

# PROJECT DEVELOPMENT FACILITY

## REQUEST FOR PIPELINE ENTRY AND PDF BLOCK B APPROVAL



AGEN **GEF** D:

**GEFSEC Project ID:**

**COUNTRY:** China

**PROJECT TITLE:** SHANGHAI

**AGRICULTURAL AND NON-POINT  
POLLUTION REDUCTION PROJECT  
(SANPR)**

Related Program: World Bank/Global  
Environment Facility Strategic  
Partnership Investment Fund for  
Pollution Reduction in the Large Marine  
Ecosystems of East Asia

**GEF AGENCY:** World Bank

**OTHER EXECUTING AGENCY(IES):**

**PDF B DURATION:** 18 months

**GEF FOCAL AREA:** International Waters

**GEF OPERATIONAL PROGRAM:** OP10: Contaminant-based;

**GEF STRATEGIC OBJECTIVES:** SO1 - catalyzing implementation policy reforms and  
pollution reduction measures; SO3 - demonstrating, testing, and replicating innovative  
ways to reduce land-based pollution

**ESTIMATED STARTING DATE (PDF B):** SEPTEMBER 2006

**ESTIMATED WP ENTRY DATE:**

**RECORD OF ENDORSEMENT ON BEHALF OF THE GOVERNMENT:**

Date:

Ministry of Finance, China

This proposal has been prepared in accordance with GEF policies and procedures.

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Date: October 26, 2006

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FINANCING PLAN (US\$)	
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Project ( <i>estimated</i> )	5,000,000
Project Co-financing	26,870,000
PDF A*	
PDF B**	350,000
PDF C	
<i>Total PDF Financing:</i>	350,000
PDF Co-financing	
Local government	
<b>Total PDF Financing</b>	<b>350,000</b>

## **PART I - PROJECT CONCEPT**

### **A - SUMMARY**

#### **1. STRATEGIC FRAMEWORK**

East Asia's rapid economic growth has been accompanied by significant environmental degradation. Land-based pollution of the region's seas, coasts, estuaries and rivers is one of its most severe environmental problems. In order to help the littoral states address this problem, the GEF and World Bank, in collaboration with other partners such as the GEF/UNDP Partnership for Environmental Management of the Seas of East Asia (PEMSEA), have established a *Strategic Partnership Investment Fund for Pollution Reduction in the Large Marine Ecosystems of East Asia* (the Fund). The Fund is the financing component of the emerging *Strategic Partnership for Sustainable Development of the LMEs of East Asia*, which aims to address all aspects of sustainable development, including pollution. The objective of the Fund is to scale up investment to reduce land-based water pollution in coastal areas and major river basins. The Fund would help remove barriers to pollution reduction by demonstrating and helping the World Bank in adopting innovative investment projects that reduce pollution, and enabling the replication and dissemination of non-traditional pollution-reduction practices. The Fund offers a good opportunity for close collaboration with the GEF/UNDP *Regional Programme on Building Partnerships in Environmental Management for the Seas of East Asia*, implemented by PEMSEA. The World Bank's *Shanghai Agricultural and Non-Point Pollution Reduction Project (SANPR)* is proposed for GEF co-financing from the Fund.

In the case of China, with economic development and improvements in standards of living, increasing attention has been and continues to be paid to environmental pollution. In the past, environmental protection has been focused principally on the central city areas and comparatively less effort has been exerted in the rural areas, which account for 90% of China's total area. Pollution in the rural areas is diverse and largely from non-point sources, which makes its effective control more difficult. For a long time, it has been an important contributor to overall pollution of land and watercourses, and therefore has significant indirect impact on the marine environment.

Facing the East China Sea in the east, and bordering the Changjiang River (Yangtze) in the north, Shanghai is located at the mouth of the Changjiang Delta. (See Annex 2 for Basic Data on Shanghai, and Maps.) It is one of China's most important economic centers. Unlike other international metropolises, such as Hong Kong or New York, Shanghai Municipality consists of a core city, six Outer Districts and one County (Chongming Island). Approximately 4,000 of its 6,300 square kilometers are farmland. The core city is only 662 sq km, or about 10% of the total municipal area. Compared with industrial pollution abatement, non-point pollution treatment in the rural areas is a difficult problem in Shanghai's water environment because the pollution covers a large area and is of significant quantity. Non-point pollution, such as domestic animal waste (DAW), domestic sewage from rural areas, crop wastes and residue of chemical fertilizers, is the main pollution source for the Shanghai water environment, causing significant negative impact on the East China Sea. Studies during project preparation will make a more accurate inventory of each of the sources and the nature of the pollution.

The rural areas (largely the agriculture sector) in Shanghai account for some 60-70% of the loads of nitrogen, phosphorus and organic matter discharged to watercourses. Pollution in the rural areas comprises four main components:

### **1) Pollution from Domestic Animal Waste (DAW)**

In Shanghai rural areas, the main source of non-point pollution is from domestic animal waste (DAW). Investigations during the last five years have found that about 7.6 million metric tonnes (mt) of DAW are generated annually from about 1,000 domestic animal farms. About 40% of DAW enters the water environment due to lack of effective DAW treatment facilities; this is either through direct discharge to watercourses or from stormwater discharges when wastes are stored outside houses or in farmyards. It has been estimated that annually about 106,000 mt of COD, 55,400 mt of BOD, 18,000 mt of total nitrogen (TN) and 4,300 mt of total phosphorus (TP) enter the water environment because of ineffective control of DAW. This pollution load is equivalent to that of the domestic wastewater from a population of at least 4 million.

### **2) Pollution from Domestic Sewage in the Rural Areas**

Although the farmers' living standards have steadily improved and the urbanization rate of the area has reached 62%, the domestic wastewater treatment rate in the rural area is below 40%. Some 500,000 m<sup>3</sup> of partially treated domestic sewage are discharged daily into the water environment in Shanghai. This is the second largest pollution source in the rural areas.

### **3) Pollution from Farming Straw**

With the increased and now widespread use of natural gas in Shanghai's rural areas, straw has lost its function as fuel as used in the past. Every year, about 1 million mt of straw is left on the farmland and finally enters the water environment. The pollution load from straw in mg/l BOD will be determined during preparation.

### **4) Pollution from Chemical Fertilizers and Chemical Pesticides**

For a long time, the application rate of chemical fertilizers and chemical pesticides used in agriculture has been at a very high level (about 550 kg of net N per ha/yr, and some 30 kg of net chemical pesticides per ha/yr). The level of both chemical fertilizer and chemical pesticide usage represents significant over-dosage; it not only causes the loss of about 10% of the chemical fertilizer and the degradation of farmland, but also threatens the safety of the agricultural products and the water environment. Fertilizer run-off is the fourth largest non-point pollution source.

Shanghai attaches great importance to environmental protection and annual investment in pollution control is more than 3% of GDP. In the period 2000 to 2005, Shanghai carried out two "Three-Year Environmental Protection Action Plans" targeting both urban and rural pollution. By the end of 2005, the centralized treatment of wastewater in the central city had reached 70% and that in the rural areas had reached 46%. During the three years from 2003 to 2005 Shanghai enhanced the control of agricultural

activities in the Upper Huangpu catchment, where the strategic water abstraction for the majority of Shanghai is located. Some 259 domestic animal farms within the prohibited areas were closed and relocated, thus reducing pollution loads and avoiding the use of 70,000 mt of chemical fertilizers and 735 mt of chemical pesticides in the catchment. Starting from 2006, Shanghai will carry out its third “Three-Year Environmental Protection Action Plan”. The target for the agricultural pollution treatment in this Action Plan is to increase the treatment and recovery of DAW as a resource and reduce the dosage rate of nitrogen fertilizer by 10% and that of chemical pesticides by 8%.

