1: Wetlands biodiversity conservation and SLWM model incorporated into policies, plans, and regulations for the agriculture and water resource management sectors (including land and water use planning and management) in western Jilin province	a) Existing body of laws and regulations on water use efficiency, water quality in the agricultural sector without clear landscape perspective integrating questions of biodiversity and land degradation in an integrated way b) Individual projects have address saline alkaline soil degradation, but no coordinated and sector integrated landscape approach for western Jilin province has been applied	a) At least a 40% increase in BD-2 TT score; 40-60% in LD AMAT score; incorporation of SLWM and BD conservation recommendations into five years development plans in 4 counties and at least one investment program for western Jilin province		a) incorporated in the “River connection of lakes for rehabilitation of the western Jilin ecosystem” investment program	a) incorporation of SLWM and BD conservation recommendations into five years development plans in 4 counties	a) At least a 40% increase in BD-2 TT score; 40-60% in LD AMAT score	Policy review Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 1.2.2: Wetlands biodiversity conservation and SLWM model replicated in saline alkaline landscapes in western Jilin province	a) 2,489,500 ha saline alkaline land under desertification and degradation process and wetlands drying up in western Jilin province.	a) 4340 ha of saline alkaline landscapes are managed under the application of wet-lands biodiversity conservation and SLWM practices at the end of the project and 302,265 ha 5 years after the end of the project				4340 ha of saline alkaline landscapes are managed under the application of wet-lands biodiversity conservation and SLWM practices	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
Outcome 1.3: Training of decision makers, government and technical staff as well as local communities, extension workers and individual farmers (training in SLWM agricultural practices)								
Output 1.3.1: Decision makers and technicians from water resource, agriculture, forestry, environmental protection bureau at prefecture and county level and Chagan Lake Administration are trained	a) About 80 decision makers and technical staffs have participated in similar training; training needs to be complemented and extended	a) 60 technicians and decision makers from relevant line agencies of Da'an and Zhenlai County are trained in procedures and technologies included in SLWM and BDC models b) 80 decision makers from provincial, prefecture and county levels attended the SLWM and BDC related policy consultation workshop and built agreement on how to replicate				a) 60 technicians and decision makers from relevant line agencies of Da'an and Zhenlai County are trained in procedures and technologies included in SLWM and BDC models b) 80 decision makers from provincial, prefecture and county levels attended the SLWM and BDC related policy consultation workshop and built agreement on how to replicate	Training reports	DWR
Output 1.3.2: Extension workers and Farmers trained in application of SLWM practices including green/ecological, conservation, water saving and grassland rehabilitation practices.	a) About 120 farmers have participated in similar training; training needs to be complemented and extended	a) 400 farmers and 70 extension workers trained.				a) 400 farmers and 70 extension workers trained	Training reports	DWR
Component 2: Design and piloting of sustainable land and water management and conservation agriculture practices in production landscapes around Chagan Lake								
Outcome 2.1: Water management guidelines for agricultural use (based on and adjustable to the information gathered by the comprehensive water monitoring system)								

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
Output 2.1.1: Water management guidelines for agricultural water use as well as use of chemicals and pesticides formulated and implemented in all project sites	a) No water management guidelines	a) Water management guidelines for agricultural water use as well as use of chemicals and pesticides formulated and implemented in all project sites				a) Water management guidelines for agricultural water use as well as use of chemicals and pesticides formulated and implemented in all project sites	Guideline review Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 2.1.2: Ground water levels stabilized in the project area and positive demonstration effects for the wider irrigation area	a) current ground water 7 ~ 10m; Groundwater level declining	a) Groundwater level no lower than 7 meter in the project area, which is the minimum required eco-indicator for sustaining the underground water reserve.				a) Groundwater level no lower than 7 meter in the project area and positive demonstration effects for the wider irrigation area	Groundwater measurements	DRW
Outcome 2.2: Design, testing and adoption of sustainable agricultural practices for water and land use in coherence with the overarching SLWM model including the development of technical guidelines for implementation								
Output 2.2.1: Degradation and desertification processes stopped and reversed in saline-alkaline land with improved vegetation cover resulting in increased productivity and reduced vulnerability to climate variability	a) 101,360 ha saline alkaline land under desertification and degradation process in Songyan irrigation area.	a) Degradation and desertification processes reversed in 32,000 ha 170,780 ha rehabilitated saline-alkaline land by the end of the project, 46,700 ha will be improved by 2025 depending on the construction process of the relevant irrigation projects				a) Degradation and desertification processes reversed in 32,000 ha 170,780 ha rehabilitated saline-alkaline land by the end of the project b) replication measures underway	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 2.2.2: SLWM agricultural practices adopted in Qian'an and Qian'guo pilot sites and scaled to the total Songyuan irrigation area of inter-	a) Some experiments have been done with different SLWM practices in the Matsubara experimental station located in the Songyan irrigation area, but no	a) SLWM practices adopted in 48,573 ha in the two pilot sites at end of the project, and scaled to 172,000 ha covering the total Songyuan irrigation area 5 years after the				a) SLWM practices adopted in 48,573 ha in the two pilot sites at end of the project b) replication		

