

PIP annex 9 - A of GEF Hai Basin Integrated
Water and Environment Management Project

**The Environmental Impact
Assessment (EIA) Report on the GEF
Hai Basin Project**
(Final Version)

GEF Hai Basin Project Office of SEPA and MWR

November 2003

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1 Executive Summary

The Hai River basin is the key area and also an important industrial and agricultural base of China. The river basin includes the Hebei, Henan, Shandong, Shanxi provinces, the Inner Mongolia autonomous region, the Beijing and Tianjin cities, has a population of 126 million (according to the statistics of 2000), and accounts for 15% of the GNP of the whole country. The Hai River basin, which has significant historical and geographical backgrounds and is enriched with population and natural resources, is now facing an unprecedentedly severe situation in water resources and water environment.

On the other hand, the Hai River basin is one of the largest and most significant river basins flowing into Bohai Sea, which is at the northeast corner of Yellow Sea, is one of the water bodies with significant ecological functions for the world and provides substantial fishery resources to China, Japan and South and North Korea. Under the impact of the shortage and severe pollution of the water resources of the Hai River basin, the natural water ecosystem of Bohai Sea is being damaged, and its neighboring oceanic areas are also polluted to different extents. Therefore, it is of great urgency at present to improve the water resources and environment management of the Hai river basin, including to strengthen the management of the water resources demand, and to enhance the utilization efficiency and productivity of water resources.

As an important countermeasure to strengthen the management of the pollution control and water resources of the Hai river basin and to treat the environment of Bohai Sea, the “Hai Basin Integrated Water and Environment Management Project” provides an important connection to China’s GEF project on improving the oceanic environment of Bohai Sea at the same time. The overall objective is to catalyze an integrated approach to water resource management and pollution control in the Hai River Basin in order to improve the Bohai Sea environment. Specifically, the Project

will (i) improve integrated water and environment planning and management in the Hai Basin, (ii) support institutional aspects related to effective local, municipal/provincial, and basin-wide water and environment planning and management, (iii) enhance capacity building in water and environment knowledge management and implementation, and (iv) reduce wastewater discharges from small cities along the rim of the Bohai Sea. During the implementation of the “Hai river basin project”, whether the wastewater pollution and area source pollution of small and medium-scale cities (including the towns with a population of less than 500 thousands) will be treated and the Integrated Water and Environment Management (IWEM) will be promoted is the key for the project’s success. This is because, according to estimation, at least half of the water pollution in Hai river basin comes from towns (and their attached industries) and rural areas, and almost no town has any wastewater treatment facilities. Thus this is also a direct objective of the “Hai river basin project”.

2 Overview

2.1 Formulation foundations and assessment criteria of the EIA report

2.1.1 Formulation foundations

The EIA report of this project is formulated mainly according to national and local environmental protection laws, regulations, official documents and reports, international environmental protection rules and the operation manual of the World Bank, which include the following:

- *Environmental Protection Law of the People’s Republic of China* (December 26, 1989)
- *Water and Soil Conservation Law of the People’s Republic of China*
- *Regulations on the Environmental Impact Assessment of River basins Planning*
- *Regulations on the Environmental Impact Assessment of Irrigation and Hydraulic Power Projects*
- *Environmental Impact Assessment Law of the People’s Republic of China* (October 28, 2002)
- *Rules on the Environmental Protection Management of Construction Projects* (The Ordinance (98) 253 of the State Council)
- *Regulations on the Environmental Protection Design of Construction Projects*
- *Water Law of the People’s Republic of China* (October 1, 2002)

- *Water Pollution Prevention and Treatment Law of the People's Republic of China* (May 11, 1984)
- *Guidelines on Environmental Impact Assessment* (HJ/T 2.2~2.3-93)
- Non-pollution ecological impact, *Guidelines on Environmental Impact Assessment* (HJ/T19-1997)
- *Beijing Municipal Water Resources Protection Plan*
- *Beijing Municipal Plan on the Environmental Functions of Water Areas*
- *Tianjin Municipal Water resources Protection Plan*
- *Tianjin Municipal Plan on the Environmental Functions of Water Areas*
- *The Operation Manual of the World Bank*
- *Memorandum of the Preparation Group for China's GEF Hai Basin Integrate Water Environment Management Project* and its Appendixes
- *PIP Report on the Beijing City Project of the GEF Hai Hai Basin Integrate Water Environment Management Project*
- *PIP Report on the Tianjin City Project of the GEF Hai Basin Integrate Water Environment Management Project*
- *PIP Report on the Hebei Province Project of the GEF Hai Basin Integrate Water Environment Management Project.*

2.1.2 Assessment Criteria

This project is a large-scale ecosystem construction project operated cooperatively by the World Bank and relevant departments of our country, and should observe the following principles:

(1) Should comply with relevant laws, regulations, policies and standards of our country, and take into account relevant regulations of provinces and cities concerned in the Hai river basin.

(2) Should comply with relevant regulations of both the Chinese and foreign parties, and important data in the assessment should be discussed and confirmed by the Chinese and foreign parties jointly.

(3) Should strive to reflect completely and objectively all benefits this investment will bring about, such as economical benefits, social benefits and environmental benefits.

(4) When conducting exist-or-not comparisons or comparing and selecting different

schemes, whether as a qualitative or quantitative analysis, should pay attention to the comparability.

The written standards adopted include the following:

- *Agricultural Fields Irrigation Water Quality Standards* (GB5084-96)
- *Surface Water Environmental Quality Standards* (GB3838-2002)
- *Integrated Wastewater Discharge Standards* (GB8978-1996)
- *Groundwater Quality Standards* (GB/T14848-93)
- *National Soil Quality Standards* (GB15838-95)
- *Soil Environmental Quality Standards* (GB15618-95)
- *Irrigation Canal Systems Design Standards* (SDJ—78)
- *Beijing Municipal Water Pollutants Discharge Standards* (Issued by the Beijing City People's Government of in October 15, 1985)
- *Water Engineering Design Manual*

2.1.3 Assessment level

According to the official document numbered as environmental-supervision [1993] 324 and the principles concerned with environmental classifications in the World Bank's operation manual, and considering with the concrete situations of the project areas, we have decided this project's environmental assessment level as class B.

2.2 Assessment principles

Environmental impact assessment is an important component of planning, and it is to emphatically study the situation of environmental quality, determine the capacities of environmental elements and predict the impact of development activities. Therefore, it is a highly scientific, comprehensive, predictive, planned and practical work, and should observe the following principles:

- The integrated principle. Environmental impact assessment should be integrated into environmental planning, and the environmental impact assessment work should be conducted simultaneously with environmental planning.
- The wholeness principle. The assessment involves coordinating and solving various environmental problems emerging from development and construction activities, and embraces all departments, regions and construction units that produce pollution and ecological damages. So we should assess comprehensively

the development behavior of every construction project and the mutual influence between these development projects, and understand and solve the environmental impact problem from an overall perspective. We should not only propose the environmental protection measures for every construction project, but also propose the schemes and countermeasures for centralized control of development.

- The comprehensiveness principle. The assessment work should not only consider the social environment, but also take into account the natural environment and the impact on the living quality. Therefore, during the assessment and analysis, we must stress adopting comprehensive measures in order to reach correct assessment conclusions.
- The strategy principle. Environmental impact assessment should not only assess the pollution impact on the surrounding environment of development activities, but also, from a strategic level, assess the consistency between development activities and the development plan of the region where they take place, evaluate the rationality of the internal function layout of development activities, and from the consideration of total volume control, propose the principle of division between projects and constrained projects, the total control volume of pollution discharge and the reduction scheme.
- The practicality principle. The practicality of environmental impact assessment is reflected concentrately in formulating optimization schemes and pollution prevention and treatment countermeasures, which should be technically practical, economically reasonable, reliable in effect, and can be adopted by construction departments.
- Sustainability principle. Development activities are usually a long-term rolling developing process; therefore, in the environmental impact assessment, we should not only assess the development activities from the perspective of sustainable development, but more importantly, ensure the sustainability of the development activities in respect of environmental management system.

2.3 Environmental Protection Objectives

The purpose of the “Hai river basin project” is to actually enhance the integrated management capability for the water resources and water environment of the Hai river basin, actually reduce the pollution of the Bohai bay, actually reverse the trend of water quality deterioration and severe over-excavation of surface and groundwater resources.

In addition, this project will facilitate resolving the wastewater pollution and area sources pollution of Small and Medium Sized cities and towns (including towns with a population less than 500 thousands). Although the concrete data are not available, according to estimation, at least half of the wastewater pollution in the Hai river basin comes from small cities and towns (and their attached industries) and rural areas, and almost no town has any wastewater treatment facilities. The participation of GEF will help resolve the shortage of funds and management capabilities of towns. The integrated management of water sources and water environment is also a necessary approach to resolve the complex water problem of Hai river basin. A key management question is how to substitute groundwater with recycled water in an integrated way, so as to reduce the excavation of groundwater and the pollution of Bohai Sea from wastewater inflow.

Through constructing demonstration projects in the project areas, studying the demonstration projects, formulating integrated water and environment management plans (IWEMPs), training personnel and other means, including pollution source control plan, wastewater recycling and “real water saving” in irrigation agriculture etc., gradually establish an integrated management system of water resources and water environment adapted to the characteristics of project areas.

Through gradually spreading the experience obtained from the project areas into the whole city and the whole Hai river basin, develop, from the base level upwards, an

integrated water resources and water environment management system, boost the capability construction of the regional IWEM, accelerate the improvement of the water environmental quality of Bohai Sea, and facilitate the realization of the IWEM, which is the project's overall objective. This is also the ultimate aim of the great effort made jointly by the State Environmental Protection General Bureau and the Water Utilization Department.

2.4 Assessment scope, assessment contents and work procedure

The assessment scope is the project's planning and implementation scope, including the project implementation areas located in the Beijing area, the Tianjin area, the Hebei province area and the Zhangweinan area. The assessment mainly refers to the assessment of natural environment and ecological environment, including the impact on the water environment (wastewater treatment and recycling, and the scientific management of surface water and groundwater resources), the impact on water and soil conservation, the impact on forestry and vegetation, and the impact on the ecological environment of wetlands etc.

The assessment method adopted is a combination of qualitative method and quantitative method. The scientific quality and practicality of the assessment should be strengthened, processing individually environmental parameters should be developed into the integration and relation of parameters, and considering statically the impacts of development behaviors on environment and ecosystem should be developed into studying dynamically these impacts.

The main contents of the assessment is as follows:

- Assessment of the current situation of the water resources in the project areas.
- Assessment of the current situation of the environmental quality in the project areas.
- Assessment of the environmental impact of the implementation of the project's contents.

- Conclusions and suggestions.

The work procedure of the assessment is as follows:

- Determine the project's contents, scale, assessment criteria, standards to be adopted, assessment scope and environmental protection objectives.
- Investigate and assess the natural geographical, hydrological and meteorological characteristics and social and economical status of the assessment areas.
- Assess the environmental status of the surface water and groundwater.
- Assess the environmental problems before the projects' construction and the change of the environment and ecosystem brought about by the project's construction.

Through the above assessments, put forward objective, practical and realistic conclusions and operational suggestions on abating or preventing negative environmental impacts.