Historically, the primary focus of pollution control initiatives in the Upper Huangpu has been the protection of river water quality largely to safeguard urban water supply. However, this has been mainly by closure, and to a degree relocation, of farming activities further downstream or outside the immediate catchment. Accordingly, Shanghai proposes to develop Chongming Island, currently largely undeveloped, as a major agricultural area. However, unless this is accompanied by the effective control of pollution at the new farms and other agricultural areas, the problem of pollution of the East China Sea will remain and will even be aggravated. Effective control of agricultural pollution in Chongming Island is also critical to avoid pollution of the East China Sea.

While a few very large pig and duck farms are being established on the island, many farms are relatively small and farmers lack the funding and operational expertise for effective DAW management. For the new large farms, advanced pollution control approaches need to be ensured, including through “waste-to-energy” applications, where applicable.

Therefore, Shanghai is applying for GEF funds under the Strategic Partnership Investment Fund for Pollution Reduction in the Large Marine Ecosystems of East Asia to carry out demonstration projects in both Chongming Island and in the Upper Huangpu Catchment Area with the principal ultimate objective of reducing the rural/agricultural pollution load to the East China Sea. The approach will be to develop new and innovative approaches to DAW treatment and resource/energy recovery at both existing and new farms, and to improve rural agricultural area non-point source pollution control. It is estimated that the successful implementation of the demonstration project will greatly accelerate the rural area pollution control in Shanghai and will directly bring about more than 50 million USD investment in environmental protection.

Shanghai Municipal Government (SMG) is submitting this Shanghai Agricultural and Non-Point Pollution Reduction Project (SANPR) to the GEF in mid 2006. The project as a whole is based on a comprehensive and holistic approach to the pollution problems of the rural areas and agriculture sector in Shanghai and targets an overall reduction in the pollution load from the sector on the East China Sea.

Implementation of the project has the following strategic objectives:

(1) to support China's sustainable development strategy, with the requirements of strengthening the construction of new rural areas suggested by the 16<sup>th</sup> National Representative Congress of the Communist Party of China (CPC), and support the construction of Chongming into an eco-island, encouraging the development of a circular economy and eco-agriculture, and promoting the construction of small towns; and

(2) to develop, test and demonstrate innovative approaches to address two main sources of non-point pollution sources, DAW and domestic sewage in rural areas, thereby mitigating marine pollution.

## **2. PROJECT RATIONALE**

This project intends to use the GEF funds to implement a demonstration project comprising a range of innovative solutions targeting the specific key rural agriculture sector pollution problems and covering: (i) comprehensive management (collection, treatment and resource recovery / waste-to-energy) of domestic animal wastes; (ii) rural area domestic wastewater treatment; (iii) recovery and use of straw as a resource, and (iv) a reduction in the use of chemical fertilizer and chemical pesticides.

The project is designed to explore, pilot and demonstrate innovative solutions in two different environments, with each case being designed to promote a mutual sharing of benefits. The two environments are:

a) **An Immature (Green Field) Agricultural Environment** in the newly developed/green field environment of Chongming Island, where traditional farming methods have not taken hold, and innovative solutions can be explored in an unbiased manner. However, Shanghai has major plans for Chongming to become an important center for agricultural production for the city, and by 2010 it is expected that 25% of its animal production will be located in Chongming; and

b) **A Very Mature (Brown Field) Environment** in the Upper Huangpu river catchment, where longstanding traditional and seriously polluting farming methods are engrained in the community, and new approaches are vitally needed, both for local use and as a demonstration for use elsewhere. In particular there is a prohibition zone where certain agricultural activities are not permitted and there needs to be a change in the nature of agricultural or other economic activities to provide low-pollution employment opportunities.

During preparation, the program will investigate, explore, pilot and as appropriate select and combine pollution management technologies available in China and internationally, seeking overall least-cost approaches and options. In addition the project would seek to strengthen dissemination of information and to provide training within the agricultural community in the project areas; in each case the programs would be designed to be readily suitable for replication elsewhere in Shanghai, China and beyond.

The result of the preparation phase would be a clearer idea of the pollution problems to be addressed, their nature, quantity, load, and geographic distribution, and of the technologies to use. The implementation phase would serve as a demonstration of the approaches and technologies applied.

Of note is that Shanghai is at the stage of preparing the 2010 Expo, which will need to demonstrate Shanghai's state-of-the-art environmental management skills and experience. Timely GEF support is thus of key importance to Shanghai. The centralized treatment of DAW project and the domestic sewage treatment project through wetland on the Chongming Island are currently unable to commence due to inadequate funding in what is among the least developed areas of Shanghai, although these projects are listed in Chongming's 11<sup>th</sup>-Five Year Plan and in the new "Three-Year Environmental Protection Action Plan".

The rationale for selection of the two contrasting Green Field and Brown Field environments and related sub-projects to be implemented are as follows:

#### **1. Chongming Island - Green Field environment.**

- (a) Chongming Island is one of the new production bases in Shanghai. However, many of the small and medium-sized animal production farms and many individual breeders do not have DAW treatment facilities and the DAW is washed away, causing water pollution. According to the plan and environmental assimilation, many farms in Shanghai will be closed and relocated there (e.g. some of the domestic farms in the water source protection areas of the Upper Huangpu have already been relocated here). As mentioned above, by 2010, one-fourth of the domestic animal production in Shanghai will be located here. The GEF-supported Fund would develop and demonstrate cost effective and state-of-the-art treatment and utilization options with low input, high treatment efficiency and convenient operation.
- (b) Chongming is a less developed area of Shanghai, but is developing faster. In order to mitigate and prevent pollution during its development, it is necessary to strengthen environmental protection from the very beginning. Regarding the typical pollution sources in the rural areas, such as DAW, domestic sewage, and straw, it is necessary to get GEF financial support to carry out a demonstration project to promote an approach that uses low level of input but can comprehensively address various kinds of pollution.
- (c) In 2005 through a World Bank loan, Chongming started construction of a relatively modern wastewater collection and treatment system in its major urban area. Apart from this, it has no other complete wastewater collecting and treatment systems in its area of more than 1,300 km<sup>2</sup>, and indeed it is not

economic to construct and operate extensive centralized systems for the largely rural areas. Therefore, it is necessary to explore and promote innovative, more appropriate treatment options such as integrated artificial wetlands suitable for the diverse nature of the expected development of the island.

## **2. Upper Huangpu - Brown Field environment.**

The rationale for selecting the proposed Brown Field sites in the Upper Huangpu Area as a demonstration site for the projects of comprehensive DAW treatment and rural domestic sewage treatment, the use of straw as resources, and other rural area pollution control technology and training, is as follows:

(a) In the Upper Huangpu Area, there are still a number of domestic animal farms in the prohibited area, and some of these are large. For example, the Bright Milk Company plans to remove all its eight cow farms (1,900 cattle) in the Huangpu River Water Source Protection Zone and one cow farm (2,300 cattle) from the prohibition zone to Langxia Agricultural Park in Jinshan District for the centralized animal production. On completion it will be the largest cattle production base in Shanghai.

The objective is to use GEF funds to provide treatment for DAW both from the farm itself and as far as is practicable from smaller nearby farms from which waste would be transported to the facility. This would provide economies of scale and would offer a facility for cost-effective DAW treatment for smaller farms where it would otherwise not be affordable or in some cases even not practicable.

(b) According to the plan, the Upper Huangpu Water Source Protection Zone belongs to the prohibited area for livestock production and the residents in this area must change to other forms of agricultural activity if they are to remain within the agricultural sector. GEF financial assistance would be used to promote low-pollution agricultural technology, e.g. environmentally friendly straw treatment/reuse technology (to avoid the straw being put into the rivers or being burnt), bio agricultural pesticides, organic chemical fertilizer and soil improvement.

(c) The rural area has a small population spread over a large area and large scale centralized wastewater collection and treatment is not economic. Therefore GEF funds would be used to explore and promote simple domestic wastewater treatment technology (e.g. garden type artificial wetland) which needs limited energy and skilled labor inputs and which is more appropriate for rural areas.