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
grated production landscape contributing to the conservation of wetlands biodiversity	adoption by farmers	project				measures underway		
Output 2.2.3: Develop technical guidelines	a) No technical guidelines	a) Technical guidelines in i) salinity management for irrigated fields (including 'green/ecological' paddy production, irrigation area conservation agriculture and reducing agrochemicals, ii) reclaiming saline irrigation areas (reclaiming saline alkaline wastelands by washing out the salt), iii) rain-fed farmland (conservation agriculture), and iv) rehabilitation of native grassland (irrigation and enclosure).		a) Technical guidelines developed		b) Technical guidelines under implementation	Guideline review Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 2.2.4: Farmer's households adopt SLWM practices and benefit from increased land productivity in two pilot sites	a) d) No farmer's households have adopted SLWM practices and land and other input productivity are: i) 4,590 kg/ha and 12,400 CNY/ha for paddy fields ii) 5,625 kg/ha and 11,000 CNY/ha for corn in rain-fed land iii) 1,500 kg/ha and 1,350 CNY/ha for grassland	a) 27,000 farmer's households (4,000 in Qian'an and 23,000 in Qian'guo) adopt SLWM practices and Land productivity increased to: • 9,750 kg/ha for ca. 200ha of paddy rice fields (scaled to 45,000ha in PY4 to PY4+5) • 10,500 kg/ha and 11760 CNY/ha for ca. 200ha of corn in rain-fed land (scaled to 45,000ha in PY4 to PY4+5) • 13,500 kg/ha and 8505 CNY/ha for 2000ha				a) Productivity gains reached according to target	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
		rehabilitated grassland • Fish: 350kg/ha and 800 Yuan /ha net income for 4150 ha in Xinmiaopao and Dakouzipao Pilot Areas; for 12838 ha replicated in Hua'aopao in Y4 and Y5						
Outcome 2.3: Establish and gain local agreement on Integrated Land and Water Management Plans (ILWMP) for agricultural use in coherence with the overarching SLWM model								
Output 2.3.1: Prepare comprehensive and dynamic ILWMP for the project area that integrate agriculture, pasture management, biodiversity conservation and ecosystem service preservation with salinity and water management.	a) No ILWMP	a) One Integrated land and water management plan (ILWMP) for Songyuan area covering 220,000 ha agreed with stakeholders.			ILWMP developed and agreed at the end of year 3 and adopted by the Hadashan management bureau (regarding water management) and county governments (approving for their respective territories)	a) One Integrated land and water management plan (ILWMP) for Songyuan area covering 220,000 ha agreed with stakeholders.	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 2.3.2: Integrated land and water management plan (ILWMP) for the entire Songyuan Area consulted, validated and agreed with relevant stakeholders.		a) One Integrated land and water management plan (ILWMP) for Songyuan area covering 220,000 ha agreed with stakeholders.			ILWMP developed and agreed at the end of year 3 and adopted by the Hadashan management bureau (regarding water management) and county governments (approving for their respective territories)	a) One Integrated land and water management plan (ILWMP) for Songyuan area covering 220,000 ha agreed with stakeholders.	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
Output 2.3.3: Integration of the ILWMP guidelines and principals into the training programs of the WRB and CAD (measured by the number of training packages updated).		a) Implementation of ILWMP in 167,000 ha by the end of the project and 220,000 ha 5 years after the end of the project.		Action plan for implementation of the ILWMP through replication of SLWM practices prepared	Action plan for implementation of the ILWMP under initial implementation	a) Implementation of ILWMP in 167,000 ha by the end of the project	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Component 3: Rehabilitation of wetlands and grasslands leading to improved biodiversity conservation in the productive landscapes around Chagan Lake								
Outcome 3.1: Rehabilitation of wetlands in project sites 1&2 and improved biodiversity conservation leveraging the baseline irrigation infrastructure; water flow management in-formed by monitoring system (see 3.2)								
Output 3.1.1: Rehabilitation and conservation of wetlands managed as an integrated part of the freshwater fishery and irrigated crop and grassland production landscape providing important habitats for endangered migratory birds resting and feeding in these wetlands.		a) Rehabilitation and conservation of 24,100 ha wetland (direct impact pilot area) and an additional 5,600ha in Da'an South (indirect impact in whole irrigation area)	a)1,000 ha Xinmiao and 12, 800 ha Hua'er		a) 10,300 ha Dakouzi	a) Rehabilitation and conservation of 24,100 ha wetland (direct impact pilot area) and an additional 5,600ha in Da'an South (indirect impact in whole irrigation area)	Monitoring System Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 3.1.2: Improved biodiversity indicators for: population and number of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned)		a) Population and number of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned), plus other migratory species mentioned in the baseline table4, maintained or increased in pilot sites by the end of the project (<5% variance)				a) Population and number of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned), plus other migratory species mentioned in the baseline table4, maintained or in-creased in	Monitoring System Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
						pilot sites by the end of the project (<5% variance)		
Outcome 3.2: Design and establishment of a comprehensive monitoring system to monitor salinity as well as pollutant levels, water flow quantities, and biodiversity development (early warning system to inform adjustments of water management and farming practices throughout the project)								
Output 3.2.1: Establish comprehensive monitoring system measuring pollutants and salinity across the project area.	Theoretical model for water management exist for the Songyan irrigation system. Equipment for the control and measurement system are partly purchased, but needs to be installed. Guidelines need to be developed according to the analyzed data from the system.	a) Water quality and quantity measurement system (including protocols, databases and reporting formats) installed in pilot areas of Xinmiaopao and Dakouzipao, will be functioning by the end of PY1 and PY2 respectively and information will be incorporated into the ILWMP by the beginning of PY4	a) Water quality and quantity measurement system in Xinmiaopao functioning	a) Water quality and quantity measurement system in Dakouzipao functioning		a) Information will be incorporated into the ILWMP	Monitoring System	DRW
Output 3.2.2: Agricultural non-point source pollution controlled and monitored within the project area.		a) Measurements for agriculture non-point source below required values		a) Indicators for agriculture non-point source below required values) ⁵	a) Indicators for agriculture non-point source below required values) ⁵	a) Indicators for agriculture non-point source below required values) ⁵	Monitoring System	DRW
Output 3.2.3: Model for water quality requirements and ecological water demand for rehabilitation of wetlands developed based on the data collected from buffer zone inflow and outflow water quality and quantity measurement.		a) One model developed and will be incorporated into the SLWM Model by end of Y4.			a) Model developed	a) Incorporated into the SLWM Model		DRW
Output 3.2.4: Buffer zone inflow and outflow water quality and quantity systematic		Systematic monitoring, early warning system and inflow and outflow operation strategy in place by	Systematic monitoring, early warning system and inflow and	Providing monitoring information and data	Providing monitoring information and data	Providing monitoring information and data	Monitoring System	DRW