3 Overview of the project

3.1 The basic situation of the Hai river basin

3.1.1 The general natural geographical situation

The Hai river basin is located between longitude 112° - 120° east, and latitude 35° - 43° north, with Bohai Sea in the east, bounded by the Yellow River in the south, relying on the Shanxi Plateau in the west and overlooked by the Mongolia Plateau in the north. It spans 8 provinces, autonomous regions and municipalities directly under the central government, including the whole of the Beijing city and Tianjin city, most parts of the Hebei province, the eastern part of the Shanxi province, the northern part of the Henan province and Shandong province, and a small part of the Inner Mongolia Autonomous Region and the Liaoning province, with a total area of 318 thousands square kilometers, among which the area of hills, mountains and plateaus is 189 thousands square kilometers, accounting for 60%; and the area of plains is 129 thousands square kilometers, accounting for 40%.

The Hai river basin includes there major water systems, which are the Hai river, the

Luanhe river and the TuhaiMajia river, and is characterized by dispersed water systems, complex river systems, numerous tributaries, short transition zones, near sources and rapid flows.

The areas of every administrative regions and water resources divisions in the Hai river basin are illustrated in Table 3.1.

Table 3.1 The areas of the administrative divisions and the drainage areas of every river systems in the Hai river basin (unit: km²)

Divisions	Beijing	Tianjin	Hebei	East Shanxi	North Henan	North Shandon g Province	Part of Inner Mongolia	Part of Liaoning	Total	Percentag e
Luanhe River and the coast area of East Hebei Province			45870				6950	1580	54400	17.1%
The northern system of Hai River	14191	6589	37033	19385			5626		82824	26.1%
The southern system of the Hai River	2176	4945	88194	39998	13395	2945			149587	47.8%
The Tuhaimajia River			365		1742	26633			28740	9.0%
The Hai river basin	16367	11534	171462	59383	15137	29714	12576	1580	317753	100%
Percentage in the river basin	5.2%	3.6%	54.0%	18.7%	4.8%	9.4%	4.0%	0.5%	100%	

The geographical configurations of the Hai river basin is diversified, with mountainous areas and plateaus in the north and west, expansive plains in the east and southeast. The Yanshan Mountain lies in its north; the Jundu Mountain is situated in its northwest, the Wutai Mountain and Taihang Mountain is in its west, which embrace the plains. The coastline is 922.6 km long.

The Hai belongs to the half-humid and half-dry continental monsoon climate region of the temperate zone, with north winds and northwest winds prevailing in winters, southeast winds frequently seen in summers, and dry, windy and sandy springs. The annual average temperature of the river basin is 1.5-14° C, the annual average relative humidity is 50%-70%, the annual average frost-free period is 150-220 days, the annual average sunshine time is 2500-3000 hours, the annual average land surface evaporation volume is 470mm, and the water surface evaporation volume is 1100mm.

The groundwater in the mountainous areas of the Hai river basin consists of karst water, cranny water and hole water. Due to over-excavation of groundwater, the outflow volume of some springs has prominently decreased, while some springs have dried up.

The bottom boundaries of the shallow level groundwater in the plains of the Hai river basin are usually 40-60m deep. According to the strata formation causes and hydrological and geological characteristics, the plains are divided into three hydrologic and geologic divisions, which are the torrentially alluvial plains in front of mountains, the lake-related alluvial plains of the middle and eastern areas, and the coastal tide-related alluvial plains. The deep level groundwater systems in the in-front-of-mountains plains include the III and IV hydrated rock sets with the top boundaries of 80-150m deep and the bottom boundaries of 140-350m. In the plains of the middle and eastern areas, the deep level fresh groundwater under the salty water bodies include the II and III hydrated rock sets with the top boundaries of 120—160m

deep and bottom boundaries of 270-360m deep, while the bottom boundaries of the IV hydrated rock sets are 350-550 deep.

3.1.2 The social and economical situation in general

Hai river basin is the core area of our country in terms of politics, economy and culture. Within the river basin, there locate 25 large and medium-scale cities, such as Beijing, the capital, Tianjin, a municipality directly under the central government, Shijiazhuang and Tanshan etc. The whole river basin embraces 31 cities of prefecture level, 2 leagues, 256 counties (districts) and among them 35 cities of county level. In 2000, the total population of the river basin is 126 million, accounting for about 10% of total population of the whole country, and in it the urban population is 36.47 million (according to residential registry statistics) with the urbanization ratio of 29%. The average population density in the river basin is 397 persons/km², while the population density in the plain areas is 628-persons/ km².

Hai river basin is our country's significant industrial and hi-technology industrial base, and possesses an important strategic status in the national development. In 2000, the GDP of the river basin was 1.1211 trillion yuan, accounting for about 15% of the whole country's GDP, with the per capita GDP of 8890 yuan, which is higher the average level of the whole country. Its gross industrial output is 1.5831 trillion yuan. The Hai river basin is one of our country's three major food production bases with the cultivated land area of 164 million mu in 2000. Its staple food crops include wheat, barley, maize, grain sorghum, rice and legume etc., and its main cash crops are cotton, oil plants, flax, beet and tobacco. Since 1980s, the economy and society of the Hai river basin has maintained a continuous development. When the GNP has increased, the economical structure has also been undergoing a profound change. The industrial structure has been being readjusted incessantly, the proportion of the first industry (the agriculture industry) has decreased with the continuous enhancement of the agricultural productivity, while the proportion of the third industry has increased

constantly, and traditional industries has gradually been substituted by hi-technological industries.

3.1.3 The characteristics of the water resources

The main characteristics of the water resources of the Hai river basin are that the total volume of the water resources is small, the precipitation is distributed unevenly in time and space, and spells of continuous drought years often occur. The average precipitation of multiple years is 539mm, with the annual precipitation varies greatly. Since 1949, there have occurred 4 spells of continuous drought years, which are in 1951-1952, 1980-1982, 1992-1993 and 1997-2000.

a. The current situation of the exploitation and utilization of the water resources

In 1998, the overall water supply (not including wastewater) of the river basin is 43.2 billion m³, including groundwater, surface water, the water diverted from the Yellow River, slightly salty water and sea water etc.. The supply of groundwater is 26.5 billion m³, accounting for 61% of the total water supply. In 1998, the river basin diverted water of 5.1 billion m³ from the Yellow River, accounting for 12% of the total water supply. The volume of slightly salty water utilized is 330 million m³. The volume of seawater utilized is 2.6 billion m³, which amounts to 70-million m³ fresh water.

In the total water supply of the river basin in 1998, the volume of the water used in urban areas is 9.8 billion m³, accounting for 22.7%; the volume of the water used in rural areas is 33.4 billion m³, accounting for 77.3%. Among all main industries that use water, urban living-used water is 2.61 billion m³, accounting for 6% of the total volume of water used; industry-used water is 7.05 billion m³, accounting for 16%; the water used for the urban rivers and lakes environment is 140 million m³, accounting

for 0.3%; rural living-used water is 2.15 billion m³, accounting for 5%; agricultural irrigation water is 29.32 billion m³, accounting for 68%, the water used in forestry, animal husbandry, fishery is 1.94 billion m³, accounting for 4%.

The total water supply of the river basin in 2000 is 40.06 billion m³, and in it the surface water supply is 13.66 billion m³, accounting for 34.0% of the total water supply. In the surface water, the water diverted from the Yellow River is 4.01 billion m³, accounting for 29% of the surface water supply. The local groundwater supply is 26.28 billion m³, accounting for 65.6% of the total water supply. Groundwater includes shallow level water, deep level water and slightly salty water.

The exploitation and utilization ratio of the water resources in the river basin has reached 80%. With the increase of the population, the development of the economy and the further enhancement of the urbanization level, the shortage of water resources will become a key constraining factor for the economical and social sustainable development in the 21st century.

(1) The situation of the surface water use

The surface water supply of the Hai river basin is mainly relying on water retaining projects. At present, there have been constructed 32 large-scale reservoirs (with the storage capacity of ≥ 100 million m³ each), among them 31 are situated in mountainous areas and 1 (namely Beidagang) is situated in a plain area, with the overall storage capacity of 26 billion m³. 10, 000 water diversion works and 8,200 water-lifting works have been constructed, constituting a relatively complete water supply system.

(2) The situation of over-use of the groundwater

The large-scale exploration of the groundwater of the Hai river basin began in 1970s. The exploration areas of shallow level groundwater are mainly distributed in the areas such as the east of Beijing, the plain in the middle and south of Hebei

province, the plain in the east of Hebei province, Datong and the north of Henan etc, with an overall over-excavation area of 44 thousands km², and in it the ordinary over-exploration area is 41 thousands km², while severely over-exploration area is more than 3400 km².

b. The basic situation of Bohai Sea

Bohai Sea is a nearly closed inland sea at northeast China. It begins in the east from the Laotieshan mountain at the south end of the Liaodong peninsula, reaches in the south the water area to the west of the Penlai diagonal line in the Shandong peninsula, with four provinces or cities, which are Lianning, Hebei, Tianjin and Shandong, surrounding its coast. Bohai Sea spans from the longitude 117°32'E in the east, to 122°08'E in the west, with a length of 555 km measured from the northeast to the southwest, and a length of 346 km measured from the east to the west; its average water depth is about 18 m, its maximum water depth is about 80 m, its overall perimeter is about 3780 km, and in it the length of the coastline is about 3020kmm, its sea area is 77 thousands km², and is the only inland sea of our country. The areas surrounding Bohai Sea is an important economically developed area of our country, with not only the convenience of foreign transportation and trade, but also a prosperous fishery and aquiculture from ancient times, and is abundant with resources such as petroleum and natural gas.

For a long time, because of the impact of human activities, especially the fast growth of the population in the coastal areas, and a great deal of the industrial pollutants and living wastewater discharge, Bohai Sea area has been undertaking heavier and heavier environmental and ecological pressure.

The pollutants received by Bohai Sea come from the land sources, maritime transportation, offshore oilrigs etc, and 80% of the pollutants comes from the

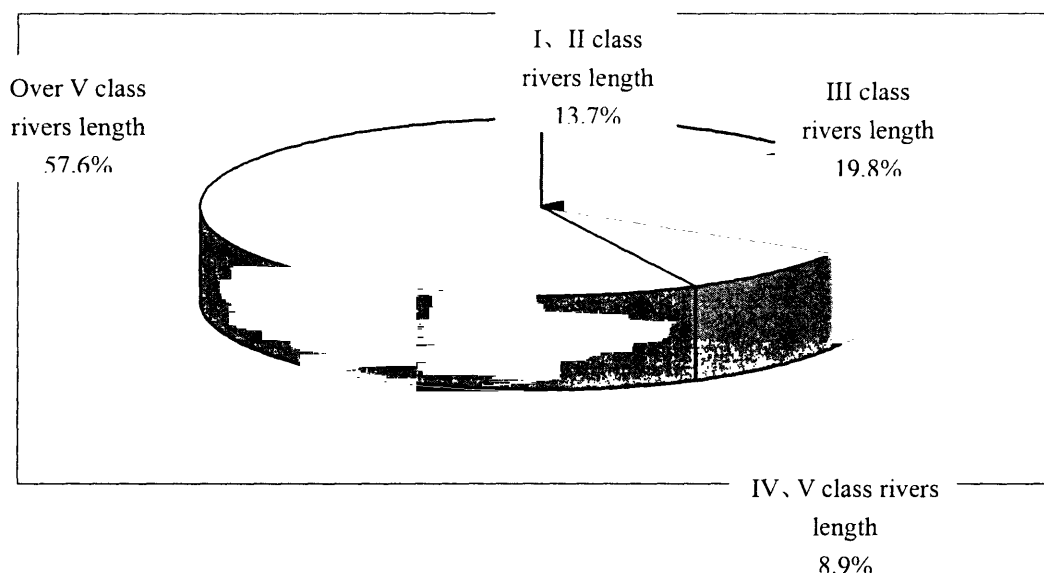
wastewater discharged from the pollution sources on the land. The volume of pollutants discharged greatly exceeds the bearing capacity of the maritime environment, and moreover, the growth rate of the pollutants discharge is greater than the growth rate of the treatment facilities.

