Document of
The World Bank

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Report No: 49565-CN

PROJECT APPRAISAL DOCUMENT

ON A

PROPOSED GRANT FROM THE
GLOBAL ENVIRONMENT FACILITY TRUST FUND

IN THE AMOUNT OF US$ 4.788 MILLION

TO THE

PEOPLE'S REPUBLIC OF CHINA

FOR A

GEF SHANGHAI AGRICULTURAL AND NON-POINT POLLUTION REDUCTION PROJECT

DRAFT February 25, 2010

CURRENCY EQUIVALENTS

(Exchange Rate Effective September 29, 2009)

Currency Unit	=	Renminbi Yuan (RMB)
RMB 6.830	=	US$ 1
US$ 0.146	=	RMB 1

FISCAL YEAR

January 1 – December 31

ABBREVIATIONS AND ACRONYMS

APL	Adaptable Program Loan
ARAP	Abbreviated Resettlement Action Plan
BOD	Biological Oxygen Demand
CAS	Country Assistance Strategy
CDM	Clean Development Mechanism
CEA	Consolidated Project-Wide Environmental Assessment
CEMP	Consolidated Project-Wide Environmental Management Plan
CNAO	China National Audit Office
COD	Chemical Oxygen Demand
CSTR	Completely Stirred Tank Reactor
DA	Designated Account
EA	Environmental Assessment
ECNU	East China Normal University
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
ER	Emission Reduction
FAO	Food and Agricultural Organization
FM	Financial Management
FMM	Financial Management Manual
FMS	Financial Management Specialist
GEF	Global Environment Facility
GPA	Global Program of Action
HRT	Hydraulic Retention Time
IF	WB/GEF Strategic Partnership Investment Fund for Pollution Reduction in the Large Marine Ecosystems of East Asia
IMO	International Maritime Organization
IPM	Integrated Pest Management
IW:LEARN	GEF International Waters Learning Exchange and Resource Network
LEAD	Livestock, Environment and Development Initiative
LMC-2	Liaoning Medium Cities Infrastructure Project
LME	Large Marine Ecosystems
M&E	Monitoring and Evaluation
MEP	Ministry of Environmental Protection
MOF	Ministry of Finance

MSW	Municipal Solid Waste
MTSP	Manila Third Sewerage Project
NWEP	Ningbo Water and Environment Project
O&M	Operations and Maintenance
PAP	Project Affected People
PCG	Project Coordination Group
PEMSEA	Partnerships for Environmental Management of the Seas of East Asia
PIA	Project Implementing Agency
PIP	Project Implementation Plan
PMO	Project Management Office
PMP	Pest Management Plan
RAP	Resettlement Action Plan
SA	Social Assessment
SABTS	Shanghai Agricultural Broadcasting Television School
SAC	Shanghai Agricultural Commission
SANPR	Shanghai Agricultural and Non-Point Pollution Reduction Project
SATESC	Shanghai Agricultural Technology Extension and Service Center
SBH	Shanghai Bright Holstan Company Limited
SDEP2	Second Shandong Environmental Project
SDRC	Shanghai Development and Reform Commission
SDS-SEA	Sustainable Development Strategy for the Seas of East Asia
SEC	Shanghai Electric Company
SEPB	Shanghai Environmental Protection Bureau
SFB	Shanghai Municipal Finance Bureau
SIACNUD	Shanghai International Automobile City New Anting United Development Company Limited
SMAO	Shanghai Municipal Audit Office
SMG	Shanghai Municipal Government
SOE	Statement of Expenditure
SSDC	Shanghai Shenye Dairy Cooperative
STAP	Scientific and Technical Advisory Panel
TN	Total Nitrogen
TOR	Terms of Reference
TP	Total Phosphorus
TYAPEP	Three-Year Action Plan for Environmental Protection
UASB	Up-Flow Anaerobic Sludge Blanket
UNDP	United Nations Development Program
UNEP	United Nations Environmental Program
WB	World Bank

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CHINA
GEF Shanghai Agricultural and Non-point Pollution Reduction Project