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
cally monitored and analyzed, and pollution risk early warning system and inflow and outflow management strategy implemented.		Y2 and providing monitoring information and data in Y2,Y4 and Y5.	outflow operation strategy in place					
Output 3.2.5: Establish comprehensive monitoring system measuring biodiversity across the project area.	Initial BD monitoring in Chagan Lake Nature Reserve, no monitoring in surrounding areas (i.e. project area)	Biodiversity monitoring system operating monitoring at least the species mentioned in outcome 3.1.2 and providing data on aquatic organism biodiversity changes in three wetland pilot areas (Xinmiao, Dakouzi and Hua'aopao) and giving monitoring feedback information and suggestions to modifying the irrigation and water supply strategy	Measurement points selected, equipment installed and data collected and analyzed periodically Biodiversity monitoring indicators and baseline confirmed	Data collected and analyzed periodically	Data collected and analyzed periodically	Data collected and analyzed periodically. Water management guideline for Songyan irrigation system	Monitoring System	DRW
Outcome 3.3: Long-term management system to protect rehabilitated wetlands and conserve wetland bio-diversity; includes a wetland co-management approach for local communities as well as awareness raising efforts wetland biodiversity conservation								
Output 3.3.1 : Wetlands co-management committees with local communities and county reed administration and biodiversity co-management plan for the wetlands and buffer zone prepared and under implementation.		a) 3 wetlands co-management committees established, 3 biodiversity co-management plan for the wetlands and buffer zone developed and under implementation		a) 1 wetland co-management committees established b) 3 biodiversity co-management plan for the wetlands and buffer zone developed	a) 2 wetland co-management committees established b) 3 biodiversity co-management plan for the wetlands and buffer zone under implementation	a) 3 wetland co-management committees established	Committee documentation Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 3.3.2: Awareness raising campaign on wetlands biodiversity conserva-		a) Campaign implemented reaching 6 communities and at least 40% of the families are aware of	a) Campaign implemented reaching 1 communities	a) Campaign implemented reaching 2 communities	a) Campaign implemented reaching 4 communities	a) Campaign implemented reaching 6 communities	Campaign documentation Mid-Term and	DRW, External Evaluators, FAO