To strengthen the near-land sea area's ecosystem protection, to construct ecological demonstration projects, to reinforce the pollution prevention and treatment and ecological protection, to realize the 'double wins' both in terms of economic construction and ecological protection during development constructions so as to realize a sustainable development, has already become a focus of attention of the people.

c. The situation of the pollution of major rivers in the Hai river basin

The Hai river basin is in severe shortage of water, at the same time, a large amount of untreated industrial and living wastewater flows directly into rivers, lakes and reservoirs, causing heavy pollution to the water bodies in the Hai river basin. In 2000, the overall industrial wastewater and municipal sewage discharge volume was 5.39 billion tons, in it the industrial wastewater was 3.38 billion tons, accounting for 63% of the total wastewater and polluted discharge volume; the municipal wastewater was 2.01 billion tons, accounting for 37% of the total wastewater and polluted water discharge volume. Compared with that in the 1999, the total industrial wastewater volume had decreased by 5.4%, the total sewage discharge volume had decreased by 1.7%, and the overall wastewater discharge volume had decreased by 4%.

Figure 3.1 Chart on the current situation of the water quality in the Hai river basin

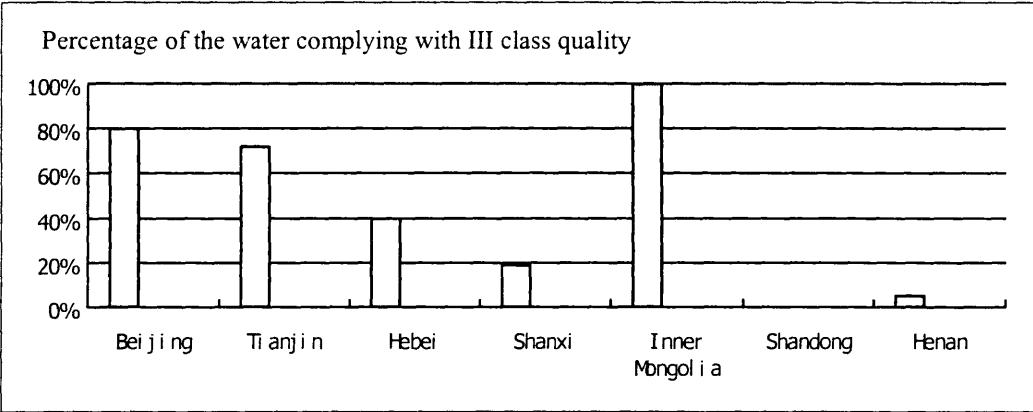


d. The current situation of the water quality in every province(autonomous region, municipality directly under the central government)

In the 7 administrative regions being assessed in the Hai river basin, the Inner Mongolia Autonomous Region has the best water quality, with the water quality of all of the 246km river courses reaching or exceeding the III class standards; the Beijing city follows, with the water quality of more than 80% of the river courses reaching or exceeding the III class standards; the Shandong and Henan province is the worst, with the water quality of less than 5% of the river courses reaching or exceeding 5%, so their pollution situation is extremely severe. This is illustrated in Chart 3.2. The phenomena that COD pollutes water bodies are prevalent, and the main pollution items are ammonia and nitrogen, the potassium permanganate index, volatile phenol and biochemical oxygen demand.

From the results of the assessment of the quality of the water resources of the main rivers in the Hai river basin, it can be seen that COD commonly pollutes the surface water in the Hai river basin, and moreover, the pollution is tending to deteriorate year after year. The main standard-exceeding items are ammonia and nitrogen, the potassium permanganate index, volatile phenol and biochemical oxygen demand.

Figure 3.2 Chart on the current situation of the water quality of every provinces (regions) in the Hai river basin



3.1.4 The current situation of the Hai river basin water resources management system and organizations

In August 29, 2002, the 29th meeting of standing committee of the 9th session of the National People's Congress passed the "Water Law of the People's Republic of China" (implemented from October 1, 2002), stipulating that the state implement the water resources management system characterized by combining the river basin management and the administrative region management. The water-related major responsible department of the State Council will be in charge of the unified water resources management and supervision work of the whole country. The river basin management organizations (abbreviated as the river basin management organizations hereafter) established for the important rivers and lakes determined by the State will perform, within its administrative scope, the water resources management and supervision functions that is stipulated by laws and administrative statutes and regulations and authorized by the water-related major responsible department of the State Council.

a. The river basin water resources management

In 2002, according to the “*Adjustment plan on the main functions, organization establishment and staff of the river basin organizations dispatched by the Water Utilization Department*” and the “Plan on the function and organization establishment and staff of the Hai Water Utilization Commission” and relevant laws and regulations of the State, the Hai Water Resource Utilization Commission (abbreviated as the Hai Commission hereafter) performs the authorized water-related main administrative functions in the Hai river basin, and is an institution with administrative powers.

The main responsibilities concerned with water resources management of the Hai Commission include the following:

The first is to be in charge of the implementation of the relevant laws and regulations such as the “*Water law*” and the related supervision and inspection, and the drafting of water-related policies, laws and regulations specific to the river basin; to be in charge of the work of the water-related administrative law-execution, water administrative supervision and water administrative reconsideration under its jurisdiction, investigating and dealing with water-related law-violating behaviors; to be in charge of coordinating and dealing with inter-provincial water-related disputes.

The second is to organize and draw up river basin comprehensive plans and relevant specialized or specific plans and take the charge of supervising their implementation; to organize and conduct the water projects with the river basin control character, the early-phase work of the water projects in the central government’s charge such as important water projects spanning provinces’ (autonomous regions, municipalities directly under the central government) boundaries; under authorization, to conduct technical examination for the early-phase work of local large and medium-scale water projects, and to draw up and issue to the lower levels the annual investment plans for the water projects under the central government’s charge that is located in the river basin.

The third is to manage unifiedly water resources (including surface water and groundwater) in the river basin. To be in charge of organizing the investigation and assessment of the water resources in the river basin; to organize and draft the river basin's inter-provincial water supply allocation plans, the annual water dispatch plans and the water supply dispatch precautionary plans for the case of draught emergencies, implementing unified dispatch of water supply. To organize or direct the water resources assessment work for relevant significant construction projects in the river basin; within the authorized scope, to organize and implement the water-drawing license system; to guide the local water saving work of the river basin; to organize or coordinate the hydrologic work of the main rivers and river courses in the river basin, and to guide the local hydrological work in the river basin; to release bulletins on the water resources of the river basin.

The forth is to be in charge of the water resources protection work, to organize the division of water functional areas and to control the pollution discharge into the water areas such as the drinking water sources protection zones; to examine and determine water areas' pollution containing capacities, and to give opinions on restricting the total pollution discharge volume; to be in charge of the water quantity and quality monitoring work for the water bodies and important water areas within the provincial(autonomous regions and municipalities directly under the central government) boundaries, the rivers, lakes and banks directly under its jurisdiction, and trans-river basin transferred water.

The fifth is to organize and formulate or participate in formulating the river basin's flood prevention plans and to be in charge of supervision and implementation, according to regulations and authorization to conduct the anti-flood and anti-draught dispatch for important water projects, to guide, coordinate and supervise the anti-flood and anti-draught work of the river basin, to guide and supervise the management and utilization compensation work for flood holding and hindering areas,

to organize or guide the anti-flood discussion and assessment work for relevant significant construction projects in the river basin, and to be in charge of the relevant work of the anti-flood command office of the river basin.

The sixth is to direct the treatment and development of the rivers, lakes and river mouths, seashores and seaside swamps; to be in charge of the management, protection of the river sections, river courses, embankments, bank lines and important water projects, and the examination and approval of the construction projects within the river course management scope; to guide the safety supervision and management of the water facilities in the river basin. According to regulations or authorization, to be in charge of construction and management of central government's water projects such as the water projects with the river basin control character and the important water projects spanning provinces (autonomous regions and municipalities directly under the central government), and to establish the projects' corporations with legal status; to be in charge of inspection and supervision of the construction, danger elimination and reinforcement of the water projects invested by the central government, to supervise and manage the water construction market.

The seventh is to organize and implement the prevention, supervision and treatment of soil erosion in the water and soil conservation ecological construction key areas in the river basin, to organize the dynamic monitoring of the river basin's water and soil conservation, and to guide the local water and soil conservation ecological construction work in the river basin.

The eighth is, according to regulations and authorization, to be in charge of the operation or supervision and management of the state-owned assets of the central government's water projects such as the water projects with the river basin control quality and the water projects spanning provinces (autonomous regions, municipalities directly under the central government), to formulate the water rates and electricity rates of the directly managed projects and the schemes on the establishment

and adjustment of other relevant charging items, and to be in charge of the use, checks, examination and supervision of the funds of the central government's projects in the river basin.

The ninth is to undertake other matters commissioned by the Water Utilization Department.

b. The administrative region water resources management

The provincial level administrative region water resources management system implemented is a combination of centralized management and distributed management. The water-related administrative major responsible department of the governments of every level is in charge of the management and supervision work, while other relevant departments, according to their functional divisions, are responsible for the relevant work concerned with the exploitation and utilization, saving and protection of water resources. Now we take the Hebei province as an example to illustrate it.

(1) The divisions of the water resources management functions among relevant departments of the people's government of the province

The water resources management functions of the water administrative major responsible department: the Provincial Water Utilization Department, as the functional department of the provincial government that is in charge of water administration, centrally manage the whole province's water resources, river courses, reservoirs and shallow lakes. Its main functions include: to organize and formulate the comprehensive plans of water utilization of the whole province and specialized plans such as those concerned with water resources, anti-flood and water resources protection, and to be in charge of implementation and supervision; In company with

relevant departments, to formulate the long-term water supply and demand plans and water amount allocation schemes of the whole province and those concerned with different cities directly under the province, and to be in charge of supervision and management; to organize and implement the water-drawing license system; to manage the water saving work of the urban and rural areas of the whole province; to implement supervision and management for the water resources protection; to coordinate water-related disputes between departments and cities directly under the province; as the principal department, to manage the river courses, reservoirs and shallow lakes of the whole province, and to be in charge of the comprehensive treatment and development of major river courses and water areas.

The water resources management functions of other relevant departments: the provincial construction department is responsible for the exploitation, utilization and protection of the groundwater in the urban planned areas of the whole province, the management of urban water supply and water saving, the management of urban wastewater discharge and treatment facilities; the provincial land resources department is responsible for the prospecting and reserve assessment of groundwater of the whole province; the provincial environmental protection department is responsible for the water environmental protection work of the whole province, and conducting unified supervision and management for water pollution prevention.