CONTENTS

CHINA

GEF SHANGHAI AGRICULTURAL AND NON-POINT POLLUTION REDUCTION PROJECT

PROJECT APPRAISAL DOCUMENT

EAST ASIA AND PACIFIC

EASCS

Date: February 20, 2010 Country Director: Klaus Rohland Sector Manager: Ede Jorge Ijjasz-Vasquez Project ID: P090376 Focal Area: International waters Environmental Assessment: Category B Lending Instrument: GEF Grant	Team Leader: Takuya Kamata/Hiroaki Suzuki Co-TTL: Weiguo Zhou Sectors: Solid waste management (45%); General water, sanitation and flood protection sector (45%); Sewerage (10%) Themes: Rural services and infrastructure (40%); Rural policies and institutions (40%); Pollution management and environmental health (20%) Joint IFC: N/A Joint Level: N/A

Project Financing Data

[ ] Loan [ ] Credit [X] Grant [ ] Guarantee [ ] Other:

For Loans/Credits/Others:
Total Bank financing (US$m.): 4.788
Proposed terms:

Financing Plan (US$m)

Source	Local	Foreign	Total
BORROWER/RECIPIENT	27.94	1.95	29.89
Global Environment Facility (GEF)	4.76	0.03	4.79
Total:	32.70	1.98	34.68

Recipient:
The People's Republic of China

Responsible Agency:
Shanghai Municipal Government
No. 1 Lane 1114, Liyang Rd.
Shanghai, China
Tel: (86-21) 5666-8104 Fax: (86-21) 6540-6094
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Estimated disbursements (Bank FY/US$m)									
FY	2010	2011	2012	2013	2014	2015			
Annual	0.29	2.32	1.08	0.80	0.20	0.10			
Cumulative	0.29	2.61	3.69	4.49	4.69	4.79			

Project implementation period: Start: July 27, 2010 End: December 31, 2013
Expected effectiveness date: July 27, 2010
Expected closing date: June 30, 2014

Does the project depart from the CAS in content or other significant respects? ***Ref. PAD I.C.***	[ ]Yes [X] No
Does the project require any exceptions from Bank policies? ***Ref. PAD IV.G.***	[ ]Yes [X] No
Have these been approved by Bank management?	[ ]Yes [ ] No
Is approval for any policy exception sought from the Board?	[ ]Yes [X] No
Does the project include any critical risks rated "substantial" or "high"? ***Ref. PAD III.E.***	[X]Yes [ ] No
Does the project meet the Regional criteria for readiness for implementation? ***Ref. PAD IV.G.***	[X]Yes [ ] No

Project development objective ***Ref. PAD II.C., Technical Annex 3***
The project development objective is to demonstrate effective and innovative pollution reduction activities in Shanghai's rural areas in order to reduce the rural and agricultural pollution load (especially nutrients) in the surface water flowing to the East China Sea.

Global Environment objective ***Ref. PAD II.C., Technical Annex 3***
The global environment objective is the same as the project development objective: to demonstrate effective and innovative pollution reduction activities in Shanghai's rural areas in order to reduce the rural and agricultural pollution load (especially nutrients) in the surface water flowing to the East China Sea.

Project description *[one-sentence summary of each component]* ***Ref. PAD II.D., Technical Annex 4***
The proposed Project consists of four components. The total project cost is US$34.68 million.
Component 1: Livestock Waste Management Technology Demonstration (US$9.75 million)
(a) Livestock waste management on large-scale farm
(b) Livestock waste management on medium-scale farm
(c) Integrated livestock and agricultural waste management

Component 2: Wetland Demonstration for Pollution Reduction (US$3.34 million)
(a) Rural town river-network wetland demonstration
(b) Village wetland sewage treatment system

Component 3: Integrated Agricultural Pollution Reduction Techniques (US$20.41 million)
(a) Demonstration of the use of organic fertilizer
(b) Demonstration of the scientific application of agricultural chemicals
(c) Monitoring and extension

Component 4: Project Management and Dissemination (US$1.18 million)

(a) Project management
(b) Replication strategy development, monitoring and evaluation
(c) Training and dissemination.

Which safeguard policies are triggered, if any? ***Ref. PAD IV.F., Technical Annex 10***

Environmental Assessment (OP/BP 4.01)
Pest Management (OP/BP 4.09)
Involuntary Resettlement (OP/BP 4.12)

Significant, non-standard conditions, **if any**, for:
Ref. PAD III.F.
Board presentation:
n/a

Grant Effectiveness:

a) Approval by the relevant competent government agency of Shanghai Municipality of the final draft of the Feasibility Study Report on River-network Wetland Demonstration Sub-project in Juyuan New Development Area and Waigang Town, both located in Jiading District, satisfactory to the World Bank.