(d) GEF funds would also be used to assist rural residents, in the form of training and other short-term practical assistance, to adapt to the transition from livestock farming to alternative forms of employment in the agricultural sector.

## **3. OBJECTIVES**

The overall objectives of the GEF project are to:

- (i) test methodologies to reduce land-based pollution from the rural/agricultural sectors of the coastal areas and the East China Sea;
- (ii) test and replicate cost-effective and resource-efficient agricultural sector pollution control and waste management; in particular management of livestock farm waste would as far as possible be based on conversion of waste to useable by-products and/or on energy recovery through the use of waste-to-fertilizer and waste-to-energy technology;
- (iii) promote and replicate methodologies appropriate for the cost-effective management of wastewater from diverse rural communities;
- (iv) protect water resources and enhance access to sanitation in rural areas; and
- (v) encourage and facilitate coastal conservation.

#### **4. OUTPUTS**

##### **(1) The Chongming Green Field Sites**

###### **(a) Localized DAW Comprehensive Treatment Project**

- 1) demonstration of animal liquid waste treatment in a localized way;
- 2) demonstration of treatment system for pig production waste;
- 3) duck waste treatment system demonstration.

###### **(b) Comprehensive Agricultural Waste Utilization Demonstration Project**

Demonstration of utilization of pig solid waste and, pig liquid waste, straw; and local food waste, and waste-to-energy.

###### **(c) Artificial Wetland Sewage Treatment Project.**

Demonstration of phased construction of one or more artificial wetland sewage treatment plants.

Each large facility will as far as possible treat waste from the respective farm at which they are located, and serve as regional facilities for reception and treatment for waste transported from smaller farms, where the scale of operations is too small for comprehensive treatment to be affordable, or for expertise in treatment plant operation to be available.

##### **(2) The Upper Huangpu Area**

###### **(d) Comprehensive Pilot Dairy Farm Waste Treatment and Conversion to Fertilizer**

Treatment of liquid waste and production of organic fertilizers.

**(e) Promote and disseminate state-of-the-art environmentally friendly agricultural production techniques and pollution control options.**

This would include to research, disseminate, promote and apply four new techniques in agriculture:

- organic fertilizers; accurate fertilizer application technique according to the soil conditions,
- safe chemical fertilizer with high efficiency and low toxicity
- bio-pesticides; insect killing lamp, insect nets, pheromones, physical prevention and treatment technology, and
- plant disease and insect pest and pollution monitoring network.

The preparation supported by the PDF B funds, would determine the best combination of the above techniques and methods to be funded by the GEF project.

**(f) Strengthen the environmental protection dissemination and training in rural areas in Shanghai.**

This would comprise establishing a scientific and technical education and training center for rural non-point source pollution prevention and treatment, and holding two large agricultural and non-point pollution prevention and treatment technique and experience exchanges, one domestic and one international.

It is anticipated that a garden type artificial wetland domestic sewage treatment demonstration project will be built with a capacity of 1,000 m<sup>3</sup>/day suitable for the farmers' living areas. A project-supported environmentally friendly 100 hectares would demonstrate means of returning straw directly to farmland and to reduce the utilization of chemical fertilizers and pesticides. The results of this would have widespread replicability, in the Upper Huangpu, on Chongming, and in coastal and inland areas of China generally, where both straw and pesticides present major environmental and economic challenges.

**B - Country ownership**

**1. COUNTRY ELIGIBILITY**

China is eligible for GEF assistance under the International Waters Focal Area through the World Bank.

**2. COUNTRY DRIVEN-NESS**

This demonstration project is to enhance China's sustainable development strategy and strengthen the construction of new rural areas suggested by the 16<sup>th</sup> National Representative Congress of the CPC. It will address the need to develop a circular economy and eco-agriculture, help to speed up the construction of Shanghai's

small towns, help to build Chongming into an eco-island, help to protect the water source of the Upper Huangpu, and reduce pollution of the East China Sea. This project has the support of the relevant agencies of SMG. It will help Shanghai to learn and apply advanced international experience and creative approaches in agricultural and non-point pollution treatment, and adapt them to conditions in China, taking local development requirements into account. Local communities have been notified of and briefed on the project through newspapers, libraries and consultative meetings and have expressed their support for it. It is consistent with the transboundary diagnosis and strategic recommendations of the PEMSEA-facilitated SDS-SEA, which China has endorsed.

## **C. PROJECT AND POLICY CONFORMITY**

### **1. PROJECT CONFORMITY**

#### **Conformity with OP 10:**

This demonstration project is consistent with the GEF's Operational Program (OP) 10, the Contaminant-based International Waters OP, in that it will demonstrate best practices to overcome barriers to reducing land-based contamination of an international water body, the East China Sea. It will address four pollution sources (DAW, domestic sewage, agricultural wastes and leached chemical fertilizers and pesticides applied in unnecessarily high amounts to farmland) and address them using innovative methodologies, with the aim of encouraging the replication of these methodologies. The implementing agency is seeking GEF financial assistance to prompt the smooth implementation of this project at a more rapid rate than would occur if not for the GEF funds.

#### **Conformity with overall Fund criteria:**

The project is consistent with GEF Strategic Objectives (SO) 1 and 3 for the International Waters Focal Area.

With respect to Objective 1 (*catalyze reforms and investments*), it will facilitate the efforts of a nation that signed the *Putrajaya Declaration of Regional Cooperation for the Sustainable Development of the Seas of East Asia* to mobilize financial resources to implement policy/institutional reforms and stress-reducing investments to address a priority transboundary water issue (land-based pollution of a shared water body) that is highlighted in the Declaration.

With respect to Objective 3 (*undertake innovative demonstrations*), the project is a demonstration project, which will promote the activities (including investment) for solving four pollution sources to waters in the rural areas and control the land surface and ground water pollution that contaminate an international water body. The project will demonstrate certain creative mechanism and technical solutions that will help financially constrained communities apply environmentally responsible sewage treatment, contributing to the reduction of contaminants from land-based activities.

In addition, Chongming Island, which is one of the proposed project sites, is located at the mouth of China's Changjiang River. It is an important habitat for animals (especially for birds) and has a vast wetland and shallow water. Implementation of the project will have great importance in helping to protect biological diversity, and conserve and rehabilitate the ecosystem related with the international waters.

Finally, the project would contribute to improving water sources and sanitation, consistent with the World Summit on Sustainable Development's Plan of Implementation.

## **2. PROJECT DESIGN**

### **2.1 Problem Statement**

#### **1. Chongming Island**

Chongming Island in Shanghai is located at the mouth of the Changjiang River and has a population of 630,000. It is expected that by 2010 it will have 25% of the animal production units in all of Shanghai. At present, Chongming is among the least developed areas of Shanghai. Owing to the limitations from its location and transport conditions, and because of its underdevelopment and scattered population, the majority of Chongming Island is lacking comprehensive wastewater collection and treatment systems. Also, it is not economical to construct and operate centralized sewage collection and treatment systems. There are numerous small and medium sized livestock farms, and many individual producers. Chongming is in particularly great need of small sized DAW treatment facilities, which use low input, are highly efficient and are easy to operate and manage. The subprojects proposed are facing the following main problems:

- (1) There is no DAW treatment facility in the seven livestock farms, which have 17,000 pigs and 1,150 cows, located within 10 km around the East Chongming Modern Agricultural Park. Furthermore, the planned pig production demonstration zone (50,000 pigs) and the duck production demonstration zone (1.8 million ducks) do not have any corresponding DAW treatment facilities either.
- (2) Qianwei Village of Shuxin Town in Chongming is a famous demonstration site for new rural area construction in Shanghai. All the typical agricultural surface pollution sources exist there, such as domestic sewage, DAW, and agricultural wastes. A detailed description of the type and quantity of waste produced (e.g. BOD, N and P) will be established during preparation. At present, it has a small comprehensive treatment and utilization facility of experimental nature to treat all kinds of pollution and to use the waste as a resource to produce gas and organic fertilizer, and to digest straw and other wastes. This facility will be expanded to meet new development requirements. It is suitable as a demonstration case for

comprehensive waste treatment and use of waste in rural areas. The results would be widely disseminated for replication in other areas.