(2) The divisions of the water resources management functions among the relevant departments of the cities directly under the province and counties (cities)

The water administrative major responsible departments of the people's governments of cities directly under the province and counties are responsible for the unified management of the water resources of their respective jurisdiction regions. At present, most of the cities directly under the province and counties (cities) have set up water matter bureaus, which perform the functions of the management of water-related activities as the water administration major responsible department. Unified

planning and unified dispatching of water resources, unified issuing of water-drawing licenses, unified charging of water resources fees, and unified management of water quantity and quality has been initially realized.

It need to be noted that after the implementation of the newly-revised “Water Law”, the water resources management system of every province (autonomous region, municipality directly under the central government), prefecture (city) and county level will be adjusted and altered according to the demands of the new “Water Law”, and will emphasize and represent to a greater extent the unified management of water resources.

3.2 Description of the project

Country	China
The operation field of the global environmental fund	International Waters Focal Area
Operation plan (OP)	OP 10: Contaminant-Based Program
Name of the project	Hai Basin Integrated Water and Environment Management Project
Total funds of the project	31.74 million US\$
GEF Grant	350 thousands US\$ – preparation 17 million US\$ - implementation
Domestic counterpart funds	600 thousands US\$ -- preparation 14.74 million US\$ – implementation
Application institution	The World Bank
Project implementation institutions	The Finance Department, the Water Utilization Department, the State General Bureau of Environmental Protection, the Beijing city, the Tianjin city, the Hebei province
Term of the project	2004 – 2008

3.2.1 Objectives of the project

The overall objective is to catalyze an integrated approach to water resource management and pollution control in the Hai River Basin in order to improve the Bohai Sea environment. Specifically, the Project will:

- (i) Improve integrated water and environment planning and management in the Hai Basin,
- (ii) Support institutional aspects related to effective local, municipal/provincial, and basin-wide water and environment planning and management,
- (iii) Enhance capacity building in water and environment knowledge management and implementation, and
- (iv) Reduce wastewater discharges from small cities along the rim of the Bohai Sea.

The Project is intended to demonstrate new technologies and management approaches, with the lessons learned applied throughout the Hai Basin and other basins boarding the Bohai and Yellow Seas.

3.2.2 The contents and implementation of the project

The project is consisted of four components:

(1) Integrated Water and Environment Management

It includes the integrated water and environment management plans (IWEMPs), integrated water and environment strategic action plans, strategic studies and demonstration projects. The IWEM activities are described in the PIP.

The IWEMPs would include a preparation phase and an initial implementation phase. The demonstration projects will also be designed in the initial phase of project implementation and implemented thereafter. The implementation of the demonstration projects and the initial implementation phase of the IWEMPs would include small civil works in activities which could include installation of measuring devices and

monitoring stations, onfarm irrigation system improvements, minor land leveling activities, changes in agriculture practices, groundwater recharge, wells, wastewater collection and treatment, and environmental restoration. The initial implementation phase of the IWEMPs will also include preparation of feasibility studies.

Because of the very limited amount of resources available for these demonstration projects, any civil works would necessarily be small and of limited scope. Also, because there will be much more to do than limited resources would permit, all civil works will be screened, resulting in significantly reduced environmental impacts or resettlement issues.

During Project preparation, a detailed consultation process was undertaken in two of the Project pilot counties that are representative of typical plain area and mountain area counties. This consultation involved identification of water resources, water environment, and agriculture and income aspects. A specific problems analysis of water and environment conditions was undertaken in these counties and potential solutions were discussed with stakeholders. This consultation and problems analysis is illustrative of what will be done in each IWEMP county during the initial stages of IWEMP preparation.

Farmers associations and cooperatives, as well as business and social groups will be consulted as a part of IWEMP preparation during the first phase of Project implementation. Mechanisms for their participation during IWEMP implementation will be defined in the IWEMPs. To the extent possible farmer Water User Associations (WUAs) will be established to facilitate preparation and implementation of the irrigated agriculture aspects of IWEMPs.

Disclosure will take place through advertisements in the major newspapers in the main Project locations to describe the Project activities and its potential impacts. Furthermore, the public will be invited to express their concerns about the Project

through the latter announcements. In addition, the EA reports and other project related information, including project environmental information, will be placed in both project management offices and environmental institutes involved in the EA for public reviews and comments.

(2) Knowledge Management (KM)

KM is the process of making value through arrangement of intelligence and knowledge asset. It includes knowledge accumulation, knowledge sharing and knowledge exchange. KM is not only on management of existing knowledge but also the management of knowledge generating process and knowledge innovation.

The KM system is to be developed jointly by the Ministry of Water Resources and the State Environmental Protection Administration. The research projects will be conducted in the Hai River basin, and the application will be carried out in Zhangweinan sub-basin, Tianjin, Beijing and 10 key counties in Hebei province.

The KM component will have 2 subcomponents: (a) KM Development; and (b) Remote Sensing and Evapotranspiration (ET) management systems. These subcomponents are very interrelated and need to be prepared and implemented in a coordinated manner. KM is the technical basis through which the Project will be implemented and all KM activities at all levels are grouped together in this component. Further, to ensure that this remains a needs-driven and not technology-driven component, significant attention will be given to the management of the component.

(3) Tianjin Coastal Wastewater Management

The component will assist the Tianjin Municipality address a set of critical water pollution control issues in the coastal area, particularly for activities closely related to the TUDEP2. A *Coastal Wastewater Management Study* will cover institutional, financial, and technical studies for wastewater management programs. The *Dagu*

Technical Assistance activity would assist the TUDEP2 on technical aspects related to the renovation and remediation of the 83 km-long Dagu Canal system which has served as the main wastewater canal for Tianjin City for four decades and which discharges directly into the Bohai Sea. The *Dagu Catchment Industrial Pollution Control* program will support an industrial pollution control and pre-treatment study, and improve monitoring and enforcement of discharges into Dagu canal. A *Small Cities Financial Incentives* program will be established to assist cities in meeting their financial obligations. Instead of providing construction subsidies, the basic concept is to provide output-based aide to small cities during the early years of their service agreements with wastewater treatment companies. In order to receive these subsidies, however, the small cities must demonstrate they have:

- i) A functional wastewater treatment plant,
- ii) Plans to develop a comprehensive collection system network; and
- iii) A comprehensive industrial pollution pre-treatment program within the network collection area.

(4) Project Management, Monitoring and Evaluation, and Training

Hai Basin Project management would support coordinated and integrated actions by the Ministries/Bureaus of environmental protection and water resources at the various levels. All Project Management Offices (PMOs) would have Joint Expert Groups to assist the PMOs in coordination, review, and supervision and in some cases execution of technical activities under the Project. An international expert panel would support the Central PMOs with broad experience in water quality and quantity management, water and environment planning and KM. The PMOs will also arrange international and domestic study tours and international and domestic training on a variety of topics related to IWEM, river basin management, knowledge management, “real” water savings and ET management, pollution control, water rights and well permits, wastewater treatment, wastewater canal clean up, wastewater reuse, ecological restoration, etc. The Project will also support PMO operations, monitoring and evaluation and other Project management aspects mainly through counterpart funding.

3.3 Estimation of the project's expense

The contents of the IWEMPs of the GEF project will be implemented in two phases. What should be pointed out emphatically is that the objective of the GEF is to actually improve the IWEM of the Hai river basin and actually reduce the pollution to Bohai Sea. In addition, the project has another objective, which is to help produce the actual change to the current situation and trend, reverse the current situation and trend that the water quality deteriorates, the surface water and groundwater is over-used. This two-phased method will allow a well-designed process accompanied by concrete actions, so is conducive to the actual change. The parallel demonstration projects will test and demonstrate the actions that apparently need to be performed as a priority in the whole river basin. The GEF project is not isolated, which will help the Chinese government to implement IWEM in the Hai river basin. The following table displays the preliminary estimated expenses of this project.

Table3.2 Preliminary estimation of the expenses for the GEF—Hai Basin Integrated Water and Environment Management Project (million US\$)

Project Cost By Component	Total US\$'000
A. Integrated Water and Environment Management	14,305.9
1. Strategic Studies	1,592.6
2. Integrated Water and Environment Management Planning	9,364.0
3. Demonstration Projects	3,349.3
B. Knowledge Management	6,510.0
1. KM Development	5,000.0
2. Remote Sensing and ET Data Systems	1,510.0
C. Tianjin Coastal Wastewater Management	4,750.0
1. Component-wide Support	600.0
2. Binhai Wastewater Management Study	350.0
3. Dagū waste discharge river Technical Assistance	750.0
4. Dagū coastwise Industrial Wastewater Management	350.0
5. Small Cities Financial Incentives Mechanism	2,700.0
D. Project Management and Training	6,175.9
1. Project Management Support	630.0
2. International Expert Panel	836.0
3. Training and review	1,480.2
4. PMO Operation and Management	3,229.7
Total Baseline Cost	31,741.8
GEF Grant	17,000.0
Domestic counterpart	14,741.8
Total Project Costs	31,741.8

4 Project Environmental Impact

4.1 Environmental Impact Analysis in Project Implement Period

From the content angle of this project, the analysis aims at the effects to the surroundings caused by small civil works in activities which could include installation of measuring devices and monitoring stations, onfarm irrigation system improvements, land leveling, changes in agriculture practices, groundwater recharge, wells, wastewater collection and treatment, and environmental restoration during the period of infrastructure construction, during the second phase implementation of IWEMPs and including four demonstration projects construction (GEF demonstration project 1

in Zhangweinan sub-canal basin: Polluted water body remediation project in Zhangweixin river; GEF demonstration project 2 in Zhangweinan sub-canal basin: Wastewater emission control within country scale; GEF demonstration project in Hebei province: Study report on sufficient management of water authority and permission of digging wells within country scale; GEF demonstration project in Beijing city: Study on technological system of sufficient use of water in agriculture and actual water saving technologies). The actual definition of the small civil works will be determined during the initial implementation of the project. Several aspects can be mainly shown as following:

Noise pollution during project implementation period; Air pollution; Effects on surface water quality and groundwater quality; Effects on the lost of water and soil during project implementation period; Temporary effects on regional ecology; Possible effects on land occupancy; Possible encountering of cultural resources

4.1.1 Effects of three kind of wastes (wastewater, waste gas and waste solid)

According to the analysis on characteristics of the project construction, local people mainly carry out project construction with little mechanical works, so little amount of wastewater and waste gases produced almost has no effects on the environment. The possible solid wastes are sands, stone blocks, bricks and soil. Since the little demand on sands and stones, there will be no much solid waste left by rational purchase on such stuffs. The main solid wastes are the disused soil in field projects. According to the related regulations in water and electricity industry, the solid wastes will be piled up nearby. Combined with the land clean-up projects in the construction of farmland irrigation works, farmland is recovered and the lost of water and soil will be not increased. There will be also a decrease effects caused by plantation.

4.1.2 Noise effects

Most water conservancy projects, like enforcement of the construction of agriculture irrigation project and integrated protection and management for small rivers, are

earthwork, most of which are far away from residential areas. Thus there is almost no noise pollution. For the projects that are located near to residential areas, noisy mechanics should be avoided for use. Further more, projects cannot be constructed during time-out.