Disbursement Conditions:

b) For Categories (1) through (4), (6) and (8), the World Bank's receipt of evidence satisfactory to the World Bank that a Sub-Grant Agreement has been entered into between the Shanghai Municipality and Project Implementing Agencies (PIA) in respect of PIA's Respective Parts of the Project.

I. STRATEGIC CONTEXT AND RATIONALE

A. Country and sector issues

1. Shanghai Municipality has undergone rapid economic and population growth. It has maintained an annual double-digit economic growth over 14 consecutive years. While reaping significant benefits from its strong economic performance in terms of enhanced competitiveness and improved living standards, Shanghai is facing serious constraints in resource and environmental sustainability as a consequence of this rapid economic and population growth. One of the major environmental issues is deterioration of the water quality in two major rivers, the Huangpu River and the Yangtze River, which are the main sources of raw water supply for the municipality. Suburban areas of Shanghai, including areas adjacent to these two rivers, have been populated rapidly since 1990s due to de-concentration from the core city. However, because these areas lack sufficient treatment facilities, pollutants are directly discharged into water environments without treatment. As a result, hypoxia and eutrophication have become serious problems in the Yangtze River estuary, the Hangzhou Bay, and in the coast of East China Sea. The nutrient loading of the marine environment through freshwater inflow has resulted in an increased frequency of harmful algal blooms in the East China Sea[1].

2. Pollution in the rural areas of the Yangtze River and the East China Sea comes from four major sources. The largest pollution source is livestock waste. Out of 7.6 million metric tons of annual livestock waste, about 40 percent is discharged into waterways due to lack of effective treatment facilities. The amounts of chemical oxygen demand (COD), biological oxygen demand (BOD), total nitrogen, and total phosphorus have risen significantly due to the discharge of untreated livestock waste. The second largest pollution source is untreated wastewater from households in rapidly urbanizing villages and towns in suburban areas. Based on statistics, less than 40 percent of the household wastewater in the area was treated by end 2007, and some 500,000m^3 of untreated or partially treated household sewage were discharged daily into the water environment in Shanghai. The third and fourth pollution sources are crop straw, and non-point agricultural run-off fertilizers and pesticides. In rural Shanghai, about 1 million metric tons of crop straws are left on the farm land annually. In the past, people used crop straw to cook at home, but crop straw is no longer a preferred source of fuel due to the widespread use of natural gas. Hence, most crop straw now remains uncollected and eventually flows into the waterways. Finally, according to statistics, farmers in Shanghai tend to use more chemical fertilizers and pesticides than the national average; these chemicals eventually wash into the waterways, as well.

3. The Shanghai Municipal Government (SMG) has recognized the issues of pollution in the major water sources and agricultural pollution and addressed the issues seriously in the Three-Year Action Plans for Environmental Protection (TYAPEP), which set targets and prioritized environmental projects to be implemented during the period of the plans. The second TYAPEP (2003 – 2005) and the third TYAPEP (2006 – 2008) introduced key measures for livestock waste management and agricultural and non-point source pollution reduction, including: (a) closure of small-scale livestock farms; (b) establishment of organic fertilizer producing facilities; (c) stricter pollution discharge permits for livestock farms; (d) promotion of land application of livestock manure; (e) promotion of organic fertilizers, integrated pest management techniques,

[1] The East China Sea is a marginal sea, located at the east of China. It is a part of the Pacific Ocean and covers an area of about 1,249,000 km^2.

and applications of low-toxicity pesticides; (f) a ban on open burning of agricultural wastes; and (g) comprehensive utilization of crop straws.

4. These investments were successful in achieving their intended objectives in water pollution control. By the end of 2008, Shanghai was able to treat about 75 percent of its wastewater, improved water quality of rivers in urban areas, reduced unit consumption of pesticides and chemical fertilizers in its agricultural production, and curbed significantly pollution discharges from livestock wastes. The SMG intends to continue its efforts in the fourth TYAPEP (2009 – 2011).

5. In addition to these efforts initiated by Shanghai, the Bank has supported the municipality by mobilizing IBRD loans (Shanghai Urban Environment Project – Adaptable Program Loan (APL) Phases I, II and III) and domestic resources to implement a US$1.5 billion investment program. This program has an objective of improving environmental conditions in the Greater Shanghai Municipality by progressive development and implementation of integrated, metropolitan-wide environmental management measures. During implementation of the first phase of the APL, a study, "Upper Huangpu Catchment Management Plan," was conducted, and agricultural and non-point source pollution in the rural areas were identified as major sources of pollution.