- (3) Chenjiazhen Town is located at the east end of the Chongming Island and faces the east seashore natural protection zone of the Island (wetland/bird sanctuary). It is one of the towns in Shanghai's strategic concept of "one city, nine towns." According to the plan, Chenjiazhen Town will be constructed into an integrated town consisting of Yu'an community, an international eco-community, a forest business zone, and an international advanced educational zone. At present, the Yu'an community has completed its planning and started phased construction. It is estimated that there will be a population of over 50,000 in this community in the not too distant future. Because of the phased development and scattered residences, it is not suitable to build any centralized wastewater treatment plant.

## **2. Upper Huangpu Area**

The Huangpu River is the largest and longest river in Shanghai. It receives the water from the Jiangsu and Zhejiang provinces in the west and runs east towards the East China Sea. It is the life river of the Shanghai people. Approximately 70% of the drinking water for the municipality comes from the Huangpu River. Therefore, the Upper Huangpu area located in the west of Shanghai includes Shanghai's drinking water source protection zone, which covers 559 km<sup>2</sup> of Jinshan, Qingpu, Songjiang and Minhang districts.

In order to protect the drinking water source of the Huangpu River, since the 1980's, Shanghai Municipal Government has paid great attention to pollution treatment and water environmental protection within the water source protection zone, and has invested a lot of capital to address the main industrial polluters and to relocate agricultural non-point pollution sources (the livestock farms). While this has achieved good results, the main pollution to the water environment of the Huangpu River comes from the non-point pollution sources in the rural areas, especially the change of life style and production in these areas, e.g. scattered residences have moved to more centralized residences and small towns, electricity and liquid gas have replaced biofuels (straw) for cooking, some rural labor has changed from farmland to industry and other business for work, and the use of chemical fertilizers has increased due to the relocation of livestock farms (which used to produce organic fertilizers) to more distant zones. All this has generated new pollution to the water environment. In addition, in the Upper Huangpu Area, beyond the water source protection zone, there are animal production farms in great need of DAW treatment facilities. These factors keep water quality of the Huangpu River at a low level. Some important indicators, such as nitrogen and phosphorus, have even continued to decline. The main causes are as follows:

- There are still a number of livestock farms in the Upper Huangpu Area (outside the special protection zone) and they lack DAW treatment facilities.
- Although construction of small towns for farmers' centralized residence makes the land use more rationalized, it also centralizes the domestic sewage, which in the past was "self-purified" under the scattered residence conditions. Due to lack of economical and proven sewage treatment technology for rural areas, almost all domestic sewage from the farmers' centralized residential quarters and the small towns lack the necessary sewage treatment. The domestic sewage tends to discharge directly into the rivers.
- The water source protection zone of the Upper Huangpu River is the production base for grain (rice and wheat) and edible oil crops. The straw used to be an important fuel for cooking, but with the improvement of the living standard of the rural residents, and the urbanization, this cooking fuel is gradually and completely replaced by electricity and liquid gas. This makes the straw lose its main function and instead is left in the farmland. It finally ends up in and pollutes the water environment where it is decomposed.
- Due to a lack of labor and nearby organic fertilizer resources (DAW), the farmland increasingly depend on chemical fertilizers. Overuse of chemical fertilizers not only causes the loss of a high proportion of nitrogen and phosphorus and the pollution to the water environment, but also causes farmland degradation, thus increasing plant diseases and insect pests, which create the need for chemical pesticides and herbicides, thus further threatening the safety of the agricultural products and the water environment.

During preparation, the project will establish a pollution baseline against which progress can be measured, by carrying out a detailed study of type and quantity of pollution generated and discharged into the waterways. The parameters would include, at a minimum, BOD, N and P pollutants, as these are most likely to affect water quality in terms of supporting marine life and causing algal blooms.

## **2.2 Baseline Scenario**

Because of the difficulties in treating agricultural surface pollution in rural areas, and in spite of Shanghai's efforts to treat and control non-point pollution sources, there are capital and technical barriers to pollution treatment. So far, there is no non-point pollution treatment project in Shanghai suitable for the features of the rural areas and agriculture, i.e. solutions with high-energy efficiency, low cost and use of the wastes as resources, which could be used as reference and be replicated.

Under the baseline scenario, agricultural and non-point pollution in Shanghai would not be addressed, or would be addressed in a piecemeal and uncoordinated way. The number of livestock units would most likely grow, and the concentration of livestock on each farm would intensify. A coordinated approach towards addressing livestock and other rural area waste would be absent, and pollution loads to the East China Sea would increase. Water and soil quality would continue to deteriorate. Existing efforts to address pollution would be implemented only partly, and over a longer period, and would have low likelihood of replication.

The Shanghai Urban Environment Project, supported by IBRD, is providing wastewater treatment, but only to the highly urbanized Shanghai city center and other core urban areas, and will have little impact in the Municipality's rural areas in the outlying districts. The existence of the District Financing Vehicle (DFV) in Shanghai, whose purpose is to utilize Shanghai's existing project management, financial and technical capacity, which is high, to fund projects in the outlying districts, is a potential means of addressing pollution problems in the districts. However, the current DFV activities are for the foreseeable future oriented towards the larger urban centers in the outer districts. Without a dedicated commitment from a GEF-financed project, it is unlikely to expand to any rural areas.

### **GEF Alternative Scenario**

Under the GEF alternative scenario, GEF cofinancing would give strong support to the Chongming and the Upper Huangpu components under the Shanghai Agricultural and Non-Point Pollution Reduction Project (SANPR). In most part of China, infrastructure investments are far slower in the rural area than in the cities. This situation is even more apparent in the less developed Chongming and the Upper Huangpu Area in Shanghai. With GEF support, Chongming and the Upper Huangpu would be able to implement a number of environmental protection demonstration projects to solve agricultural and non-point pollution problems, and to bring similar projects to fruition on a big scale through replication with local resources. Without the GEF support, it would be unlikely that any new and innovative solutions would 'see the light' in the foreseeable future.

The following are the options proposed to be implemented in Chongming and Upper Huangpu:

#### **1. Green Field Site - Chongming Island**

##### **Component 1: Chongming DAW Comprehensive Treatment Project**

With the development of domestic livestock farming, increasing amounts of waste is generated every year, which has become a big pollution source for the water, the air and the ground. This waste need to be properly treated. The pollution will also harm the health of the people and animals, and at the same time, it reduces the

quality of the domestic animals. This component will support a number of organic fertilizer processing industries, to use the DAW to produce organic fertilizer. It will promote organic fertilizers to replace the chemical fertilizers gradually to rehabilitate the soil environment, developing more ecologically friendly and sustainable agriculture.

This component involves a certain innovation. The technical options are as follows: After the dried DAW passes the first ferment (piled on the soil surface after collected) at the animal farm, the dried waste will be delivered to a treatment center, where it will be blended. During the blending, oxygen will enter, and eco-bacteria and cut straw (supporting materials) will be added and mixed together with the dried waste. It will then be piled and start the second fermentation. High quality organic fertilizer will be made in powder or in particles through a further process after the germs and eggs of insects are killed by high temperature. This organic fertilizer can be further processed, if required, according to special requirements, e.g. for gardening, vines, etc.

A similar innovation is also applied in the processing of domestic animal liquid waste. The technical options are as follows: The liquid waste is collected on the animal farms, and passed gravitationally into an underground anaerobic fermentation system. High quality liquid fertilizer will be made after anaerobic fermentation by a natural aerobe. It will be delivered through networks to the farmland to cultivate crops. The distinguishing features are: use of underground temperature, which ensures an even temperature for anaerobic fermentation, producing good results under normal temperature. No need for heating, and no power is required for the liquid in- and outflow with the designed levels, and thus energy is saved. Because it is underground, crops or flowers can be planted on top. The liquid will not produce any offensive smell after the anaerobic treatment during which the eggs of insects and germs are killed.

