

CHINA
Hai Basin Integrated Water and Environment Management Project

GEF Project Brief

East Asia and Pacific Region
EASRD

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Country Manager/Director: Yukon Huang	Theme(s): Water resource management (P), Environmental policies and institutions (P), Pollution management and environmental health (P)
Project ID: P075035	
Focal Area: I - International Waters	

Project Financing Data					
<input type="checkbox"/> Loan <input type="checkbox"/> Credit <input checked="" type="checkbox"/> Grant <input type="checkbox"/> Guarantee <input type="checkbox"/> Other:					
<u>For Loans/Credits/Others:</u> Amount (US\$m): 17					
Financing Plan (US\$m):		Source	Local	Foreign	Total
BORROWER/RECIPIENT			14.74	0.00	14.74
GLOBAL ENVIRONMENT FACILITY			5.17	11.83	17.00
Total:			19.91	11.83	31.74
Associated Parallel Financing (US\$m):		Source	Local	Foreign	Total
Tianjin Urban Development and Environment Project II					
Borrower			51.77	5.63	57.40
IBRD			0.00	40.85	40.85
Total			51.77	46.48	98.25

Borrower/Recipient: PEOPLE'S REPUBLIC OF CHINA Responsible agency: MOF, MWR, SEPA, BEIJING & TIANJIN MUNICIPALITIES & HEBEI PRO Ministry of Water Resources State Environmental Protection Agency Municipalities of Beijing and Tianjin Province of Hebei Address: Ministry of Water Resources, Baiguang Road, Beijing, China Contact Person: Mr. Liu Bin - MWR and Ms. Li Pei -SEPA Tel: (8610) 6320-2127 - MWR; (8610) 6615-3366 – SEPA Fax: (8610) 6320-2027 - MWR; (8610) 6615-1932 – SEPA Email: nfb@mwr.gov.cn									
Estimated Disbursements (Bank FY/US\$m):									
FY	2005	2006	2007	2008	2009	2010			
Annual	2.44	3.25	3.35	3.60	3.17	1.19			
Cumulative	2.44	5.69	9.04	12.64	15.81	17.00			
Project implementation period: 5 years Expected effectiveness date: 07/01/2004 Expected closing date: 06/30/2009									

A. Project Development Objective

1. Project development objective: (see Annex 1)

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. The Project will also serve as a complement and link to, water and environmental management issues for two on-going World Bank-financed operations in the Hai Basin: Second Tianjin Urban Environment and Development Project (TUDEP2 - FY03) and the Water Conservation Project (WCP - FY01).

2. Key performance indicators: (see Annex 1)

Key performance indicators are:

- i. Decreased water pollution in pilot counties (tons of reduction);
- ii. Reduced Groundwater overdraft in pilot counties (rate of water table lowering reduced);
- iii. Reduced pollution loading to the Bohai Sea from coastal counties;
- iv. Formulated Integrated Water and Environmental Management Plans (IWEMPs) for 10 selected counties in the Hai Basin and for Tianjin Municipality;
- v. Produced seven Strategic Studies at central and Hai Basin levels and integrated findings into IWEMPs;
- vi. Carried out four Demonstration Projects and integrated findings into IWEMPs;
- vii. Formulated Strategic Action Plans (SAP) for the ZhangWeiNan subbasin and Hai River Basin;
- viii. Established river reach data management system for the Hai Basin;
- ix. Established a functional Evapotranspiration (ET) Management system for the Hai Basin;
- x. Provided technical support to Tianjin coastal wastewater management.

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)

Document number: 25141

Date of latest CAS discussion: December 19, 2002

The proposed Project is consistent with the Bank's Country Assistance Strategy (CAS) for China. The sector related goal is the sustainable development and management of water and other natural resources. The Strategy includes environmental protection objectives, strengthening of institutions and tools for improved environmental management, and financing of environment-related investments that will produce rapid benefits. The proposed Project will contribute towards these objectives and actions by promoting a more integrated approach to water resource management in the Hai Basin, providing technical assistance to the construction of wastewater treatment plants in secondary towns and wastewater canal clean up (financed by TUDEP2), and funding pre-investment studies for innovative projects including pollution prevention and wastewater treatment and reuse/disposal. The proposed Project was mentioned in the CAS as a project to support environmentally sustainable development, and specifically in the area of improving water resources management.

1a. Global Operational strategy/Program objective addressed by the project:

The proposed Project falls under the GEF International Waters Focal Area, and specifically under Operational Program Number 10: Contaminant-Based Program. The Project has direct relevance for the Global Programme of Action (GPA) for the Protection of the Marine Environment from Land-based Activities. One of the Chinese leaders in the national response to the GPA is actively involved in the preparation of this GEF Project. The Project directly responds to the needs of the GPA by seeking to reduce pollutant loadings to the Bohai Sea through integrated water and environment management. The Bohai Sea is a semi-enclosed sea with globally important ecological resources that provide significant fishery benefits to China, North and South Korea, and Japan. The GEF Operational Program objective of the Project is to improve water resources management and reduce land-based sources of pollution to the coastal and marine environment of the Bohai Sea. Furthermore the Project would also consider the need for environmental flows in rivers, flood plains, wetlands, and into coastal and estuary waters.

The integrated framework proposed by the Project would allow better understanding of important surface-subsurface and water quantity-quality interactions, and facilitate important new management approaches. Consistent with Par. 10.5 for OP 10, the Project will "play a catalytic role in demonstrating ways to overcome barriers to the adoption of best practices limiting contamination of international waters." OP 10 is also the only International Waters program which does not require the Project to be tied to a multi-country collaborative effort. The global benefits are the improvements of the Bohai Sea coastal and marine environment, and the demonstration-dissemination-replication nation-wide and region-wide of compliance with the GPA. Close cooperation with on-going GEF-financed efforts, such as the Yellow Sea Large Marine Ecosystem (YSLME) Project and the Partnerships for the Environmental Protection and Management of Asian Seas (PEMSEA) / Bohai Sea Project, would be maintained during Project implementation. During Project preparation, linkages have already been established between the Project management offices and periodic interactions will take place during implementation. The long-term objective of the former Project is ecosystem-based, by supporting environmentally-sustainable management and use of the Yellow Sea. The proposed Project will contribute to YSLME Project's long-term objective and to PEMSEA's objective to control land-based sources of pollution of the Bo Hai Sea and to establish inter-jurisdiction coordinating mechanisms to address environmental issues in the Bo Hai Sea.

The Project also supports the objectives of the Convention on Biodiversity, insofar as one of the components focuses on environmental needs for water (see Annex 2). This will include specific studies on requirements for reduced pollution and increased flows to the Bohai Sea in order to enhance marine ecology, and other studies to determine minimum ecological flows for water courses and wetlands in the Hai River Basin.

In the Hai Basin (as elsewhere) the poor are the first and most seriously affected by the deteriorating environment. This can lead to social instability, which is a global concern. Water pollution negatively affects water sources for domestic and irrigation purposes impacting on health and livelihoods. Untreated wastewater is used for irrigation when other water sources are not available. Water table drawdown affects the poor directly because their wells are normally shallow and dry up sooner. The need to drill deeper wells, install more powerful pumps and consume more electricity is a continuous burden on poor farmers, many of which end up without irrigation water which has a major effect on their livelihood, and forces them to use often polluted surface water for domestic and irrigation purposes. The Project will support integrated water and environment management in rural and peri-urban areas and will involve farmers to participate in the definition of viable alternatives to improve the water resource conditions and use patterns. Community Driven Development (CDD) will be piloted in one of the demonstration projects to build in

more participation and ownership.

The Project is also consistent with the Bank's 2001 Environment Strategy, its 1993 Water Resources Management Policy and its 2003 Water Resources Sector Strategy. The Environment Strategy emphasizes the need to improve the quality of growth, reduce environmental health risks, improve the institutional framework for environmental management, and protect regional and global commons--all key elements of the proposed Project. The Water Resource Policy stresses the importance of managing water in a comprehensive and integrated manner, which is one of the primary objectives of the Project. The Water Resources Sector Strategy emphasizes the importance dedicating more effort to integrated water resources management actions in water rights administration, discharge control, water conservation, pricing, institutional strengthening combined with infrastructure investments and poverty alleviation. The Project would support the management part of this equation linked to major ongoing infrastructure investment programs.

Finally, the proposed Hai Basin Project also is in line with the World Bank's China Country Water Resources Assistance Strategy (CWRAS), which is an outgrowth of the Water Resources Sector Strategy. The CWRAS addresses the important issues and provided a good foundation for future Bank assistance to China in water resources management issues. One of the important messages in the CWRAS is that integrated water resources management is both a top down and a bottom up set of activities. It is not possible to achieve integrated water resources management only by establishing laws, policies, regulations standards, and water allocations from the top down. Implementation needs to be bottom up. In China that means that the counties (and the townships, villages, and individual water users) need to be directly involved in planning and implementing integrated water resources management actions, including water rights and well permit administration, and enforcement, discharge control, industrial restructuring, "real" water savings measures, wastewater treatment, treated effluent reuse, etc. The Project addresses many of the important issues discussed in the CWRAS including a strong emphasis on top-down bottom-up water resources management.

2. Main sector issues and Government strategy:

Degradation of the Bohai Sea

The Bohai Sea, located in the northwest corner of the Yellow Sea, is one of the world's ecologically important, and stressed, bodies of water. The fishery resources are important to China, Japan, and North and South Korea. More than 40 rivers discharge into the Bohai Sea, of which the Yellow (Huang), Hai, and Liao rivers are the most significant. From an ecological perspective, the Bohai Sea is a large, shallow embayment of the Yellow Sea. The Yellow Sea, in turn, is a shallow continental sea of the northwest Pacific Ocean. These relationships are important because of the physical and biological links between these systems. In particular, fish and shellfish stocks in the Yellow Sea are dependent on the Bohai Sea as a reproduction and nursery area.

The open water environment in the Bohai Sea supports diverse marine life including invertebrates, fishes, marine mammals and birds. In the past, a major source of larvae and juveniles for the East China Seas came from the Bohai Sea, but this function has steadily diminished. Therefore, the ecological condition of the Bohai Sea is critically important for maintaining fishery stocks and biodiversity in northwest Pacific Ocean fisheries. It is generally accepted that over-fishing, pollution, reduction of freshwater inflows and habitat loss have combined to reduce these ecosystem functions.

The Bohai Sea has historically been an important fishing area due to its location adjacent to major population centers, and its role as a seasonal spawning and nursery ground for the larger and more productive Yellow Sea fishery. The history of Bohai Sea fisheries is one of boom and bust scenarios, with the major impact being the introduction of motorized fishing vessels in the 1960s, and new types of fishing gear such as fine-mesh nets for prawns that also caught all kinds of juvenile and larval fish. In 1988, prawn trawling was banned, and has been replaced now by thousands of kilometers of drift and set gill nets, which also have a negative impact on juvenile and larval fish. A major paradox of the Bohai Sea fishery is that despite its damaged condition, it is still attracting increasing numbers of fishermen due to lack of alternative employment in the region for many people. Today, the Bohai Sea is very heavily fished, with almost 90,000 registered fishing vessels in the provinces/municipalities surrounding the Sea.

In contrast to the decline in the natural aquatic systems, aquaculture has grown rapidly, and the Bohai Sea and northern Yellow Sea now account for almost two-thirds of the PRC's total production. The major species cultivated are prawns, oysters, clams, mussels, cockles, abalone, and seaweed. Pollution, both from external sources and self-production, as well as diseases are increasingly affecting aquaculture production, and the threat of human disease and toxic contaminants are putting pressure on the government and the industry to clean up pollution problems.

The Bohai Sea is subject to heavy land-based pollution from domestic, industrial, agricultural, and livestock sources. The Bohai Sea is subject to one-third of the wastewater and half of the pollutant loading discharged into seas bordering China. This amounts to 3 billion m³ of wastewater and 700,000 tons of pollutants per year. The areas where pollutant concentrations exceed the national standards in the Bohai Sea, mainly for inorganic nitrogen and phosphorous, has been expanding and in 1997 it covered 43,000 km², accounting for half of the total sea area. The most seriously affected areas include the estuaries and coastal shallows. Pollution has led to mass mortalities of aquaculture species and contributes to an increasing frequency of harmful algal blooms, commonly known as "red tides." In 1989 a "red tide" covering 1,300 km² formed in the Bohai Sea off the coast of Hebei; an even more massive "red tide" extending over 3,000 km² appeared in the Liaodung Gulf of the Bohai Sea in 1998.

Water Pollution

Surface and groundwater quality in China has been seriously degraded due to lack of effective pollution control, combined with rising population and industrial operations. Sixty-eight percent of the total river length in the north China plains is classified as polluted (i.e., unsuitable as raw water sources for drinking water), and large amounts of the groundwater resource is also polluted. Hai River is one of the most polluted river systems with more than 80% of the river reaches classified as polluted. Much of this is at or above Class V (worst pollution category). Hai River discharges into the Bohai Sea and is a major contributor to its pollution loadings.

The Chinese Government is beginning to address the serious water pollution problem in the Bo Hai Sea and the Hai Basin, both of which have been identified as priority areas in the 9th National Five Year Plan (1995-2000). The State Environmental Protection Administration (SEPA) has prepared the "Bo Hai Blue Sea Action Plan" and the "Water Pollution Prevention Program of Hai River Basin". Both plans include components of pollution control. The Government's efforts to control pollution has been focused on large municipal and industrial sources, with the major cities of Beijing, Tianjin, and Shijiazhuang having embarked on large-scale wastewater treatment plant construction programs. Despite considerable reduction of pollution generated from these large point sources, water quality has continued to decline. This trend suggests that many other sources are contributing to water pollution. Reducing pollution from secondary

cities and towns and suburban industries is essential to improving water quality in the Hai Basin and the environment of the Bo Hai Sea. Although information on the impact on water quality from these areas is limited, it is estimated that – together with surrounding rural areas – they account for more than half of the total pollution generated in the Hai Basin. However, pollution from these peri-urban and rural areas is largely uncontrolled. Almost none of the secondary cities and towns have wastewater treatment facilities. Township and Village Enterprises (TVE) and other small industries located in and around these cities and towns have very little pollution control infrastructure.

In 2001, SEPA formulated the 10th Five Year Plan of Water Pollution Prevention and Treatment in the Hai Basin, briefly named the Hai River Plan. The Hai River Plan is based on a Program of Water Pollution Prevention in the Hai Basin, approved by the State Council in March 1999. In this plan, the programmed water quality goals of some river reaches were revised, a control target index of gross amount of pollutant for 2005, COD and $\text{NH}_3\text{-N}$ were added, and some necessary water pollution treatment items were supplemented. The Hai River Plan identified that the key needs are to substantially reduce the gross amount of pollutant discharge in Hai Basin, to guarantee drinking water source areas reach standards, to address cross-provincial water quality disputes, and to establish a control system for the gross amount of $\text{NH}_3\text{-N}$ pollutant.

Water Scarcity and Groundwater Mining

Water resources in China are unevenly distributed. While water resources are quite abundant in the south, water availability in the north is very limited. In the Hai Basin, water availability is only 305 m³ per capita which is about 14% of the national average and about 4% of the World average. A 2001 study sponsored by the World Bank, "Agenda for Water Sector Strategy for North China" estimates current economic losses from water shortages of approximately US\$7.3 billion per year in the three major river basins in North China: the Hai, Huai, and Huang (Yellow River). Total abstraction of groundwater in the Hai Basin is estimated to be around 26 bcm per year, which is approximately 9 bcm more than the sustainable yield.

The Government has started to take measures to address water scarcity problems, including improving irrigation efficiency, increasing the price of piped water to encourage conservation and improve the finances of public water utilities, and encouraging wastewater reuse. One of the most ambitious measures is the proposed "South-North Water Transfer Project" (SNWT Project). This Project, when completed, will transfer 20 bcm of water from the Yangtze River system to North China, including the Hai Basin, at an estimated cost of around U.S. \$10-15 billion.

China's leadership, in particular Premier Zhu Rongji, has made a point of emphasizing the need to combine the construction of the SNWT Project with redoubled efforts on water management and water use efficiency, pollution clean-up and prevention, and appropriate (i.e., higher) pricing. The official slogan emerging from the high-level study session in October 2000, where it was decided to go ahead with the Eastern and Central Routes of the SNWT Project is "first save water, then transfer water; first treat pollution, then move water; first protect the environment, then use water."

In order to safeguard sustainable development of the social economy in the capital city of Beijing and surrounding areas, the Capital Water Resources and Sustainable Utilization Plan for 2001-2005 for the Early Part of 21st Century, was approved by the State Council. The water consumption in Beijing has exceeded bearing capacity of the water resources and the ecological system due to rapid population and economic growth and the high speed of urbanization. Therefore, in view of the water ecological system, the plan emphasized the need for coordinated attention to population, resources, and the environment. The Plan

aims to achieve a general balance of water resources supply and demand in terms of the water supply systems and the configuration of water resources in local region, in order to guarantee sustainable development of the social economy in Beijing and surrounding areas. The Plan will include integrated policies such as water conservation, water recycling, utilization of rainfall and flood waters, conjunctive use of surface water and groundwater, water resources protection, and adjustments in water pricing.

Water and Environmental Management Institutions

The complex and interrelated nature of water pollution, water scarcity, groundwater overdraft, and flooding in the Hai Basin calls for an integrated approach to water and environmental management. An integrated approach will lead to better understanding of important surface/subsurface and water quality interactions, and facilitate new management techniques. However, integrated water and environmental management techniques are problematic because of difficulties in inter-jurisdictional and inter-administrative cooperation along several dimensions.

Water and environment management involves many central-level ministries and agencies: Ministry of Water Resources (MWR), SEPA, Ministry of Construction (MOC), Ministry of Agriculture (MOA), and others. MWR has the primary responsibility for overall management of the nation's water resources, and SEPA has overall responsibility for pollution control. There are considerable overlapping jurisdiction problems between these agencies and with other ministries and agencies concerning urban water supply, water pollution control, groundwater management, and irrigated agriculture. Much of this problem has its foundation in Chinese law that applies to water resources (Water Law) and pollution control (Water Pollution and Prevention Control Law --WPPC) in which mandates are not clear, with overlapping responsibilities, and poorly defined planning linkages between the two ministries. Laws are traditionally drafted to give ministries power, not to share power. The Project would provide a powerful demonstration effect and an incentive to break through these horizontal institutional barriers.

The management role of central ministries is further limited by the increasing powers of provinces following the decentralization process. According to the official government structure, local and provincial agencies have vertical technical interaction with central ministries. However, the local and provincial agencies report and depend on provincial and lower-level governments, especially in relation to administration of laws and most importantly for funding. Well-meaning principles (such as water allocation at the basin level or polluter-pays-principle) are often in conflict with the economic interests of the provinces and lower-level governments which have no legal obligation to downstream jurisdictions under current Chinese laws. Administrative bodies -- whose financial viability depends on provincial budgets -- empowered by laws to enforce regulations at the local level are often under pressure to act in the interest of local governments to the detriment of sound overall water or environmental resource management. This has implications not only at the planning level, but also in critical areas such as pollution enforcement. The Project would provide a powerful demonstration effect and an incentive to break through these vertical institutional barriers.

China also has a number of River Basin Commissions (RBCs) for its major river basins. The RBCs are part of the MWR and, while they have been established for many years, are unrepresentative of basin stakeholders, have no separate governing board or corporate status, and have a major focus on basin planning, hydraulic infrastructure construction and operation and flood control. It is difficult for the RBCs to enforce provisions of basin plans on other sector ministries and provincial governments, and the functions they perform overlap with activities undertaken at the provincial and local level. In principle, RBCs prepare basin development and operating plans in full consultation with the provinces, sectoral ministries, and other stakeholders. In practice, there are few formal consultation mechanisms, and the main

directives affecting RBC activities are received vertically from MWR. A further factor is that SEPA has no institutional/operational presence at the basin level.

3. Sector issues to be addressed by the project and strategic choices:

Land-Based Sources of Pollution to Bohai Sea: An important Project focus will be on water pollution from coastal small cities in Tianjin Municipality for two reasons. First, the large urban areas in the Hai Basin such as Beijing, Tianjin, and Shijiazhuang are already investing in large Wastewater Treatment Plants (WWTP); yet more than half of the population and pollutant loading comes from outside the large urban areas. Second, since Tianjin borders on the Bohai Sea, interventions to reduce wastewater flows should have an immediate beneficial impact on water quality in the Sea. The GEF grant would finance technical assistance to address complex water pollution control problems in the Tianjin coastal area, including industrial pollution control, remediation of contaminated canals that flow into the Bohai Sea, and wastewater management institutional and financial issues. The Grant would also be used to pilot an incentive-based financing mechanism for wastewater management in the coastal areas. These activities would be carried out in close coordination with the World Bank's FY03 TUDEP2, which provides financial support for the rehabilitation of the canal and construction of small cities wastewater treatment plants.

Left on their own, the secondary cities and towns in the Hai Basin are unlikely to invest in comprehensive wastewater management systems for several reasons. One is that the financial constraints facing secondary cities and towns, and rural areas are severe. The fiscal position of many small city governments is weak and many have heavy debt burdens. Another reason is that the massive national effort to control water pollution is mainly focused on point industrial sources and large urban areas (with populations over 500,000 inhabitants). Since national and provincial resources are major sources of financing for water sector projects, the gap in planning seriously limits the development of comprehensive wastewater management in secondary cities towns.

China is beginning to recognize the importance of peri-urban and rural non-point sources of pollution, especially animal wastes. SEPA is currently developing comprehensive regulations on this subject and part of the output of the Project will be in defining the types and relative impacts of non-point sources in the Tianjin area as a basis for developing county policies on Non-Point Source (NPS) management.