4.1.3 Effects on surface water quality and groundwater quality

Groundwater recharging projects may temporarily affect the quality of groundwater. Inspecting and analyzing water quality should be strengthened to ensure that the changing effects are beneficial. Surface water is often affected in its flowrate, turbidity and sediment concentration by irrigation projects and water dispatching projects. Some negative effects may happen to the water ecology.

Prevention measure will require the use of good quality water for groundwater recharge.

4.1.4 Effects on the lost of water and soil

Digging Ditches, Dispatching water and constructing canals will cause soil erosion and block the drains. It also damages the soil and plants; causes new lost of water and soil and destroy the natural sight in some parts of the places for soil collection and quarry. Meanwhile, the flux from drainage roads washes the soil below the roadbed and then encroach the soil again. The suspended solids in rivers, which are affected by the encroachment in digging area, will increase, and the water quality will decrease. Thus the sediments will increase in downstream too.

The major prevention measures are to avoid the project construction in contaminated period, to protect the ditches' slope by use of stones, bricks and cement.

4.1.5 Temporary effects on regional ecology

The implementation of small civil works may affect quality and quantity of surface water including rivers, lakes and reservoir, and potentially influence the local animal

and plants. For example, because of the wastewater from works newly constructed. Water quality at some part of river's fluctuates, and then affects the plasticity of local animals and plants. Sometimes it may result in the temporary emigration of animals. This phenomenon, however, will be minor and temporary during construction and will be avoided where possible.

4.1.6 Effects on Environmental Hygiene

The accumulation of stagnant water in obsolete digging places such as borrow pit and stone quarry offer a good place for the reproduction of mosquito and other pests, which will be harmful to people and livestock. Backfilling of them after implementation will be taken to keep the people and livestock from being threatened. The digging ditches and tunnels should be flat and slope in order to drain easily. The accumulation of stagnant water should be avoided and thus the production of mosquito and fly will be prevented.

4.1.7 Effects on transportation and Power

According to the analysis, with the advanced transportation in the region like railway and road, no much long-distance transportation work is needed for the required stuff and resources in project construction such as sand, cement and mechanical and motor facilities. Because labor power and small mechanics act as the main role in project implementation, little electric power is needed. So, the normal transportation and power supply will not be affected in the project region.

4.1.8 Effects on people's working and living

Combined with the water conservancy construction of farmland in spring and winter, the implementation period water conservancy works are generally arranged from March to June and from October to December, a period free from farming and flood. There should be no much effects on the people's lives and work in the region. On the other hand, the local people can make some money by joining the construction at free time.

4.1.9 Possible effects on land occupancy.

GEF Hai Basin project will involve such as the water conservation reconstruction for original irrigation system, adjusting the agriculture water using product plant structure, enhancing the well permit right management, limit the underground water exploitation, etc. components, which is an integrated water saving measure and pollution control actions. During the implementation of these activities, it exists the potential demands from land confiscation and immigration, although this is unlikely. The Resettlement Policy Framework (Annex 9 C) discusses how this would be handled.

4.1.10 Possible encountering of cultural resources.

During the implementation of small civil works it is unlikely that culturally important sites will be uncovered. While no cultural properties to be affected by Project activities have been identified, an appropriate clause will be included in all works contracts regarding the procedures to be followed in the event of chance find of culturally significant sites during Project activities.

4.2 Environmental impact analysis in operation period of the project

After the implementation of the project, the management and the treatment on wastewater and pollutants will be strengthened, and the quality of surface water will be improved. Especially the improvement of the institution's management ability will be greatly profitable to the environment maintenance and continuous development. Great benefits on economic, society and environment will also be generated.

4.2.1 Economic benefits

According to the study and implementation of integrated water and environmental management problems in project region, it is helpful to alleviate the lack of water and to improve the water environmental quality, which will produce economic benefits directly. Besides, it will be very helpful to attract foreign investment by improving the

investing environment. The indirect economic benefits are also important.

4.2.2 Social benefits

As an international cooperation project, it will greatly increase the IWEM ability of our country by introducing advanced technologies and learning advanced management experiences of foreign countries. After implementation of the project, it will play an important role in relieve the conflict between supply and demand of water in Haihe and the deterioration of water environment by propagandizing and teaching, reinforcing the people's understanding on water saving and environmental protection. It will build a strong found in the crowd for the continuous use of water and environment. It provides policy and regulation guaranty for solution of the water and environment problems by study on the water service integration management; it will profit to optimize the arrangement of water source and save water by reclaimed water price setting and the study on policy of water fee charging; it will also profit to control the overuse of the groundwater and increase the water quality by the study on groundwater and the non-point pollution source control in cities and rural areas.

4.2.3 Environmental benefits

It is meaningful to improve the water quality and balance the supply and demand on water in Haihe basin with the implementation of this project; the study on groundwater will help to deal with the groundwater pollution and restrict the over-exploitation of groundwater; the implementation of wastewater treatment projects in small towns can effectively improve the pollution in Haihe basin and increase the water environment quality of small towns; it will be helpful to change the over-nutritious status in surface water by control on the non-point source pollution in cities and rural areas; it can improve the ecology of downstream by the study on reclaimed water utilization and the design on water ecology remediation projects.

4.3 Effects on the water source with the project implementation

4.3.1 Variation on water source and utilizable water

There is decreasing tendency on the water resource and utilizable water at present. This tendency, however, will be prevented by increasing the ability of IWEM in Haihe basin, improving the environmental quality, saving water used, adjusting the industrial structure and re-charging the groundwater reasonable.

4.3.2 effects on the water resources and water user at downstream

As mentioned before, during the project construction period the project region has been included into the water supply domain in the surface waterhead places. Additional contradiction between the waterhead places and the water user at downstream will not be added because the project region has already been water user and will not contest the water source with other water users.

4.3.3 Effects on water usage in project region

After the project implementation in project region, it will improve the farm production because of the decreasing of water loss and the increasing of water utilization rate. Besides, the united dispatching of surface and groundwater increases markedly the integrated water source utilization and shows sufficient irrigation ability of surface water.

4.3.4 Prediction and inspection on the balance of water supply and demand in typical year

With new technologies and methods, the evaporation and ET value will be reduced in Haihe basin. The contradiction between the water supply and demand in Haihe basin will be much relieved by water saving and industrial structure adjustment and the implementation of water dispatching project from south to north.

Take the water-saved irrigation project of World Bank for example, it can greatly

reduce the irrigation water usage, increase the water utilization effects and efficiency and balance the water sources by strengthening the groundwater management and implementing three measures: the water saving projects, water saving in agriculture and water saving management. If taking the "three measures" careful, the groundwater will be maintained and balanced, and both the water sources' balance and water quality can be improved.

4.3.5 Prediction on the tendency of groundwater over-exploration area

The principle for the IWEM is to sufficiently utilize the surface water, positively explore superficial groundwater, control exploration on deep groundwater, reduce the water exploration step by step and balance the supply and exploration of groundwater. It is thus predicted that the water table can be effectively controlled because of the positive exploration on superficial groundwater (Including the water with little salts and the freshwater). The integrated management on drought, flood and salts and groundwater freshening can be fulfilled by making full use of the "ground storage capacity" to store permeate of rainwater, preventing salinization and pumping salt water and recharging fresh water in the ground. With the increasing utilization on superficial groundwater and surface, the over-exploration on groundwater can be controlled.

4.3.6 Prediction on the tendency of groundwater over-exploration area

Through implementing the project and making program of exploration on groundwater, the serious over-exploration problem will be altered and the objective of non-overexploration can be realized by the year of 2010.

Prediction and analysis on the variation of groundwater quality

If not for the GEF projects, the serious tendency of groundwater over-exploration cannot be effectively changed and such status will be deteriorated. After the implementation of GEF projects, one of the important objectives is to improve the status of water and environment in Haihe basin. It is believed that the groundwater

can be well recharged to achieve the continuous exploration goal and the groundwater quality will become better and better with the implementation of projects, the increasing ability on the IWEM, the people's enhanced consciousness on water saving, adjustment of industrial structure and the decrease of ET value.

4.4 Effects on water environment quality with the project implementation

4.4.1 Improvement on point source pollution exhaust

The implementation of GEF projects will go further on the study of control and treatment for sewage and industry wastewater and build an integral wastewater treatment system. Especially with the implementation of environment management plans, the discharge of pollution sources will be more strictly controlled. The water quality of rivers and lakes will be improved with the treatment of wastewater. After the construction of wastewater treatment plants in towns, the management of wastewater discharge in factories will be strengthened to meet the discharge standard. The total amount of pollution will be controlled within the permission for discharging to avoid the pollution to rivers.

4.4.2 Improvement on non-point source pollution

The implementation of projects will rationalize the usage of fertilizer. The lost of fertilizer will be reduced and the absorption rate will be increased by choosing the compound fertilizer and specific fertilizer etc. and taking measures like additional fertilizer use, intertill and inearth fertilizing. The implementation and expansion for demonstration treatment projects for the people and livestock's excrements will fundamentally remove the effects on the surface water and groundwater environment caused by such pollutions.

4.4.3 Improvement on surface water pollution parts

Pollution source is one of the main reasons to affect water environment. In order to improve the water quality status, some measures should be carried out as soon as possible after investigating the pollution source clearly. Wastewater discharge must agree with the standards. The experiences in project region should be expanded to the other places. Because of the effective control of the pollution sources and the requirement for the wastewater discharge to meet the standards, the surface water pollution in rivers and lakes will improve a lot. The water environment in Haihe basin together with the water quality of Bohai will increase markedly.

Meanwhile, after the setup of inspection network on soil, groundwater and surface water, different kinds of fertilizer and pesticide use amount, the organics content, nitrate content, potassium content, phosphorous content, and total salts content in the soil can be inspected periodically. According to the parameters inspected, an instruction can be made to guide the farmers to use the fertilizer and pesticides scientifically, and then improve the surface water environment sufficiently.

4.4.4 Analysis of effects on water environment quality by wastewater reclamation

Wastewater reclamation will improve the former pollution status that discharged the wastewater directly and reduce the usage of water source. It will save water and increase the water environment quality. At the same time, as the major manner of water utilization in the future, wastewater reclamation will be an important component in demonstration projects and will greatly boost the recovery on the biosphere cycling in water bodies in the future.

4.4.5 Control on other pollutions discharged and effects of them

The air quality will improve a lot with the implementation of projects. The integrated management on solid wastes will be strengthened. Controls on different kinds of pollutants ischarge will decrease the whole amount of wastes in the water bodies, and will affect directly on the water environment quality. For example, reduction on many

of the organics that leads the rich nourishing of water bodies will benefit to the change on property of biological chain in water biosphere.

4.4.6 Improvement on water ecology, rivers and wetland

The implementation of the projects will reduce the pollutant amount discharged to water bodies like rivers and lakes and improve the water quality in water bodies. It is helpful for the amelioration of water biological environment and promotes the growth of waterborne creatures. Thus the self-purification ability of water bodies will be reinforced. According to the study on the river channel and wetland, measures to improve the biological system are raised. Other projects' implementation like water dispatching projects and canal digging projects, will improve directly the water environment of the region. In the event, the pollution status of Haihe basin for a long time will be effectively relieved. With the time gone, the pollution can decrease to a level at which the pollutants can be fully self-decomposed. The ecology in Haihe basin will also come back to a healthy status then.