6. The proposed Shanghai Agricultural and Non-Point Pollution Reduction Project (SANPR), is a stand-alone Global Environment Facility (GEF)-funded project, but it will support the broad program development objective of the APL. Whereas the APL focuses mostly on priority investments and institutional reforms in the water sector (including water supply, wastewater, and solid waste management), the GEF project will complement the efforts by mitigating agricultural and non-point source pollution discharged to a water environment. The GEF project also aims to take a comprehensive approach by demonstrating a number of innovative sub-projects. The project implementation plan included a replication strategy so that the technology introduced through the GEF project will be widely disseminated among the farms after the project ends.

B. Rationale for Bank involvement

7. Shanghai's decision to seek financing from the Bank, amid other financing options, is motivated by the municipality's desire to consolidate and deepen its existing partnership with the Bank. Though the Bank has been financing urban environment utilities, not many investments have been made for mitigating agricultural and non-point source pollution. Based on the established Bank-Shanghai partnership, the SANPR aims to fill the gap and demonstrate best practices to reduce agricultural and non-point pollution discharged into the coastal waters of Shanghai.

8. The SANPR comes under the WB/GEF Investment Fund (IF) for Pollution Reduction in the Large Marine Ecosystems (LMEs) of East Asia, which is managed in cooperation with the GEF/UNDP Partnerships for Environmental Management of the Seas of East Asia (PEMSEA). PEMSEA is part of the regional implementation plan of the United Nations Environment Program Global Program of Action (GPA) for the Protection of the Marine Environment from Land-based Activities. The objective of the IF is to scale up investment to reduce land-based water pollution in coastal areas and major river basins in East Asia.

9. The IF and the SANPR were consistent with GEF's Contaminant-Based Operational Program 10 (OP10), which aimed to demonstrate ways of overcoming barriers to the adoption of best practices that limit contamination of International Waters. They are also consistent with GEF's current Strategic Objective 2, "to catalyze trans-boundary actions addressing water concerns," specifically to reduce land-based coastal pollution, and with Strategic Program 2, "reducing nutrient over-enrichment and oxygen depletion from land-based pollution of coastal waters in LMEs consistent with the GPA." Regarding hypoxia and eutrophication, the aquatic environment adjacent to Shanghai's coastline is one of the main pollution hotspots in the East China Sea. The amount of nutrients reduced would be closely monitored in the areas of intervention.

C. Higher level objectives to which the project contributes

10. This project will support two of the three Country Partnership Strategy themes: (a) managing resource scarcity and environmental challenges; and (b) improving public and market institutions. The SANPR will also support the objectives of China's 11th Five-year Plan, which aims to create a "harmonious society" that balances economic growth with distributional and environmental concerns. The activities in the SANPR are also in line with Shanghai's third TYAPEP (2006 – 2008), which aims to increase the treatment and recovery of livestock waste as a resource and reduce the dosage rate of chemical fertilizer by 10 percent and that of chemical pesticides by 8 percent. Although the SANPR is processed as a GEF stand-alone project, it will support the broad project development objective of the APL3, which is to improve Shanghai's resource and environmental sustainability in the core and suburban areas through strategic priority investment and selective institutional reforms in the water and wastewater sectors.

II. PROJECT DESCRIPTION

A. Lending instrument

11. The proposed project would be financed by a US$4.788 million grant provided from the WB/GEF Strategic Partnership Investment Fund for Pollution Reduction in the Large Marine Ecosystems of East Asia. The project is a full-size, stand-alone GEF-funded project, implemented in parallel with the APL3.

B. Project development objective and key indicators

12. The project development and global environment objectives are to demonstrate effective and innovative pollution reduction activities in Shanghai's rural areas in order to reduce the rural and agricultural pollution load (especially nutrients) in the surface water flowing to the East China Sea.

13. Key project outcome indicators include: (a) demonstration of pollution reduction technologies; (b) reduced pollution discharged from the sub-project sites; (c) increased replication farm area using demonstrated technologies; and (d) development of a replication strategy for disseminating demonstrated technologies. Annex 3 contains the detailed results framework for project outcome and intermediate results indicators.

C. Project components[2]

14. The proposed Project consists of four components with a total Project cost estimated at US$34.679 million (RMB225.42 million).