Water and Environmental Management: The Project would finance the formulation and implementation of "Integrated Water and Environmental Management Plans" (IWEMP) in Tianjin Municipality and 10 counties throughout the Hai Basin. Pre-investment studies for priority infrastructure will also be undertaken, with future financing coming from either local or international sources, including a possible World Bank-financed follow-up project. The plans will consider both water quantity and quality issues, with special emphasis on treating wastewater, controlling groundwater overdraft, and wastewater reuse. Although the area covered under the Project is only a small percentage of the Hai Basin (less than 10%), it is expected that the plans will serve as powerful examples for other counties and municipalities. The strategic choice was made to focus water resource planning based on administrative boundaries at the county level rather than strict hydrological boundaries because existing jurisdictions have the political authority and control the implementing agencies. Moreover, both Tianjin and the selected counties in Hebei and Beijing are involved in on-going Bank operations (TUDEP2 and WCP) that are already dealing, in a limited capacity, with some water resource management issues. However, in recognition of the importance of carrying out water and environment planning and implementation within hydrologic boundaries, the Project will select one key subbasin (ZhangWeiNan) which will cover several counties for development and initial implementation of an IWEM Strategic Action Plan.

The Project will facilitate the development of new institutional arrangements for integrated water and environmental management at the local, municipal, and basin level, and also provide policy support at the various levels. At the local and municipal level, municipal and county coordinating mechanisms with multiple agency participation for water and environmental management and organized by the local governments will be established to coordinate all water resource related activities within the respective jurisdiction. For the key subbasin (ZhangWeiNan) institutional cross-county arrangements for integrated water and environment management will be explored. At the Basin level, new institutional arrangements for basin-wide policy, planning, and management will be investigated and, hopefully, lead to the establishment of a high-level, multi-sectoral coordinating committee. During Project implementation a high-level Project coordinating committee and high-level steering committees led by MWR and SEPA will provide the institutional and coordinating support for basin wide IWEM. The mandate, functions, and authority of the existing Hai River Basin Commission (HBRC) in relation to a possible Basin Coordinating Committee will also be examined. The Project will also help the HBRC improve its Knowledge Management (KM) program, which includes activities such as measurement, monitoring, modeling, databases, planning, and information dissemination related to water and environmental management.

C. Project Description Summary

1. Project components (see Annex 2 for a detailed description and Annex 3 for a detailed cost breakdown):

The Project will support the development of top-down and bottom-up mechanisms for integrated water and environment management in the Hai Basin, based to the extent possible on existing institutional mechanisms. The Project will also promote development of new coordination mechanisms at all levels that will adopt practical and pragmatic methods to overcome current institutional barriers to integrated water and environment management. The key aspect is that the Project needs to have maximum incorporation of horizontal and vertical integration. Horizontal integration includes cross-sectoral cooperation and coordination of actions between water resources and environmental protection ministries/bureaus, as well as others including agriculture and construction ministries/bureaus. Vertical integration includes direct linking and constant interaction between the Central and Hai Basin component activities and the smaller jurisdictions of ZhangWeiNan subbasin, Tianjin municipality, and Beijing/Hebei counties components. The Project will be implemented in two phases (see Annex 4). The two phased approach will permit a process of good planning followed by specific actions to affect real change. Parallel demonstration projects will test and demonstrate high priority actions that are clearly needed throughout the basin. The proposed Project includes four components:

Component 1: Integrated Water and Environment Management - IWEM (US\$14.30)

The IWEM will be divided into 3 subcomponents: (a) Strategic Studies at the central and Hai Basin levels; (b) integrated water and environment management planning; and (c) demonstration projects. All three of these subcomponents are very closely interrelated. The strategic studies would support and provide guidance to IWEMPs and to the demonstration projects. The demonstration projects would provide important practical input into the IWEMPs. There would be constant interaction between these subcomponents to ensure that they are all working together in an integrated manner.

Subcomponent 1A - Strategic Studies - (US\$1.59)

The seven strategic studies focus on four primary areas of concern at the Hai Basin level -- policy, legal and institutional issues; environmental needs for water including the Bohai-Hai linkages; water quantity management; and pollution management. The seven strategic studies are: (a) Policy and Legal Framework

and Institutional Arrangement; (b) Bohai Sea Linkage; (c) Countermeasures for the Protection and Measurement of the Water Ecological System; (d) Water Savings and High Efficiency Water Utilization; (e) Administration of Water Rights and Well Permits, and Sustainable Groundwater Exploitation; (f) Wastewater Reuse; and (g) Water Pollution Planning and Management. These will provide both the substantive framework for the entire Project as well as guidance for the IWEMPs. The time frame for the strategic studies allows both for horizontal linkages between the studies and with the IWEMP planning process.

Subcomponent 1B - Integrated Water and Environment Management Planning - IWEMP (US\$9.36)

The IWEMP subcomponent is the core of the Project. It would provide an example of the methods and benefits of this approach to China and to the receiving environment of the Bohai Sea. The subcomponent will provide the context within law, policy, institutional arrangements, and operational practices, for the development of practical approaches to IWEM at the basin, sub-basin, and county levels. The IWEM planning process for selected counties in Beijing and Hebei, and for Tianjin municipality would utilize the outputs of the strategic studies as a basis for developing specific IWEMPs for their respective jurisdictions. The demonstration projects (see below) would provide examples of how, in practice, specific aspects of the IWEMPs can be implemented. This subcomponent would be carried out in 2 phases, the first phase would take about 2 years and would involve the preparation of the plans and the second phase would take about 3 years and would include initial implementation of the IWEMPs. The main purposes of the subcomponent would be to improve the capacity of local governments and water and environment management entities to carry out IWEM, and to achieve specific and sustainable improvements in water and environmental outcomes.

The subcomponent would support the formulation of an IWEM Strategic Action Plan (SAP) for the selected subbasin (ZhangWeiNan). The primary focus of the ZhangWeiNan SAP would be on water pollution, but water quantity aspects will also play an important role insofar as quality and quantity management intersect in virtually all aspects of pollution management. The subcomponent would also support the preparation of IWEMPs in 5 counties in Beijing, 5 counties in Hebei and in all of Tianjin. These plans would: (a) evaluate present surface and groundwater conditions in terms of both quantity and quality; (b) establish target objectives for improvements in water quantity and quality management including the definition of monitoring indicators and monitoring and evaluation requirements for tracking improvements; (c) prepare detailed plans for reaching targets using a 10 and 15 year horizon; and (d) define a set of initial actions to be implemented during the second phase of the Project. In the second phase of the Project, the subcomponent would support implementation of actions defined in the first phase which would include activities such as preparation of feasibility studies and designs, training and capacity building, and implementation of 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. The subcomponent would facilitate the establishment of institutional coordinating mechanisms for IWEM in the Beijing and Hebei pilot counties and in Tianjin. The intention is to help to improve, develop, and implement a set of policies, and legal, administrative and institutional instruments at the county and municipal level. A basin-wide IWEM SAP would be prepared for the entire Hai Basin during the second phase of Project implementation after the strategic studies and the county and municipal IWEMPs have been prepared, and based on lessons learned from them, with focus on capacity building and basin integrated management, on the basis of the natural characteristics of the basin, the existing Bohai Action Plan, and the 10th Five Year Plan of Water Resources Protection and Water Pollution Prevention in Hai River Basin.

Subcomponent 1C - Demonstration Projects (US\$3.35)

This subcomponent would finance demonstration projects that will serve as experimental units to carry out the IWEMPs. The demonstration projects will be carried out in selected counties would address: (i) effective control of wastewater discharge, (ii) pollution control combined with environmental improvements, (iii) "real" water saving and (iv) effective management of water rights and well permits. These are all critical areas common to all Hai Basin counties and they will provide powerful examples on how to address these complicated issues in an effective manner at the county level. As these demonstration projects progress, they will provide guidance to the counties and municipality for how to address these issues in the IWEMPs. The demonstration projects will include an initial design phase which will take about 1 year. Annual action plans will be developed for each demonstration project based on the concept of refining and improving the demonstration projects based on the previous year's experience.

Component 2: Knowledge Management - KM (US\$6.51)

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.

Subcomponent 2A - Knowledge Management - KM (US\$5.00)

This subcomponent would provide a service function for all users and clients within the Project and would provide hardware and software tools to help Project participants to address their specific issues. The subcomponent would improve data management, common information system platforms, standardized data transfer and security protocols, decision-support requirements, data acquisition including remote sensing, and purpose-specific systems such as water use and pollution discharge permitting and tracking. A key initial activity is a GIS-based approach for integrating the two different water function zone systems to allow MWR and SEPA data systems to communicate and to manage water and the water environment in an holistic manner. KM activities are essential for improving basin-wide water quality monitoring and modeling systems, water ecological environment monitoring systems for river reaches and other water bodies in the Basin, including a coastal water quality model; basin-wide network of flow monitoring stations coupled with a simulation model for real-time reservoir management and water allocation; regional groundwater models; GIS mapping; satellite imagery for improved resources management, etc. In addition, KM activities will strongly support the KM needs of Project pilot counties in Beijing and Hebei, Tianjin municipality and ZhangWeiNan subbasin. This will include hardware, software and training aspects concentrating on GIS systems, data sharing and management, monitoring, modeling, remote sensing and water and environment planning.

The development of the KM system will depend on the close collaboration between the MWR and SEPA, as well as other units at all levels related to the use and conservation of water resources in the Hai Basin. The system would taken into consideration both differences with present management methods of the various units and the practical needs for shared KM. During Project preparation, this collaboration has been proceeding well resulting in a significant breakthrough in MWR/SEPA cooperation, which has been poor in the past. The KM subcomponent would be jointly managed by MWR and SEPA through the Project KM Group in order to ensure integration.

Subcomponent 2B - Establishment of Remote Sensing (RS) Evapotranspiration (ET) Management System (US\$1.51)

This subcomponent will support improvements in the conservation of water resources and the water environment, in order to achieve a rational water balance and its sustainable management, based on a focus on ET management. ET management is the principal innovative international cutting edge approach being introduced under the Project. The key to sustainable water quantity management in the Hai Basin is to reduce present amounts of ET to sustainable levels (i.e., reducing ET throughout the basin in order to eliminate groundwater overdraft and provide more surface water for ecological purposes including enhancing outflow to the Bo Hai Sea), and then, in the future, to manage ET within the basin to remain at these sustainable amounts. Many of the Project activities need to be solidly based on the ET management concepts including: (i) high-efficiency water utilization and "real" water savings, (ii) administration of water rights and well permits, and (iii) water quantity management within the IWEMPs in Tianjin and in the Beijing and Hebei counties. Utilizing remote sensing techniques, the sub-component would evaluate basin wide existing ET and existing ET for all of the counties within the Hai Basin. Then the amount that basin-wide ET would need to be reduced in order to achieve sustainable use would be determined and a target ET reduction would be assigned to each Project county involved in IWEM. The sub-component would then support remote sensing and GIS techniques to develop county level ET reduction plans that would become an integral part of water quantity management within the IWEMPs. The "real" water savings demonstration project would develop practical approaches at the county level for remote sensing based ET management.

Component 3: Tianjin Coastal Wastewater Management (US\$4.75)*

The component would assist Tianjin address a set of critical water pollution control issues in the coastal area, particularly for activities closely related to the TUDEP2, which directly provides an additional US\$98.25 through associated parallel financing to this component. 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 total cost for the Dagu Canal renovation is estimated at US\$55.15 million, which will be financed under the TUDEP2. 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. Control of industrial pollution is essential for the successful renovation of Dagu canal, and the proper operation of municipal collection and treatment systems. 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. TUDEP2 will provide an estimated US\$43.10 million to finance small city wastewater treatment facilities associated with the incentive program.

*) Together with the associated parallel financing through the TUDEP2 the cost of this component totals US\$103 million.

Component 4: Project Management, Monitoring and evaluation, and Training (US\$6.18)

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, supervision and in some cases execution of technical activities under the Project. The Central PMOs would be supported by an international expert panel with broad experience in water quality and quantity management, water and environment planning and knowledge management. 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.

Component	Indicative Costs (US\$M)	% of Total	Bank financing (US\$M)	% of Bank financing	GEF financing (US\$M)	% of GEF financing
1. Integrated Water and Environment Management	14.30	45.1	0.00	0.0	7.40	43.5
2. Knowledge Management	6.51	20.5	0.00	0.0	2.50	14.7
3. Tianjin Coastal Wastewater Management	4.75	15.0	0.00	0.0	4.30	25.3
4. Project Management, Monitoring and Evaluation, and Training	6.18	19.5	0.00	0.0	2.80	16.5
Total Project Costs	31.74	100.0	0.00	0.0	17.00	100.0
Front-end fee	0.00	0.0	0.00	0.0	0.00	0.0
Total Financing Required	31.74	100.0	0.00	0.0	17.00	100.0

Note: An additional cost of US\$98.25 million for the Tianjin Coastal Wastewater Management component is included in TUDEP2.

2. Key policy and institutional reforms supported by the project:

The following reforms will be promoted under the Project:

- i. *Establishment of Institutional Coordinating Mechanisms in Tianjin, ZhangWeiNan, and the selected Pilot Counties:* Water coordinating committees or other institutional coordinating mechanisms would be established to coordinate all water resource related activities within the respective jurisdiction. This is necessary because water quality is usually regulated by the Environment Protection Bureaus (EPBs); the Water Resources Bureaus (WRBs) typically manage water allocations and flood control; and there are weak linkages between the public water and wastewater utilities, and the environmental and water resource bureaus. In a situation of extreme water scarcity, extensive water pollution, and unsustainable groundwater mining, a coordinating body with jurisdiction over the various bureaus/agencies is required to achieve the necessary integrated management of the resource.
- ii. *Establishment of a High-Level Hai Basin Coordinating Mechanisms:* The same problems that exist at the county and municipal level also exist at the basin level. New institutional arrangements for basin-wide policy, planning, and management will be explored and, hopefully, lead to the establishment of a high-level, multi-sectoral coordinating committee for the Hai Basin. The mandate, functions, and authority of the existing HRBC in relation to the Basin Coordinating Committee (BCC) will also be examined.
- iii. *Policies for Controlling Groundwater Mining:* Groundwater overdraft is a huge problem in the Hai Basin, yet the administrative and regulatory structures for groundwater management are mostly ill-defined and poorly implemented. The Project will help improve the legal, policy, and

regulatory framework for actions such as: defining aquifers and safe yields, creating groundwater management plans, permitting wells, licensing drillers, groundwater pollution control, etc.

- iv. *Policies for Water Pollution Control:* Improving water quality throughout China, and particularly in the Bohai Sea, will require more than just treating wastewater from large urban areas and industries. It will also require dealing with domestic and industrial wastes from towns and villages, and rural pollution such as livestock and agricultural run-off. The Project will help establish a broad water quality management framework for these issues and begin to address rural and small city/town pollution on a pilot basis. In addition, the Project will explore different financing and cost recovery options for investments in water pollution control in small cities and rural areas.

3. Benefits and target population:

One set of benefits revolves around improved public health, healthier ecosystems, and environmental aesthetics. Public health benefits stem from reduced use of untreated wastewater for irrigation, which endangers both the irrigators and the people who consume vegetables and other sensitive crops. Public health benefits will also accrue from reduced contamination of mariculture and capture fisheries, such as prawns, oysters, clams, mussels, cockles, abalone, and seaweed cultivated in the Bohai Sea. Pollution, both from external sources and self-production, as well as diseases are increasingly affecting mariculture production, and the threat of human disease and toxic contaminants are serious problems. The clean-up of polluted sewage canals will also improve environmental aesthetics, including odors, and raise property values alongside canals.

Economic benefits will also be generated from improved productivity of mariculture, and better management of water resources. Groundwater overdraft and pollution is threatening the sustainable use of aquifers which are valuable water storage reservoirs. Control of groundwater overdraft will lower pumping costs and preserve water for the future, thereby avoiding a "tragedy of the commons", with its well-documented economic inefficiencies. Control of groundwater pollution will also preserve valuable water storage reservoirs for drinking water purposes, where the alternative of building new storage reservoirs or conveying water from large distances is generally prohibitively expensive for local use. Use of reclaimed wastewater will create valuable new water supplies for irrigation and non-potable municipal and industrial use. Better water allocation more closely related to the economic value of water, including managed reallocation of water away from agriculture (without necessarily reducing agricultural yields) and towards high value municipal and industrial uses. Finally, economic benefits at the farm level enhance social stability which is of great importance in the Chinese system.

The China-GEF Hai Basin Integrated Water and Environment Project will significantly promote IWEM with the long-term objective to make sustainable the use of water resources in the basin, where the water crisis has become increasingly severe. In achieving its objective, the Project will also exert great influences on local socioeconomic development and people's livelihood. development and implementation of the IWEMPs will include participation of water users through water user associations and other mechanisms. The water rights and well permits demonstration Project will also introduce CDD concepts to ensure maximum ownership by the water users and the community in addressing and implementing the difficult choices necessary to achieve sustainable use of water resources.

The Hai Basin covers the Beijing municipality, Tianjin municipality and Hebei province and parts of other provinces in and around the North China Plain. People living in this area have seriously suffered from water shortage and water pollution – especially those in the rural areas outside Beijing and Tianjin who account for the majority of the population under the Project in the provinces. Control of water use and pollution in the basin, supported by the Project will lead to improvement in people's living conditions and

rehabilitation of their production sustainability. The Project will also require changes in their water use behavior that further lead to multiple interaction between their economic activities and water and environment management. As the Project beneficiary, therefore, local people's understanding, participation, and collaboration will be pursued to ensure Project success.

A social assessment was conducted for the Project to ensure that the different needs and aspirations of the Project beneficiaries and impacted people were taken into account. In terms of promoting IWEM, the participation of women and men in Project activities as well as benefit sharing is pursued. The Project also encourages the organization of Water User Associations (WUAs), in which women and men farmers participate and are empowered. Female members in the WUAs' leadership are encouraged. The enabling environment for gender equality in the Project area is good (e.g. existing legal and regulatory framework that promotes equality; adaption of international conventions and commitments; an extended network of individuals, universities and research institutes, and NGOs that promote gender equality).

4. Institutional and implementation arrangements:

The implementation arrangements would build upon the existing management structures for the TUDEP2 and the Water Conservation Project (WCP). The following agencies will have involvement in Project implementation.

- Ministry of Water Resources (MWR)
- State Environmental Protection Agency (SEPA)
- Ministry of Construction (MOC)
- State Oceanic Administration (SOA)
- Ministry of Agriculture (MOA)
- Ministry of Finance (MOF)
- Beijing Municipality
- Tianjin Municipality
- Hebei Province
- Hai River Basin Commission (HRBC) (under the MWR)

A Project Coordinating Committee led by MOF and with participation from MWR, SEPA, Beijing, Hebei and Tianjin will be responsible for coordinating the smooth implementation of the Project. High-level Steering Committees headed by Vice Ministers and Project Management Offices in MWR and SEPA will be responsible for implementing their parts of the Project in coordination with each other, and with the Project provinces/municipalities, counties and sub-basin. Leading groups and Project Management Offices will be responsible for their parts of the Project in Tianjin, Beijing, Hebei, Hai Basin Commission, ZhangWeiNan and in each of the Beijing and Hebei pilot counties, all in coordination with each other, and with the central level PMOs. All of these entities have already been formally or informally established and where informal, will be formalized before negotiations.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

A project that would only support those aspects of water and environment management under the responsibility of MWR and the provincial and county water bureaus was considered. This alternative would be much easier to implement than the proposed Project because it would not require coordination between different government entities, but would not be able to support the Project objective of promoting integrated water and environment management which requires the involvement of MWR and SEPA and the

respective provincial and county water resources and environmental protection bureaus, as well as participation from MOF, MOA, MOC, and others and their correspondent provincial and county level entities. In particular, the Project would not be able to include the water environment which is under the jurisdiction of SEPA and for which MWR does not have responsibility.

A project that would only involve the county and municipal levels and not address Hai Basin or Central level water and environmental management issues was considered. This alternative would also be easier to implement and would address many bottom-up issues, but was rejected because it would not support basin and central level policy, strategy, and institutional issues that are essential for integrated water and environmental management.

The development of a complete Hai Basin IWEMP was considered as an additional Project activity, but was rejected, because insufficient institutional mechanisms presently exist to effectively develop and implement such a plan. With the successful implementation of the Project, a second phase could be prepared and implemented that would include a Hai Basin IWEMP.