Indicators	Baseline ²	Target	Milestones towards achieving output and outcome targets				Data Collection and Reporting	
			Year 1	Year 2	Year 3	Year 4	Means of verification	Responsible for Data Collection
tion implemented in rehabilitated and existing wetlands in the area of influence of the Songyan irrigation area		wetlands biodiversity and habitat conservation needs (evaluated through campaign impact survey)					Terminal Evaluation	
Component 4: Monitoring and evaluation of project activities, dissemination of knowledge and information and public awareness raising								
Output 4.1.1: Project monitoring system is set up and operational for ensuring the effective implementation of the planned project activities and providing six-monthly reports on progress in achieving project outputs and outcomes	N/A	a) 8 six-monthly progress reports and financial reports; regular monitoring missions conducted by PMO M&E staff	a) 2 six-monthly progress reports and financial reports; regular monitoring missions conducted by PMO M&E staff	a) 4 six-monthly progress reports and financial reports; regular monitoring missions conducted by PMO M&E staff	a) 6 six-monthly progress reports and financial reports; regular monitoring missions conducted by PMO M&E staff	a) 8 six-monthly progress reports and financial reports; regular monitoring missions conducted by PMO M&E staff	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 4.1.2: Annual review and planning workshop carried out to ensure the achievements of the intended outputs and outcomes; Midterm and final evaluation reports	N/A	a) 2 Evaluations conducted		a) Mid-Term Evaluation		a) Terminal Evaluation	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO
Output 4.1.3: Project results and best practices disseminated	N/A	a) 1 up-to-date project website and 8 six-monthly project newsletters	a) 1 up-to-date project website and 2 six-monthly project newsletters	a) 1 up-to-date project website and 4 six-monthly project newsletters	a) 1 up-to-date project website and 6 six-monthly project newsletters	a) 1 up-to-date project website and 8 six-monthly project newsletters	Mid-Term and Terminal Evaluation	DRW, External Evaluators, FAO

APPENDIX 2: WORK PLAN (RESULTS BASED)

Insert rows, components and outputs as needed

Output/Activities	Responsible institution/ entity	Year 1				Year 2				Year 3				Year 4			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Component 1: Improvement of the policy, legal and regulatory framework for an SLWM model in productive landscapes, including capacity development																	
Output 1.1.1: Adoption of and clear political commitment to the integration of the SLWM model including biodiversity conservation by local governments and relevant line agencies at county level in primary and replication areas (saline-alkaline landscapes with similar ecosystem throughout West Jilin).	DWR																
Output 1.1.2: Drafting and approval of county level policy implementation guidelines outlining the details of the roll-out of the SLWM model including specific responsibilities of stakeholders.	DWR																
Output 1.2.1: Wetlands biodiversity conservation and SLWM model incorporated into policies, plans, and regulations for the agriculture and water resource management sectors (including land and water use planning and management) in western Jilin province	DWR																
Output 1.2.2: Wetlands biodiversity conservation and SLWM model replicated in saline alkaline landscapes in western Jilin province	DWR																
Output 1.3.1: Decision makers and technicians from water resource, agriculture, forestry, environmental protection bureau at prefecture and county level and Chagan Lake Administration are trained	DWR																
Output 1.3.2: Extension workers and Farmers trained in application of SLWM practices including green/ecological, conservation, water saving and grassland rehabilitation practices.	DWR																
Component 2: Design and piloting of sustainable land and water management and conservation agriculture practices in production landscapes around Chagan Lake																	
Output 2.1.1: Water management guidelines for agricultural water use as well as use of chemicals and pesticides formulated and implemented in all project sites	DWR																
Output 2.1.2: Ground water levels stabilized in the project area and positive demonstration effects for	DWR																