Component 1: Livestock Waste Management Technology Demonstration (US$9.748 million)

(a) *Livestock waste management on large-scale farm (US$5.468 million)*. This sub-component will support the establishment of a dairy waste treatment facility with a capacity of 256 t/d on Shanghai Bright Holstan Jinshan Dairy Farm in Jinshan District, which has about 5,000 dairy cattle. The facility would consist of a primary solid-liquid separator, an acidification tank, a 22-day hydraulic retention time (HRT) mesophilic anaerobic completely stirred tank reactor (CSTR), a "wet" type scrubbing biogas collector. Biogas is combusted in two 250 kW reciprocating engine generators to generate electricity power for energy sale to the local grid. Waste heat from the engines will be transferred to the CSTR to maintain mesophilic operating temperatures. A biogas fired hot water boiler will also be included to provide back-up heat for the CSTR when the engines are not in operation. Sludge from the CSTR will be dewatered through a secondary solid-liquid separator. An estimated 14 t/d of solid fraction from the CSTR will undergo additional processing as organic fertilizer. About 238 m^3/d liquid fraction will be further treated on site through a series of lagoons prior to conveying to the existing Langxia Wastewater Treatment Plant for final disposal. Some liquid fraction may be used for fodder crops on farm either through pipes or a trucking scheme.

(b) *Livestock waste management on medium-scale farm (US$1.139 million)*. This sub-component will support building a livestock waste treatment center comprising two independent systems on Shanghai Shenye Cooperative (SSDC) in Chongming County with a total of about 1,600 dairy cattle. The two independent systems would be: (i) a solid waste management system of composting and pelletizing process, with a capacity of treating 50 tons of livestock waste per day; and (ii) a liquid waste management system, comprised of a series of anaerobic and facultative lagoons with a 40 day HRT capable of treating 30 tons of livestock wastewater per day, prior to final disposal through land application. Both systems will reduce human health risks posed by pathogens and virus transmission from livestock to humans.

(c) *Integrated livestock and agricultural waste management (US$3.142 million)*. This sub-component will support livestock and agricultural waste treatment in an integrated approach in Qianwei Village of Shuxin Town in Chongming County. The proposed waste treatment facilities would consist of a main system and an auxiliary system to treat wastes of about 4,000 standing pigs, 2,500 tons of crop straw, 800 tons of municipal solid waste (MSW), and 1,100 tons of rice chaff annually. In the main system, a series of inter-connected digesters is proposed for the waste treatment. The first digester is a heated (mesophilic) mixed concrete tank with separate gas storage also referred to as a CSTR. The CSTR will digest the pig waste and MSW as these wastes are thicker and more suitable for this type of digester. The second type of digester is an Up-flow Anaerobic Sludge Blanket (UASB), which will digest the pre-treated liquid from crop straw waste.

[2] The exchange used here is RMB6.5 = US$1. It is different from the exchange rate on the cover page, as it is the projected three-year average exchange rate.

Crop straw pre-treatment requires soaking the crop straw in the effluent from the CSTR in order to acidify and transfer the volatile solids in the crop straw into the liquid phase. Biogas from the CSTR and UASB is collected in separate gas storage. From the gas storage, biogas will be scrubbed to remove corrosive hydrogen sulfide gas, and purified biogas is then combusted in a 100 kW reciprocating engine generator for energy production. Electric power will be used by the village and some gas will be used as a household cooking fuel. The auxiliary system consists of two sub-systems, a gasification plant to produce fuel gas, and a small biomass briquetting plant which is designed specifically for treating rice chaff. About 30 m^3/d liquid fraction will be further treated by a series of lagoons of 40 days HRT prior to final disposal through land application.

Component 2: Wetland Demonstration for Pollution Reduction (US$3.343 million)

(a) *Rural town river-network wetland demonstration (US$1.468 million).* This sub-component will support (i) river network wetland ecological restoration engineering; and (ii) construction of a vertical submerged wetland to collect and treat household sewage. The sub-component will cover a total area of about 66.5 ha and restore a total length of about 4,850 meters of river courses including Gujing, Miaojing, Lianqi and natural interconnected waterways. The works would consist of: (1) construction of riverside belts and vegetation buffers (47,300 m^2); (2) restructuring of river beds (88,600 m^2); (3) connection of dead-end waterway and expansion of river cross section (265 meters); and (4) construction of a vertical submerged reed-coarse sand wetland to collect and treat household sewage (105 residents in 30 households).

(b) *Village wetland sewage treatment system (US$1.875 million).* This sub-component will support construction of six village wetland sewage treatment systems in four villages of Qingpu district, which are located at the downstream of the Taihu basin. Each proposed treatment demonstration system would consist of sewage collection networks, a regulation tank, trickling filter pre-treatment, a secondary settling tank, and wetland treatment process. The design capacity of the wetland sewage treatment systems are 82 m^3/d (Qianwan), 156 m^3/d (Beiwangbang), 117 m^3/d (Jintian), 147 m^3/d (Xiezhuang), respectively.