In addition, this component proposes an animal production zone concept, which will be a demonstration compared to the traditional animal production methodology for China's vast rural areas. The traditional way of animal production in China is that all the domestic animals are raised by individual families, with human beings and domestic animals living in the same place. Although the traditional animal production method in the rural area has some benefits, such as time saving, it has many disadvantages. For example, it limits the production scale because the domestic animals are kept in a courtyard. In addition, the method is not hygienic. It is easy to have disease cross-transferred between the people and animals, and the environment is easily contaminated by the DAW generated. However, it is difficult to popularize the advanced animal production technology in China. To promote animal production zones to replace the individual producers is one alternative to solve the problem of people and animals living in a same place, solve the courtyard pollution problem, and meet the construction new rural area requirements.

## **Component 2: Eco-Agricultural Waste Resource Comprehensive Utilization Project of Qianwei Village of Shuxin Town in Chongming**

Qianwei Village of Chongming Shuxin Town is an eco-demonstration village. The development target of this village is to become a modern eco-agricultural site with organic agricultural products, comprehensive use of rural waste, and domestic sewage eco-treatment. It will become an ecological demonstration area with three unique bases, i.e. an organic agricultural products supply base for Shanghai's World Expo in 2010, an urbanized eco-agricultural and leisure tourist spot, and a popular national eco-environmental scientific education base. Therefore, this project will have big social influences as demonstration, and will facilitate results dissemination for replication.

The project is innovative in the following ways. It integrates the planting, animal production and waste treatment and utilization into one "cycle". After the agricultural waste and DAW have passed anaerobic digestion and fermentation, it will not only produce cooking gas, but the gas liquid and residues will be used as organic fertilizers. Thus, this can reduce the use of chemical fertilizers for agriculture and prevent surface pollution from being generated.

## **Component 3: Chenjiazhen Artificial Wetland Sewage Treatment Project**

Chenjiazhen does not have a sewage collection and treatment system; it only has a few sewers in the old town area. The sewage from the town and the rural area discharges directly into the rivers nearby, which causes pollution in the adjacent rivers and existing wetland and bird sanctuary and eventually in the East China Sea. In order to solve the sewage discharge problems, the local government plans to construct a large wetland sewage treatment project. The wetland would be integrating the needs of different small towns in the area.

The technical option to be explored would adopt highly efficient flocculation and sedimentation, plus a staged hidden flow artificial wetland technique. The effluent will reach China's Discharge Standard I – B of "the Pollutants Discharge Standard for City and Town WWTW." This staged hidden flow artificial wetland treatment process has three local patents, can produce high-grade effluent, and has low investment and operational requirements, low cost of maintenance and operation, and is aesthetically attractive. The sludge, after being dewatered, will be mixed with the wetland plants cut into pieces and be recycled by application in forestry.

Given the importance of one of the few remaining pristine wetlands and bird sanctuaries in the region, and in the context of Shanghai's overall urban planning concept ("one city, nine towns") comprising an international eco-community and an educational zone, the city would establish a plan and dedicate resources to enhancing

and protecting the natural wetland, and using it for educational purposes. The strategy to protect the wetland would be developed in detail during preparation.

## 2. **Brown Field Site: Upper Huangpu Area**

### **Component 4: Dairy Farm Comprehensive Waste Treatment**

There is a large number of dairy farms in Shanghai. A single company has eight cow farms in Jinshan (2,300 cows) which are located in the Upper Huangpu water source protection zone. All the farms need to be relocated. Developing appropriate technical, institutional and managerial experience for this, drawing on state-of-the-art international experience, would prove invaluable for Shanghai, for the nearby marine ecosystem into which all the corresponding wastes discharge, and for the GEF, as a replicable model, proven on a meaningful scale. It would also significantly reduce pollution in the Upper Huangpu Area itself.

The technical options to be considered would include an IT bio-fermentation technique treatment option, and other best practice techniques. This technique passed technical review by the Shanghai Scientific and Technical Commission in 2005, and is considered as having high potential for Shanghai's agriculture production. The features of this technique are that it is automatic, standardized, with low energy consumption, low cost, and low labor requirements.

The component would carry out a trial of this technique, in parallel with alternative techniques, and initial studies and/or trials during the preparation period would determine if it would be included in the GEF SANPR project.

### **Component 5: Replication of Environmental Friendly New Agricultural Pollution Control Techniques**

#### (1) **Replication of New Agricultural Pollution Control Technique**

For the surface pollution caused by chemical fertilizers and pesticides during agricultural production, the project would select some areas to demonstrate and disseminate effective agricultural pollution control techniques to reduce the utilization of chemicals. The component will commercially promote organic fertilizers (1 million mu); demonstrate accurate fertilizer application techniques (1 million mu/times); replicate the use of safe chemical fertilizers with high efficiency and low toxicity and bio-pesticides (500,000 mu/times), apply physical prevention and treatment technologies for plant diseases and insect pests, e.g. 1 million insect killing lamps, 2,000 insect prevention nets, and 20,000 mu of pheromone. At the same time, the component will upgrade an old chemical pesticide sprayer made in the 1970's and replicate 30,000 new type pesticide sprayers to increase the efficiency of the chemical pesticides. It will also include information dissemination through the media, establish a plant disease and insect pest early warning network in Shanghai and establish a number of

plant disease and insect pest and chemical pesticide monitoring points to strengthen the monitoring of the residues of chemical pesticides.

(2) Environmentally Friendly Agricultural Production Demonstration

Overuse of chemical fertilizers and pesticides causes degradation of the farmland, loss of nitrogen and phosphorus, which pollute the water environment, and threatens the safety of the agricultural products and the water environment. This is a typical problem in the rural area of Shanghai and China's economically relatively developed rural areas along the coast.

The component will establish an environmentally friendly agricultural demonstration project with 100 hectares as the core, where straw will be turned back for farmland use; appropriate organic fertilizer application will be adopted, plant disease and insect pest prevention and treatment will be carried out and crops will grow in a more rational way. The loss of nitrogen and phosphorus and the use of chemical fertilizers will be monitored. The purpose is to reduce the use of chemical fertilizers and pesticides to mitigate the pollution to the water environment.

The project will be carried out mainly by experts from relevant scientific and research institutes and other entities promoting agricultural techniques. Proper amount of relevant foreign experts will be invited to give the technical guidance.

(3) Garden Type Artificial Wetland Domestic Sewage Treatment

Since 2003, the construction of new residential quarters for farmers are important measures in Shanghai Municipal Government's implementation of optimized land use and promoting township construction in its rural area, especially after the national government in 2005 launched the campaign of all-round construction of socialist new rural areas. Since Shanghai is an economically relatively developed area, it will accelerate the construction of the farmers' new residential quarters.

However, due to change of lifestyles, the centralized residences generate a lot of waste. Especially in the Upper Huangpu, where construction of the new residential quarters has happened already, the sewage from the new residential quarters and small towns discharges directly into rivers and pollutes the larger water environment. This has become a major problem, which affects the water quality of the Upper Huangpu, the water source protection zone, and the East China Sea. Therefore, a technique needs to be found, which is economical, efficient and easy to operate, and meet the rural areas' and farmers' technical requirements for their sewage treatment.

This sub-project will adopt highly efficient garden-type artificial wetland sewage treatment techniques. It will integrate domestic sewage treatment, community greening, and landscaping. It will not require special land. It will adopt an upstream and downstream process. It adopts different kinds of flowering plants. It is a combined wetland botanical system with herbaceous plants and woody plants. Therefore, it does not need sludge treatment, and does not need daily management. It is very suitable to be replicated in Shanghai and in the rural areas of South China, with its subtropical climate.