4.5 Effects on ecological environment of Bohai and its neighborhood

The implementation of project will reduce the ET value of the evaporation of Haihe river basin and increase the water that flow in Bohai. At the same time, the improvement of water quality in Haihe will improve the quality of Bohai. It will contribute the improvement of ecology of Bohai.

4.5.1 Effects on the creatures of Bohai region

Bohai lies on the northeast of Huanghai. It is one of most important to the ecological system of world, but its ecosystem is being seriously menaced. It still provides piscatorial resource for China, Japan, Korea and North Korea. There is more than 40 rivers inflow it. Among them, Huanghe, Haihe and Luanhe are the main river. From the point of ecology, Bohai is a large shallow gulf, and Huanghai is a continental

shallow sea of the northwestern Pacific Ocean. This relationship is very important, because it demonstrates the geographical and ecological relationship of these systems. In addition, Bohai still is ichthyic and shell's breeding place of Huanghai.

In general, Bohai is not much polluted and the biotic environment in Bohai is roughly good, but some parts of the coast like estuary of Haihe are seriously polluted. The implementation of the projects will improve a lot on Bohai's function as an important sea creature-breeding place and living place. Talking into details, there are several parts to improve:

(1) Accumulation of heavy metals (mercury, cadmium and etc.) in creature bodies will be decreased. (2) The effects of heavy metals and oils in the sea along the shore to the creatures will be reduced. (3) The rich-nourishing problem in some parts of the sea areas can be solved. The over-reproduction of phytoplankton will be relieved. (4) The optimal combination of predominance population, diversity index and nourish structure on fish populations in Bohai can be promoted.

Bohai is a roost for many kinds of sea creatures including invertebrate creatures, fish, sea mammals and birds. Most of the fish seedlings of China East Sea came from Bohai in the past, but this function is being lost. The implementation of the projects must be a great impetus to recover the ecological conditions of Bohai and its neighborhood and the biodiversity. Furthermore, the implementation of the projects will be very important to the recovery of the ecosystem's functions such as over-fishing, pollution, decreasing of fresh flux and roost etc.

4.5.2 Effects on the aquaculture of Bohai

As a place near to population center and breeding for Huanghai fishery, Bohai has been a basic fishery place for a long time. The fishery of Bohai has experienced its prosperity and depression. Motor fishing boats introduced on sixties and small-pore-size fishing net that can catch young fishes had seriously influence the

fishery of Bohai. Trail net was prohibited in 1998 and gill net was then applied, but it still has disadvantages to the growth of young fishes. Fishery environment of Bohai has been destructed, but the fishing activity of Bohai is very serious, and the number of registered fishery boats reaches 90 thousand in cities along the shore. It is very useful to the fishing management and the improvement of water quality in Bohai area with the implementation of the projects.

The main pollution caused by sea farming is the organics and rich-nourishment of water bodies and bottom matters. Because of the decomposition of organics, it will cause serious lack of oxygen and will be harmful to the waterborne creatures. The implementation of the projects will not only change the destruction status of water ecosystem, but also be very helpful to the treatment of outer and inner pollution, bacteria and viruses and toxic and hazardous wastes, which is resulted from rapid increasing of aquaculture.

4.5.3 Effects on the seawater quality of Bohai

Bohai has been serious polluted by pollution sources from land such as residents, industry, agriculture, fishery and graziery. One third of the wastewater and one second of the pollutants discharged to sea in China will go into Bohai, which include the point source pollution (uniflow outlet, interflow outlet, estuary and waste outlet), seafarming pollution and non-point source pollution (pollution caused by industry wastewater, domestic sewage and fertilizing that are taken into the sea by surface run off, and the main pollutant is nitrogen and phosphorous). This means 3 billion m³ of wastewater and 700 thousand tons of pollutant will discharge into Bohai. The area whose pollutant density is more than that of national standard is increasing at all time, which has 43,000 km² in 1997, occupied half of the total area of Bohai. The most serious area of pollution is estuaries and shallow sea areas near land. The pollution causes the death of a lot of waterborne creatures. It is also one of the reasons for the frequent occurrences of red tides. Since the rivers of Haihe basin flow directly to

Bohai, the implementation of the projects—the IWEM in Haihe basin will be the direct and essential way to remove the pollution on water quality of Bohai and the occurrence of red tides.

4.5.4 Effects on the seaward, highseas and periphery countries of Bohai

The south, north and west of Bohai is connected to China, and to its east is Pacific Ocean. One of the basic characters of the sea is its opening and adjoining. As water area stretching into midland of China from Pacific Ocean, Bohai is affected by China, at the same time it affects its neighbor sea and vice verse. In a broader range, it is related to its adjacent countries like South Korea, North Korea and Japan.

Although the creatures and water environment in certain water area are stable to some extent, the ocean is floating and the creatures and substances in it can move to other water areas. On the contrary, the creatures and substances in other water areas can also move here by water flows. The pollution from the land has made the water quality of Bohai aggravation for a long time. And this current is diffusing to its neighborhood. The probability of international issue caused from it will increase. The occurrence of international issues will be a question of time if not treating.

The implementation of the projects will improve pollutions of Haihe basin—the largest pollution sources of Bohai. Obviously one of its beneficiaries is Bohai. The neighbor ocean and the adjacent countries will also be benefited a lot with improvement of ecology and water environment of Bohai. It can be said that the implementation of the projects, with enormous sense, is mutual beneficial to either China or its neighboring country and will improve the communal natural environment.

4.6 Effects to the measures on saving water of industry and agriculture

4.6.1 Basic assessment to the Effects of saving water

Agriculture is a big user of water and also the most potential trade in saving water, which account more than 80 percent of total amount of water for use. The measures of saving water include planting structure adjustment, engineering measures and chemical measure etc. The adjustment of planting structure is mostly to adjust planting proportion of the crops using a lot of water. This projects plan to integrate with the World Bank economic irrigation projects to develop many kinds economic irrigation projects, such as tube irrigation, spray irrigation and dropping irrigation, to increase the water utilizing efficiency. Agronomy is the key to the water saving. It is planned to expand technologies in project areas such as economic irrigation regulations on key water, policies and technologies of mini-scale on water using, technologies on yield increasing and water saving for wheat indent planting, technologies on interseptal planting and irrigation for xerophytes and hydrophytes, technologies on film covering, measures of returning haulm back to field, using of chemical water retaining admixture, to decrease the integrated ET of farm field.

Though much less utilization of water in industry than agriculture, the reasonable usage of industry water will leave more water for other trades to ensure the water use in industry and agriculture in years of drought. Reusing the reclaimed water is the key for the water saving in industry.

4.6.2 Sustainable Utilization Analysis for Ground Water

The principle of exploiting and utilizing water resource is to (i) fully utilize the surface water; (ii) actively exploit ground water in shallow water layer; (iii) control the exploitation with a step-down reduction of overexploitation in deep water layer; and (iv) realize the balance of groundwater resource between exploiting and filling

step by step. Actively exploiting shallow groundwater including slight salt water and ground freshwater in shallow and thin layer can perform the following functions, i.e.

- (i) Preventing floodwater in flood season;
- (ii) Preventing Salinization in return salt season;
- (iii) Desalting underground salt water through reducing salt water and supply fresh water;
- (iv) Based on (i) to (iii), realizing integrated prevention and control for flood, alkalization and salt in early period.

Some demonstration areas have summarized much successful experience in this field. Therefore, the project implementation with a result of the increase in available volume of groundwater in shallow layer and surface water can well control the status of overexploiting groundwater in deep layer.

In addition, after implementing this project the exploitation of groundwater will well managed and controlled by means of monitoring network. Based on the general monitoring of ground water quality, water table as well as the water demand of soil and crop (ET), etc. the overexploitation of groundwater can be controlled through water saving, filling groundwater by labor and reasonably scientific exploiting groundwater. On the other hand the monitoring and analyzing for soil and groundwater is beneficial to prevent and control the agricultural nonpoint source pollution (NSP), furthermore, provide a better direction for the farmers in project area towards scientific utilizing fertilizer and pesticide, strengthening eco-agriculture construction, developing scientific irrigation institution, and reducing the volume of irrigation water. The forecast of soil entropy and the wide application and demonstration of real technology of water saving improve the hardware and software infrastructure of monitoring soil entropy. It can really reduce ET combined with various measures of agriculture and engineering.

The following approaches can realize the combined control of surface water and

groundwater.

- Utilizing rain and flood in flood season;
- Maintaining and reconstructing initial pumping station;
- Leading and lifting flood in flood season;
- Storing water in channel;
- Irrigating farm; and
- Supplying groundwater

Based on the above approaches the tense status of inadequate water resource will be mitigated via the test, demonstration and application for mixed irrigation of salt water and freshwater as well as the technology of exploiting and utilizing freshwater in shallow layer.

4.7 The Effect of Project Implementation on Regional Ecology and Civilization Course

There perennially grow many rare propagation and halobios of temperate zone in Hai He Basin, Bo Hai mainly affected by Hai He Basin as well as coastal zones. Most of them are in danger of extinction due to the pollution from Hai He Basin. The implementation of the project will has a positive effect on the propagation in Hai He Basin whilst recovering natural ecology and improving environment, and it also play a very beneficial role for keeping biology chain in whole Hai He Basin.

Aquatic product in Bo Hai and its adjacent sea, Huang Hai, makes up two-thirds of national aquatic product. Aquiculture includes prawn, oyster, clam, mussel, abalone, and kelp. Therefore, Bo Hai has own both natural biology chain and artificial chain. At present, the terrestrial pollution sources from the resident, industry, agriculture, and livestock, etc. have resulted in the serious pollution of Bo Hai. One-third of sewage and half pollutants in national level are discharged into Bo Hai. The implementation of the project will be beneficial to promote the development of

biology chain towards more stable and perfect direction, especially for breeding biology or natural biology in Bo Hai as an important fishery base. The biology chain in Bo Hai region will be stretched to adjacent seas and further seas along with the move of halobios, which will have a far-reaching effect on biodiversity, integration as well as rationality.

Another benefit that is often ignored will change a lot the features of Hai He Basin with the implementation of the project. The civilization in Hai He Basin is suffering the threat from increasingly serious pollution. For example, the damage of historical and cultural heritage caused by poor management can't be recovered, so do the damage of cultural relics that are unearthed in the earth's surface and underground, which is caused by air pollution and groundwater contamination. As serious pollution goes, it not only has an adverse effect on human health but also cause great inconvenience for people's daily lives. Furthermore, life quality become worse affected by a good many factors such as dirty air and water source. Therefore, project implementation assuredly will effectively drive the improvement for urban, rural, industrial, agricultural, and social-economical features.

4.8 The Effect of Project Implementation on Other Environment

Project

4.8.1 The Effect on Tree Planting and Afforestation

First, the project implementation will improve the integrated management level of water resource and water environment in Hai He Basin through a series of technical measures, such as water saving, wastewater treatment, industrial structure adjustment, and supply groundwater, etc. It will also play a positive and stimulative role for crop growth, tree planting, and afforestation. Meanwhile, afforestation will contribute to conserve water.