2. Major related projects financed by the Bank and/or other development agencies (completed, ongoing and planned).

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed			
Wastewater treatment, sewage system development, drainage company strengthening	Beijing Environment Project 2	S	S
Water supply, wastewater treatment, institutional strengthening	Hebei Urban Environment Project	S	S
Wastewater treatment, sewage system development, institutional strengthening	Huai River Basin Pollution Control Project	S	S
Wastewater treatment, institutional strengthening	Liao River Basin Project	S	S
Irrigated agriculture system improvements and water conservation, self-financing irrigation and drainage districts and groundwater management	Water Conservation Project	S	S
Irrigated agriculture system improvements and water conservation, self-financing irrigation and drainage districts and river basin management	Tarim Basin Project 2	S	S
Wastewater treatment, sewage system development, institutional strengthening	Shandong Environment Project	S	S
Irrigated agriculture system improvements and water conservation, self-financing irrigation and drainage districts and river basin management	Yangtze Basin Water Resources Project	S	S
Wastewater treatment, sewage system development, river basin management	Guangxi Urban Environment Project	S	U

Irrigated agriculture system improvements and water conservation, and self-financing irrigation and drainage districts	Irrigated Agriculture Intensification Project 2	S	S
Coastal zone planning and management improvements, marine aquaculture	Sustainable Coastal Resources Development Project	S	U
Other development agencies			
ADB Transjurisdictional water pollution	"Transjurisdictional Environmental Management Project"		
River basin management	Yellow River Law Project		

IP/DO Ratings: HS (Highly Satisfactory), S (Satisfactory), U (Unsatisfactory), HU (Highly Unsatisfactory)

3. Lessons learned and reflected in the project design:

The Bank has assisted in financing 17 water resources and irrigation projects in China and numerous water supply and sanitation projects over the last 15 years. Generally, these projects have been implemented efficiently, and time and cost overruns have not been excessive despite periods of sharp price escalation. In recent years the Bank has been supporting institutional aspects of water and environmental management: (a) at the Basin level in the Yangtze Basin Water Resources Project, the Tarim Basin II Project, the Guanxi Urban Environment Project and the Liao Basin Environment Project; and (b) at the system level through self-financing irrigation and drainage districts and water supply and sanitation corporations in numerous projects. Key lessons from previous Bank-financed water resources projects in China are that:

- i. detailed organizational and staff arrangements should be formulated and agreed before implementation;
- ii. counterpart funding should be committed before implementation, including the direct participation of the Provincial Planning Commissions and Finance Bureaus;
- iii. projects should include institutional development support for the strengthening of provincial and local bureaus;
- iv. water and environmental management needs to have both bottom-up and top-down aspects; bottom-up activities need to have strong involvement by existing political/administrative entities (townships, counties, prefectures, municipalities, provinces) including their respective technical/administrative bureaus (water, environmental protection, agriculture, construction, etc.) because these are the entities with direct line responsibility for management; top-down activities should be concentrated at the river-basin level and should establish the enabling policy and strategic environment for cross-sectoral and cross-administrative boundary coordination;
- v. participation of water users in water resources management especially in the lower-level bottom-up aspects is crucial; and
- vi. data and knowledge management activities are critical to water and environment management and need to be widely shared and compatible.

Experience with institutional development Project indicates that strong government support is necessary for its success, and that specialized TA during preparation and early implementation is important to help promote, teach, and establish institutional reforms before full implementation begins.

The 1993 World Bank Policy Paper on Water Resources Management and Chinese Government policy are compatible and emphasize the following principles: (a) water resources should be managed and developed

in a comprehensive integrated manner and consider cross-sectoral issues with the goal of ensuring the sustainability of the water environment for multiple uses as an integral part of the country's economic development process; (b) water resources planning and management should be carried out considering the interrelationships between water, land and human resources with the objective of enhancing economic growth and development in an environmentally sustainable manner; (c) water is an economic resource and therefore should be managed in an economically efficient manner; (d) the river basin should be the basic unit for planning and managing water resources; (e) water users should participate directly in water resources management and development; and (f) water use should be efficient and environmentally sustainable.

The profound water management problems facing China, high pollution levels, and growing numbers of water and pollution disputes that have no resolution except recourse to the State Council, the reluctance of the National People's Congress to move the draft Yellow River Law into law, and the overall direction of institutional reform in China, combine to suggest that this Project would be implemented at a critical junction in China's recent history of water resources and water environment management. As the only World Bank supported Project that comprehensively addresses integrated water and environment management in China, this Project has the potential to greatly influence institutional development at a time when the central government is seeking improved institutional mechanisms for water management.

4. Indications of borrower and recipient commitment and ownership:

The Chinese government, at all levels, is committed to improving the ecological health of its coastal waters and better management of its water resources. An important policy milestone was reached in July, 2000 when the representatives from the State Oceanic Administration (SOA) and the coastal provinces/municipalities signed the "Bohai Declaration" which outlines the principles and objectives for saving the Bohai, and commits their agencies to specific actions to achieve these goals. In 1999 the Marine Environmental Protection Law (MEPL) was amended to better protect and improve the marine environment, conserve marine resources, abate pollution, and ensure sustainable coastal and marine development. Of particular importance for the proposed Project is Article 3 of the MEPL which calls "total quantity control" of pollutants based on the measured carrying capacity of the coastal waters. SEPA is held responsible for the prevention and control of land-based pollution that impacts the marine environment, and in 1999 introduced the "Blue Sea Action Program." The State Council has also ratified the "Blue Sea Action Program" which presents a suggested investment program of around US\$7.2 billion for reducing land-based sources of marine pollution. State Council Circular 37 [2000] promotes the concept of integrated water resources management, water pollution control, and water conservation. Finally, both the 9th [1995-2000] and 10th [2000-2005] National Five Year Plans agreed by multiple ministries stress the need for integrated water and environmental management, with the Hai Basin identified as the highest priority.

Government commitment to improve water management in the Hai Basin and the Bohai Sea environment is also demonstrated by the on-going investments in wastewater collection and treatment in the large cities (Beijing and Tianjin) and agricultural water conservation infrastructure, such as the Bank-financed Water Conservation Project (WCP). For secondary towns in Tianjin, the towns/counties must finance the wastewater treatment works either through loans or self-financing covering all investment costs.

MWR, SEPA, Tianjin Municipality, Beijing Municipality and Hebei Province all participated in the preparation of the GEF Concept Note and GEF PDF-B Grant request and the two preparation mission, and strongly support the Project, utilizing to a great extent their own human and financial resources to undertaken Project preparation activities. MOF, MWR, SEPA Tianjin, Beijing and Hebei have made initial

commitments to provide counterpart financing during Project implementation. The catalyzing effect of this Project is enormous and there is strong awareness by all of the entities involved in Project preparation that the Project is key to carrying out integrated water and environment management in China. The incremental cost analysis (Annex 12) shows that billions of dollars will be expended in near future to try to solve these huge water quantity and water quality problems in northern China. The Project will contribute greatly to enhancing the benefits of these investments.

5. Value added of Bank and Global support in this project:

The Bank is helping the Chinese Government to develop and implement an integrated cross-sectoral approach to water and environment management. The Project would address an important missing link in efforts to improve water and environment management in the Hai Basin and the Bohai Sea environment. Other GEF and Chinese initiatives are addressing the marine and coastal issues (PEMSEA and the Yellow Sea Marine Ecosystem Project). Large Chinese cities, such as Beijing and Tianjin, often with partial World Bank financing, are beginning to construct wastewater treatment systems to reduce land-based sources of pollution into the Bohai Sea. The proposed Project will complement these efforts by financing IWEM activities at the county and municipal level in rural and peri-urban areas (see Annex 2 for more detail). More than half of the pollutant loading into the Bohai Sea comes from secondary cities and towns and rural areas. The general approach taken will be to develop an IWEM framework, which deals with water scarcity, groundwater mining, and water pollution. Management improvements will take place from the bottom-up with pilot counties, at the middle administrative levels through Tianjin, and from the top-down at the basin and national levels.

The Project builds upon, fills in the gaps, and links two Bank-financed projects, the WCP and TUDEP2, and fits into the overall framework for improving the Bohai Sea environment. It would also help provide the management framework for integrated water resources management in the Hai Basin, which is indispensable for a long-term, sustainable approach to rescuing the Bohai Sea. Reducing pollution into the Bohai Sea is best done within an integrated water resources framework. Although government policy calls for an integrated framework, inter-jurisdictional and inter-administrative cooperation often proves difficult in practice, and the Project will provide an incentive and approach to break through institutional barriers and provide a powerful demonstration effect. The Bank is helping to provide international expertise to provide Chinese counterparts with a broad range of management experiences and instruments to draw upon.

E. Summary Project Analysis (Detailed assessments are in the project file, see Annex 8)

1. Economic (see Annex 4):

- ☐ Cost benefit NPV=US\$ million; ERR = % (see Annex 4)
- ☐ Cost effectiveness
- ☒ Incremental Cost
- ☐ Other (specify)

Per GEF requirements, a project-specific analysis on GEF incremental costs has been prepared and included as Annex 12. IWEMPs, which will be prepared during the first phase of Project implementation will carry out cost/benefit analyses of alternatives in order to determine the best plans from an economic standpoint. Social and environmental aspects will also be considered in selecting the activities for the IWEMPs.

2. Financial (see Annex 4 and Annex 5):

NPV=US\$ million; FRR = % (see Annex 4)

Financial analyses will be carried out as a part of the preparation of IWEMPs. These will evaluate the financial feasibility of different options. IWEMPs will also include financing plans that indicate the schedule and sources of financing for implementing the actions defined in the IWEMPs. The Project will provide only limited financing for IWEMP implementation during the second phase. Government and other resources will be required to implement these plans, and the Project counties and Tianjin have committed to work to line up these financing needs. The use of higher water charges in both irrigated agriculture and water supply and sanitation will also be an important sources of financing and financial sustainability. These aspects will be defined during the preparation of the IWEMPs.

Fiscal Impact:

3. Technical:

The Project would introduce a new practical approach to water savings in irrigated agriculture using remote sensing and ET management rather than only focusing on irrigation systems efficiency improvements, which has been the approach in China in the past. Improving irrigation system efficiencies does not necessarily save water and in fact can often increase the amount of consumptive use (ET) of irrigated agriculture by eliminating leakages which were returning to the surface or groundwater systems and utilizing that water for more crop production. "Real" water savings focuses on reduction in ET which can be accomplished through a combination of irrigation technology, agriculture and management measures. The objective is to reduce the ET at the county level to target levels and then maximize the production and value of production per unit of ET. There is a wide range of water productivities (Yield/ET) for each crop type depending on irrigation, agriculture and management practices. The Project will assist the counties in evaluating the range of water productivity's in the county for each crop type and to develop a plan that will assist the farmers in moving from lower to higher water productivity practices, always keeping the target ET for the county as the goal. Remote sensing combined with land use information and crop yields can be used to carry out this analysis for each parcel down to sizes of 30 by 30 m. The Project will provide strong technical support to the counties from the Hai Basin Commission and the Project KM Group to learn and implement this innovative practical approach.

River reach files and coding systems will be developed in a platform where both MWR and SEPA and the lower level water resources and environmental protection bureaus will be able to share data and utilize it in their water function zones and water environment function zones, respectively. This will greatly improve the ability of both entities to carry out their water and environment management functions. This will be an important break through in information sharing.

Comprehensive wastewater management involves the collection, treatment, and safe disposal of domestic and industrial wastewater. Coastal cities in Tianjin are under intense pressure to adhere to national policy and construct wastewater treatment plants, but they are facing a number of constraints. First, the combined drainage and wastewater networks are underdeveloped, and much of the wastewater is not collected. Second, many industries do not have pre-treatment and directly discharge toxic and hazardous wastewater, which degrades the collection network and disrupts treatment plants. Finally, most small cities do not have access to capital to investment in treatment plants and must enter into build-own-operate (BOT) contracts with companies, resulting in dramatic tariff increases. The Project will address all three issues by funding institutional and financial studies, technical assistance, and piloting a financing mechanism that provides incentives for small cities to develop comprehensive wastewater management programs.

The Dagu canal system in Tianjin is filled with approximately 2.2 million cubic meters of sediment, most of it contaminated according to Chinese environmental standards. Dredging, dewatering, treatment, and safe disposal of the contaminated sediment is a complex and highly technical task. The Dagu canal cleanup is

one of the largest and most ambitious sediment remediation project undertaken in China, and the experiences gained under the Project will be useful for addressing the hundreds of similar canals throughout the country. The Project will finance international technical assistance to help local engineers address complex technical and environmental issues.

4. Institutional:

During Project preparation and implementation, development and strengthening of institutional mechanisms for coordination and integration of activities, carried out by different bureaus (water, environmental protection, agriculture, construction, etc.) at the municipal and county levels, and by different ministries and provinces at the Hai Basin level, would be a key element. At the municipal and county levels establishing coordinating mechanisms is considered to be feasible with the strong support from the governments. At the Central level the Project Coordination Committee chaired by MOF will play an important role in the coordination and integration of activities both at the central and Hai Basin levels. Establishment of a high-level Hai Basin Committee with representation from the various ministries and provinces/municipalities would require high-level government commitment, and may not be feasible during the Project implementation period. Project management mechanisms including the Coordination Committee and the Steering committees established in MWR and SEPA should provide adequate institutional management support during Project implementation. One of the Strategic Studies will address institutional mechanisms at the Hai Basin level and make recommendations adopting new mechanisms that will ensure the adequate participation of the different ministries and provinces. The existing river basin commissions are essentially departments of the Ministry of Water Resources and lack the authority to coordinate and integrate water and environment management activities in the basins, and for this reason new institutional mechanisms are needed.

4.1 Executing agencies:

The executing agencies will be MWR and SEPA at the central level, and Beijing and Tianjin Municipalities and Hebei Province at the provincial level.

4.2 Project management:

A Project Coordinating Committee led by MOF and with participation from MWR, SEPA, Beijing, Hebei and Tianjin will be responsible for coordinating the smooth implementation of the Project. High-level Steering Committees headed by Vice Ministers and Project Management Offices in MWR and SEPA will be responsible for implementing their parts of the Project in coordination with each other, and with the Project provinces/municipalities, counties and sub-basin. Leading groups and Project Management Offices will be responsible for their parts of the Project in Tianjin, Beijing, Hebei, Hai Basin Commission, ZhangWeiNan and in each of the Beijing and Hebei pilot counties, all in coordination with each other, and with the central level PMOs. All of these entities have already been formally or informally established and where informal, will be formalized before grant agreement negotiations. All PMOs would have Joint Expert Groups to assist the PMOs in coordination, review, supervision and in some cases execution of technical activities under the Project. The Central PMOs would be supported by an international expert panel with broad experience in water quality and quantity management, water and environment planning and knowledge management. These project management arrangements are considered to be adequate.

4.3 Procurement issues:

Procurement under the Project is expected to be straightforward, as most of the procurement activities will involve hiring consultants; arrangements for training, seminars and study tours; and purchase of computer, office, and monitoring equipment. There will also be some small works that are yet to be defined. They will be defined during their first and second year of the Project when the demonstration projects and IWEMPs will be planned. These works would be in activities such as 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. Civil works procurement activities relative to the Tianjin Coastal Wastewater Management component will be carried out under TUDEP2. A procurement capacity assessment and action plan and a first year procurement plan have been prepared. The Procurement capacity assessment concludes that there is significant capacity available in the PMOs because of work on other Bank projects including particularly the WCP and TUDEP2. Some procurement training will be required. The MIS developed and functioning under the WCP will be adapted and utilized for the present Project.

4.4 Financial management issues:

Financial Management under the Project is expected to be straightforward. A Financial Management Assessment Report has been prepared. The Financial Management Assessment Report concludes that there is significant capacity available in the PMOs because of work on other Bank projects including particularly the WCP and TUDEP2. Some financial management training will be required. The MIS developed and functioning under the WCP will be adapted and utilized for the present Project.

5. Environmental: Environmental Category: C (Not Required)

5.1 Summarize the steps undertaken for environmental assessment and EMP preparation (including consultation and disclosure) and the significant issues and their treatment emerging from this analysis.

Specific actions to be included in the demonstration projects and IWEMPs will be defined during the first and second year of Project implementation. It is not possible at this time to specifically determine these actions will be, but their overall purpose will be to improve water and environment management in the counties where they will be implemented. The TORs for the IWEMPs and the demonstration projects will require that alternatives are evaluated in terms of economic, environmental and social considerations with extensive stakeholder participation. These activities will include some small civil works for actions such as 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. These actions will be very small with probable negligible environmental impact, normally costing less than \$50,000 per action. An Environmental Assessment (EA) has been prepared which includes an Environment Management Plan (EMP) that addresses steps that will be taken to ensure adequate environmental protection and mitigation measures are taken during the design and implementation of these works. The EA also includes a resettlement policy framework to address possible resettlement and land acquisition issues, although it is considered unlikely to occur. IWEM and demonstration projects will include involvement by existing political/administrative entities (townships, counties, prefectures, municipalities, provinces, ministries) including their respective technical/administrative bureaus (water, environmental protection, agriculture, construction, etc.), the entities with direct line responsibility for management. Participation of water users and polluters in water resources management is also important. Information management and sharing are needed aspects of water and environment management. During the initial phase of Project implementation, IWEMPs for about 10 counties, the Tianjin Municipality, and a key subbasin (ZhangWeiNan) will be prepared and demonstration projects will be designed in detail. These activities will include consultation with these stakeholders through surveys and working sessions to ensure their adequate involvement and input. The TORs for these IWEMPs and demonstration projects that are being prepared during Project preparation include requirements for consultation and participation. Implementation of the IWEMPs and demonstration projects will also require significant participation, which will be defined in the IWEMPs and design of the demonstration projects. The IWEMPs will be designed to take into account all the different water uses and the entire range of threats to water quality including point and diffuse pollution sources. No disbursements will be made under the Tianjin Coastal Wastewater Management - Small Cities Financial

Incentives Program until an Operational Manual has been prepared that is acceptable to the Bank, which will include environmental and resettlement criteria.

5.2 What are the main features of the EMP and are they adequate?

A brief EMP was prepared as a part of the EA. It summarizes how the Project will improve integrated water and environment management in the Hai Basin. The EMP also addresses how small civil works will be implemented in order to ensure environmental protection and mitigation of possible negative impacts. In general these impacts are considered to be small or non-existent.

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Because the Project is in fact a project to improve environmental management in the Hai Basin, the entire PIP for the Project could be considered to be an overall EMP. The IWEMPs that will be prepared during the initial phase of Project implementation will be similar to EMPs for water resources management for the counties, for Tianjin Municipality and for the ZhangWeiNan subbasin. The EMP for the TUDEP2 will cover activities related to the Tianjin Coastal Wastewater Management component.

5.3 For Category A and B projects, timeline and status of EA:

Date of receipt of final draft: 11/15/2003

5.4 How have stakeholders been consulted at the stage of (a) environmental screening and (b) draft EA report on the environmental impacts and proposed environment management plan? Describe mechanisms of consultation that were used and which groups were consulted?

During the preparation of the EA water users and other stakeholders were consulted through a survey carried out in the pilot and demonstration counties. TORs for the preparation of IWEMPs and demonstration projects are being prepared during Project preparation. These TORs include requirements for consultation and participation of water users and other stakeholders to ensure that relevant viewpoints are taken into account during the preparation of these activities during Project implementation. As a part of the social assessment process, 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, 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.

5.5 What mechanisms have been established to monitor and evaluate the impact of the project on the environment? Do the indicators reflect the objectives and results of the EMP?

The overall objective of the Project is to catalyze an integrated approach to water resource management and pollution control in the Hai River Basin. The extent to which the Project will achieve actual reductions in pollution and reductions in water consumption are dependent upon the details and time of the IWEMPs and demonstration projects that will be prepared and designed during the first years of Project implementation. Each IWEMP and demonstration project will include a monitoring and evaluation component that will specifically address the implementation and effectiveness of the IWEMPs and demonstration projects. The monitoring and evaluation plans for these activities will be prepared during the first phase of Project implementation and will identify monitoring sites, parameters and targets. IWEMPs and demonstration projects will include baseline surveys/inventories of surface and groundwater quantity and quality conditions, uses and trends and establish specific objectives, timelines and indicators for IWEMP and demonstration project implementation both during the life of the Hai Basin Project and beyond. The PIP for the Project will include a monitoring and evaluation plan which will monitor overall Project implementation in accordance with the PIP.

6. Social:

6.1 Summarize key social issues relevant to the project objectives, and specify the project's social development outcomes.

As mentioned earlier, water and environmental management requires the involvement of existing political/administrative entities and their respective technical/administrative bureaus, since these are the entities with direct line responsibility for management. Participation of water users and polluters in water resources management is also important. Information management and sharing are also needed aspects of water and environment management. During the initial phase of Project implementation IWEMPs for 10 counties (in Hebei and Beijing), the Tianjin Municipality and a key subbasin (ZhangWeiNan) and demonstration projects in Hebei, Beijing and ZhangWeiNan will be prepared. This will include consultation with water users, polluters and other stakeholders. These activities will take place through surveys and working sessions to ensure their adequate involvement and input. Implementation of the IWEMPs and demonstration projects will also require significant participation, which will be defined in the IWEMPs and demonstration projects designs.

The preparation of a Social Assessment (SA) is assisting the proposed Project to set up its social development and poverty alleviation objectives and incorporate them into the Project strategic objectives as a whole, that is, equitable allocation of water to industrial and agricultural uses in the urban and rural areas, and satisfaction of the needs for water quantity and quality by groups of people in various social strata with different economic incomes; as well as sustainable development of integrated water management systems in terms of legal, institutional, and local capacity building. Through the SA exercise, the Project is able to directly address the stakeholders and their needs and roles in Project activities, especially the primary stakeholder, local farmers, in their varied productive situations; and to grasp the complex social diversities and different gender roles in the Project context.

Participation of the Project beneficiaries and participatory capacity building of poor people would be important aspects in the Hai Basin Project. With detailed case studies and surveys in the typical project areas, studies as a part of the social assessment have helped to understand how the socio-economic, political, and institutional contexts influence the Project outcomes, and to detecting potential social risks or adverse impact the Project may bring about to local society.

6.2 Participatory Approach: How are key stakeholders participating in the project?

Preparation of IWEMPs, demonstration projects, KM systems and strategic studies will include consultation of stakeholders to ensure that relevant viewpoints are taken into consideration.

The IWEMPs and demonstration projects will include a significant amount of capacity building for farmers. The ET management, “real” water savings and groundwater management aspects will include comparisons of irrigation/agriculture/onfarm management practices by different farmers, and those with better practices will be held up as examples to those with poor practices. There will also be a considerable amount of awareness raising of farmers and other water users in regard to the sharing of limited water resources and the need to use them in a sustainable manner in terms of both quantity and quality.