This project will be carried out jointly by relevant research institutes in China and abroad with mature technique and experience in corresponding dissemination. Through technique induction, digestion and improving according to the local conditions, the component will establish a domestic sewage demonstration project for 2,000 typical residential quarters in Shanghai in the Upper Huangpu Area. The capacity will be 1,000 m<sup>3</sup>/day.

**Component 6: Strengthening the Rural Areas Environmental Protection Dissemination and Training**

(1) Rural Area Non-point Pollution Prevention and Treatment Dissemination and Training Centre

The purpose of this sub-project is to disseminate experience from the above-mentioned demonstration projects among citizens and to provide training for technical replication to maximize project results. The sub-project will cater to both ordinary people and to professional staff. This includes local Shanghai farmers, primary and secondary school students, and the citizens at large. The professional staff includes relevant professional persons from universities, research institutes and technical disseminating government departments in China and beyond. For them, technical exchange and training will be provided. The sub-project will be carried out through dissemination and distribution of training materials, multiple medium presentations, website publishing, lectures and site demonstration.

(2) International Technical Exchange and Dissemination Conference on Agricultural and Non-Point Pollution Prevention and Treatment

Based on intermediate and final results of the above demonstration projects, the component will include inviting relevant experts in China and internationally, and from management departments in Shanghai and other coastal areas of China, to exchange experiences and have academic discussions. The purpose would be to replicate the results in China and beyond. This sub-project will be carried out mainly by local technical and managerial experts (2/3) assisted by foreign experts (1/3). It will be supported by academic reports and exchanges on site visits.

### **3. SUSTAINABILITY (INCLUDING FINANCIAL SUSTAINABILITY)**

With the development of the rural economy and urbanization, the issues related to the countryside, farmers and agriculture have drawn increasing attention from the Chinese Government, from the Shanghai Development and Reform Commission (ShDRC), the environmental protection agencies, and the agencies responsible for agricultural development in Shanghai. These entities have paid great attention to infrastructure development in rural areas and to mitigation of rural environment pollution. Many of the rural environmental protection projects are important contents in Shanghai's 3-year environmental protection action plan. The Shanghai Rural DAW and Domestic Sewage Treatment Demonstration Project also have much support from the local district governments. The integration of these policies at high administrative levels ensures their sustainability in the future.

The World Bank is considering financing a number of projects in the field of agricultural waste control that stand to benefit from the Shanghai experience, and that would promote sustainability of the techniques and innovations carried out in SANPR. The first two are enhancements (one internationally, and one within China) of the Food and Agricultural Organization (FAO) Livestock Waste Management in East Asia (LWMEA) project. Both projects aim to demonstrate livestock waste management technologies, build capacity, and encourage regional coordination. A third initiative that would integrate lessons learned from the SANPR is the Huai River Basin Flood Management and Drainage Improvement project, which aims to improve water management, including water quality, for one of China's most important food-producing provinces. These potential follow-on projects would promote sustainability of the concepts demonstrated in the SANPR.

Use of waste-to-energy technologies is expected to be a key element in the proposals for management of DAW. This is consistent with China's Renewable Energy Law and policy, for which regulations have already been issued by NRDC for biomass-generated energy, which would cover energy from biogas from DAW treatment. In addition at a local level Shanghai already has regulations for Green Electricity Generation, which would also cover electricity generated from biogas produced from DAW treatment.

### **4. REPLICABILITY**

Finding low cost methods for surface pollution control techniques and implementation options, and seeking public support for pollution control and environmental conservation in China, is critical. Approximately 90% of China's land surface is rural area. The overwhelming majority of Chinese - 94 percent - live in the eastern third of the country. Of China's 1.2 billion people, over 677 million (56 percent) reside in 13 southeast and coastal provinces and two coastal municipalities - Shanghai and Tianjin. At present, much of the wastewater generated along the coast, particularly from rural areas, is untreated and flows directly or indirectly into the sea, resulting in coastal area eutrophication, adverse impacts on marine fisheries and aquaculture, and consequent public health problems.

The Shanghai Agricultural and Non-Point Pollution Reduction Project will screen and integrate rural non-point source pollution treatment techniques from within and outside China to determine and identify the most efficient and economic solutions suitable for replication in Shanghai and other areas of China. The project focuses on rural areas, and will propose solutions that are simple, highly efficient, and replicable. Successfully implemented, and through proper dissemination and replication, the project is expected to have a significant impact on agricultural and non-point pollution control, with related positive impact on the East China Sea.

The project will fund a multi-pronged replication strategy, the details of which will be refined during preparation. They will include, but not be limited to: (i) a series of workshops in Shanghai to share experiences for agricultural and non-point pollution treatment techniques. Stakeholders from throughout China, including other coastal cities and national environmental authorities, will be invited. The workshop material will be in both English and Chinese. Representatives from PEMSEA will be invited to attend and help disseminate the experience and workshop documents; (ii) Shanghai representatives will participate in conferences sponsored by GEF and PEMSEA, such as the PEMSEA East Asia Seas Congress<sup>1</sup> and the biennial GEF International Waters Conference<sup>2</sup> (iii) the proposed scientific and technical education and training center will serve as a comprehensive source of information as visitors to Shanghai from within China and more broadly from East Asia will visit the center and learn more about the GEF-supported activities in Shanghai. In collaboration with GEF and PEMSEA, the center will also present exhibits about other efforts throughout East Asia to reduce marine pollution and protect marine ecosystems, and will be a key replication vehicle for the project; and (iv) the project will help the Shanghai municipality formulate policy statements to address non-point agricultural pollution, drawing on national and international examples, and help integrate these policies at district/county, city, and metropolitan level and beyond.

Lastly, consistent with guidance on the GEF's online resource in International Waters (IW:LEARN), funding would be provided to officials from Shanghai to participate in the IW biennial conferences and projects would participate in IW:LEARN activities. The project would be allocated a travel budget for Shanghai participants to share their experiences with other provinces in China and countries in the region.

## **5. STAKEHOLDER INVOLVEMENT / INTENDED BENEFICIARIES**

There are multiple beneficiaries for these GEF activities including: (i) Villagers in the project areas are the direct beneficiaries; (ii) Experts dedicated to protecting Chongming Island, the water environment of the Huangpu River and water quality in the mouth of Changjiang River; (iii) Citizens who hope to enjoy a clean and healthy environment; (iv) enterprises who wish to have an attractive environment; and (v) the Chongming Island, the

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<sup>1</sup> To be held in Haikou City, Hainan Island, China, Dec 12 – 16, 2006

<sup>2</sup> To be held in Cape Town, South Africa, for the week July 30 – Aug 3 2007

Upper Huangpu water source protection zone, and the respective government institutions that are in charge of environmental protection and agriculture industry.

During the preparation of the proposed project, there will be comprehensive consultations with all of these key stakeholders, and an effort made to reach consensus on appropriate project design. The results of the consultations will be recorded and analyzed. A stakeholder plan will be produced as a specific activity.

## **6. MONITORING AND EVALUATION**

A monitoring and evaluation (M&E) plan would be developed during the preparation phase, which would include a strategy to monitor pollution reduction loads to the Changjiang River. The M&E plan would monitor volume of DAW collected and treated, influent and effluent concentrations of key parameters (including BOD), as well as total amounts of pollution prevented from entering the river. TORs for measuring baseline pollution load being discharged into the waterway (BOD, N and P) would be established during preparation. These indicators would correspond to, and contribute to, the cumulative indicators developed for the overall Fund.

Furthermore, appropriate M&E parameters on capacity building, dissemination of lessons learned, and institutional and regulatory reform would be prepared during the preparation phase. M&E indicators for this objective would include the number of workshops, the number of visitors to the education and training center, the number of people included in capacity building programs, and the number of presentations by Shanghai representatives at domestic and international workshops. Further indicators, and their target levels, would be developed during preparation.