Component 3: Integrated Agricultural Pollution Reduction Techniques (US$20.412 million)

(a) *Demonstration of the use of organic fertilizer (US$16.028 million).* This sub-component will demonstrate innovative techniques to reduce the utilization of chemical fertilizers by promoting the alternative use of organic fertilizer at three selected demonstration sites in Jinshan and Qingpu Districts and Chongming County as well as on other farms to partially replace the use of chemical fertilizers. About 25 percent – 30 percent reduction in chemical fertilizer use is expected based on studies and experience of Shanghai Agricultural Technology Extension and Service Center (SATESC); this will gradually help rehabilitate the soil structure at demonstration sites. The sub-component will also promote accurate fertilizer application and use of crop-specific and nutrient-customized fertilization to improve efficiency of chemical fertilizer and develop more ecologically friendly and sustainable agriculture. Manure application techniques will be demonstrated.

(b) *Demonstration of the scientific application of agricultural chemicals (US$3.443 million).* This sub-component will promote usage of eco-friendly chemicals and technologies to

reduce pollution from agricultural chemicals (insecticides and pesticides) at the same three selected demonstration sites in Jinshan and Qingpu Districts and Chongming County. In particular, it involves using (i) high efficiency, low toxic, and low residual effect chemicals; (ii) eco-friendly biological pesticides; (iii) upgraded sprayers; and (iv) non-chemical technologies for insect and pest control, such as insect net, moth-killing lamp, sticky paper, and sex-alluring agent.

(c) *Monitoring and extension (US$0.942 million)*. This sub-component will set up about 120 check points at the three selected demonstration sites for on-site examination and to collect samples for laboratory testing to monitor the effectiveness of the demonstration technologies that are demonstrated in this sub-component. The three demonstration sites under the Component have also been selected as monitoring sites for the Shanghai Municipal long-term early warning system for epidemics of plant disease, insects and pests. The sub-component will provide training for participating farmers and technicians, and will extend successful experience to localities beyond the demonstration sites to other parts of Shanghai through training, workshops and SATESC's extension network. The sub-component will support establishment of regular technology fairs as a platform for the private sector, diverse service providers, regulatory agencies, farmers, input suppliers and researchers to provide experience, introduce best practices, discuss regulatory options, and promote new technologies.

Component 4: Project Management and Dissemination (US$1.176 million)

(a) *Project management (US$0.300 million)*. This sub-component will support Project Coordination Group and the Shanghai Project Management Office (PMO) at the municipal level, Working Groups at county/district level and those at the project implementing agencies (PIAs) for efficient project management and implementation. The sub-component aims to develop and strengthen the overall implementation capacity of the various levels of project management entities in procurement, financial management, monitoring and evaluation (M&E), reports preparation, etc., through provision of adequate budgets for technical assistance, consultant services, training and incremental operating expenses.

(b) *Replication strategy development, monitoring and evaluation (US$0.330 million)*. A monitoring and evaluation system will be established at all PIAs. Results monitoring of project outcome indicators will be carried out by an independent monitoring team hired by the Shanghai PMO in accordance with terms of reference (TOR) acceptable to the Bank. Unlike Sub-component 3 (c), this sub-component is to monitor the entire project, not just one sub-component, based on the agreed outcome indicators in result monitoring and the M&E plan, prepared by the PMO. A project replication strategy will be developed under this sub-component. Details will be added to the replication strategy outline prepared by a consultant team and reviewed by the Bank during project preparation and a draft replication strategy will be prepared in the first year of project implementation. This draft strategy will be reviewed for applicability and improvement during the second year of project implementation. The replication strategy will be finalized at the completion of the project implementation. Development of the replication strategy will be contracted out to an independent institution selected by the Shanghai PMO in accordance with TOR acceptable to the Bank. The final replication

strategy will incorporate replication plans from all participating district/county Working Groups.