Secondly, the project implementation can improve local microclimate and increase

rainfall. At the same time tree planting and afforestation can also increase water vapour evaporation, air humidity, and rainfall in local areas, and progressively bring a drop in the highest temperature and the degree of dryness and wateloggging in project areas. In addition, local wind speed and day temperature in farm can be decreased along with the construction of farm windbreak forest. As a result the effect of natural disaster on crop is mitigated.

4.8.2 The Effect on Water and Soil Conservation

After the project implementation, the following technical measures will increase water volume in the watercourses and wetlands and improves the air quality. Accordingly, tree planting, afforestation, and water conservation also reduce sand blown by wind, and contribute to water and soil conservation.

(i) Eco-measures

- Study and demonstrate addressing eco-environment issues in small watershed, make great efforts to plant and preserve forest of conserving water, and increase the cover rate of forest and well-distribution through planting tree and grass;
- Insist on reusing farmland for forest, plant wind break forest mainly composed by arbor, bush and grass;
- Plant the tree with high economic benefit such as economical forest, fruit trees and medicinal trees to increase biomass and stabilize function;
- Plant wind break forest along ridge of field, ditch, and roadside in plain, develop a good farm eco-system to effectively prevent the runoff of water and soil, and prevent desertification caused by water erosion and wind erosion.

(ii) Engineering measures

- Improve onfarm irrigation systems;
- Level land for fundamental farm;
- Strengthen self-conservation of farm.

(iii) Farming measures

- Based on well-construction of terrace, insist on ridging to seed and plant in a way of horizontal ridge following the contour lines;
- Pay much attention to interplanting and mixed planting in horizontal slope belts for various kinds of crops, e.g. sparse crop and close crop, tall stalk and short stalk, and cereal crop and medical grazing;
- Push optimized planting mode, such as wheat-corn- potato mode, to effectively control the runoff of water and soil.

4.8.3 The effect on Agricultural Structure Adjustment

The lack of water resources in Hai He Basin has become an important constraint factor for economic and social development. There exists widely the waste of water resources in agricultural using water that is a big component of using water. The project implementation can make full use of the advantage of land, climate, and agricultural technology, etc. in Hai He Basin, and bring a good adjustment of agricultural planting structure. Therefore, there is still a great potential of water saving. The industrial structure adjustment includes: (i) the development direction of cereal crops, cotton, oil plants, vegetable, fruit, aquatic products and livestock; (ii) suggestions on different water resources and climate subarea; and (iii) the distribution of irrigation and dry farming. To develop water saving agriculture the corresponding policies, such as water price, revenue, the invest support from the government, water resources fee, the purchase of agricultural products and subsidy, etc. are needed.

The project implementation will have the following effects on agricultural structure, i.e.

(i) Planting structure

A planting structure with local characters such as local water resources condition, soil fertility, and climate, etc. has been developed. After project implementation, the above-mentioned factors, especially water resources condition, will be improved, and

meanwhile bring an increase in multiple crop index and a decrease in planting areas. Therefore, planting structure get further optimized adjustment.

(ii) Farming mode

After the project implementation, there will be an increase in mechanization farming areas and an improvement in farming quality, which is beneficial to changing soil physical nature, improving soil conservation water ability and ventilation status, and increasing the yield of crops.

(iii) The analysis for environmental effects

The analysis concluded that after the project implementation, the optimized planting structure would increase farm water supply, improve the quality of land planting, soil structure, and the status of water and air in soil, which impelled to develop eco-agriculture and high-profit agriculture and had a positive effect farm environment.

4.8.4 The Effect on Public Participation and the Initiative of Environmental Management

The degree of public participation is an important indicator for the success of the project. The GEF project in Hai He Basin play a great role in improving watershed water resource and water environment, and meanwhile, it has a close relationship with public benefit in the basin. Therefore, a higher public approval rate for the project will promote the public to participate in the water environmental management to some extent.

In recent years national ‘relief farmers’ unreasonable burden’ policy is advantageous to develop irrigation agriculture and increase agriculture investment. The national adjustment in rural, agricultural and farming policies provide a guarantee for implementing the project of strengthening irrigation agriculture, altering comparatively backward agricultural production style, increase farming yield in unit

area with more profit, and furthermore make local agricultural production step into a new stage. All of these are consistent with direct benefit of local people, and they can extremely mobilize the mass in project area to implement project.

4.8.5 The Comprehensive Effect on Eco-environment

The project implementation improves water environment quality in Hai He Basin, mitigates the conflict between supply and demand for water resources, and control serious status of overexploiting groundwater. There is flowing water in watercourse again; the wetlands are recovered to some extent; the water quality in Bo Hai is improved, which shows that the eco-environment in Hai He Basin has been obviously improved.

After using fertilizer and pesticide their residues may enter into water body along with runoff or permeate into soil, which will accelerate eutrophication in the watercourses and lakes. So it is necessary to make various kinds of measures to reduce the use of fertilizer and pesticide as soon as possible and irrigate farm in scientific way to reduce the runoff of fertilizer and pesticide. Only in this way will biodiversity of water body not be affected. In addition, spraying pesticide may threaten natural enemy of pest, and so its overuse must be seriously forbidden, or it will break eco-balance, cause the increase of pest and at last result in a vicious cycle.

4.9 Demonstration Effect.

4.9.1 Positive effect

The demonstration effect, which set up in GEF haihe objective, was confirmed by “bottom-up” and “top-down” principle. The function of overall demonstrates item is:

According to national and river basin strategic research and the advanced technical idea on water resource and integrate management plan of water environment of item’s location, and focus on idiographic problem to carry through demonstration.

Therefore, the obverse effects of all items are expectable. Mostly are:

1) Promoting river basin management of water resource and water environment synthetically.

The item's designing was taking bohai sea as objective, carry through the missions like strategic research, IWEMPs, demonstration projects, advanced managerial technique, wastewater treatment project in representative area and set up of item management ability in following aspects--law organization, environmental requirement, water using efficiency and pollution control, forming a integrate management structure of solving water problem of haihe drainage area effectively.

2) Implementing advance water resource and water environment management

Contrapose knowledge management (KM) technique which for demand of drainage area knowledge sharing and also contrapose effective control of evaporation transpiration (ET) technique which for scientific agricultural water using, offer important support and dependable indemnification for implement collective objective.

3) Implement project demonstration of priority action plan in drainage area

According with drainage area's strategic action plan and locality water resource and water environment integrate management plan principle, implement a series of project item like water saving, decrease pollution and restore the ecological environment of river alternatively. These projects will bring benefit directly in abate the lack of water in drainage, minify contamination and ameliorate ecological environment.

Except solving local idiographic problem in water resource and environment problem, these demonstrate items also will contribute in generalize haihe drainage area.

4.9.2 Negative effect

The negative effect of operating demonstrations is focused on three aspects, after particularity research and hard working, these negative effects can be decrease,

eliminate even turn to positive factor.

Difference between existing management plans and IWEMPs

This item was carried through under a completely new integrate idea; difference or inconsistency must be happened between the existing management plan and new one. Especially the action plan of this item, is likely to be totally different with the environmental ameliorate work which had be taken or taking in that location. It maybe bring stress to existing management work, including the impingement in thinking way of old workers, the adjust of some working plan and stop of some plans etc. Off course, concussion is unavoidable in when some new managerial idea be fetched in.

The main method of abate this negative effect is try your best to keep the actions of demonstrate item accord to existing plan. Utilize the condition of other actions (like strategic research, new technique's and training) in GEF haihe project, enhance local population's understanding level, it's also a active act of settling inconsistency during adjust item management plan to the idea which has sparkplugged by this item in future.

2) Lack of local funds

To participate in the GEF Project the local government needsa to provide counterpart funds as a condition of using the grant funding. Especially in some needy area, which also has already confirmed finance plan, the stress of this counterpart funding cannot be neglected. The negative effect of this kind of pressure may be developed into difficult stage that makes difficult the project implemented smoothly, including cause various kinds of suspicion and words of the various circles of society, for example uses the rational degree of the fund, launches economy of GEF Haihe River project and validity of introducing technology etc. to the government.

During the process implementing the counterpart fund, analysis the economic benefits

of input and output of the project conscientiously, carry on essential propaganda and explanation to the public, alleviate the indispensable supplementary means of this negative effect. More positive method of alleviating includes: expand the financing channel, pursue the advanced financial incentive mechanism and look for new capital source etc.

Suitability and result of demonstration technology

Already there is demonstration of the administrative skill in GEF Haihe River project, also include the demonstration of the new technology import. However, no matter which kind of technology demonstration is carried on, all will revise even deny existing technology. Therefore, must confirm demonstration technology whether or not suitable they're enough to deserve replacing existing technology in advance. Otherwise, negative function that produce cause to implement demonstration project doubt, even deny. Must pay enough attention to such potential negative effect, and must guarantee at first the dependability, suitability, economy and can popularizing etc of demonstration technologies, put emphasis on winning certainty of the project result of demonstration. Or else, excessive to emphasize demonstration advance of technology neglect their results, may make the process of the demonstration project meet the unexpected obstacle finally.

5 Citizen participation

5.1 Arouse the enthusiasm of citizen participation

It is one of the important sign whether a project succeeds or not is the degree that the public participates. GEF Haihe River project has bigger function in improving the water resources of the basin and water environment, closely related to public interests in the basin. So between the public and to relatively high approval rate have project this, improve the public participate in water enthusiasm of environmental management from a certain degree. The central authorities have made a series of policies and measures about "lightening peasant's unreasonable burden " in recent

years, develop water-saving irrigation agriculture, increase to peasant agricultural input very much favorable. Adjustment to countryside, agriculture, peasant's question every policy of the country, to strengthening and irrigate the agricultural project, change the relatively backward agricultural mode of production, improve the output of cultivated land of unit's area, make peasants of project district increase production, increase income, make local agricultural production reached a new level and given security, accord with local vital interests of masses, can great transfer project district masses implement the enthusiasm of the project.

Before this project implementation, during implementation and after implementation, all need to offer the concrete way for citizen participation, and analyze the public advisory opinion in time, revises, supplementary and perfect the project.