## **D – Financing**

Total Estimated Project Cost (Chongming and Huangpu River Components Only): US\$ 31.87 million

1. Counterpart Funding: US\$ 26.87 million
2. Proposed GEF co-financing: US\$ 5 million

## **E - INSTITUTIONAL COORDINATION AND SUPPORT**

### **1. CORE COMMITMENTS AND LINKAGES**

The project is a proposed component of the World Bank/Global Environment Facility Strategic Partnership Investment Fund for Pollution Reduction in the Large Marine Ecosystems of East Asia (the Fund). Its design reflects the lessons learned from the World Bank's large portfolio of pollution reduction projects.

The project will address two key themes of the World Bank's China Country Assistance Strategy: (i) accelerate the transition to a market economy through improving public sector management and delivery of services; and (ii) facilitate an environmentally

sustainable development process through better management of water resources. These two themes are highlighted in the project design.

SMG has for a long time paid great attention to pollution control and environmental protection issues, and at the same time has given great support to protection of eco-resources and worked hard to reduce the pollution to the East China Sea. SMG has prepared and implemented two “three-year environmental protection action plans” and now is implementing a third “three-year environmental protection action plan.” According to this third 3-year action plan, Shanghai will shift its efforts on pollution control to the suburban areas having achieved noticeable results in pollution control in the center city. Construction of Chongming into an eco-island, protection of the Upper Huangpu water source zone, and the general efforts made for environmental protection have become key points for Shanghai’s continued development. At present, ShDRC, Shanghai Construction Commission (SCTC) are actively supporting and coordinating the investment activities for the environmental protection of the districts and counties in the municipality. Shanghai Environmental Protection Bureau (SEPB) has established a special organization to coordinate the activities carried out by the districts and counties for implementation of the 3-year environmental protection action plan.

## **2. CONSULTATION, COORDINATION AND COLLABORATION BETWEEN AND AMONG IMPLEMENTING AGENCIES, EXECUTING AGENCIES AND THE GEF SECRETARIAT.**

The project is part of with the Fund, developed in close collaboration with the GEF/UNDP PEMSEA initiative. One of PEMSEA’s main achievements has been the development of the *Sustainable Development Strategy for the Seas of Asia* (SDS-SEA), which was endorsed by the ministers of twelve East Asian countries,<sup>3</sup> including China, in December 2003, and which lays out a road map for improving and sustaining the seas of East Asia. It is on the basis of this strategy that the WB/GEF Investment Fund was created. The Fund, therefore, seeks to collaborate with the implementation action plans of PEMSEA, as well as other initiatives in the region such as the UNDP/GEF Yellow Sea and UNEP/GEF South China Sea initiatives. During project preparation, a survey of ongoing related activities among other implementing agencies, executing agencies, and the GEF Secretariat would be undertaken and a plan for appropriate collaboration would be conceived. PEMSEA’s Secretariat would be briefed on the SANPR to disseminate information about this project. PEMSEA’s regional project - Implementation of the SDS-SEA - provides a useful coordination function that the SANPR would seek to take advantage of in term of spreading the lessons learnt throughout East Asia.

## **3. IMPLEMENTATION/EXECUTION ARRANGEMENTS**

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<sup>3</sup> The original twelve countries included Brunei Darussalam, Cambodia, China, Indonesia, Japan, DPR Korea, RO Korea, Malaysia, Philippines, Singapore, Thailand and Vietnam. Two additional countries joined in 2005 (Lao PDR and Timor-Leste) making a current total of 14.

The implementing agency for the project will be the World Bank, through the East Asia Urban Sector Unit (EASUR), which is responsible for the overall Strategic Partnership Investment Fund for Pollution Reduction.

All activities would be coordinated through the Shanghai DRC (ShDRC), which will form a multi-agency GEF Project Team. The project will be carried out under the guidance of the Shanghai APL PMO, which is an organization and coordination agency for Shanghai's APL program, using World Bank's loans. It is headed by ShDRC and consists of SCTC, Shanghai Finance Bureau (SFB), Shanghai Water Authority (SWA), and Shanghai Environmental and Sanitation Bureau (SESAB). The APL PMO will coordinate and monitor the Fund together with Shanghai Agricultural Commission (SAC) and Shanghai Environmental Protection Bureau (SEPB) according to the national regulations regarding foreign grant capital utilization and management. The GEF support would also support experts organized by Shanghai Comprehensive Economic Research Institute under a plan prepared by this Institute under the guidance of Shanghai APL PMO.

A working group headed by Chongming DRC will be responsible for the coordination and guidance for the Chongming Component. This group will consist of relevant governmental agencies, including Chongming EPB, Chongming Agricultural Committee. The implementing entities for different components are anticipated to be as follows: Component 1 will have the following entities to be responsible: Chongming Investment and Development Company Ltd will be responsible for construction of the east DAW treatment center; Shanghai Liangyu Modern Agricultural Development Company Ltd will be responsible for the pig production demonstration project, and Shanghai Laodu Duck Company Ltd will be responsible for the duck production demonstration project. Component 2 will be organized and implemented by the Villager Committee of Qianwei Village of Shuxin Town of Chongming County. Component 3 will be organized and implemented by Chenjiazhen Construction & Development Company Ltd. The other components will be implemented through the respective local governments, with detailed project execution undertaken through Shanghai Chengtou Environmental Asset Management Company Ltd. (CEAM), and other internal Shanghai entities such as Shanghai Municipal Sewerage Company (SMSC) with detailed program and project management execution experience.

## **PART II - PROJECT DEVELOPMENT PREPARATION**

### **A - DESCRIPTION OF PROPOSED PDF ACTIVITIES**

The activities during the PDF grant period are described below:

**Activity 1: Prepare and Review the Feasibility Study Reports of the Demonstration Projects:**

Prepare the detailed feasibility reports of the approved rural area non-point source pollution treatment demonstration projects in Chongming and Jinshan District (in Upper Huangpu), and invite the international experts to provide review and technical advice.

**Activity 2: Put in Place the Responsible Entities for Techniques of the Demonstration Projects and Prepare Task Documentation**

Through review of the technical sub-components of the rural area non-point source pollution treatment demonstration projects, establish/define the implementation entities and prepare detailed implementation options and plan, including related terms of references (TORs).

**Activity 3: Prepare a Monitoring and Evaluation (M&E) Plan:**

Prepare a M&E plan to monitor implementation performance, and collect corresponding technical data.

**Activity 4: Assess Replication Potential:**

Carry out an assessment of potential production and living environmental improvements in China's rural areas, particularly along the coastal areas. This assessment will assist in the design of specific replication and dissemination activities under the project, including workshops, conference presentations, and technical publications.

**Activity 5: Prepare GEF Project Documentation:**

A consultant experienced in GEF project preparation would be contracted to assist in preparing the necessary documents for GEF and World Bank appraisal and approval.

**Activity 6: Conduct Workshops and Study Visits:**

There would be a series of workshops on project design. In addition, study visits within China and to other countries could be organized to provide examples of improvement of suburban areas for districts and counties in Shanghai and other areas of China.

## B - PDF Block B Outputs

The outputs expected from financing from the PDF B are:

1. Feasibility studies
2. Relevant policies and institutions related to the project subject in Shanghai, and proposed tasks, necessary facilities and equipment, and related project implementation plan and terms of references (TORs);
3. Monitoring and Evaluation (M&E) Plan, including a stakeholder plan;
4. Replication and Dissemination Plan;
5. GEF Project Document; and
6. Workshops and study visit reports.

## C - Institutional Arrangements

The Shanghai Development and Reform Commission (ShDRC) would execute the PDF B activities. They would be responsible for contracting both international consultants to assist in the development of the project proposal, and domestic consulting firms/design institutes to assist in project preparation and for obtaining any necessary domestic clearances.