6.3 How does the project involve consultations or collaboration with NGOs or other civil society organizations?

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.

6.4 What institutional arrangements have been provided to ensure the project achieves its social development outcomes?

The institutional mechanisms that will be designed and implemented at the county and municipal level will include mechanisms for ensuring the involvement of water users and other stakeholders in water and environment management activities. The demonstration project on water rights and well permits will include a pilot CDD component in order to introduce CDD concepts to ensure maximum ownership by the water users and the community in addressing and implementing the difficult choices necessary to achieve sustainable use of water resources. To the extent possible WUAs will be established to enhance farmer participation.

6.5 How will the project monitor performance in terms of social development outcomes?

The PIP will include a monitoring and evaluation plan which will include mechanisms for monitoring and measuring the performance of the Project in terms of social development outcomes.

7. Safeguard Policies:

7.1 Are any of the following safeguard policies triggered by the project?

Policy	Triggered
Environmental Assessment (OP 4.01, BP 4.01, GP 4.01)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Natural Habitats (OP 4.04, BP 4.04, GP 4.04)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Forestry (OP 4.36, GP 4.36)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Pest Management (OP 4.09)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Cultural Property (OPN 11.03)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Indigenous Peoples (OD 4.20)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Involuntary Resettlement (OP/BP 4.12)	<input checked="" type="radio"/> Yes <input type="radio"/> No
Safety of Dams (OP 4.37, BP 4.37)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in International Waters (OP 7.50, BP 7.50, GP 7.50)	<input type="radio"/> Yes <input checked="" type="radio"/> No
Projects in Disputed Areas (OP 7.60, BP 7.60, GP 7.60)*	<input type="radio"/> Yes <input checked="" type="radio"/> No

7.2 Describe provisions made by the project to ensure compliance with applicable safeguard policies.

Although the Project has been determined to be a Category C, because the small civil works would have very limited environmental impacts, an Environmental Assessment that includes an Environmental Management Plan and a Resettlement Policy Framework has been prepared, in order to ensure that any such impacts would be avoided, minimized or mitigated. No resettlement and land acquisition is anticipated under the Project. However, in case such resettlement would occur during Project implementation, the Resettlement Policy Framework would apply. The Project will provide technical assistance for activities related to the TUDEP2, such as Dagu Canal rehabilitation and Small Cities wastewater management. All environmental and resettlement requirements for these works will be covered under the Environmental Assessment, the Environmental Management Plan, the Resettlement Action Plan, and the Resettlement Policy Framework of TUDEP2. The Small Cities Financial Incentives Program under Component 3 - Tianjin Coastal Wastewater Management, will provide post-construction financial support to any eligible coastal small city in Tianjin that demonstrates reduction of pollution into the Bohai Sea, including those financed under TUDEP2. The Incentives Program will be carried out in accordance with an Operational Manual that is acceptable to the Bank and will define procedures and eligibility criteria, including environmental and resettlement aspects.

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 finds

of culturally significant sites during Project activities.

F. Sustainability and Risks

1. Sustainability:

Counties and municipalities participating in the Project will establish institutional mechanisms to coordinate across sectors to prepare and implement IWEMPs. Implementation of the IWEMPs will continue after Project completion and the IWEMPs will include financing plans for their implementation. Successful preparation and initial implementation of IWEMPs under the Project with sound institutional mechanisms will be a powerful incentive for sustainability and also for replicability in other counties and municipalities in the basin and throughout China. Successful implementation of KM systems including data sharing mechanisms and particularly the coding and river reach file systems under the Project will be adopted by MWR and SEPA and utilized throughout the basin and elsewhere in China. Having Government budgeting for Project activities including KM and ET management through counterpart funding will help to ensure their sustainable funding after Project completion.

Investments in wastewater treatment for secondary towns under the Project will be financed through a combination of self-financing, IBRD loans, and GEF grants (the terms and conditions of the GEF grant will be determined). Financial management and operational development plans are a condition for financing and will be monitored during Project implementation.

The Chinese government has provided assurances about the priority nature of this Project and their commitment to ensure adequate government support including financial resources for sustainability after the Project is completed of the successful Project actions.

1a. Replicability:

The Project is designed to be highly replicable. The development of demonstration projects and IWEMPs at the county level provides an excellent opportunity for replicability because first the water and environment issues in most of the Hai Basin counties are very similar to the Project pilot counties and second the governmental set up in all Chinese counties is highly uniform. Successful demonstration projects and IWEMPs will therefore be very replicable. The Chinese government has provided assurances that they will take full advantage of successful results of the Project and promote broad replication. The Project will include a good deal of interaction between the Project pilot counties in the form of study tours and workshops to the different Project counties so that they can learn from each other. Once successful experiences have been achieved other counties from the Hai Basin and from elsewhere in China will be invited to visit and to learn. At the Basin level the experiences learned will be highly replicable to other China basins (such as the Liao) with similar water scarcity and water pollution issues. In addition the practical integrated water and environment approaches implemented in the Project address problems of water scarcity and pollution that are common in many parts of the world. Therefore the potential for replicability is very large.

2. Critical Risks (reflecting the failure of critical assumptions found in the fourth column of Annex 1):

Risk	Risk Rating	Risk Mitigation Measure
From Outputs to Objective Bottom-up water resources management at the county and municipal level will not be replicable and won't contribute to IWEM at the basin level. An improved policy environment at the central level will not contribute to improved IWEM and planning. Improvements in KM and ET management will not contribute to better IWEM. Wastewater Treatment Plants will not operate as planned.	M S M M	The Chinese Government is committed to strongly support replication of successful IWEMP. The Project is designed to plan and implement Project activities at grass roots level in accordance with policies and improved policies. The KM and ET management subcomponents have been designed to provide direct service to IWEM at the county, municipal and sub-basin levels. Project will include technical assistance to ensure that adequate financial and operational aspects are addressed during the planning phase.
From Components to Outputs Counterpart funding will not be adequate and not available on time. County and municipal governments don't support IWEMPs and their implementation, as well as new institutional coordinating mechanisms. Hai Basin Commission does not exercise strong ownership in KM design and improvements and does not provide necessary support to other components. Political will is inadequate to support program of Integrated Wastewater Management Measures. Project management is not adequate and there is no cooperation between the various agencies.	M S S S S	Assurance will be sought prior negotiation, so that counterpart funding is adequate and available on time. Assurance will be sought prior negotiation, so that support for the Project and new coordinating mechanisms, from all levels of local Governments, is obtained. Assurance will be sought prior negotiation, so that the Hai Basin Commission would provide strong support to Project activities and exercises strong ownership in KM design. Initial steps in the Tianjin small cities and the Dagou Canal rehabilitation support that are undertaken under the TUDEP2 will demonstrate commitment. Assurance will be sought prior negotiation, so that the cooperation between agencies is optimal; Project preparation is carried out with various agencies and joint management, working, and implementation groups are established.
Overall Risk Rating	S	

Risk Rating - H (High Risk), S (Substantial Risk), M (Modest Risk), N (Negligible or Low Risk)

3. Possible Controversial Aspects:

G. Main Conditions

1. Effectiveness Condition

(1) Standard Covenants.

2. Other [classify according to covenant types used in the Legal Agreements.]

Legal Covenants

(1) Standard Covenants.

(2) Project Management Organizations. Maintain throughout the period of Project implementation organizations with composition and staffing acceptable to the Bank, including: (a) Central Level: the Project Coordinating Committee led by MOF, and the Project Steering Committees and PMOs in MWR and SEPA; (b) River Basin Level: the PMO in Hai Basin Commission, the Leading Group led by SEPA and Joint PMO for Zhangweinan sub-basin; (c) Provincial Level: a Coordination Group lead by the Finance Bureau, Joint PMO of WRB and EPB in Hebei Province and Beijing Municipality respectively; a Coordination Group lead by the Finance Bureau, PMO in Tianjin Construction Commission and Joint PMO of WRB and EPB in Tianjin; and (d) County Level: a Coordination Group lead by the Finance Bureau, the Joint PMO of WRB and EPB in Counties namely Chengan, Guantao, Feixiang, Linzhang and Shexian respectively in Hebei Province; a Coordination Group lead by the Finance Bureau, Joint PMO of WRB and EPB in Counties or Districts namely Tongzhou, Daxin, Fangshan, Miyun and Pinggu respectively in Beijing Municipality; a Coordination Group lead by the Finance Bureau, PMO in Lucheng County of Shanxi Province, in Xinxiang County of Henan Province; and in Dezhou City of Shandong Province.

(3) Cooperation between Water Department and Environment Department. MWR, SEPA, Beijing and Tianjin municipal governments and Hebei provincial government, under coordination of MOF, shall ensure, through the institutional cooperative mechanisms established under the Project, the close cooperation between water department and environment department at central level, river basin level, provincial level and county level for Project management and implementation, especially during the process of integrated water and environment management planning and implementation. The mechanisms and management structure developed and tested under this Project shall be promoted gradually through MWR and SEPA in the non-Project areas of Hai Basin during Project implementation and after Project completion.

(4) Joint Expert Groups. Maintain throughout the period of Project implementation, the Joint Expert Groups at central, river basin, provincial and county levels for providing technical assistance to the PMOs at various levels as above-mentioned, with composition and staffing acceptable to the Bank. The Joint Expert Group at Central Level shall carry out internal supervision mission at field level twice a year and prepare independent technical report with recommendations to the Bank supervision mission and various PMOs at all levels.

(5) Project Workshops. The Central PMO of MWR and of SEPA, under the leadership of Steering Committees of MWR and of SEPA and coordination of the Project Coordination Committee led by MOF in cooperation with all the PMOs at various levels, shall take primary responsibility for maximum incorporation of horizontal and vertical integration into the Project activities by maintaining constant communications and organizing workshops at least twice a year throughout the period of Project

implementation. Horizontal integration includes cross-sectoral cooperation and coordination of actions between water resources and environmental protection ministries/bureaus, as well as others including agriculture and construction ministries/bureaus. Vertical integration includes direct linking and constant interaction between the Central and Hai Basin component activities and the Zhangweinan sub-basin, Tianjin municipality and Beijing/Hebei counties components.

(6) **Sustainability of Remote Sensing-Based ET Technology Application.** A RS-ET Specialist Group, consisting of at least three specialists, shall be established officially within the Information Center of the Hai Basin Commission to be responsible for application of RS-based ET Management technology in Hai Basin. The Hai Basin Commission shall approve the necessary staff quota for the three specialists with qualification and TOR acceptable to the Bank.

(7) **Annual Plans.** Annual Project implementation plans shall be prepared and approved by the Bank prior to January first of each year during Project implementation. The plan shall be prepared by the PMOs of Hai Basin Commission, Zhangweinan Sub-basin, Hebei, Beijing and Tianjin respectively and consolidated by MWR and SEPA PMOs at Central level. In addition to the annual plans prepared for the entire Project, specific annual plans should be prepared in detail for the demonstration projects that would be reviewed and approved by the Bank prior to January first of each year.

(8) **Management Information System.** Maintain throughout the period of Project implementation the MIS installed and operated within all the PMOs to facilitate Project management and implementation, and monitoring and evaluation.

(9) **Project Progress Report.** The semi-annual Project progress report shall be prepared attached with the MIS tables by the PMOs of Hai Basin Commission, Zhangweinan Sub-basin, Hebei, Beijing and Tianjin respectively and consolidated by MWR and SEPA PMOs at Central level, and submitted to the Bank supervision mission for review.

(10) **Training and Study Tours.** Domestic and overseas training and study tours shall be carried out under their respective part of the Project in accordance with the Chapter of PIP for training and study tours. The plans for each overseas study tour shall be submitted to the Bank for its review and approval.

(11) **Monitoring and Evaluation.** Monitor and evaluate Project implementation on an ongoing basis facilitated by MIS, in accordance with key indicators in Annex 1 and in Chapter 5 and Annex 8 of PIP. The M&E report shall be prepared annually by the PMOs of Hai Basin Commission, Zhangweinan Sub-basin, Hebei, Beijing and Tianjin respectively and consolidated by MWR and SEPA PMOs at Central level. In addition, a thematic M&E report shall be prepared in detail for each of the demonstration projects. The annual M&E reports and thematic M&E reports, which incorporate the collected data and criteria, and analyzed and evaluated results of Project implementation, shall be completed by June 30 of the next year and submitted to the Bank for review.

(12) **Water User Association Development.** During the period of Project implementation, WUAs shall be planned and established gradually to cover all the irrigated agricultural areas of all the Project counties or districts in Beijing and Tianjin municipalities and Hebei province in order for the WUAs to participate in the whole planning and implementing process of the integrated water and environment management. Before effectiveness of the Project, at least one WUA shall be officially established in each of the townships in all the Project counties or districts in Beijing and Tianjin municipalities and Hebei province.

(13) **Community Driven Development.** Guantao and Chengan county governments of Hebei province shall strongly support the bottom-up approach to the demonstration programs for groundwater and water-right management by providing counterpart funding and making institutional arrangements for community driven development in the demonstration pilot sites of the two counties. Beijing municipal and Hebei provincial governments, learning from the demonstration program, shall promote CDD approach to all the other irrigated agricultural areas of all the Project counties or districts in Beijing and Hebei.

(14) **Counterpart Funding.** MWR, SEPA, Beijing and Tianjin municipal Governments and Hebei provincial government shall ensure availability of the counterpart funding in a timely manner during Project implementation as planned in the Project costab attached to PIP during the Project implementing period.

(15) **EMMP.** MWR, SEPA, Beijing and Tianjin municipalities and Hebei province shall: (a) ensure that all activities under its respective part of the Project shall conform to environmental standards and guidelines satisfactory to the Bank, including the environmental regulations and guidelines issued by the SEPA of PRC and said Project province or municipality's Environmental Protection Bureau; and (b) to that end, implement the part of the Environmental Mitigation and Monitoring Plan applicable to its respective part of the Project, in a manner satisfactory to the Bank;

(16) **Replicability of Project Approaches.** MWR, SEPA, Beijing and Tianjin municipal governments and Hebei provincial government shall replicate the following approaches and concepts developed and implemented under the Project into other areas of Hai Basin during Project implementation and after Project completion: (a) integrated bottom-up and top-down approach for water and environment management planning supported by KM; (b) concept of ET management for sustainable planning and use of water resources; (c) concept of real water savings (reduction of ET) for irrigated agricultural water savings in resources water shortage areas; (d) application of RS-based ET technology in River Basin Planning and Management; (e) application of RS-based ET Technology in Irrigated Agricultural Water Savings; (f) integrated planning for both water quality and quantity control; (g) approaches for non-point source pollution control; (h) ET based groundwater management with linkage between withdraw permits and groundwater availability; (i) Monitoring and Evaluation of activities; and (j) application of MIS in Project management and implementation.

(17) **Stakeholder Involvement.** MWR, SEPA, Beijing and Tianjin municipal governments and Hebei provincial government shall organize and mobilize the stakeholder involvement in the whole process of the integrated bottom-up and top-down water and environment management planning and implementation through various workshops, training, public consultation, WUAs and CDD approaches during Project implementation.

(18) **Cooperation with other Programs.** MOF, SEPA and MWR shall strengthen cooperation between this Project and PEMSEA Bohai Sea Management Project administered by State Oceanic Administration, Yellow Sea Large Marine Ecosystem by UNDP, and have meetings and exchanging results and views with the PMO for PEMSEA Bohai Sea Management Project and Yellow Sea Large Marine Ecosystem Project as well as with ongoing SEPA and MWR related programs such as the Bohai Blue Sea Action Plan, the Water Pollution Prevention Program for the Hai River Basin and the South North Transfer Programs.

H. Readiness for Implementation

- ☐ 1. a) The engineering design documents for the first year's activities are complete and ready for the start of project implementation.
- ☐ 1. b) Not applicable.

- ☐ 2. The procurement documents for the first year's activities are complete and ready for the start of project implementation.
- ☐ 3. The Project Implementation Plan has been appraised and found to be realistic and of satisfactory quality.
- ☐ 4. The following items are lacking and are discussed under loan conditions (Section G):

I. Compliance with Bank Policies

- ☐ 1. This project complies with all applicable Bank policies.
- ☐ 2. The following exceptions to Bank policies are recommended for approval. The project complies with all other applicable Bank policies.

Douglas C. Olson
Team Leader

Mark D. Wilson
Sector Manager/Director

Yukon Huang
Country Manager/Director

Annex 1: Project Design Summary

CHINA: Hai Basin Integrated Water and Environment Management Project

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Sector-related CAS Goal: Sustainable development and management of water and other natural resources	Sector Indicators: 	Sector/ country reports: 	(from Goal to Bank Mission) Sustainable management will reduce poverty
GEF Operational Program: Improve integrated water and environmental management in terms of water quantity and water quality in the Hai Basin and reduce land-based sources of pollution to the coastal and marine environment of the Bohai Sea	Outcome / Impact Indicators: <ul style="list-style-type: none"> ● Decrease water pollution in pilot counties ● Reduce Groundwater overdraft in pilot counties ● Reduced pollution loading to the Bohai Sea from coastal counties 	<ul style="list-style-type: none"> ● Annual monitoring and evaluation reports 	Improvements in water and environmental planning and management will result in sustainable management of water resources
Global Objective: Catalyze a more integrated approach to water resources management and pollution control in the Hai Basin in order to improve the Bohai Sea environment	Outcome / Impact Indicators: <ul style="list-style-type: none"> ● Improved cooperation and integration of WRM and pollution control activities at the county level with support from upper levels (prefectures, provinces, HRBC, ZhangWeiNan, MWR and SEPA) ● Adoption of improved WRM and pollution control approaches at the county level with support from upper levels (prefectures, provinces, HRBC, ZhangWeiNan, MWR and SEPA) including ET management, river reach data sharing, KM applications, water rights and discharge control administrative systems, real water savings, pollution reduction ● Improved small city wastewater management and discharge canal cleanup activities 	<ul style="list-style-type: none"> ● Annual monitoring and evaluation reports 	(from Objective to Goal) Improvements in water and environmental planning and management will result in sustainable management of water resources

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Output from each Component: 1. Integrated Water and Environment Management (IWEM) <ul style="list-style-type: none"> ● IWEMPs for 10 counties and the Tianjin Municipality ● Improved institutional coordinating mechanisms for IWEM created ● Strategic studies conducted: <ol style="list-style-type: none"> 1. Policy and legal framework and institutional arrangements; 2. Bohai Sea Linkage; 3. Countermeasures for the Protection and Measurement of the Water Ecological System 4. Water Savings 5. Water Rights and Well Permits, and Sustainable Groundwater exploitation; 6. Wastewater Reuse 7. Water Pollution and planning. ● SAP for Hai Basin and for ZhangWeiNan subbasin ● Demonstration Projects carried out: <ol style="list-style-type: none"> 1. Real Water Savings 2. Management of Water Rights and Well Permits 3. Control of Wastewater Discharge 4. Pollution Control and Water Environmental Improvements ● Policies, mechanisms and instruments 2. Knowledge Management <ul style="list-style-type: none"> ● Development Integrated Water Resource – Water 	Output Indicators: <ul style="list-style-type: none"> ● Prepared and initial implementation has started ● Established and functional ● Prepared and findings integrated into IWEMPs ● Prepared, distributed and initial implementation has started ● Prepared and findings integrated into IWEMPs ● Defined and implemented ● Created and implemented 	Project reports: <ul style="list-style-type: none"> ● Semi-annual reports on physical and financial progress ● Annual monitoring and evaluation reports ● Bank/GEF supervision mission reports ● Semi-annual reports on physical and financial 	(from Outputs to Objective) <ul style="list-style-type: none"> ● Bottom-up water resources management at the county, subbasin and municipal level will be replicable and contribute to IWEM at the basin level ● An improved policy environment at the central level will contribute to improved IWEM and planning ● Improvements in KM and ET management will

<p>Quality Information Management System</p> <ul style="list-style-type: none"> ● Development Application Systems for the former ● Develop a functional ET Management System ● Create Mechanisms for the Continuation of Systems after the Projects finalization 	<ul style="list-style-type: none"> ● Established and functional ● Established, tested and functional ● Working Groups in existing agencies have been trained and use technology 	<p>progress</p> <ul style="list-style-type: none"> ● Annual monitoring and evaluation reports ● Bank/GEF supervision mission reports 	<p>contribute to improved IWEM</p>
<p>3. Tianjin Coastal Wastewater Management</p> <ul style="list-style-type: none"> ● Provide TA for the Renovation and Remediation of the Dagou Canal ● Dagou Catchment Industrial Pollution Control ● Binhai Wastewater Management Study ● Small Cities Financial Incentives 	<ul style="list-style-type: none"> ● Provided and carried out ● Carried out and integrated into IWEMP ● Carried out and integrated into IWEMP ● Incentive mechanism tested 	<ul style="list-style-type: none"> ● Semi-annual reports on physical and financial progress ● Annual monitoring and evaluation reports ● Bank/GEF supervision mission reports 	<ul style="list-style-type: none"> ● Wastewater Treatment Plants will operate as planned
<p>4. Project Management and Training</p> <ul style="list-style-type: none"> ● Joint Expert Groups ● Conduct Training, Workshops and Study Tours ● Monitoring and Evaluation, specifically of IWEMPs and Demonstration Projects 	<ul style="list-style-type: none"> ● Set up and functional ● Carried out ● Adequate System in Place 	<ul style="list-style-type: none"> ● Semi-annual reports on physical and financial progress ● Annual monitoring and evaluation reports ● Bank/GEF supervision mission reports 	<ul style="list-style-type: none"> ● An improved policy environment at the central level will contribute to improved IWEM ● Project management setup can guide water and environmental planning and management in the Basin