Output/Activities	Responsible institution/ entity	Year 1				Year 2				Year 3				Year 4			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
the wider irrigation area																	
Output 2.2.1: Degradation and desertification processes stopped and reversed in saline-alkaline land with improved vegetation cover resulting in increased productivity and reduced vulnerability to climate variability	DWR																
Output 2.2.2: SLWM agricultural practices adopted in Qian'an and Qian'guo pilot sites and scaled to the total Songyuan irrigation area of integrated production landscape contributing to the conservation of wetlands biodiversity	DWR																
Output 2.2.3: Develop technical guidelines	DWR																
Output 2.2.4: Farmer's households adopt SLWM practices and benefit from increased land productivity in two pilot sites	DWR																
Output 2.3.1: Prepare comprehensive and dynamic ILWMP for the project area that integrate agriculture, pasture management, biodiversity conservation and ecosystem service preservation with salinity and water management.	DWR																
Output 2.3.2: Integrated land and water management plan (ILWMP) for the entire Songyuan Area consulted, validated and agreed with relevant stakeholders.	DWR																
Output 2.3.3: Integration of the ILWMP guidelines and principals into the training programs of the WRB and CAD (measured by the number of training packages updated).	DWR																
Component 3: Rehabilitation of wetlands and grasslands leading to improved biodiversity conservation in the productive landscapes around Chagan Lake																	
Output 3.1.1: Rehabilitation and conservation of wetlands managed as an integrated part of the fresh-water fishery and irrigated crop and grassland production landscape providing important habitats for endangered migratory birds resting and feeding in these wetlands.	DWR																
Output 3.1.2: Improved biodiversity indicators for: population and number of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned)	DWR																
Output 3.2.1: Establish comprehensive monitoring system measuring pollutants and salinity across the project area.	DWR																
Output 3.2.2:	DWR																

Output/Activities	Responsible institution/ entity	Year 1				Year 2				Year 3				Year 4			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Agricultural non-point source pollution controlled and monitored within the project area.																	
Output 3.2.3: Model for water quality requirements and ecological water demand for rehabilitation of wetlands developed based on the data collected from buffer zone inflow and outflow water quality and quantity measurement.	DWR																
Output 3.2.4: Buffer zone inflow and outflow water quality and quantity systematically monitored and analyzed, and pollution risk early warning system and inflow and outflow management strategy implemented.	DWR																
Output 3.2.5: Establish comprehensive monitoring system measuring biodiversity across the project area.	DWR																
Output 3.3.1 : Wetlands co-management committees with local communities and county reed administration and biodiversity co-management plan for the wetlands and buffer zone prepared and under implementation.	DWR																
Output 3.3.2: Awareness raising campaign on wetlands biodiversity conservation implemented in rehabilitated and existing wetlands in the area of influence of the Songyan irrigation area	DWR																
Component 4: Monitoring and evaluation of project activities, dissemination of knowledge and information and public awareness raising																	
Output 4.1.1: Project monitoring system is set up and operational for ensuring the effective implementation of the planned project activities and providing six-monthly reports on progress in achieving project outputs and outcomes	DWR																
Output 4.1.2: Annual review and planning workshop carried out to ensure the achievements of the intended outputs and outcomes; Midterm and final evaluation reports	DWR, External Evaluators, FAO																
Output 4.1.3: Project results and best practices disseminated	DWR																
Project Management																	

APPENDIX 3: RESULTS BUDGET



Jilin Budget_final
version for GEF subm

<i>Component 1: Improvement of the policy, legal and regulatory framework for an SLWM model in productive landscapes, including capacity development</i>	<i>Component 2: Design and piloting of sustainable land and water management and conservation agriculture practices in production landscapes around Chagan Lake</i>	<i>Component 3: Rehabilitation of wetlands and grasslands leading to improved biodiversity conservation in the productive landscapes around Chagan Lake</i>	<i>Component 4: Monitoring and evaluation of project activities, dissemination of knowledge and information and public awareness raising.</i>
Output 1.1.1: Adoption of and clear political commitment to the integration of the SLWM model including biodiversity conservation by local governments and relevant line agencies at county level in primary and replication areas (saline-alkaline landscapes with similar ecosystem throughout West Jilin)	Output 2.1.1: Water management guidelines for agricultural water use as well as use of chemicals and pesticides formulated and implemented in all project sites.	Output 3.1.1: Rehabilitation and conservation of wetlands managed as an integrated part of the freshwater fishery and irrigated crop and grassland production landscape providing important habitats for endangered migratory birds resting and feeding in these wetlands.	Output 4.1.1: Project monitoring system is set up and operational for ensuring the effective implementation of the planned project activities and providing six-monthly reports on progress in achieving project out-puts and outcomes.
Output 1.1.2: Drafting and approval of county level policy implementation guidelines outlining the details of the roll-out of the SLWM model including specific responsibilities of stakeholders.	Output 2.1.2: Ground water levels stabilized in the project area and positive demonstration effects for the wider irrigation area	Output 3.1.2: Improved biodiversity indicators for: population and number of IUCN red listed Crane species (Siberian, Hooded, White-naped, and Red crowned).	Output 4.1.2: Annual review and planning workshop carried out to ensure the achievements of the intended outputs and outcomes; Mid-term and final evaluation reports.
Output 1.2.1: Wetlands biodiversity conservation and SLWM model incorporated into policies, plans, and regulations for the agriculture and water resource management sectors (including land and water use planning and management) in western Jilin province.	Output 2.2.1: Degradation and desertification processes stopped and reversed in saline-alkaline land with improved vegetation cover resulting in increased productivity and reduced vulnerability to climate variability.	Output 3.2.1: Establish comprehensive monitoring system measuring pollutants and salinity across the project area.	Output 4.1.3: Project results and best practices disseminated.
Output 1.2.2: Wetlands biodiversity conservation and SLWM model replicated in saline alkaline landscapes in western Jilin province.	Output 2.2.2: SLWM agricultural practices adopted in Qian'an and Qian'guo pilot sites and scaled to the total Songyuan irrigation area of integrated production land-scape contributing to the conservation of wet-lands biodiversity.	Output 3.2.2: Agricultural non-point source pollution controlled and monitored within the project area.	