## D - TIMELINE & BUDGET

(See Annex 1) The PDF B-funded activities are expected to begin immediately after GEF approval of the proposal in August 2005 and would be completed by December 2007. The budget estimate is presented below:

Cost Estimates for Shanghai PDF B-GEF Proposal

PDF B Activities	Total	Bank Executed	Shanghai Executed
	US\$		
1. Prepare and Review the Feasibility Study Reports of the Demonstration Projects	110,000	0	110,000
2. Put in Place the Responsible Entities for Techniques of the Demonstration Projects and Prepare Task Documentation	40,000	0	30,000
3. Prepare a Monitoring and Evaluation (M&E) Plan	20,000	0	30,000
4. Assess Replication Potential:	30,000	0	30,000
5. Prepare GEF Project Documentation	100,000	0	100,000
6. Conduct Workshops and Study Visits:	50,000	0	50,000
TOTAL	350,000	0	350,000

## ANNEX 1 - TIMELINE AND BUDGET: SHANGHAI COMPONENT ACTIVITIES

<b>PDF B BUDGET – Part 1</b>					
Activities	Deliverables	Costs (US \$)		Organization Responsible For Deliverable	Deadlines
		GEF PDF B	Co-Financing <sup>4</sup>		
1. Prepare and Review the Feasibility Study Reports of the Demonstration Projects	Feasibility studies	110,000	30,000	ShDRC	2007.5
2. Put in Place the Responsible Entities for Techniques of the Demonstration Projects and Prepare Task Documentation	Relevant policies and institutions related to the project subject in Shanghai, and proposed tasks, necessary facilities and equipment, and related project implementation plan and terms of references (TORs);	40,000	5,000	ShDRC	2007.7
3. Prepare Monitoring and Evaluation (M&E) Plan	Monitoring and Evaluation (M&E) Plan, including a stakeholder plan	20,000	5,000	ShDRC	2007.8
4. Assess Replication Potential:	Replication and Dissemination Plan	30,000	5,000	ShDRC	2007.9
5. Prepare GEF Project Documentation	GEF project Document for approval	100,000	30,000	ShDRC and World Bank	2007.9
6. Conduct Workshops and Study Visits:	Workshops and study visit reports	50,000	5,000	ShDRC	2006.10 - -2007.12
<b>TOTAL</b>		<b>350,000</b>	<b>80,000</b>		

<sup>4</sup> Would be provided mainly in kind, such as provision of counterpart personnel, office facilities, etc.

## **Annex 2: SHANGHAI MUNICIPALITY – BASIC DATA**

### **Basics:**

1.4% of China's population

>5% of China's GDP

10% of China's FDI

25% of China's exports leaves from Shanghai

### **Districts:**

Shanghai has 18 districts and 1 county (Chongming island). Six(6) districts are within the outer ringroad; eight(8) are cut by the outer ringroad; and four(4) districts and one county are outside the ringroad. Each district has about 1 million residents (Chongming the smallest with 0.7 mill).

### **Area:**

The core urban area (Shanghai City), refers to the area within the Outer Ringroad (red ring on map). Total municipal area is 6,300 km<sup>2</sup> (a little larger than the State of Delaware) of which about 10% (662 km<sup>2</sup>) is the core city area.

### **Population:**

Based on the year 2000 census, plus estimated 10% increase since then, the number of residents (incl. migrants with residency more than six month) are about:

Shanghai total: 18 million (of which 5 million migrants)  
(density of 2,600 persons / km<sup>2</sup>)

Within the outer ring road: 9 million people (density 14,500 pers/km<sup>2</sup>; highest in China; a few core areas have 30,000 persons per km<sup>2</sup>, one of the highest densities in the world)

The suburban area: 9 million  
(density of 1,200 persons per km<sup>2</sup>)

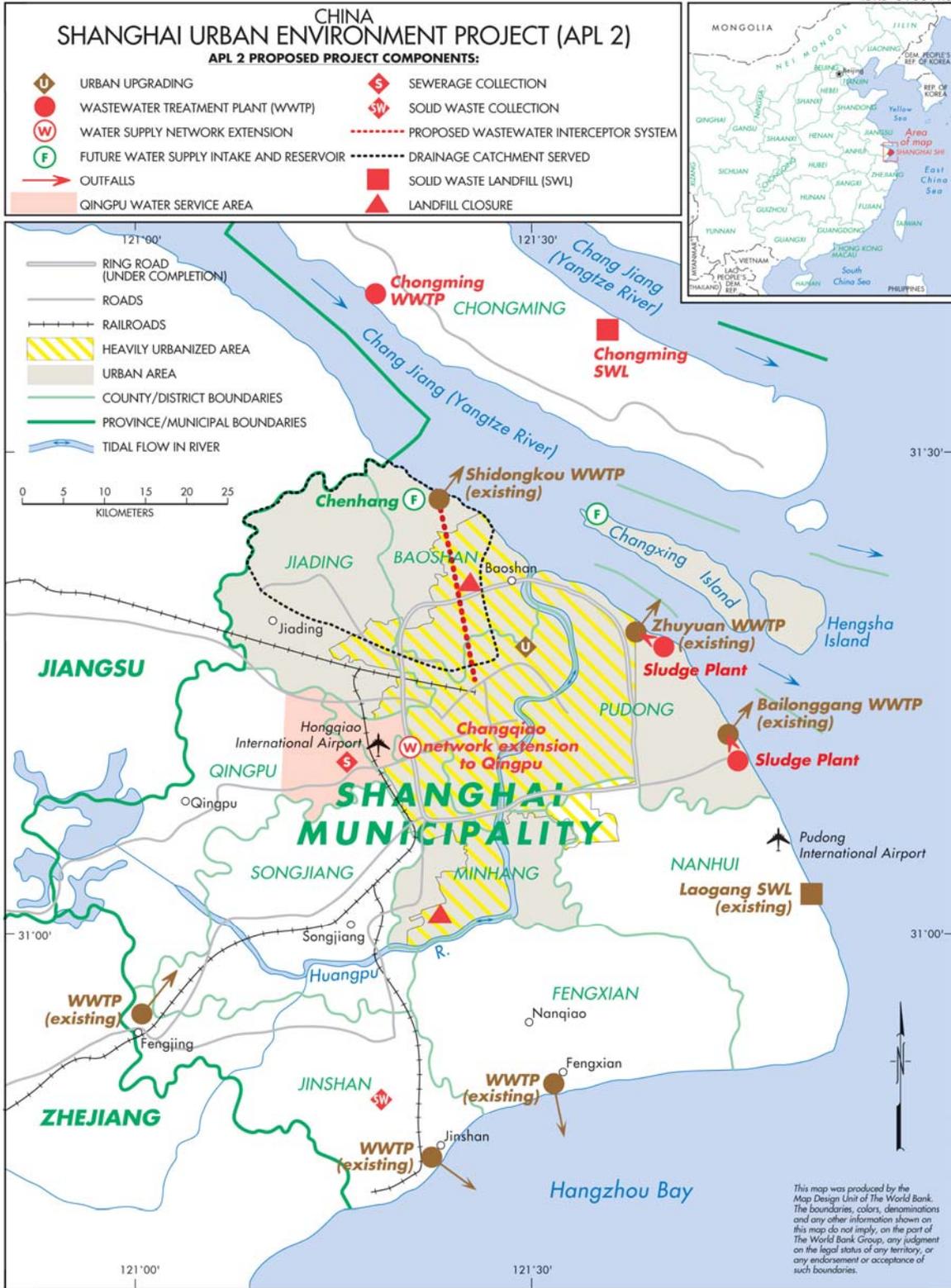
Essentially all population increase during the last three years occurred in the outer districts (combination of net immigration and relocations from the core city).

Population is expected to increase to (at least) 20 million in 2010, with 9 million in the city core and 11 million in suburbs. SMG is encouraging relocation of residents from the core city to suburban/satellite areas, why the core city population is not expected to increase.

### **Maps that follow:**

Map of Shanghai with the investments supported by the Shanghai APL Program indicated

Map of Core City and Suburban Districts in Shanghai



**Shanghai's Core City (red line) and Suburban Districts**