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Project Components / Sub-components:	Inputs: (budget for each component)	Project reports:	(from Components to Outputs)
1. Integrated Water and Environment Management (IWEM)	<ul style="list-style-type: none"> Support formulation of County Integrated Water and Environmental Plans (IWEMPs) Support preparation of pre-investment studies and implementation of some planned actions Support establishment of institutional coordinating mechanisms for IWEM Support formulation of SAP for ZhangWeiNan subbasin Support formulation of SAP for Tianjin Municipality (Total budget: US\$14.3 million) 	<ul style="list-style-type: none"> Semi-annual reports on physical and financial progress Annual monitoring and evaluation reports 	<ul style="list-style-type: none"> Counterpart funding will be adequate and on time County and municipal governments strongly support IWEMPs and their implementation as well as new institutional coordinating mechanisms
2. Knowledge Management	<ul style="list-style-type: none"> Support strategic planning and technical investigations at the basin level through improved data collections, GIS, river reach data systems, river basin models, ET management and other KM applications Support formulation of County IWEMPs through improved data collections, GIS, river reach data systems, models, ET management, and other KM applications (Total budget: US\$6.51 million) 	<ul style="list-style-type: none"> Semi-annual reports on physical and financial progress Annual monitoring and evaluation reports 	<ul style="list-style-type: none"> Hai Basin Commission will exercise strong ownership in knowledge management design and improvements and provide necessary support to other components
3. Tianjin Coastal Wastewater Management	<ul style="list-style-type: none"> Support establishment of institutional coordinating mechanisms for IWEM (Construction Commission, Environmental Protection Bureau, Water Bureau) Support formulation of a Municipal IWEMP Support preparation of pre-investment studies and implementation of some planned actions 	<ul style="list-style-type: none"> Semi-annual reports on physical and financial progress Annual monitoring and evaluation reports 	<ul style="list-style-type: none"> Political will exists to support program of Integrated Wastewater Management Measures

4. Project Management and Training	<ul style="list-style-type: none"> ● Support the rehabilitation of the Dagu Canal Support small city wastewater management (Total budget: US\$103 million) ● Support the development of policy, legal and administrative mechanisms and instruments for improving IWEM ● Support Project Management, Monitoring and Evaluation ● Provide Training (Total budget: US\$6.18 million) 	<ul style="list-style-type: none"> ● Semi-annual reports on physical and financial progress ● Annual monitoring and evaluation reports 	<ul style="list-style-type: none"> ● Project management at all levels will be adequate and involve good cooperation between the various agencies
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Annex 2: Detailed Project Description

CHINA: Hai Basin Integrated Water and Environment Management Project

The Project has the goal of achieving real improvements and important progress in Integrated Water and Environment Management (IWEM) in the Hai Basin, and achieving real reductions in pollution to the Bo Hai Sea. In addition the Project has the objective of contributing to the reversal of existing trends in deteriorating water quality and worsening overexploitation of surface and groundwater resources. The Project would be implemented in two phases. The two phased approach will permit (i) a process of good planning, followed by (ii) specific actions to affect real change (see Annex 4). Parallel demonstration projects will test and demonstrate high priority actions that are clearly needed throughout the basin. The key aspect of the GEF Hai Basin Project is that it will have maximum incorporation of horizontal and vertical integration. Horizontal integration includes cross-sectoral cooperation and coordination of actions between water resources and environmental protection ministries/bureaus, as well as others including agriculture and construction ministries/bureaus. Vertical integration includes direct linking and constant interaction between the Central and Hai Basin component activities and the ZhangWeiNan subbasin, Tainjin municipality, and Beijing/Hebei counties components.

The Project (estimated total cost: US\$ 31,741,800) would be divided into 4 interrelated components: (a) Integrated Water and Environment Management; (b) Knowledge Management; (c) Tianjin Coastal Wastewater Management; and (d) Project Management, Monitoring and Evaluation, and Training. Main products would include: (i) Seven strategic study reports (two reports at national level, five reports at Hai Basin level); (ii) Integrated Water and Environment Management Plans (IWEMP) for five key counties in Beijing, five key counties in Hebei Province, and Tianjin Municipality; (iii) Strategic Action Plans (SAP) on IWEM for the Hai Basin and the ZhangWeiNan sub-Basin; (iv) Four demonstration projects; (v) A Knowledge Management (KM) system based on sharing between water conservancy institutions and environmental protection institutions and a Evapotranspiration (ET) management system based on satellite Remote Sensing technologies; and (vi) The promotion and technical support of wastewater treatment in small cities/towns in the coastal areas of Tianjin municipality, and technical support for the clean up of the Dagu Wastewater Canal in cooperation with the Tianjin Urban Environment Development Project (TUDEP2) Project.

By Component:

Project Component 1: Integrated Water and Environment Management - US\$14.30 million

The IWEM is divided into 3 subcomponents: (a) Strategic Studies (SS) at the central and Hai Basin levels; (b) Integrated Water and Environment Management (IWEM); and (c) Demonstration Projects. As can be seen in Figure 1, all three of these subcomponents are very closely interrelated. The SS will support and provide guidance to IWEM planning and to the demonstration projects. The demonstration projects will provide important practical input into the IWEM planning. There will be constant interaction between these subcomponents to ensure integration. There will also be an important link, with continuous feedback and information updating, to the Knowledge Management (KM) component of the Project.

Subcomponent 1A - Strategic Studies (SS)

Policy and Legal Framework and Institutional Arrangement (SS 1): The evolution of the legal and policy environment in China has been very rapid, however it still tends to reflect a command and control, top-down approach to social, economic, and environmental development. In the water sector, this has created severe institutional problems due to ambiguities in the law, and lack of effective coordination mechanisms. For water resource management and water pollution control, the legal, policy and institutional framework has created particularly serious coordination problems with the result that there is duplication

and competition between the Ministry of Water Resources (MWR) and the State Environmental Protection Administration (SEPA) in many areas of water management. These problems are reflected down to the local level. In particular, the fact that river basin organizations are part of MWR, and that SEPA has no presence at the basin level, makes IWEM especially difficult. The SS will examine the legal, policy and institutional framework within the context of the Hai River basin with the purpose of identifying barriers that can be overcome by practical measures that will achieve a level of coordination between the two ministries to allow and support IWEM both at the basin and local levels. The study will further elaborate upon how institutions must respond and possibly modify themselves through stronger cooperation – and in certain cases integration – in order to meet the challenges driven forward by technical, economic, and financial innovations in the field of both water resource management and water pollution control. There is a desire on the part of MWR and SEPA to achieve the practical benefits of improved institutional coordination, but without sacrificing the authorities provided to each ministry in the Water Law and the Water Pollution Prevention and Control Law, and their respective Implementing Rules. This study will provide the context within law and policy for practical approaches to operational coordination between the two ministries, and the GEF Project as a whole will catalyze the entire integration process.

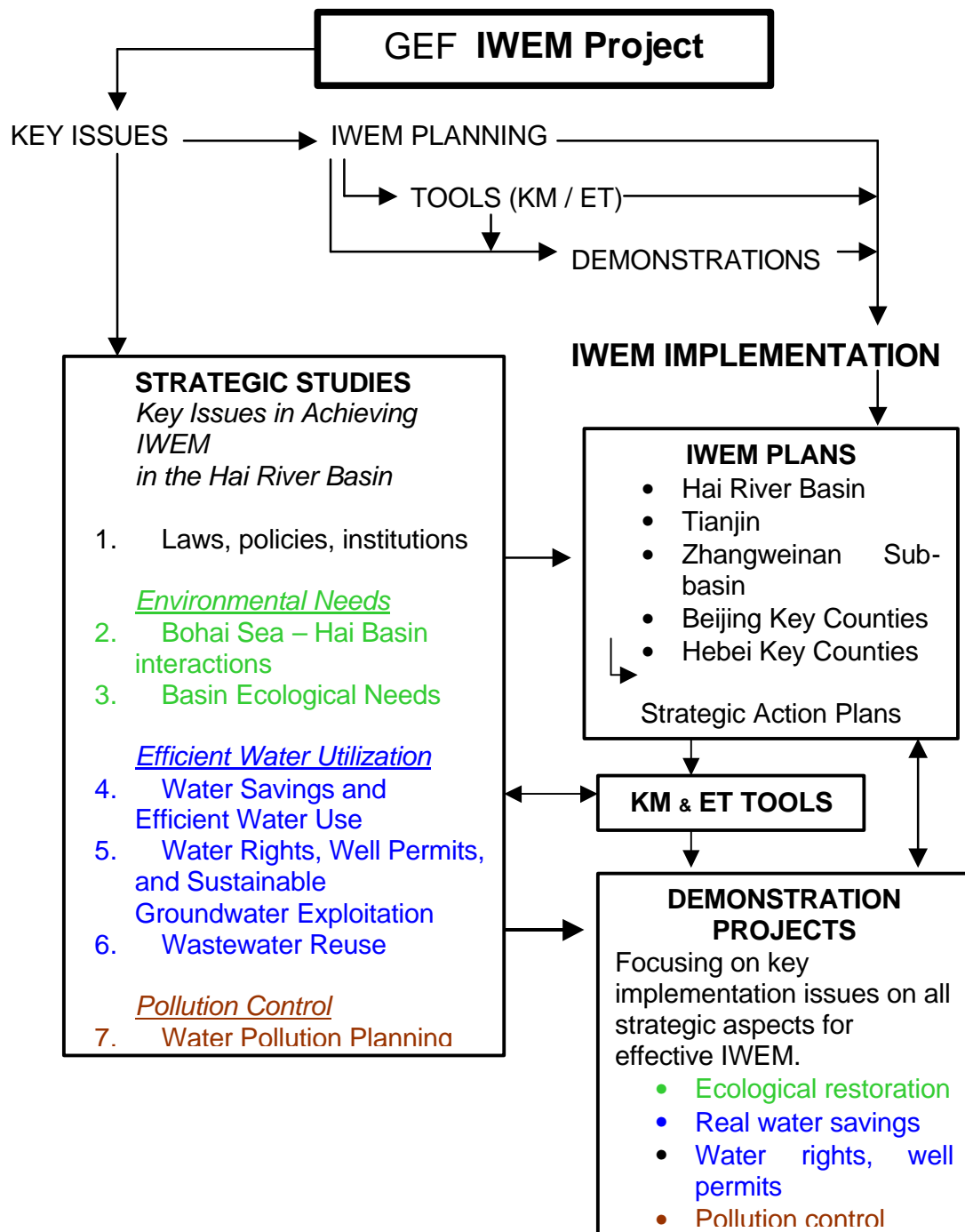


Figure 1: Project Integrated Water and Environment Management (IWEM) Logic and Linkages

Bohai Sea Linkage (SS 2): The main objective is to provide the linkage between environmental condition of the Bohai Sea and of Bohai Bay which receives the runoff from the Hai River basin. The main issues to be researched are: (i) to identify and assess regulations and laws on environmental quality of the Bohai Sea that have implications for land-based actions that may be included in the Hai River basin SAP; (ii) to assess pollutant load reductions and water volume increases from the Hai River basin that will have meaningful consequences for the Bohai Sea and Bohai Bay; (iii) to recommend spatial and temporal pollutant control actions that will maximize beneficial effects on the Bohai Sea; and (iv) to provide guidance to the development of the Hai River SAP that will reflect the actions that will be required to maximize ecological benefits in the receiving marine environment. The SS would also create the linkages with other institutions and programs in the Bohai Sea such as the Bohai Sea Environmental Management Project that is sponsored under the PEMSEA program of the GEF, and the United Nations Programme of Action for Protection of the Marine Environment from Land-Based Activities. The objective is to maximize the benefit of these studies for the purpose of the SAP, and to provide input into ongoing research and management programs focusing on the marine environment.

Countermeasures for the Protection and Measurement of the Water Ecological System (SS 3): The natural aquatic environment, including wetlands, has been all but destroyed in the Hai River due to the high levels of pollution and reduction of flow volumes in all rivers that has dried out most wetlands. An integral part of the IWEMP process is to factor into the planning process the minimum flows, the scheduling of these flow, and water quality requirements that are needed to maintain the environmental functions of important wetlands. The study will capture the existing information base for important wetlands and river courses in the basin and, including coastal wetlands as a basis for making decisions on priorities for the balance of the study. In addition to technical and financial considerations, socio-economic implications will also be assessed. Important outputs will be to: (i) assess the nature of ecological functions in order to develop priorities for follow-up actions, (ii) examine the technical options and feasibility for ecological maintenance and their costs, and (iii) determine minimum flows and their scheduling to maintain ecological functions. A conservation plan will be proposed for inclusion in the Hai Basin IWEMP and implementation plans will be developed for several key areas. The study of coastal wetlands will be a key linkage to the Bohai Sea insofar as water volume enhancement targets have not been established for the Bohai Sea under any of the national or international Bohai Sea programs. Therefore, as a first approximation, flow required to maintain coastal wetlands will provide guidance to drafters of the basin IWEMP on flow adjustment requirements that will also have beneficial effects on Bohai Bay.

Water Savings and High Efficiency Water Utilization in the Hai Basin (SS 4): The aim is to change the water balance in the Hai Basin into a water balance that supports a sustainable river-aquifer system. Present amounts of ET in the basin far exceed this sustainable balance resulting in groundwater overdraft and inadequate environmental flows. Thus the overall goal is to reduce ET to levels that will achieve a sustainable water balance. With the objective of achieving this water balance an target ET annual quota amount will be assigned to each county in the basin. This SS will help the counties in achieving their ET reductions. The likely attainable ET reductions for each land use class will be assessed. Some limited field experiments will be carried out, to verify the expected results, before they will be applied in the Demonstration Projects and IWEMPs. The Project will also inventory Chinese and international success stories in reducing ET. Groundwater table declinations will also be investigated. Groundwater and ET are coupled through percolation processes and groundwater extractions. Analytical relationships between rainfall, groundwater irrigation, and ET will be worked out to better understand at which threshold levels of irrigation, ET will actually start to diminish. At the same time, the impact on crop yield will be paid attention to, because the Project aims to enhance rather to negatively impact farmers incomes.

Administration of Water Rights and Well Permits, and Sustainable Groundwater Exploitation in the Hai Basin (SS 5): This study will analyze the reasons why existing water rights and well permit systems have not been effective in controlling the use of water to sustainable levels and how this has resulted in groundwater overdraft. The study will evaluate laws, regulations and processes and make recommendations on how they can be directly linked to the control and management of water resource use to sustainable levels. This will include a detailed analysis of measuring and monitoring requirements. The study will also analyze how to improve the knowledge base of the groundwater system of the Hai Basin. Relevant data is scattered among various institutes. The aim is therefore to describe the groundwater behavior of the entire Hai Basin using as much as possible field and satellite data that becomes available during the execution of the Project. A good understanding of the exchange processes between the saturated and unsaturated zone is of importance to make groundwater use quantitative. Currently, the extractions are only marginally known, because there is no control on the volume individual farmers pump out from the aquifers. The Project intends to compute the Net Groundwater Use from a novel combination of precipitation and ET data. Net Groundwater Use is basically the sink from the groundwater system, which together with the fluctuations of the hydraulic head will yield to first order assessments of lateral groundwater movements across the basin (i.e. simple GIS based groundwater model).

The Hai Basin Wastewater Reuse (SS 6): The main objectives are to provide recommendations on wastewater treatment (in order to increase suitability for various uses) and prepare strategic level wastewater reuse plans in 8 cities (Beijing, Tianjin, Shijiazhuang, Baoding, Tangshan, Datong, Xinxiang and Dezhou city). Specific attention will be paid to: (i) investigate current water pollution sources; (ii) demand and supply aspects of renovated water; (iii) analysis of plans for sewerage treatment; (iv) sewerage water renovation and use; and (v) analysis of the benefits of sewerage renovation and utilization including mechanisms for encouraging wastewater reuse. In addition the Project would promote wastewater utilization technologies and experiences across the Hai Basin beyond the 8 specified cities.

Water Pollution Planning and Management (SS 7): One of the significant failures of the 8th and 9th Five Year Plans has been the inability to reduce pollution levels in most rivers in China, particularly ambient water quality. During this 10 year period in the Hai River basin, the water quality has been declining to the point where most of the surface water is now Class V+ (worst water quality without any functional use). This failure is due to a variety of reasons, including the planning framework, lack of investment, inadequate management tools, and by the poor coordination between MWR and SEPA in both planning and operations. The recent announcement of the intention to implement the Eastern Route of the South to North Water transfer scheme, which will flow through the lower and most polluted part of the Hai River basin, has direct implications for both ministries because failure will compromise this enormous investment. This study will examine the reasons for past failures and, using this as a basis for taking corrective actions, to develop a detailed, realistic, and implementable plan for basin-wide pollution control. In addition to institutional coordination issues, the study will develop pollution load reduction targets through a total load control process that has not yet been widely adopted in China. The study will evaluate the types of management tools that are required to more effectively manage the day-to-day operations of pollution control such as discharge permitting and tracking systems. A review and evaluation of wider application of policy instruments for water pollution control will be made, including economic instruments such as permit trading. Problems of enforcement of discharge regulations is a major problem in China for political and economic reasons, and will be examined to determine what measures can be implemented to ensure compliance of industry to their permitted discharge, and to ensure accountability of local EPBs in enforcing the law. As an integrated part of the pollution control study, reviews and discussions of options will be made on how pollution control and cleaner production could be further enhanced within the framework of an industrial adjustment policy for the Hai Basin. The output of these activities will be a basin-wide action plan for pollution control, with realistic targets, development and application of management tools,

assessment of economic options and incentives, capacity development, linkages to industrial adjustment programs, and operational issues involving coordination between the two ministries. More particularly, plans will be developed for key areas and for protection of the Bohai Sea.

Subcomponent 1B - Integrated Water and Environment Management Planning (IWEMP)

IWEMPs are one of the primary vehicles for achieving real on-ground change in this Project. As such they are principal clients for the results of the Basin wide SS, KM, remote sensing of ET, and demonstration sub-projects (see Figure 1). The Plans would address the endemic problems of water use exceeding sustainable levels of groundwater and surface water supply, as well as improving the water quality situation where much of the surface water exceeds level 5 (the worst) quality standard. Interactions between water quality and quantity will also be addressed so that the optimal integrated Plan is produced. The primary objectives of these Plans is to improve the capacity of management entities to carry out IWEM and to achieve specific and sustainable improvements in water and environmental outcomes.

IWEMPs would be developed in a two Phase approach during this Project. Phase one, during the first two years, will involve Plan preparation. The second Phase will involve initial IWEMP implementation during years 3-5 (Annex 4). IWEMPs would be developed in five counties in both Beijing and five counties in Hebei Province, and an overall IWEMP is to be developed for the Tianjin Municipality which will include four, more detailed County/District level Plans. The Tianjin component would also include special studies dealing with water quantity, water quality, rural and urban non point source pollution, aquatic ecology, agricultural reuse and groundwater management.

Strategic Action Plans (SAP) will be prepared for the Hai Basin and Zhangweinan sub-basin. The scope of SAPs is less comprehensive than the IWEMP, and focuses more on specific issues. For example, the Zhangweinan SAP will focus primarily on water pollution control. The Hai Basin SAP will be formulated near the end of the Project, consolidate the lessons learned under the Project, and provide guidance for the next steps in Hai Basin water and environment management. All IWEMPs and SAPs will provide a plan of action which will guide government investment well beyond the five year term of the Project and into the next 10-15 years.

The Plans will: (i) identify actions aiming to balance water consumption as measured by ET; (ii) to reduce water pollution to levels more consistent with the assimilative capacity of river function zones; (iii) to improve institutional arrangements by integrating management responsibilities horizontally (between agencies at the same level of government) as well as vertically (between the different levels of government and stakeholders); and (iv) to establish improved water management arrangements locally, including Water User Associations water permits, and volumetric based water pricing.

In the second phase of the Project, initial priority actions defined in the first phase would be implemented, which would include activities such as preparation of feasibility studies and designs, training an capacity building, and implementation of 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.

The subcomponent would facilitate the establishment of institutional coordinating mechanisms for IWEM in the Beijing and Hebei pilot counties and in Tianjin. The intention is to help to improve, develop, and implement a set of policies, and legal, administrative and institutional instruments at the county and municipal level. The PMOs, joint expert groups and leading groups at the different levels would provide the foundation for these coordinating mechanisms.