GEF FUND BUDGET IN USD																												Total										
Oracle code and description	unit	No. of units	Unit cost	Component 1:							Component 2:								Component 3:								Component 4:				PM	GEF						
				1.1.1	1.1.2	1.2.1	1.2.2	1.3.1	1.3.2	Total	2.1.1	2.1.2	2.2.1	2.2.2	2.2.3	2.2.4	2.3.1	2.3.2	2.3.3	Total	3.1.1	3.1.2	3.2.1	3.2.2	3.2.3	3.2.4	3.2.5	3.3.1	3.3.2	Total			4.1.1	4.1.2	4.1.3	Total		
External Project Evaluation, Mid-Term	week	10	3,000																																			
External Project Evaluation, Terminal	week	10	4,000																																			
Sub-total international Consultants																																						
National consultants																																						
Expert on hydrology	month	20	4,000						0	8,000	8,000	4,000	4,000	4,000	4,000	16,000	16,000	16,000	80,000																		80,000	
Expert on environmental hydraulics	month	6	4,000						0	2,000	4,000	2,000		2,000		2,000	2,000	16,000	4,000	4,000																	24,000	
Expert on SWLM, agricultural practices	month	10	4,000						0	8,000		8,000	8,000	8,000	8,000			40,000																		40,000		
Expert on biodiversity and ecology	month	10	4,000						0									0	8,000	8,000	8,000	8,000	8,000	8,000												40,000		
Expert on wetlands	month	10	4,000						0									0	8,000	8,000	8,000	8,000	8,000	8,000												40,000		
Socio-economic expert	month	3	4,000	4,000	4,000				8,000			4,000						4,000																		12,000		
Policy/Regulation expert	month	2	4,000			2,000	2,000	2,000	8,000									0																		8,000		
Agriculture saline-alkali soil management Specialist	month	16	4,000						0			6,000	6,000	8,000	8,000	6,000	6,000	46,000	6,000				6,000	6,000											64,000			
Institutional capacity building specialist	month	6	4,000						0				10,000		10,000			20,000						4,000											24,000			
Project management, planning and M&E specialist	month	48	1,400						0									0															67,200		67,200			
Establishment of project M&E system	month	3	4,000						0									0													12,000		12,000		12,000			
total national Consultants				4,000	4,000	2,000	2,000	2,000	2,000	16,000	18,000	12,000	24,000	28,000	22,000	30,000	24,000	24,000	206,000	26,000	20,000	16,000	22,000	26,000	0	0	0	0	110,000	12,000	0	0	12,000	67,200	411,200			
5570 total Consultants				4,000	4,000	2,000	2,000	2,000	2,000	16,000	18,000	12,000	24,000	28,000	22,000	30,000	24,000	24,000	206,000	26,000	20,000	16,000	22,000	26,000	0	0	0	0	110,000	12,000	70,000	0	82,000	67,200	481,200			