(c) *Training and dissemination (US$0.546 million)*. This sub-component will be implemented by the Shanghai Agricultural Broadcasting Television School (SABTS). This sub-component will provide training for the participating entities, local farmers, students, professionals and government officials throughout the project implementation period. The sub-component will disseminate information and experience obtained from overall project implementation within project scope, to sector-wide coverage and to the general public in Shanghai and China through the SABTS's satellite broadcasting network, on-line course on internet, network and traditional classroom and on-site dissemination. A project website will be developed as a platform for information circulation, experience dissemination and a link to associated web sites, such as those of the World Bank, GEF, PEMSEA, and GEF International Waters Learning Exchange and Resource Network (IW:LEARN). The project will have a specified budget line ($52,000) to support IWLEARN activities, such as production of distance promotion courseware and network maintenance. Moreover, Aa project video program has been planned to video-record project implementation of all sub-projects at pre-implementation, during implementation and at completion as a means for training and education and a tool for replication in future. Seminars, workshops and an international technical exchange and dissemination conference will be organized with the aim of replicating the project's demonstrated technologies and practices in Shanghai, throughout China and beyond. Representatives from PEMSEA will be invited to attend and help disseminate the experience and workshop documents. The sub-component will finance Shanghai representatives to attend conferences sponsored by GEF and PEMSEA, such as the biennial GEF International Waters Conference and the triennial PEMSEA East Asia Seas Congress. The SABTS will also serve as a center of comprehensive information for the project.

D. Lessons learned and reflected in the project design

15. Key lessons learned are drawn from the World Bank's livestock, wetland and rural environmental operations, the Livestock, Environment and Development Initiative (LEAD) Area-Wide Integration Pilot project in China, and the government programs. They are reflected in the proposed Project design and include the following:

(a) Appropriate technical solutions are crucial for addressing agricultural and non-point pollution. In the SANPR, the Bank's technical team reviewed and verified the proposed technologies, which are technically sound and cost-effective, with project implementing agencies.

(b) Since the agricultural and non-point pollution issue involves various stakeholders including farmers, private enterprises, academics and governments at different levels, it is important to have a strong institutional coordination of efforts by various stakeholders. In the SANPR, a Shanghai municipal Project Coordination Group (PCG) has been established, with representatives from major stakeholders. Moreover, four Working Groups will manage project implementation in different districts/county and sub-components. Roles and responsibilities of working groups and PIAs are described in the Project Implementation Plan (PIP).

(c) It is critical to have strong government commitment to compliance, enforcement, and provision of incentives, and the full involvement of key stakeholders in project preparation and implementation to ensure ownership, sustainability and success of the project. The Shanghai municipal PCG and Shanghai PMO have demonstrated a strong commitment and support to the SANPR: they have established a relationship with each PIA, understand constraints, and mobilized resources to resolve issues.

(d) Dissemination of demonstrated technologies and practices and a well-developed Replication Strategy to integrate a project into the government's mainstream programs are necessary to ensure adoption and replicability. The SANPR has a specific outcome indicator to develop a replication strategy for the technology demonstrated in the project. It is also included in an implementation covenant to ensure that the replication strategy will be finalized at the end of implementation of pilot sub-projects in the SANPR.

(e) Practical monitoring and evaluation e effective tools to assess achievement toward a project development objective and project impact. In SANPR, a monitoring and evaluation plan has been developed by the Shanghai PMO and included in the PIP. The Shanghai PMO plans to hire a consultant to be in charge of the monitoring and evaluation for the project. The Shanghai PMO will report results of monitoring in progress reports and submit the reports to the Bank semi-annually.

(f) The capacity-building of project implementing agencies through training, technical assistance and client-customized support is the key to ensuring efficient and effective project implementation. Various training and workshops will be provided by the Bank and the Shanghai PMO to the PIAs and Working Groups during the project implementation.

E. Alternatives considered and reasons for rejection

16. In designing the project, the following alternatives were considered as possible approaches to reducing and preventing pollution from agricultural and non-point pollution sources but were rejected as unfeasible.

(a) *Approach to use exclusively regulatory forces for livestock farms*. Regulatory measures could include: (i) capping or reducing the number of farm animals; and (ii) forced relocation or closing down of existing livestock farms. This approach was rejected because these measures may potentially run into major economic, social and political problems. Capping or reducing the number of farm animals is likely to hit the livestock production industry hard as well as to reduce incentives for investment in livestock farming. Forced relocation or closing down of existing farms would be possible only where alternative livelihoods can be ensured for the farm owners and employees. Such control measures should be reserved only for the most serious problem cases and used as a last resort.

(b) *Approach to involve all eligible entities*. This approach was rejected mainly because of the limited GEF Grant availability for the project. Extending the project to involve all eligible farms, villages and Districts would most likely result in: (i) the increased complexity of project coordination to an unmanageable extent; and (ii) the diminished interest of eligible entities to participate in the project because the average GEF Grant allocation to any individual participating entity would be too small.