Subcomponent 1C - Demonstration Projects

The demonstration projects will play a very important role in evaluating and testing practical measures to implement different aspects of integrated water and environment management at the county level. Because the demonstration projects will need to have considerable learning by doing, they need to be flexible and adjustments need to be made as they are implemented. All demonstration projects will have the full involvement of local officials and experts and will contain outreach components to ensure that lessons learned are made available to other counties. After in-depth coordination efforts between CPMO and basin-level provincial (municipal) PMOs, four main topics for demonstration projects, in different areas of the Bohai Basin, were selected:

- The "Real" Water Savings demonstration project for irrigating agriculture, will be carried out in Daxing County, Tongzhou District, and Pinggu District of Beijing. These counties are also included in the WCP, so there is already considerable knowledge in "real" water savings approaches. This Demonstration Project will be based on the bottom-up approach, where farmer user groups will be involved in achieving ET reductions (i.e. "real" water savings). The Project is planned to be action driven and aims at reducing the comprehensive ET in the counties selected for water savings by 10% between 2003 to 2008. This approach can only become successful if farmers agree to cooperate. Farmers have not applied "real" water savings on a large scale (partially because the practical guidelines are absent), so substantial attention will be given to make the water users aware that water is a limited resource, and that their help is unavoidable to improve their local water resources sustainability as well as the basin wide situation. The work will largely rely on the development of software tools that will help water policy makers at various levels understand what "real" water savings means and where in the counties the reductions of ET can potentially be achieved. The operational aspects of reducing irrigation water will be assisted by the application of quotas. Sound and robust calculation procedures that quantify the allowable groundwater irrigation amounts in relation to ET quota will be developed and tested. A farmers-training-farmers program will be launched.
- The demonstration projects of "Effective Management of Water Rights and Well Permits" at county level, which targets the World Bank Water Saving & Irrigation Project Zones in Cheng-an County and Guantao County, both in Hebei Province. This Demonstration Project aims at reducing groundwater use through a legal system of laws, permits, and water rights. It is an effort to boost the concepts of sustainability and to prevent the groundwater table from falling at a pace of over 1 m/yr in the Southern part of the Hebei Province. The overall objective is to get pilot areas where it has been feasible to stop the groundwater table declination. The regulations on water right management is based upon the general concept of local sustainability, i.e. the groundwater extractions should be in balance with the replenishment. Such an approach can be worked out exploring the Net Ground Water use data that will be provided by the Strategic Study on groundwater.

Both Cheng-an and Guantao are typical in that they have serious shortage of surface and groundwater, while heavily relying on use of both shallow and deep ground water for domestic and irrigation purposes for more than a dozen years. The Demonstration Project would use a CDD approach, based on the fact that people depend on groundwater for agricultural and industrial production as well as for domestic purposes. Water shortage seriously constrains their economic development. To achieve the overall Project objectives, it is obvious that there won't be a sustainable use of the water resources unless the users want to do so; and there won't be sustainable socio-economic development unless its beneficiaries participate in the development process with a sense of ownership. The CDD approach is adopted for purpose to promote local participation and ownership.

- The county-level demonstration projects on "*Effective Control of Wastewater Discharge*" into the two major tributaries of the upper ZhangWeiNan Canal; locations are Lucheng City in the upper Zhang River, Shangxi Province, and the Xinxiang City in the upper Wei River, Henan Province. The demonstration project will include improvements of capacity of local and basin managers to control waste discharges and the implementation of control measures such as a total load approach to pollution management. The range of management tools required will be determined during an initial phase and implemented thereafter. The demonstration project will also focus on waste discharge control and protection of water sources in two different locations: one in Xinxiang County, and one in Lucheng City being two of the most polluted upstream parts of the Sub-basin. Control of upstream pollution and protection of water sources will be a key element in the demonstration project.
- The "*Pollution Control and Water Environmental Improvements*" demonstration project is selected in parts of the Zhangweixin River in the Dezhou City, Shangdong Province, which is an important part of the lower ZhagnWeiNan Canal. The Project will be focusing on pollution control for enhancing water environment and will take place in Dezhou City in the downstream part of the sub-basin. It has, as a major objective, the restoration of surface water environmental conditions through a program of control of sources, improved management of groundwater, implementing improved treatment processes, application of a range of management tools such as integrated management of sluice gates, permitting systems, etc., while developing a greening landscaping along the Dezhou Section of the South Canal. The Project will be closely linked to an overall plan for improving the water environment and ecological restoration along the Wei River and Wei and South Canal from Xinxiang County to Dezhou City now being shaped by authorities in the Hai Basin.

Project Component 2: Knowledge Management - US\$6.51 million

The KM component would have 2 subcomponents: (a) KM Development; and (b) Remote Sensing and Evapotranspiration (ET) management systems. These subcomponents are interrelated and will be prepared and implemented in a coordinated manner.

Subcomponent 2A - Knowledge Management (KM)

KM will play a key role and will provide tools, information, technical support, and linkages to IWEM and planning at all levels (central Hai Basin, ZhangWeiNan Subbasin, Tianjin Municipality, Beijing and Hebei counties). The four primary goals of this Hai Basin KM component would be to: (1) develop a truly integrated Basin-level water resources-water quality information management system; (2) develop integrated application systems at the Basin and local levels; (3) provide direct support for ET-based water management, and (4) develop an integrated water management system that will continue to be sustained after this Project is over.

Both HBC/MWR and SEPA have developed significant basic information management systems that will form the foundation for the integrated water management systems in the Hai Basin. Both organizations have implemented some vertical integration mechanisms, working at provincial and other levels to collect and manage water data. A very important development is that both organizations have enthusiastically embraced the concept of joining together to provide horizontal integration of water quantity and water quality management. The development of this working relationship between these two organizations is an extremely important development for the GEF Project. Without this working relationship, the integration of water resources management and pollution control/water environment management would be almost impossible to achieve in the Hai Basin. An agreement has been reached to freely share data as well as share in the development of integrated databases and applications.

The component design provides for nine major tasks: (i) Project management; (ii) Status Assessment and Requirements Analysis; (iii) Implementation Plan and System Design; (iv) Data and Software Standards Development; (v) Additional Data Collection, primarily for support of ET; (vi) Basin-Wide Fundamental Platform; (vii) Applications for Water Resources and Water Environment Management; (viii) System Maintenance and Operation; and (ix) Staff Training.

Subcomponent 2B - Remote Sensing and Evapotranspiration (ET) data systems

ET management is the principal innovative international cutting edge approach being introduced under the Hai Basin Project. The key to sustainable water quantity management in the Hai Basin is to reduce present amounts of ET to sustainable levels (i.e. reducing ET throughout the basin in order to eliminate groundwater overdraft and provide more surface water for ecological purposes including enhancing outflow to the Bo Hai Sea), and then, in the future, to manage ET within the basin to remain at these sustainable amounts. Many of the Project activities need to be solidly based on the ET management concepts including: high-efficiency water utilization and real water savings, administration of water rights and well permits and water quantity management within the integrated water and environment management plans in Tianjin and in the Beijing and Hebei counties.

The Project would introduce a new practical approach to water savings in irrigated agriculture using remote sensing and ET management rather than only focusing on irrigation systems efficiency improvements, which has been the approach in China in the past. Improving irrigation system efficiencies does not necessarily save water and in fact can often increase the amount of consumptive use (ET) of irrigated agriculture by eliminating leakages which were returning to the surface or groundwater systems and utilizing that water for more crop production. "Real" water savings focuses on reduction in ET which can be accomplished through a combination of irrigation technology, agriculture and management measures.

The innovative aspect is that spatially distributed ET information based on satellite remote sensing data will be used for strategic planning of ET at the basin level, as well as for the "real" water savings at county level. The only feasible way to increase basin outflow and reduce groundwater overexploitation is the reduction of the comprehensive ET. Although this is a simple hydrological fact, it is not straightforward to implement a large scale ET reduction program. One of the largest problems in ET management is the determination of the ET value. Although there are several field scale measurement techniques, none of these techniques provides insight in the spatial distribution of ET across vast areas.

The work plan foresees the generation of a continuous time series of ET data between 2003 to 2008. The data will have a 1000 m resolution for the basin wide studies and has a 30 m resolution for the demonstration projects in the various counties. To facilitate the ET reduction process and allocate areas that are potentially suitable for reducing ET, remote sensing maps of ET will be combined with digital maps of land use and cropping patterns. Furthermore, this Project will provide technical assistance on quantifying the ET quota and implementing these quota through a water rights and well permits program that will be designed through the execution of Strategic Studies and Demonstration Projects. The objective is to reduce the ET at the county level to target levels and then maximize the production and value of production per unit of ET. There is a wide range of water productivities (Yield/ET) for each crop type depending on irrigation, agriculture and management practices. The Project will assist the counties in evaluating the range of water productivities in the county for each crop type and to develop a plan that will assist the farmers in moving from lower to higher water productivity practices, always keeping the target ET for the county as the goal. Remote sensing combined with land use information and crop yields can be

used to carry out this analysis for each parcel down to sizes of 30 by 30 m. The Project will provide strong technical support to the counties form the Hai Basin Commission and the Project KM Group to learn and implement this innovative practical approach. It is recognized that an early stage involvement of several authorities and stakeholders is a pre-requisite to successful implementation of an ET driven water resources management plan.

Project Component 3: Tianjin Coastal Wastewater Managemnet* - US\$ 4.75 million

The component would focus exclusively on the Tianjin coastal area for two reasons. First, wastewater management for small cities and industries along the coastal area will directly address GEF Operational Program #10 by demonstrating ways to reduce land based-sources of marine pollution, in this case to the Bohai Sea. Second, the component will leverage GEF funds by supporting infrastructure investments financed under the TUDEP2. The TUDEP2 plans to finance from two to four wastewater treatment plants in the coastal area, with an estimated cost of around US\$50 million. In addition, there are other small cities in the coastal area on the verge of making wastewater management investments. TUDEP2 will provide associated paralld financing of US\$98.25 million towards this component for: (i) 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, and (ii) wastewater management for small cities and industries along the coastal counties of Tianjin.

The component would cover the following set of integrated activities:

- *Binhai Wastewater Management Studies:* The Binhai Coastal Commission, which is a special administrative agency responsible for guiding the development of the Hangu, Tangu, and Dagang districts, will conduct a comprehensive wastewater management study which will cover institutional, financial, and technical studies.
- *Dagu Technical Assistance:* The Dagu canal system is filled with approximately 2.2 million cubic meters of sediment, most of it contaminated according to Chinese environmental standards. Dredging, dewatering, treatment, and safe disposal of the contaminated sediment is a complex and highly technical task. The Dagu canal cleanup is the largest and most ambitious sediment remediation project undertaken in China, and the experiences gained under the Project will be useful for addressing the hundreds of similar canals throughout the country.
- *Dagu Catchment Industrial Pollution Control:* Although most of the collected municipal wastewater will go to treatment plants in the future, there are still many industries that discharge directly into Dagu Canal (or into municipal systems) without adequate treatment. The GEF program will fund an industrial pollution control and pre-treatment study, and improve monitoring and enforcement of discharges into Dagu canal. Control of industrial pollution is essential for the successful renovation of Dagu canal, and the proper operation of municipal collection and treatment systems.
- *Small Cities Financial Incentives:* Controlling water pollution from small cities is a major challenge in China due to their limited technical and financial resources. Pollution from small cities accounts for approximately half of the pollution generated in Tianjin municipality, and currently no small city in Tianjin treats its wastewater. A special fund will be established to assist cities in meeting their financial obligations during the early years of wastewater treatment plant operation. Instead of, or in addition to, 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. The GEF financing will be used to establish and test this incentive mechanism for the Binahi Coastal Districts and Jinnan District. If successful , the output based subsidy model could be expanded to cover other small cities in Tianjin, or other provinces/municipalities in the Hai Basin and elsewhere in China.
- *Component-Wide Activities:* There are many issues which span all four activities above, and require a

component wide approach. International and domestic program advisors will guide the implementation of the activities and ensure coordinated and best practice approaches are taken, so that the component can fulfill its GEF objective of serving as a demonstration model for integrated wastewater management. Seminars, workshops, and reports for small cities throughout the Hai Basin and along the rim of the Bohai Sea, will be organized. High priority pollution testing equipment and computer/software will be procured for district construction and environmental bureaus, and the municipal EPB.

*) Together with the associated parallel financing through the TUDEP2 the cost of this component totals US\$103 million.

Project Component 4: Project Management, Monitoring and Evaluation, and Training - US\$6.18 million

Hai Basin Project management would support coordinated and integrated actions by the Ministries/Bureaus of environmental protection and water resources at the various levels. Central Project Management Offices (CPMOs) have been established in MWR and SEPA which will be supported by a Joint Expert Group of water, environment and other national experts to assist the PMOs in coordination, review, supervision and in some cases execution of technical activities under the Project. The central Joint Expert Group will be key to Project success, because they will work to ensure the technical vertical and horizontal integration of Project activities. The CPMOs will also be supported by international experts with broad experience in water quality and quantity management, water and environment planning and knowledge management. These experts will provide guidance and make detailed recommendations in technical aspects of the Project and would visit China 2 to 4 times a year for periods of 2 to 6 weeks each time to provide periodic guidance and assistance. This approach will ensure Chinese ownership of actions because the international experts will not be directly responsible for Project activities but instead for providing assistance and on-the-job training in technical aspects related to the Project. The CPMOs will also be responsible for arranging 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 CPMO operations, monitoring and evaluation and other Project management aspects mainly through counterpart funding. The Project will support Project management, joint expert groups and training and the other Project areas including Tianjin, Beijing, Hebei, Hai Basin Commission, ZhangWeiNan and in each of the Beijing, Hebei and ZhangWeiNan pilot counties. Domestic training will be an important aspect of the Project which will include quarterly workshops held in different Project counties and areas to learn from each other, interchange ideas and receive guidance from experts.

Project monitoring and evaluation will be carried out by Project PMOs. Annual monitoring and evaluation reports will be prepared that detail the Project implementation progress of activities and finances for each subcomponent and the performance indicators. This will be tracked in the Project MIS system. In addition each IWEMP and demonstration project will include a monitoring and evaluation component that will specifically address the implementation and effectiveness of the IWEMPs and demonstration projects. The monitoring and evaluation plans for these activities will be prepared during the first phase of Project implementation. IWEMPs and demonstration projects will include baseline surveys/inventories of surface and groundwater quantity and quality conditions, uses and trends and establish specific objectives, timelines and indicators for IWEMP and demonstration Project implementation both during the life of the Hai Basin Project and beyond.

Additional GEF Annex 3: STAP Roster Technical Review
CHINA: Hai Basin Integrated Water and Environment Management Project

HAI BASIN INTEGRATED WATER AND ENVIRONMENT MANAGEMENT PROJECT

World Bank/GEF: International Waters, OP 10 Project: Contaminant-Based Program

STAP Roster Expert Review
undertaken by

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Overall impression

The Hai River is one of the most significant rivers discharging into the Bohai Sea, China, in the north east part of the Yellow Sea. The river basin area is about 265 000 km² and includes the counties of Beijing, Tianjin, almost all of Heibei, parts of Nei Mongol in the north, of Shanxi in the west, and of Henan and Shandong in the south and southeast. The Bohai Sea is a reproduction and nursery area for parts of the fish and shellfish stocks of the Yellow Sea. The population of the area is more than 117 million with a density of 500 – 1000 people/km² and several mega cities but also several secondary cities. The region is one of the countries most important industrial and agricultural regions accounting for 15 percent of China's GDP. Over-exploitation of surface and groundwater in the semiarid-subhumid area has resulted in that the annual water availability per capita is only 305 m³ and that the total groundwater abstraction per year in the Hai Basin is around 26 billion m³, approximately 9 billion m³ more than the sustainable yield. As only parts of the mega cities today have any wastewater treatment, 68 percent of the rivers in north China are polluted. In the Hai River system more than 80 percent of the surface water and 50 percent of the ground water is classified as polluted and unsuitable as raw resources for drinking water.

Both the reduction of freshwater inflows and the increasing pollution from the discharging Hai river system has a detrimental effect on the fish stocks and biodiversity of the East China Seas as well as the ecosystem functions of the Bohai Seas. And the attempts to address these issues have been hampered by a lack of coordination between the different agencies involved.

The GEF Hai Basin Integrated Water and Environment Management Project aims at addressing the current threats by (i) improving integrated water and environmental planning and management in the Hai Basin, (ii) supporting institutional aspects related to effective local, municipal/provincial, and basin-wide water and environment planning and management, (iii) addressing the issue of declining amount of available water by "real" water saving, and (iv) reducing wastewater discharges from small cities along the rim of the Bohai Sea. The project will enhance capacity building in water and environment knowledge management and implementation, including by demonstrate new technologies and management approaches. The project intends thus to contribute to the objectives under OP 10 and "play a catalytic role in demonstrating ways to overcome barriers to the adoption of best practices limiting contamination of international waters".

The overall impression of the project is very good. It clearly demonstrates the need to build an integrated management framework to water management in the area. Cooperation between agencies with responsibility

for different aspects of water use having an impact on water quantity and on water quality and on the environment is absolutely necessary to achieve any sustainable results. The project is clearly demonstrating ways to overcome existing institutional barriers by addressing both horizontal cross-sectoral integration and vertical bottom-up and top-down integration. The approach to decreasing accessible water quantity is innovative but is most of all providing means to address these problems more sustainably. As the secondary towns, having no wastewater treatment, are the main contributors to pollution of surface and groundwater, the prioritisation of pollution control by wastewater treatment is a logical first step, a step that will need to be followed by addressing other sources of pollution such as agriculture. This would be initiated within the framework of the different demonstration projects, which also will serve to develop capacity at the implementing agencies to deal with the problems at different levels.

1. Scientific and technical soundness of the project

The project brief is describing the approach to work with Integrated Water and Environment Management, IWEM, including developing and implementing policies, and legal, administrative and institutional instruments at different levels. It is further describing measures to within such a framework achieve water quantity management, water savings in irrigated agriculture, by developing Evapotranspiration management systems including high-efficient water utilisation and different techniques for water savings, and administration of water rights and permits. These techniques are new and innovative for the region and are based in a qualified scientific and technical knowledge. The wastewater management technique is not described in detail but such methodologies are well tried and needed. Wastewater treatment techniques are also used in World Bank supported projects in the region.

1.1 Sufficient information and knowledge to carry out the project

Information and knowledge to carry out the project has to sufficient extent been secured by including relevant institutions in the area in the preparation for the project and in that the project builds upon, fills in the gaps and links to two World Bank-financed project in the region.

1.2 Appropriateness of approach to collect relevant information on sections of society and economy and on different aspects of the environment, water management and ecosystems

The available information presented is to a very large extent collected by local experts, through local institutions or through the World Bank projects, which would secure best possible access to such information. A Social Assessment of the project has been undertaken by a local consultant.

1.3 Sectoral changes needed to achieve the goals of the project

The project brief clearly identify the need to identify the stakeholders and their behaviour and roles in relation to the project as crucial for project success. It further following the Social Assessment recommends the piloting of the community-driven development approach to achieve a win-win situation on the integrated water and environment management including natural resources management and local socio-economic growth and will thereby secure necessary stakeholder participation.

1.4 The issue of inter-comparability of data

The data collected through the Ministry for Water Resources, MWR, and through the State Environmental Protection Administration, SEPA, are not always compatible or comparable. As they are both key agencies in water management for the region and will be implementing parts of the project this could be a critical

issue. The Knowledge Management subcomponent of the program is requiring close collaboration between the two agencies, including on data management, common information system platforms, standardised data transfer and security protocols etc. The development of the component during project preparation resulted according to the project brief in a significant breakthrough in MWR/SEPA cooperation. The river reach files and coding systems is going to be developed into a platform where the two agencies will be able to share data and utilise it in their water function and water environment function zones, which should ensure inter-comparability.

1.5 The interlinkages between water-related environmental issues and root causes behind the different environmental problems

The different environmental problems in the region are, as is described in the Overall Impression, mainly water related but with an adverse effect not only on the Bohai Sea and the East China Sea and its biodiversity and ecosystem and their functioning but also on the living conditions for the people and the economic system. The degradation of the Bohai Sea is resulting from Land-based Sources of Pollution, by non-treated or insufficiently treated wastewater mainly from secondary or small cities, and by agriculture, discharging through the Hai River, which is heavily polluted. The decreasing amount of freshwater reaching the Bohai Sea is partly a result of over-extraction of surface and groundwater, mainly for irrigated agriculture. These issues are to be addressed by the project, where in particular measures to address the decreasing water quantity (by evapotranspiration management) will address the root causes, while pollution control by wastewater treatment can be seen as a remedy.

1.6 Tools and methodology for TDA and SAP in the project

The project is not identifying any Transboundary Diagnostic Analysis, TDA, for the project as that is not required for projects that are not developed in a transboundary cooperation but which are addressing causes to environmental degradation in a transboundary sea, here the Bohai Sea. Strategic Action Plans are going to be developed in different areas but not with the same focus as for this project. This makes it difficult to see whether some aspects of relevance to the project will be missing in the SAPs.

1.7 Technologies adapted and their relation to the regional socio-economic profile

It is assumed that the project will contribute to the local socioeconomic development and people's livelihood including by possibilities to use reclaimed wastewater as new water supplies for irrigation and non-potable municipal and industrial use. Further, evapotranspiration ET, management will contribute to better and more efficient water use in irrigated agriculture, an important economic sector in the area.

1.8 Do proposed technologies pose environmental threats?

As the proposed technologies will result in an increased amount of water available in the area, by application of ET management, not only the socio-economic sectors but also the environment should benefit from that. However, if measures to address pollution in the region, such as wastewater treatment, are only applied in the most downstream parts, the resulting consequences for the environment in upstream areas might still be less advantage than anticipated. Such issues need to be addressed in the Integrated Water and Environment Management framework as need the necessity of not exceed the ecological carrying capacity for the region.

1.9 Technological innovations applied to support the project

The methodology for evapotranspiration, ET, management that is to be applied for the region is innovative and well suited for an agriculture region where applied methodologies for large scale water saving have failed. For it to be successful a participatory approach needs to be applied, where the individual farmers as well as the sectoral organisations are informed and involved. There is thus a need for a strong component of capacity building and knowledge management.

1.10 Institutional arrangements including their scientific capacity

The project will according to the documentation ensure for Joint Expert Groups at central, river basin, provincial and county levels for providing technical assistance to the Project Management Offices at the different levels. A majority of these experts will be regional experts with only few international experts.