Oracle code and description	unit	No. of unit	Unit cost	GEFN FUND BUDGET IN USD					Total	Expenditures by year			
				Compo- nent 1	Compo- nent 2	Compo- nent 3	Compo- nent 4	PM	GEF	Year 1	Year 2	Year 3	Year 4
				Total	Total	Total	Total						
5570 International Consultants													
External Project Evaluation, Mid-Term	week	10	3,000				30,000		30,000	0	30,000	0	0
External Project Evaluation, Terminal	week	10	4,000				40,000		40,000	0	0	0	40,000
Sub-total international Consultants							70,000		70,000		30,000		40,000
National consultants													
Expert on hydrology	month	20	4,000	0	80,000	0			80,000	16,000	24,000	24,000	16,000
Expert on environmental hydraulics	month	6	4,000	0	16,000	8,000			24,000	4,000	8,000	8,000	4,000
Expert on SWLM, agricultural practices	month	10	4,000	0	40,000	0			40,000	8,000	12,000	12,000	8,000
Expert on biodiversity and ecology	month	10	4,000	0	0	40,000			40,000	8,000	12,000	12,000	8,000
Expert on wetlands	month	10	4,000	0	0	40,000			40,000	8,000	12,000	12,000	8,000
Socio-economic expert	month	3	4,000	8,000	4,000	0			12,000	4,000	4,000	0	4,000
Policy/Regulation expert	month	2	4,000	8,000	0	0			8,000	4,000	0	0	4,000
Agriculture saline-alkali soil management Specialist	month	16	4,000	0	46,000	18,000			64,000	12,800	19,200	19,200	12,800
Institutional capacity building specialist	month	6	4,000	0	20,000	4,000			24,000	4,000	8,000	8,000	4,000
Project management, planning and M&E specialist	month	48	1,400	0	0	0		67,200	67,200	16,800	16,800	16,800	16,800
Establishment of project M&E system	month	3	4,000	0	0	0	12,000		12,000	6,000	6,000	0	0
total national Consultants				16,000	206,000	110,000	12,000	67,200	411,200	91,600	122,000	112,000	85,600
5570 total Consultants				16,000	206,000	110,000	82,000	67,200	481,200	91,600	152,000	112,000	125,600
5650 contracts													
Conservation Agriculture design/identification, piloting and implementation	whole item	1	180,000		80,000	100,000			180,000	27,000	36,000	72,000	45,000

Land restoration (Saline-alkali soil; native grassland) and water-saving irrigation	whole item	1	442,500		382,500	60,000			442,500	66,375	88,500	177,000	110,625
Implementation of "green paddy rice production" (with A Grade)	whole item	1	70,000		70,000	0			70,000	7,000	21,000	28,000	14,000
Design and preparation of land and water resource integrated management plans (ILWMP)	whole item	1	139,000		139,000	0			139,000	20,850	55,600	34,750	27,800
Comprehensive, multi-layered monitoring system (including monitoring of water quality, flow quantity + biodiversity monitoring of birds and aquatic species)	whole item	1	666,000		312,500	353,500			666,000	99,900	266,400	166,500	133,200
5650 total contract					984,000	513,500	0	0	1,497,500	221,125	467,500	478,250	330,625
5900 travel													
International consultant travel	travel	4	4,000				16,000		16,000	0	8,000	0	8,000
National consultants and PMO travel	travel	110	100					11,000	11,000	1,100	3,300	3,300	3,300
5900 total travel							16,000	11,000	27,000	1,100	11,300	3,300	11,300
5023 training and workshops													
across-sites visit (international)	participant	10	9000	0	72,000	18,000	0		90,000	27,000	27,000	27,000	9,000
across-sites visit (local)	participant	30	1000	12,000	18,000	0	0		30,000	5,000	10,000	10,000	5,000
wetland co-management committee training meeting	workshop	6	5000	0	0	30,000	0		30,000	5,000	10,000	10,000	5,000
decision maker and technical staff training meeting	participant	100	130	13,000	0	0	0		13,000	3,250	3,250	3,250	3,250
training for community farmers	participant	400	50	20,000	0	0	0		20,000	4,000	6,000	6,000	4,000
government cadre training (capacity building)	workshop	4	2000	8,000	0	0	0		8,000	2,000	2,000	2,000	2,000
local community training (capacity building)	workshop	4	4000	16,000	0	0	0		16,000	4,000	4,000	4,000	4,000
overall launch meeting	meeting	1	8000	0	0	0	0	8,000	8,000	8,000	0	0	0
steering committee meeting of the project	meeting	3	3000	0	0	0	0	9,000	9,000	0	3,000	3,000	3,000
mid-stage assessment workshop	workshop	1	13500	0	0	0	13,500		13,500	0	13,500	0	0