5.2 The purpose of citizen participation and organizational principle

The purpose of citizen participation and organizational principle are:

- Reflect the right of being in knows of the public's major event to social development and economic construction, safeguard the public interests of overwhelming majority, and improve the sense of participation that the public protects the environment.
- Let the public understand the environmental impact produced during construction and circulation period, including helpful and harmful influence, improve the sense of participation that the public protects the environment.
- Reflect the environmental impact that the public produces to the construction project synthetically, and the attitude influenced to local economic construction and community's life.
- Collect the opinions and suggestions to the environmental protective measure of the construction project of the public.
- It should be representative that the public participates in personnel; an

organizational form is disclosed justly

5.3 The citizen participation and information open procedure

According to the relevant requests of World Bank, draft that the public participates in the procedure (see table 5.1) and information open procedure (see table 5.2)

Table 5.1 citizen participation procedure

Mission	Investigator/ respondent	Time	Place	Requirement of work bank
Meets the masses and hold the initial public meeting while investigating on the spot	Investigator		Beijing, tianjin,hebei,	
Preliminary environmental evaluation TOR consultation	Investigator			TOR stage consultation
Environmental evaluation TOR consultation	Investigator			TOR stage consultation
Distribute the questionnaire (including the key environmental evaluation information)	Local masses			
Issue information of the project and preliminary environmental evaluation at the 2nd public meeting	Local masses			Consultation before the first draft is finished
Final environmental evaluation	Local masses			

Table 5.2 information open procedure

Associated documents	Open date	Open place	Requirement of world bank
Environmental evaluation and TOR copying			
The questionnaire and key environmental evaluation information			
First draft of environmental evaluation			
Final draft of environmental evaluation			
Validity notice of the environmental appraisal report			
Can issue relevant information again on the net			

5.4 The content's set up of citizen participation

There is the main content that recommends to the public:

- Main content and goal of water resource and environment comprehensive planning of water
- The content of the construction project, adopt the craft, produce the pollutant situation, prevention and control of pollution and cutting down the measure and result.
- Current situation of Local ecology, water environment, air environmental quality and acoustic environment, and environment of environmental function zoning before project construction.
- The forecast result of environmental effect of objective was worked during

construction and circulation period.

- Social benefit, economic benefits and environmental benefit of the construction project.
- Set up the hot question that the public cares, seek the opinion of between the public and environmental protection suggestion of issue that project involve.

5.5 Job placement of citizen participation

1) Mode.

The citizen participation plans to go on by the way of granting" questionnaire of citizen participation", Questionnaire content as shown in table 5.3, make content that citizen participation set up publicity materials grant for your guidance at the same time.

2) Pay attention to and choose the public participation scope.

The public who participates in activity should have certain representativeness on the job, schooling, age composition, public age composition of participating in moving about should rely mainly on person 30-50 years old, the cultural level should be relatively high, in this way, can think that the accuracy of expressing the suggestion is relatively high.

3) The public quantity of participating in moving about is about 100 people.

4) Analyze, sum up, count the public suggestion objectively, especially different suggestions on the construction project and environmental impact.

Table. 5.3 The questionnaire of public participation

name: _____ gender: ____ age: ____ education degree: _____
job: _____ office: _____ home address: _____
1. Do you understand this project? A. yes B. a little bit C. no
2. Do you think which kind of benefit of this project is the most remarkable? A. economy benefit B. society benefit C. environment benefit

3. Do you think this is a rational utilization to water resource or not after build up?
A. yes B. no C. no change
4. Which environmental impact will be produced do you think during project construction? (not single option)?
A. water pollution B. air pollution C. waste residue D. yawp
E. peculiar smell F. zoology
5. Which environmental impact do you think the project will be produced after being built up ? (not single option)?
A. water pollution B. air pollution C. waste residue D. yawp
E. peculiar smell F. zoology
6. Do you afraid of the water pollution will be worse than before after build up this project?
A. very afraid B. afraid C. no
7. Do you afraid of the air pollution will be worse than before after build up this project?
A. very afraid B. afraid C. no
8. Do you afraid of project this can produce a serious one firm to abolish the pollution problem after building up??
A. very afraid B. afraid C. no
9. Do you afraid of project this can influence to some extent the ecology after building up?
A. very afraid B. afraid C. no
10. do you afraid of there is any negative effect of your work, obtain employment and life after building up this project?
A. big effect B. some effect C. a bit effect D. no effect
11. Do you think whether the site selection of this project is rational?
A. yes B. almost rational C. no
12. Base on the knowledge above, do you think this project can be performed? A.
yes B. no B. I don't know

13. Any questions and suggestions(write on below)

year month day

Note: Please hit colluding in relevant one of the questionnaire

5.6 Statistical analysis of citizen participation

The public who participates in activity forms statistical forms, to the public filling in content go on statistical analysis among questionnaire, in order to confirm whether this project obtains public support. Gather public suggestion after regard as and revise with concrete to implement reference basis of method reconciliation item.

The public who has already finished consults the result to analyze as follows

Table 5.4 The area distribution of the public investigates

Area	Location	Number of public participation	gender		Proportion of age between 30-50	Proportion of education level over university	Job range
			Male	Female			
Beijing	Daxing, pinggu, miyun	76	41	35	95%	26%	Proportion of official and 55% of granger
Tianjin	Tanggu,han gu	79	56	23	75%	65%	Proportion of official and worker is 96%
Hebei	Cheng'an county	50	28	22	82%	18%	Proportion of official and granger is 93%
Zhangw einan	Henna xianxiang Shandong dezhou	50	31	19	78%	24%	Proportion of official and worker is 86%
total		255	156	99			

Table 5.5 Statistical analysis of citizen participation

Question setting	Choose answer	Public participation	
		Public amount	percentage (%)
1.do you understand this objective whether or not?	A. yes	52	20.4
	B. a bit	201	78.8
	C. no	3	1.2

2. which benefit do you think is most markedness of this objective ?	A. economy benefit	24	9.4
	B. society benefit	102	40
	C. environment benefit	129	50.6
3. do you think it is good for using water reasonable if set up this objective?	A. yes	192	75.3
	B. no	2	0.8
	C. no change	61	23.9
4. which kind of environmental effect will be happened do you think during the building period of this objective (not single option)?	A. water pollution	21	8.2
	B. air pollution	5	2.0
	C. waste residue	43	16.9
	D. yawp	52	20.4
	E. peculiar smell	6	2.3
	F. zoology	5	2.0
5. Which kind of environmental effect will be happened do you think after building up of this objective(not single option)?	A. water pollution	0	0
	B. air pollution	0	0
	C. waster residue	2	0.8
	D. yawp	3	1.2
	E. peculiar smell	5	2.0
	F. zoology	3	1.2
6. Do you afraid of the water pollution will be worse than before after build up this project	A. very afraid	0	0
	B. afraid	20	7.8
	C. not afraid	235	92.1
7. Do you afraid of the air pollution will be worse than before after build up this project?	A. very afraid	0	0
	B. afraid	6	2.4
	C. not afraid	249	97.6
8. Do you afraid of project this can produce a serious one firm to abolish the pollution problem after building up?	A. very afraid	0	0
	B. afraid	14	5.5
	C. not afraid	241	94.5
9. Do you afraid of this project will influence to some extent the ecology after building up	A. very afraid	0	0
	B. afraid	9	3.5
	C. not afraid	246	96.5
10. do you afraid of there is any negative effect of your work, obtain employment and life after building up this project??	A. very big effect	0	0
	B. some effect	19	7.4
	C. a little bit effect	21	8.2
	D. no effect	203	79.6
11. Do you think whether the site selection of this project is rational?	A. rational	213	83.5
	B. more or less rational	42	16.5
	C. irrational	0	0
	A. yes	245	96.0

12. Base on the knowledge above, do you think this project can be performed?	A. yes	245	96.0
	B. don't know	00	0.9
	A. fill out	202	79.2
	B. not fill out	53	20.8

Investigation method: according to the request of relevant regulations of our country and World Bank's business policies, and use the successful experience of the domestic similar project for reference, this evaluation adopt public questionnaire combine with telephone interview launch the public activity of participating in originally, solicit the idea, suggestion and request on the project publicly to the public, answer the public knotty problem and measure of slowing down of solving the environmental problem.

Investigation amount: statistical analysis of the questionnaire result show in table 5.4 and 5.5. We can see from the tables, this respondent is distributed in the range widely, involve different gender, different age, different the public of schooling, have extensive representativeness, and can fully reflect the public suggestion in the influenced area. As a whole, public think that this project can be performed when think about from point of environmental effect view.

But there are some questions and suggestions, for instance: the majorities of investigators have been think about devote more efforts to propagating and attention degree, enhance public environmental consciousness, and propose regarding water resource as the theme, let the masses be able to understand prevention and cure in local water resource and environmental state of water more concrete and deeply in various forms.

6 Conclusions and Suggestions

6.1 The Conclusions of Effects on Water Resources

The thorough analysis and full discussion conclude that:

- The positive and beneficial effects of the project implementation are further defined;
- The project implementation improves the integrated management abilities of water resources and water environment in Hai He Basin. The tendency of progressive decrease in the quantity of water resources and available water resources will be changed through saving water, adjusting industrial structure, and reasonably supplying groundwater;
- The advanced technology and approaches will reduce ET value of invalid transpiration, and furthermore, mitigate the conflict between supply and demand of water resources in Hai He Basin;
- The groundwater quality will become better and better if setting up a reasonable programme of exploiting groundwater to change the status of seriously overexploiting groundwater;
- The demonstration and spread of can bring some effects of water saving and has a realistic meanings for increasing water volume;
- The project implementation can also reduce the exploitation of groundwater, reasonably utilize surface water, conserve source water and improve local eco-environment even whole environmental status;
- Full use of rules of transforming surface water into groundwater and spread mixed irrigation of salt water and freshwater as well as the technology of exploiting and utilizing freshwater in shallow layer, which will effectively control overexploitation of groundwater in deep layer and improve some environmental issues such as drop funnel of water table and ground sedimentation, etc;

6.2 The Conclusions of Effects on Water Environment

- The project implementation will better control the various pollution sources,

improve surface water quality and groundwater quality;

- Wastewater reuse will change the past pollution status of direct discharge with a reduction for consuming water resources and a improvement of water environment;
- The project implementation will reduce the volume of pollutants discharged into watercourse and lakes, etc, and improve the water quality, which are beneficial to improve not only aquatic ecosystem but also whole water environment.

6.3 The Conclusions of Effects on Other Environmental Factors

- The project implementation will improve integrated management level of water resources and water environment;
- The obvious improvement of water resources and water environment will be advantageous to plant growth and tree planting. Correspondingly, tree planting will play some roles of conserving source water, reducing wind and sand, and conserving water and soil in mountain areas;
- The project implementation will speed up the adjustment of agricultural structure, and arouse the public's initiatives of participating in water environment management to improve the eco-environment in Hai He Basin. As a result, the improvement of water environment will further promote reasonable and healthy development of biology chain in this region, and it will be beneficial to biodiversity.

6.4 Improved Integrated Water and Environmental Management

- To realize the concentrated management of water resources and water environment through corresponding improvement for management system and management personnel;
- To develop the integrated management information system to improve the scientific management abilities of water resources.

All of these are advantageous to saving water resources and improve water environment, and helpful to address the question of water saving, wastewater discharge, and wastewater treatment from the point of system view and realize the improvement of eco-environment.

6.5 The Existing Adverse Effects and Corresponding Settlement Measures

The project belongs to environmental protection project, which almost has not adverse effects on environment. The “Three waste” and noise pollution caused in construction period are main disturbance and effects for nearby residents, but they are temporary and can be reduced or eliminated through reasonable construction arrangement and environmental protection measures.

6.6 Some Suggestions on the Project

The objectives of GEF Project Management Office (PMO) in Hai He Basin are divided two phases. The objective in first phase is to really improve the integrated management of water resources and water environment and to accomplish the purpose of really reducing pollution in Bo Hai Bay. The objective in second phase is to impose on changing status and tendency of water quality deterioration and overexploitation for surface water and groundwater. The first objective can be achieved after the completion of project, but the second will have an actual change after a long-term period. Therefore, based on successful experiences obtained in demonstration projects, the continuous cooperation among GEF, WB, and Chinese Government is recommended to make the success in whole basin.