1.11 Are the choices of demonstration sites representative and appropriate?

The demonstration sites have been chosen to address issues of effective control of wastewater discharge, pollution control combined with environmental improvements, “real” water savings (application of ET management), and effective management of water rights and well permits. As these issues are crucial for project implementation the choice of demonstration sites to be able to demonstrate such techniques are essential.

1.12 Problems overlooked

The project documentation and plan is addressing the problematic and water and environment issues of the area within an Integrated Water and Environment Management framework, including water quality as well as water quantity aspects and their linkages to socio-economic aspects and factors, all important for the scientific base of the project. There are some references to Monitoring and Evaluation, M&E, of the project and the project documentation is including a presentation of Key Performance Indicators that might be used in such a process. There is, however, no plan for the Monitoring and Evaluation process. Such a process needs to be initiated early on in the project process and an M&E plan needs to be incorporated in the project documentation, including in the Project Brief.

1.13 Issues of conflict

No issues of conflict between different types of water use or between different water users have been identified in the documentation. The earlier lack of cooperation between the Ministry for Water Resources, MWR, and the State Environmental Protection Administration, SEPA, had it not changed into cooperation during the project preparation, could have resulted in a conflict between water use sectors. An assessment of different risk and presentation of different mitigation measures to meet these risks is presented in the documentation. Some of those risks, should they not be addressed, might of course develop into a conflict and it is essential that proper mitigation measures are taken.

2. The global environmental benefits of the project and its contribution to the IW focal area goals.

2.1 Does the project address issues that will result in global environmental benefits?

The project, although the project area, the Hai River Basin, is situated within one country, China, will contribute to global benefits in an International Waters area, the Bohai Sea, where the Hai River is discharging, and further the East China Sea. The project should result in improvement of the Bohai Sea

environment and protection of the fish stocks and biodiversity of the Yellow Sea and the East China Sea by reduction of marine pollution caused by land based sources, including secondary towns and their industries. Application of ET management should have an effect on the total water budget of the region including on the International Waters where Hai River is discharging.

2.2 *Are any negative environmental effects anticipated?*

No negative environmental effects are anticipated should the project activities be undertaken within the Integrated Water and Environment Management framework, identified risks be mitigated and any emerging new risk be addressed by the cooperating institutional structure to implement the project.

2.3 *Will the project be able to strategically meet the incremental costs of*

a) Assisting the country to better understand the environmental concern of the Bohai Sea and subsequently the Yellow Sea and the East China Sea?

In cooperating with local stakeholders, including with farmers on the ET management and with municipal stakeholders on wastewater treatment and reuse, awareness, training and capacity building should be important issues. The documentation does not clearly describe how this critical aspect will be addressed although it clearly demonstrates the need to involve all groups.

b) Building the capacity of existing institutions?

Many of the different institutions were involved in the project preparations and would, based on the experiences from that be aware of what is needed from them. All the different Project Management Offices would have Joint Expert Groups to assist the PMOs in various steps to implement activities. The PMOs are responsible for different aspects of international and domestic training. The project documentation does not, however, specify how such training should be organised and how the different PMOs themselves should be trained in order to ensure compatibility not only in data and methodology but also in the approach to problem-solving.

c) Implement measures that address the priority transboundary concerns?

Meeting incremental costs to address priority transboundary concerns might be an issue in applying the integrated approach to Water and Environment Management for the Hai River Basin as such an approach should also include addressing issues of the Hai River discharging into the Bohai Sea. In doing this, contacts for information exchange and, where appropriate, cooperation should be made with other relevant projects in the region, including the two GEF/UNDP-projects for improvement of the Bohai Sea environment. The project documentation is referring to such exchange as being relevant.

3. The project's replicability and regional context

The project approach, to within an Integrated Water and Environment Management system apply measures to improve water quality and quantity and thus the discharging water into the International Water of Bohai, Yellow Sea and subsequently East China Sea, development of relevant demonstration sub-projects, and application of innovative technology would make it highly replicable in particularly for areas with the same climatic and socio-economic conditions as the Hai River Basin.

3.1 *Scope for replication of approaches in other international water bodies*

The demonstration projects and the Integrated Water and Environment Management structure have been developed to be possible to replicate in other counties in the river basin and are thus seen as highly replicable. The Chinese government has ensured a broad replication should the project be successful. Particular parts, such as the ET management technology, would be applicable also to other river basins, should the physical and socio-economic conditions be favourable.

3.2 *The regional scope of the project*

The project intends to be implemented in a densely populated, water scarce and highly water polluted river basin in China discharging into the International Waters of Bohai and the Yellow Sea LME, which makes the region very relevant for this type of project.

3.3 *The innovativeness of the project*

The project is introducing a new and innovative approach to water savings, which focuses on reduction in evapotranspiration through a combination of irrigation technology, agriculture and management, building on water productivities for different crops etc. Although the methodology is site and crop specific in its application the system as such can be applied to other areas and is very interesting.

4. Linkages to other focal areas, programmes, action plans etc.

4.1 *Linkages to other GEF focal areas*

The project falls under the GEF IW Focal Area, specifically under the OP 10: Contaminant-Based Programme but it is also contributing to the objectives under the Biodiversity focal area 2 “Coastal, Marine and Freshwater ecosystems” as the intention is that it will include specific studies on requirements for reduced pollution and increased flows to the Bohai Sea whereby it should enhance marine ecology. It will further determine minimum ecological flows for watercourses and wetlands in the Hai River Basin.

4.2 *Relevant conventions/programs considered and taken into account*

Objectives under the Biodiversity convention will be supported. The project will also respond to what is stated in the Global Programme of Action to Protect the Marine Environment from Land-based sources of Pollution by seeking to reduce pollution of water discharging into the Bohai Sea by the different activities under the project.

4.3 *Consistency between proposed activities and existing National Plans*

The project documentation is identifying existing plans such as the 10th National Five Year Plan (2000-2005), Bohai Blue Sea Action Plan, Hai Basin Comprehensive Management Plan, etc. municipality plans etc. and their emphasis on the need for water-saving, reduction and prevention of pollution etc. It thus seems to be good consistency between proposed activities and existing plans.

5. Degree of involvement of stakeholders in the project

The project has, according to the project documentation, been designed to involve stakeholders. Detailed case studies and surveys in typical project areas have shown the necessity to involve stakeholders in the preparation of the different steps of the project implementation. The demonstration project on water rights and well permit will include components to ensure maximum ownership by water users, and mechanisms

for farmers' participation during the implementation of the integrated agriculture aspects of Integrated Water and Environment Management, IWEM, plans will according to the project brief be ensured. Detailed plans for such participation will need to be worked out and spelled out in the IWEM plans.

5.1 Will national and regional institutions be able to contribute to the achievement of the project objectives?

Farmers associations and cooperatives as well as business and social groups will according to the documentation be consulted as part of the IWEM preparation. At project policy level the documentation describes the need to examine possible new institutional arrangements for basin-wide policy, planning and management for establishing a high-level, multi-sectoral coordinating committee. Otherwise the implementation arrangements will build on existing institutional structure, which to a large extent has been involved in the project preparation, thereby enhancing cooperating abilities. In such cooperative efforts they would be able to contribute towards the project objectives.

5.2 Capacity building

As part of the project the Joint Expert Group that will support the Central Project Management Offices will provide assistance and training and the project shall according to the documentation include quarterly workshops in different areas to exchange experiences. The documentation does not provide information about capacity building of different stakeholders such as water users and farmers. Such capacity is essential and would need to be ensured to secure project sustainability.

6. Conclusions

The project is a very well designed and developed project with a strong governmental ownership and commitment by the Chinese government. The project approach, to develop an IWEM framework and within that develop and implement measures to deal with water scarcity (by applying new and innovative methodologies), groundwater mining and pollution, is scientifically and regionally appropriate and viable. A strong national and regional institutional arrangement is in place and as project preparations has resulted in increased cooperation efforts it is likely that this arrangements will provide a good bases for project implementation. To achieve long-term sustainability the project also intends to include participation of different water users, although the project is not providing any information on how it intend to enhance the capacity among different water users for them to contribute towards successful project implementation and sustainability. Furthermore, a detailed plan for Monitoring and Evaluation, that needs to be initiated early in the project, has not been provided. With these two aspects remediated, I would strongly recommend the project for approval by the GEF Council, and am convinced that implementation of this project would lead to beneficial results for the region and the global environment.

Uppsala 22 August 2003

Gunilla Björklund

Additional GEF Annex 4: Incremental Cost Analysis

CHINA: Hai Basin Integrated Water and Environment Management Project

Overview

The overall objective of the GEF alternative is to catalyze a more 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 would: Improve integrated water and environment planning and management in the Hai Basin; Support institutional aspects related to effective local, municipal/provincial, and basin-wide water and environment planning and management; and support reduction of wastewater discharges from small cities along the rim of the Bohai Sea. Specific Project components, all interrelated include: (i) Integrated Water and Environment Management (IWEM); (ii) Knowledge Management (KM); (iii) Tianjin Coastal Wastewater Management; and (iv) Project Management, Monitoring and Evaluation, and Training. The GEF Alternative intends to achieve these outputs at a total incremental cost of US\$ 129.99 million and focuses on high-priority issues for the Chinese government and international environment protection.

Broad Development Goals

The Hai Basin, home to over 117 million people and accounting for 15 percent of China's GDP, is spread over four provinces and the municipalities of Beijing and Tianjin. The area that would be covered by the Project is one of the country's most important river basins and one of the most important industrial and agricultural regions of China. Water has played a pivotal role in the development of the Basin, and sustainable development is heavily dependent on water resource management. Like many other areas in China, the Hai River Basin is facing serious water-related problems, including water pollution, water scarcity, and flooding. Over-exploitation of groundwater, estimated by some to be 9 Billion cubic meters annually, and overuse of surface water resulting in inadequate environmental flows, along with increasing groundwater and surface water pollution, are contributing to the decline and deterioration of water resources and damage to freshwater and in coastal environments in the Hai Basin. Present water use patterns in the Hai Basin are not sustainable and continued rapid economic growth is jeopardized.

The Basin discharges into the Bo Hai Sea and is a major contributor to pollutant loadings. The sea is an important eco-system and fishery resource, reflecting its role as a seasonal spawning and nursery ground for the larger and more productive Yellow Sea. However, heavy land-based pollution from urban, industrial, agricultural, and other sources in the Hai River Basin, combined with over-fishing, reduction of freshwater inflows, and habitat loss, threatens the fishery and has steadily diminished many of the Bo Hai Sea's eco-system functions.

The Chinese Government is committed to corrective action. China's 9th Five Year Plan (1995-2000) included provisions for improving water resource management in the Hai River Basin and restoring the Bo Hai Sea – notably pollution control measures. Other measures include greater efficiency in water use, water diversions from the Yellow River to the Hai Basin, and improved flood control measures. While these initiatives are vital, they address problems of immediate concern and insufficiently provide for longer-term challenges. The south north transfer of water from the Yangtze River to northern China including the Hai Basin is a more long-term solution, but would still be inadequate to meet demands without major improvements in water resources management.

Baseline Scenario

This scenario comprises previously agreed plans and initiatives of the Chinese Government to address water related problems at national and local levels. It reflects the likely situation concerning the Hai Basin and Bo Hai Sea in the absence of GEF support. There are various national programs and more detailed investment programs, generally formulated by sector management agencies and local governments, to implement the national plans. It has to be taken into account that these national plans are highly ambitious and are sometimes not fully realized. The related activities are often carried through to the next planning period and tend to be large scale investments, leaving out the medium to small scale investment level. Another important issue is the institutional fragmentation of water resource management as it involves amongst others, the following agencies: the Ministry of Water Resources (MWR), the State Environment Protection Administration (SEPA), the Ministry of Construction (MOC) and the Ministry of Agriculture (MOA). Each agency has its own planning process, frequently leading to overlapping and/or inconsistent plans and programs.

National Plans

- *9th National Five Year Plan (1995-2000)*: China's environmental improvement priorities were defined as: three rivers (Huai, Hai, and Liao), three lakes (Tai, Cao, and Dianchi Lake), two air quality issues (SO₂ and acid rain), one municipality (Beijing), and one marine area (Bo Hai Sea). (Planned Investment: US\$ 22.2 billion)
- *10th National Five Year Plan (2000-2005)*: Emphasizes the need for sustainable management and use of water resources, especially intensifying agricultural water-saving and wastewater reuse efforts. (Planned Investment: US\$ 30.5 billion)
- *China Trans-Century Green Program*: Emphasizes construction of urban environmental infrastructure. The Program has three phases, spanning 15 years. Formulated through joint efforts of SEPA, The State Development Reform Commission (SDRC), and the State Economic and Trade Commission, it is an umbrella program for all pollution control initiatives in China, including water pollution control of the Hai River Basin. (Planned Investment: component of National Five Year Plan)
- *The South-North Water Transfer Project (SNWT Project)*: This proposed Project would address the serious water scarcity problems in North China, including the Hai Basin. The intention is to transfer 20 bcm water from the Yangtze River system to North China. (Planned Investment: US\$ 10-15 billion)
- *Bo Hai Blue Sea Action Plan*: The plan seeks to influence urban development, the economic structure, and the adoption of clean production technologies. High priority is given to the control and prevention of land-based pollution. The intention is to invest in new and improve existing sewage treatment plants, recycling and reuse of waste, and the adoption of various "clean" technologies. (Planned Investment: US\$ 7.2 billion)
- *Water Pollution Prevention Program of Hai River Basin*: The Program endeavors to ensure that all industries abide by national discharge standards and improve water quality. (Planned Investment: US\$ 5.3 billion for water pollution control)
- *Hai Basin Comprehensive Management Plan*: The Plan incorporates flood control, water resource management, and soil and water conservation. (Planned Investment: US\$ 1.5 billion)
- *National Irrigated Agriculture Water-Saving Program*: The Program endeavors to rehabilitate irrigation systems and improve irrigation technologies in 300 counties, identified as demonstration sites. (Planned Investment: US\$5.2 billion)

Beijing Municipality

- *Plan for Sustainable Use of Water Resources in the Capital in the 21st Century (2001-2005)*: It focuses on the development and protection of water resources. By 2005, Beijing Municipality plans to

achieve water savings of 790 million cbm, reuse of 645 million cbm of treated wastewater, supply of 150 cbm of water from rain and flood sources, achieve groundwater balance in the city, and ensure that the water quality of the city suburbs reaches national standards. (Planned Investment: US\$ 3 billion)

Tianjin Municipality

- *Hai Basin Tianjin Municipality Wastewater Treatment Project:* The Project will complete the Municipality's 1958 Sewerage and Drainage Master Plan, which designates six drainage zones, a WWTP in each zone, and separate sanitary and storm sewers. (Planned Investment: US\$274 million)

Hebei Province

- The Hebei Provincial Government has outlined an ambitious environment protection plan for the province up to the year 2010 to be implemented in three phases. The plan is consistent with national environmental plans including the Trans-century Green Engineering Plan and the Hai River Pollution Control and Prevention Plan, which are mentioned above. (Planned Investment: TBD)

Related Projects financed by the World Bank and the Asian Development Bank

- Water Conservation Project
- 2nd Tianjin Urban Environment Project
- 2nd Beijing Urban Environment Project
- FY01 Hebei Urban Environment Project
- Agenda for Water Sector Strategy for North China
- Tianjin Wastewater Treatment and Water Resources Protection Project
- Coastal Resource Conservation and Environment Management Project for the Bo Hai Sea

The cumulative effect of the Government's initiatives outlined above will be considerable, particularly with regards to reduction of pollution of water resources in the Hai Basin. COD loadings from major sources in the Hai Basin are estimated to be reduced by 17 and 25 percent in 2010 and 2020, respectively, compared with the 2000 levels. However, reductions in loads will not be sufficient to improve water quality to the extent needed for public health, environmental needs, and restoration of the marine environment of the Bo Hai Sea.

Table 1: Hai Basin COD Loads from Major Pollution Sources				
	1997	2000	2010	2020
Urban Industry	2,289	2,213	1,435	1,225
Urban municipal	401	488	656	713
Rural industry	1,623	1,607	1,266	858
Livestock	643	663	730	848
Rural municipal	239	254	276	292
Total COD	5,195	5,225	4,361	3,935

Baseline Scenario: 1000 tons/year (Agenda Water Sector Strategy for North China, April 2, 2001)

Global Environmental Objectives

Success in managing the Hai River Basin and restoring and protecting the environment of the Bo Hai Sea is of global importance, because the trans-boundary effects of water pollution are severe. The Bo Hai Sea and the Yellow Sea are a single large marine ecosystem and interdependent fishery. Approximately 600 million people live in the basins that drain into the Yellow Sea. Many depend on it as a source of livelihood. Damage to the Bo Hai Sea's function as a nursery area for fish and shellfish stocks damages the resource wealth of the Yellow Sea. The implications are even more widespread, for pollution of the Bo Hai Sea ultimately affects the East China Sea. The Bo Hai Sea, the Yellow Sea, and the East China Sea are connected, forming a continuous circulation system.

The deterioration of the water resources in the Hai Basin is severely impacting the quality of life of millions of people in a river basin with major population, industrial production and agriculture production. Water pollution and water scarcity impact on agricultural production and human and environmental health. Deterioration of the environment is also hampering poverty reduction, the most seriously impacted are often the most vulnerable.

The GEF Alternative Project will assist China to significantly improve its water resource management practices. From a global perspective, this improvement would result in the following benefits:

- It would help improving the Bo Hai Sea environment, contributing thereby to maintaining fishery stocks and biodiversity of the Yellow Sea and the East China Sea more generally;
- Poverty reduction enhances social stability which, if not addressed, has national and potential international implications.
- An integrated approach to water resources management in the Hai Basin would provide a model for wider application in China;
- Success in China would encourage other developing countries to draw upon the lessons learned.

GEF Alternative

The proposed GEF Program for the Hai Basin and Bo Hai Sea will encourage a more comprehensive integrated water resource management approach than outlined under the baseline scenario. This will help give direction to and ensure that various plans of the agencies involved in the Hai Basin are coordinated and properly integrated. The central focus of the GEF alternative would be the support of the formulation of Integrated Water Resource Management Plans (IWEMPs) in pilot counties and at the sub-basin and basin levels. Attempts to improve water resources management in China have been very top down, with strong laws, policies, regulations and large investments, but with insufficient bottom up implementation at the grass roots level. The purpose of the IWEMPs is to address integrated planning and to implement practical bottom up actions that translate top down initiatives into bottom up results. The IWEMPs will include water user participation and local government ownership in the development of plans that address: (i) water quality management aspects, concentrating on point and non-point sources of pollution through the implementation of discharge controls, industrial restructuring to clean industries, wastewater treatment in small cities, industrial wastewater treatment, and agricultural and livestock production related pollution controls, (ii) reuse of treated wastewater, (iii) improvements in water use efficiencies that result in "real" water savings by reducing non-recoverable losses particularly evapo-transpiration (ET), (iv) implementation of effective water rights and well permits systems, (v) increasing water pricing combined with volumetric measurement, (vi) conjunctive use of surface run-off and groundwater, and (vii) ecological restoration.

The IWEMPs would also, where appropriate, provide revisions to laws, regulations, standards, and other factors related to water quality and water quantity management at basin and local levels. In addition,

Demonstration Projects would be implemented in selected counties to deepen experience in key complicated areas including: (i) “real” water savings, (ii) administration of water rights and well permits, (iii) pollution control, and (iv) ecological restoration. Strategic Studies at the basin level would address important basin policies, programs and approaches in order to ensure adequate governmental support to the lower levels to implement to plan and implement the IWEMPs and demonstration projects. Lessons learned from the pilot counties and demonstration areas would be shared with other counties throughout the Hai Basin and elsewhere in China. An integrated approach would furthermore lead to a better understanding of important surface/subsurface and water quality interactions, and facilitate new management techniques.

Without GEF support, integrated water resource management at the county level is unlikely to be achieved because of the already mentioned difficulties in inter-jurisdictional and inter-administrative cooperation and inadequate programs to implement government policies at the grass roots level. Each agency has its own programs with generally ineffective bottom up implementation and inadequate coordination because of lack of adequate vertical and horizontal integration of activities. Water resource management involves many agencies. While the MWR has the primary responsibility for overall management of the nation’s water resources, and SEPA has overall responsibility for pollution control. There are considerable overlapping jurisdiction problems between these agencies and with other ministries and agencies concerning urban water supply, water pollution control, groundwater management, and irrigated agriculture. MWR’s and SEPA’s management role is further limited by the increasing powers of provinces following the decentralization process. The GEF Program would provide a powerful demonstration effect and an incentive to break through institutional barriers.

The GEF alternative has already resulted in a breakthrough during Project preparation whereby Project related cooperative mechanisms have been established between MWR and SEPA. The Project would include an integrated program to improve basin-wide measurement, monitoring, modeling, and data sharing that will greatly enhance water resources management. River reach files with a common coding system will be developed and implemented that will allow for the sharing of information that will satisfy both SEPA and MWR needs, as well as the lower-level needs at the county level. Applications will also be developed that support the needs of integrated water resources management for the different entities. These activities under the Project are referred to as Knowledge Management (KM). KM improvements are needed because an adequate system of data collection and analysis is critical to integrated water resources management. Monitoring is another serious problem in the Hai Basin. Without effective monitoring and enforcement, it is impossible to have an adequate system of water rights administration or volumetric pricing.

This is the first GEF initiative of this kind. A further global benefit, therefore, is the important demonstration effect of solving problems related to water resources through adopting a comprehensive integrated management approach for a globally important river basin. The Project would help to provide the management framework for integrated water resources management, which is indispensable for a long-term sustainable approach to water use in the Hai Basin and to reducing pollution into the Bohai Sea. Although government policy calls for an integrated framework, experience has shown that inter-jurisdictional, and inter-administrative cooperation often proves difficult. The GEF grant would provide an incentive to break through institutional barriers and intends to provide a powerful demonstration effect. The Project would help to provide international expertise to provide Chinese counterparts with a broad range of management experiences and instruments to draw upon.