final assessment workshop	workshop	1	10000	0	0	0	10,000		10,000	0	0	0	10,000
training for wetland biodiversity protection	workshop	5	4500	0	0	22,500	0		22,500	5,625	5,625	5,625	5,625
wetland protection school education	workshop	5	5500	0	0	0	27,500		27,500	6,875	6,875	6,875	6,875
project supervision and management training	workshop	2	5000				10,000		10,000	5,000	5,000		
5023 total training				69,000	90,000	70,500	61,000	17,000	307,500	75,750	96,250	77,750	57,750
6000 expendable procurement													
training material (capacity development)	sets	10	4,000	40,000	0	0	0		40,000	6,667	13,333	13,333	6,667
sustainable water and soil management and implementation guidelines	publications	50	100	5,000	0	0	0		5,000	0	1,250	2,500	1,250
land and water management plan	publications	30	2,000	0	60,000	0	0		60,000	10,000	20,000	20,000	10,000
"successful experiences" report	publications	2000	10	0	0	20,000	0		20,000	4,000	6,000	6,000	4,000
"successful experiences" compilations	publications	2000	10	0	0	20,000	0		20,000	3,333	6,667	6,667	3,333
Periodical publication of results	publications	20	300	0	0	6,000	0		6,000	1,500	1,500	1,500	1,500
6000 total expendable procurement				45,000	60,000	46,000	0	0	151,000	25,500	48,750	50,000	26,750
6100 non-expendable procurement													
advertising board in GEF project area	items	6	1,000		0	0	6,000		6,000	1,000	1,000	4,000	0
desktop computer	items	3	500		0	0	0	1,500	1,500	1,500	0	0	0
Laptop computer	items	5	1,200		0	0	0	6,000	6,000	6,000	0	0	0
3 in 1 machine (print, copy, scan)	items	2	500		0	0	0	1,000	1,000	1,000	0	0	0
DSLR and camera lens	items	1	3,000		0	0	0	3,000	3,000	3,000	0	0	0
motor vehicle	items	1	21,300		0	0	0	21,300	21,300	21,300	0	0	0
6100 total Non-expendable procurement				0	0	0	6,000	32,800	38,800	33,800	1,000	4,000	0
6300 GOE budget													
Audit	times	4	1,000		0			4,000	4,000	1,000	1,000	1,000	1,000

Miscellaneous including contingencies		1	120,000		60,000	60,000			120,000	30,000	30,000	30,000	30,000
6300 total GOE budget					60,000	60,000		4,000	124,000	31,000	31,000	31,000	31,000
TOTAL				130,000	1,400,000	800,000	165,000	132,000	2,627,000	479,875	807,800	756,300	583,025

SUBTOTAL Comp1	130,000	4.9%
SUBTOTAL Comp2	1,400,000	53.3%
SUBTOTAL Comp3	800,000	30.5%
SUBTOTAL Comp4	165,000	6.3%
SUBTOTAL Project Management	132,000	5.0%
Total	2,627,000	100.0%

APPENDIX 4: RISK MATRIX

Risks	Risk rating	Mitigation countermeasures
A. Ecological risks		
Impacts of climate change	High	<ul style="list-style-type: none"> • Introduce water saving irrigation technologies and facilities in rain-fed farmlands; • Straw Mulching
Impact of water diversion on down stream	Low	<ul style="list-style-type: none"> • Assessment and monitoring measures will be considered at project inception.
Salt moving to the upper layers of the soil	Medium	<ul style="list-style-type: none"> • Introduce integrated saline soil improvement technologies, such as physical engineering, chemical absorption, plant salt resistant crops, etc.
B. Social economic risks		
Farmers lack of capacity to adopt water saving agriculture practice and technologies	Medium	<ul style="list-style-type: none"> • Can be mitigated through farmer's training and field demonstration
Market risks for green food products	Medium	<ul style="list-style-type: none"> • Support to farmer's cooperatives • Promote the agro-company plus households marketing modality
Risks of marginalization of rural women and poor farmers in the project	Medium	<ul style="list-style-type: none"> • Provide technical training to women • Give the priority to poor farmers in selecting pilot households • Conduct participatory consultation with women and poor households in planning, monitoring the project activities
Conflicts between farmers' livelihoods and management of wetland and habitats	Medium	<ul style="list-style-type: none"> • Support alternative livelihood activities in the community co-management pilot
C. Institutional risks		
Interests conflicts between different sectors and line agencies	High	<ul style="list-style-type: none"> • Set up multi-institutional consultation mechanism at prefecture and county levels during planning and implementation • Incorporate the SLWM and biodiversity conservation models into local government development planning by different sectors • Hold multi-stakeholder policy consultation conference at Y4
Lack of participation of agriculture, animal husbandry and environmental agencies in the policy implementation	Low	<ul style="list-style-type: none"> • Sub-contracting agronomy and pastoral management activities to agriculture and animal husbandry departments
Local government is not able to pay the eco-service compensation to farmers	Medium	<ul style="list-style-type: none"> • Consult with and formulate recommendations to local government
Delayed physical engineering construction of Songyuan Irrigation Area for Dakouzipao Pilot Area	Medium	<ul style="list-style-type: none"> • Jilin Department of Water Resources, PMO will coordinate with the SIA Project implementation unit to give priority to the Dakouzipao