The rationale for GEF involvement is that, without support, the Government tends to focus on measures that are visible and with immediate effect, thus geared towards investment in infrastructure rather than management activities and research (see baseline scenario). The Government and research institutes have limited practical experience in designing integrated water resources management instruments resulting in

sustainable use of water resources and environmental protection/restoration. The international expertise that accompanies GEF Projects would provide Chinese authorities with a broad range of management experiences and instruments to draw from.

In addition to the global benefits described above, the Project would also generate significant supplementary benefits for China. The IWEMPs formulated under the Program will enable government agencies at various levels to better manage and use water resources in the Hai Basin. The improved knowledge management system, including ET management, for the Hai River Basin will help government agencies to formulate efficient and sustainable water resources policies and ensure effective enforcement of water pollution regulations and laws. These benefits are not in the baseline scenario because of inadequacy of financing and institutional capacity limitations. ET management using remote sensing is a principal innovative international cutting edge approach being introduced under the Hai Basin Project. The key to sustainable water quantity management in the Hai Basin is to reduce present amounts of ET to sustainable levels, and the Project provides a practical feasible approach for achieving this objective. Eventually reducing ET to sustainable levels will result in stabilization of groundwater systems and the long-term provision of water for environmental purposes including delivery of fresh water to the Bo Hai Sea.

The wastewater management for small cities and industries along the coastal area (component 3) will directly address GEF's Operational Program #10 by demonstrating ways to reduce land based-sources of marine pollution, in this case to the Bohai Sea. China presently pays very little attention to small cities and suburban industrial pollution, concentrating almost exclusively on pollution control in large urban areas. The Project would attempt to leverage GEF funds by supporting infrastructure investments in small cities and suburban areas financed under the World Bank-financed Tianjin Urban Environment and Development Project (TUDEP2). In addition this component will support cleanup of the 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. China has many of these large sewerage discharge canals that need to be renovated and the Project will provide a demonstration on technically and environmentally sound approaches for this. Success of this component will provide powerful demonstrations of how to begin to address these huge and presently largely un-addressed pollution problems.

Although the scope of the proposed GEF Program is small compared to the enormity of reducing pollution of the Bo Hai Sea, it will provide important demonstration effects. It will support technical assistance to control pollution from secondary cities, and suburban and rural areas, which account for more than half the pollution loadings entering the Bo Hai Sea. The global benefit, therefore, will be laying the groundwork for substantial reduction of pollution of the Bo Hai Sea and an improved marine environment. This, in turn, will contribute to sustainable management of the Bo Hai Sea and maintaining fish stocks and the biodiversity of the Yellow Sea and East China Sea.

Related GEF Projects

The proposed GEF Project builds upon, fills in gaps, and complements other related initiatives in the region that are supported by GEF. By contributing to improvement of the Bo Hai Sea environment, the Program addresses an important missing link in the China/GEF relationship. China is a participating state in two GEF/UNDP Projects for improvement of the Bo Hai Sea environment: "Building Partnerships for the Environmental Protection and Management of Asian Seas" (PEMSEA); and "Reducing Environmental Stress in the Yellow Sea Large Marine Ecosystem" (YSLME). The proposed GEF alternative also complements initiatives supported by other international agencies. Some of these projects are listed above.

The PEMSEA Project is designed to assist the East Asia Sea Region to collectively protect and manage the coastal and marine environment through intergovernmental and inter-sectoral partnerships. It involves ten

countries in Asia, including China. A key element is to facilitate development of institutional capacity, management strategies and action plans to deal with land-based pollution. The Bo Hai Sea is identified as a sub-regional sea under stress and a pollution “hot spot”. A demonstration site has been established to reduce waste discharges and to address environmental problems common to adjacent provinces and municipalities. The proposed GEF Program for the Hai Basin and Bo Hai Sea complements the PEMSEA Project in two important ways:

- It will contribute to PEMSEA’s objective to control land-based sources of pollution of the Bo Hai Sea;
- It will complement PEMSEA’s efforts to establish inter-jurisdiction coordinating mechanisms to address environmental issues in the Bo Hai Sea by promoting integrated water resource management in the Hai Basin.

The YSLME Project is a regional effort involving China and the Republic of Korea to formulate and implement a regional Strategic Action Program (SAP). The Democratic People’s Republic of Korea has also been invited to participate in the Project, although it has so far declined formal involvement. The long-term objective of the Project is ecosystem-based, by supporting environmentally-sustainable management and use of the Yellow Sea. As mentioned earlier, the Bo Hai Sea is critical to maintaining the fish stocks and biodiversity of the Yellow Sea. The Hai, Liao, and Yellow Rivers have important effects on salinity in the western Yellow Sea. Therefore, the SAP must involve the Bo Hai Sea and the Hai River Basin. The proposed GEF alternative will contribute to YSLME Project’s long-term objective and support the formulation and implementation of the SAP.

Incremental Costs

As discussed in the Baseline Scenario section above, the Government of China has plans or is in the process of implementing billions of dollars in investments that will result in improvements in water quantity and water quality conditions in the Hai Basin with consequent improvements to the Bo Hai Sea. These investments will not appreciably contribute to the Project objectives of moving towards integrated water resources management in the Hai Basin and small city and suburban wastewater treatment. For the purpose of this incremental cost analysis it was decided to only include in the Baseline Scenario those investments related to the closely-linked TUDEP2 and Water Conservation Project (WCP), that would contribute to the Project objective of integrated water and environment management. In this regard, using data from TUDEP2 and WCP, the total cost of the Baseline Scenario is US\$ 206.95 million, including Government of China expenditures of US\$ 118.72 million and IBRD financing of US\$ 88.23 million. (Note: The Baseline Scenario included all of WCP and only the Water Reuse and Institutional Development components of TUDEP2). For the GEF Alternative, the total cost is US\$129.99 million, including US\$ 72.14 million from the Chinese government (US\$ 57.40 million under TUDEP2 and US\$14.74 million direct), US\$ 40.85 million of IBRD loans under TUDEP2, and the GEF grant of US\$ 17 million. (Note: The Dagu Canal Rehabilitation and Suburban Sewerage components of TUDEP2 were included in the GEF Alternative because their successful implementation is dependent upon the GEF Project.) All of these funds would be incremental to the baseline scenario. Table 2 shows the incremental cost distribution according to Project component.

Table 2: Incremental Cost Matrix				
Component	Cost Category	US\$ Million	Domestic Environmental Benefit	Global Environmental Benefit
1. Integrated Water and Environment Management (IWEM)	Baseline	187.85	(i) Water conservation in irrigation agriculture and reduction in surface and groundwater overuse.	Some improvement of Bo Hai Sea marine and coastal environment and protection of fish stocks and biodiversity.
	With GEF Alternative	202.15	(i) Demonstration effect of adopting integrated water management measures to control water pollution and deal with water shortage and other related problems; (ii) Reduction of marine pollution caused by land-based sources, especially pollution from secondary towns and their associated industries (iii) Improvement of public health because of better water quality and pollution reduction; (iv) Improvement of the environment of the Hai River Basin; (v) Protection of fish stocks and biodiversity; (vi) Enhanced habitat & species protection.	Demonstration effect of adopting integrated water and environment management measures to control water pollution and deal with water shortages. Further improvement of Bo Hai Sea marine and coastal environment and greater protection of fish stocks and biodiversity.
	Increment	14.30		
2. Knowledge Management	Baseline	3.82	Improved Knowledge Management in Water Conservation and Pollution Control.	
	With GEF Alternative	10.33	Improved Integrated Knowledge Management System for the Hai Basin and improvements in the conservation of water resources and the water environment.	Demonstration effect of adopting integrated water management measures to control water pollution and deal with water shortage and other related problems.
	Increment	6.51		
3. Small Cities Wastewater Treatment Support	Baseline	0.00		
	With GEF Alternative	103.00	Improvement of the water quality of the Hai River Basin and improvement of public health because of better water quality and pollution reduction.	Reduction of marine and coastal pollution caused by land-based sources, especially pollution from secondary towns and their associated industries.
	Increment	103.00		
4. Project Management and Training	Baseline	15.28	Improved Public Sector capacity for water conservation and pollution control.	
	With GEF Alternative	21.46	Increased public sector capacity for Integrated Water and Environmental Management and improved institutional arrangement for integrated water resource planning and management.	
	Increment	6.18		
TOTAL	Baseline		206.95	
	With GEF Alternative		336.94	
	Increment		129.99	

Additional GEF Annex 5: Social Assessment

CHINA: Hai Basin Integrated Water and Environment Management Project

The China-GEF Hai Basin Integrated Water and Environment Project will cover the whole basin or a total 318,000 square km, including Beijing, the national capital, Tianjin municipality, Hebei and several parts of five other provinces, with a population of 117 million people, about 9 percent of the Chinese population. For more than a dozen years, over-exploitation of the surface water and overdraft of groundwater for domestic, industrial and agriculture uses in the densely populated basin has resulted in a severe water crisis with water resources shortage and environmental pollution. This situation has seriously affected people's lives and health, and constrained local socio-economic productivity development.

This Project will support promotion of integrated water and environment management in the Hai Basin, with the long-term objective to realize a more rational distribution of water resources, increase water use efficiency and rehabilitate environmental quality and ecological systems. To counter the deteriorated situation water resources in the Hai Basin, strict control of water use and pollution would lead to improvement of the people's living conditions and rehabilitation of their production sustainability. At the same time there is a need for major changes in their water use behavior that further lead to multiple interactions between their economic activities and the water control management. As the Project beneficiaries, the local people's understanding, participation and collaboration will be an important aspect of Project success.

A social assessment (SA) was recommended and undertaken in the Project preparation to address the Project impact on behavioral change among the local population under integrated water and environment management, to detect any potential social risks and possible social costs that the Project may bring about on local society, and to promote community participation and empowerment in the programs of ground water management and water right management in the Demonstration Projects. According to the Project contents and the socio-economic characteristics of the Hai Basin, the SA was particularly focused on the rural areas outside Beijing and Tianjin municipalities where about 80-90 percent of the Project population in the related provinces live while lacking effective measures to protect themselves from water shortage and pollution. Such focus of the SA made it more pointed and meaningful in steering the Project design.

The SA was commissioned to a qualified sociologist from the China Agricultural University as SA. In accordance with the Bank requirements, including methods and contents of social analysis (Social Analysis Sourcebook), the SA consultant prepared a work guideline and first did a desk review, collecting and analyzing the secondary data and information of the Basin socio-economic background, water related crisis and current anti-crisis activities, legal and policy environment, as well as the potential Project stakeholders at various levels and their interests in comparison with the proposed Project concept. Based on this initial review, the SA fieldwork was designed and conducted through exemplary qualitative data gathering using the participatory approach and quantitative data collection with appropriate sampling methods. As the culminating activities of the SA, stakeholders workshops were carried out at village, township, county and municipality levels for validating, verifying and communicating the SA concerns and results. A SA report was completed and attached to the draft Project Implementation Plan (PIP).

The Project areas were exemplified with two typical counties in Hebei Province, Cheng-an and Shexian, for the SA field surveys and case studies, where water was extremely short and severely polluted, which has affected local economic production. Moreover, in terms of the topographic features and groundwater quality, these places were also demarcated into some plain and mountainous areas with different irrigation

schemes, and some brackish and fresh groundwater zones facing different water usability constraints. These represented the multiple characteristics of the Project coverage and reflected the complex socio-economic diversities in the Hai Basin for the SA to analyze. Table 1 (below) summarizes the basic conditions of water resources and quality and the related socio-economic situations in the Project areas in Hebei Province.

Table 1
Basic Water Conditions and Socio-Economic Situations in Hebei's Five Key Counties

	Plain area (Cheng-an, Guantao, Linzhang and Feixiang Counties)	Mountainous area (Shexian County)
<u>Water resources</u>		
Surface water	Very little or almost no surface water, "all rivers dried up, and all water polluted".	High proportion of surface water, mainly used for irrigation; More conservancy engineering works (middle – small scales mainly).
Underground water	Deficient in shallow layer of freshwater with low quality; Large area of shallow brackish water, requiring the use of deep layer freshwater for drinking and irrigation; Severe deficiency due to long term over exploitation.	More water resource in volume, freshwater, uneven distribution, with difficulties.
Industry and agriculture use	Low percentage of industrial use, more than 85% by agriculture.	High use degree, with large proportion and concentrated distribution of industry use.
Fluorine and Iodine	There are high fluorine concentrate areas with different degrees.	Better water quality, lack of iodine in some areas
<u>Water environment</u>		
Agricultural pollution	Area pollution by chemical fertilisers and pesticides exists extensively and can be quite serious, esp. nitrogen and phosphorous to shallow underground freshwater (mainly in the plain areas); Caused secondary salinization of arable land soil (plain area).	
Industrial/living pollution	Very limited wastewater treatment for industrial and domestic wastewater, more severe in mountain area (Shexian County).	
Cross boundary pollution	More serious than mountain areas.	Entering surface water deteriorated in quality, the pollution concentration increased.
<u>Agriculture</u>	Wheat and corn as the main crops; More cotton and vegetable production compared with the mountainous area; More difficult to adjust cropping pattern due to market factors.	Wheat and corn as the main crops; more fruit production; More structure adjustment was made with more water and soil conservation and converting cultivation to forestry.
<u>Farmers' non-land income sources</u>	Pig rearing is the principal animal husbandry production;	Small sized and scattered animal rearing;
<u>Rural industry structure</u>	More out-migration as wage labour, construction, trade, etc.	More TVEs of construction material and mining, more local wage labours.

Each of the items and the related findings in the table were detailed and elaborated in the SA analyses of the sampling cases. In the plain area, most agricultural and industrial water uses, as well as the domestic water uses, relied on groundwater; while in the mountainous area, irrigation districts were served mostly with the surface water. Different water resources resulted in differentiation of community livelihoods but all water resources were significantly polluted. In the plain area, the groundwater was drawn from the shallow layer in the freshwater zone and from the deep layer in the shallow brackish water zone (brackish water in this zone is generally not suitable for drinking or irrigation). With overdraft, however, the freshwater in the shallow layer became almost exhausted while the deep groundwater has very limited recharge resulting in very rapid drawdown. Local people, from county leaders to farmers, were well aware of the water problems, and they were even panicking about their deteriorating situation, and hence very keen to change.

Beilangpu village in Cheng-an county, for example, had 100 wells irrigating its 450 ha of farmland. The wells were deployed much more densely (about one per 2 ha of land) than they were supposed to be (about one per 7 ha) because of competition in irrigation without unified management and cooperation. As a result, in most cases no more water could be drawn from one well if two neighboring wells being pumped simultaneously. Still worse, farmers might have to enlarge the wells and buy bigger pumps more frequently (almost every year in the worst cases) due to rapid water table lowering (in some cases by about 2 meters annually and it was presently as deep as 42 meter in the fresh shallow layer zone). They also had to take more and more time and pay for more and more electricity to irrigate the same land. Farmers said, with this tendency, it would not take too long that all the 100 wells might have to be abandoned because the expense installing deeper wells and larger pumps was too high. Farmers hence wanted to save water in order to stabilize their livelihoods and secure their future. In fact, they had some ideas to do so, such as using pipe irrigation, cultivating dry crops, and organizing themselves under a unified irrigation management systems for better cooperation. They practiced some of the ideas, such that they cultivated 4000 mu of cotton taking about 60 percent of the village land. Yet this was not good enough for either water saving or increasing their incomes, and they wanted to do more. So when they heard of this proposed Project, they were very enthusiastic and participated energetically in the discussions.

The SA found that there were some other local projects going on for natural resource rehabilitation, such as the programs of Returning Unarable Farmland to Forestry, Integrated Watershed Management, etc. But for most of the Projects as well as the local development planning in general, decisions were usually made top-down and communities and farmers had not much say but merely collected-funds and provided labor inputs. Even village leaders rarely had voices in Project choices and decision-making processes. As a result, the rehabilitation measures were limited. The World Bank supported Water Conservation Project was also implementing in some of these areas with significant bottom-up aspects. WCP pays great attention to institutional management reform as one of its three major measures for “real” water saving (the other two measure are improvement of irrigation systems and improved agricultural techniques), by encouraging farmers’ participation in local irrigation management through organizing Water User Associations (WUAs). The WUA as an effective participatory means was hence also introduced and adopted in this Hai Basin Project design, based on the rich experience from WCP and other Bank aided rural development projects nationwide. With a systematical review of the rehabilitation effectiveness on the basis of local community and farmer consultation, the SA synthesized some potential rehabilitation measures as shown in the table below, in comparison with other ongoing development programs.

Table 2
Local Rehabilitation Measures Synthetic Analysis

Identified measures	WB WCP	GEF Project	Local
Reform the evaluation system of the leaders' performance, and strengthen their environment awareness			
Establish coordination and management mechanism among the relevant agencies	*	*	
Formulate and implement plans for integrated management of water resource and environment Scheme of integrated management of surface water Scheme of well irrigation management with quota of well amount and water volume	* *	Formulate plans for integrated management of water resource and environment	
		Improve or establish and operate monitoring system for underground water	
		Improve or establish and operate monitoring system for surface water	
		Integrated management and control of underground water exploration	
		Prevention of agric. Pollution	
		Management of water use right and admission of digging well	
Formulate necessary local regulations and water rights systems	*	*	
Raise relevant agencies' abilities of administrative guidance and technical service		Capacity building of water resource and environment management	
Improve the techniques and equipment of enterprises to save water and treat pollution		Engineering work for polluted water re-collection and re-use	
Improve engineering works of irrigation systems	Underground pipe project, drip irrigation	Works and devices to prevent leakage	
Establish or improve irrigation management system	Water Users' Associations	Organise WUAs	
Adjust cropping pattern and adopt water saving techniques	Agronomic measures (plastic film, returning straw to field, etc.)	Water saving techniques	Convert unarable farmland to forestry
Convert cultivation to forestry, prevention of erosion			Integrated watershed management

Note: * mark means that activities would be included in this area.

To undertake these rehabilitation measures, the SA stressed a bottom-up approach to the Project design and implementation. For the Project objectives, it was obvious that there would not be a sustainable use of the water resources unless the users wanted to do so; and there would not be a sustainable socio-economic development unless its beneficiaries participated in the development process with a sense of ownership. For this purpose, the SA recommended the piloting of the community-driven development (CDD) approach as a good way to achieve a win-win situation of both natural resource management and local socio-economic growth in the Project context.

The primary objective of the CDD approach to be adopted would be to enhance the capacities of communities (especially the poor) to implement development programs of their own choice while improving their access to social and productive services, resources and infrastructure. Through household interviews, focus group meetings and stakeholder workshops on various levels, both the Project and local people confirmed to each other the significant roles of community participation and empowerment in improvement of the local situation. The SA actually did a pre-survey and information dissemination for some CDD pilots under the Project's demonstration project of water resources management and water right management; and particularly highlighted the commitment and capacity building of community participation in these programs at current stage, especially for those poor and vulnerable groups. Following the SA survey and analysis, the Project will prepare and plan for the CDD adaptation to the demonstration pilot sites in the following aspects:

- Understanding of the objectives of the CDD exercise in the Project context (links to intended social and economic development outcomes and impacts of the Project), the needs and meanings of incorporation of CDD into the demonstration projects, from both the perspectives of local communities and the Project design/management;
- Investigation of the pilot's situations of water crisis, local socio-economic conditions, natural resources, demographic information, social diversity and gender, important contingencies, and legal, regulatory and policy environment; identification of stakeholders and analysis of their behavior and roles in relation with the Project/CDD activities;
- Institutional capacity assurance and capacity building for the CDD approach (from the village to county levels); creation of enabling environment for stakeholder participation (with different gender roles); technical training framework on community level;
- Community mobilization and involvement through PRA (participatory rural appraisal), including community members in all social strata and especially those in the poor and vulnerable groups; farmers' commitment and capacity building (including training programs and leaning by doing), participation mechanism establishment;
- Community/village (or in a township scope if preferred) development plan – its contents and drawing procedures based on the PRA outcomes; combination of water resource management with community socio-economic development action plan – to be made with a bottom-up approach involving and ensuring communities themselves in all aspects of the development activities' design, financing, management, implementation, monitoring and evaluation;
- CDD budget estimation, implementation tactic framework and timetable;
- CDD participatory monitoring and evaluation mechanism; clear accountability (to local people/farmers and authorities) and aligned incentives through transparent and flexible processes; and
- CDD outcomes expected.

In the SA exercise, CDD was thus determined to be an effective means to either achieve Project goals or avoid/minimize potential social and cultural risks, though there still is a good deal of work necessary to prepare and implement a successful CDD demonstration pilot in its adaptation to a Chinese society where there was no previous experience of this kind. More trainings in this regard was proposed as well. Moreover, because of the SA was a reiterative process during the Project life cycle, it also set forth the monitoring and evaluation indicators for future assessment of the CDD participatory nature in particular and the Project achievements in general.

On the whole, as an integrated method to incorporate participation and social analysis into Project design and implementation work, the SA helped to ensure the Project social development objectives were well set and the proposed means to achieve them were appropriate, in light that this Project proved to be eagerly expected and strongly supported by local communities and farmers as its primary beneficiaies. As an integral part of its overall strategic objectives, this Project was set to demonstrate a win-win achievement of both sustainable use of water resources through the integrated water and environment management, and sustained community livelihood development via local institutional and participatory capacity building.