(c) *Approach to focus on single agricultural and non-point pollution source*. This approach was rejected based on findings of a study organized by SMG. The study concluded that the main agricultural and non-point pollution sources in rural Shanghai included: (i) livestock waste; (ii) rural household sewage; (iii) agricultural chemicals; and (iv) crop straw and residues. Focusing on any single pollution source under the proposed project would create a gap for a comprehensive pollution management to achieve project development objective and global environment objectives unless a series of similar projects focused on all single pollution sources, which is not the case.

III. IMPLEMENTATION

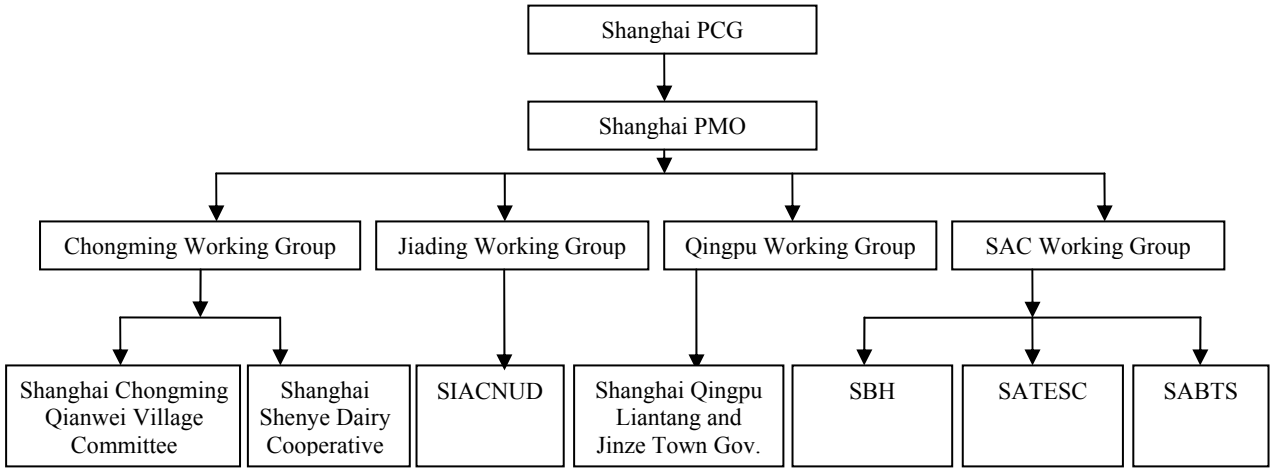
A. Partnership arrangements

17. The SANPR project is institutionally linked to the WB/GEF Strategic Partnership for Sustainable Development of the Large Marine Ecosystems of East Asia, its financing arm—Strategic Partnership Investment Fund for Pollution Reduction in the Large Marine Ecosystems of East Asia—and its regional agency, PEMSEA. The partnership arrangements are described in Annex 17.

B. Institutional and implementation arrangements

18. Specific institutional arrangement has been made for the implementation of the SANPR project. It is categorized in three levels: municipal, sub-municipal, and participating entity levels. A detailed description of the project's institutional and implementation arrangements is presented in Annex 6 as well as in the PIP.

Figure 1: Institutional and Implementation Diagram



19. **At Shanghai Municipal Level**. The Project Coordination Group (PCG) has been established. It is chaired by the Shanghai Development and Reform Commission (SDRC) and comprised of representatives from the SDRC, the Shanghai Municipal Finance Bureau (SFB), the Shanghai Environmental Protection Bureau (SEPB) and the Shanghai Agricultural Commission (SAC). The principal functions of the PCG are: (a) to provide guidance on municipal policies and priorities concerning agricultural and non-point pollution reduction for

the project; and (b) to integrate the activities of various agencies involved in the project and to ensure an inter-agency coordinated approach to project implementation.

20. The Shanghai PMO is a primary focal point for the Bank and the PIAs for the project, and it is placed under the direct supervision of the PCG. Responsibilities of the Shanghai PMO are: (a) to serve as the secretariat of the Shanghai PCG in project preparation and implementation; (b) to act as a coordinating body for the project activities implemented by various agencies; (c) to implement the project's two sub-components (project management and replication strategy development) under Project Management and Dissemination Component; and (d) to serve as the project's focal point for the Bank.

21. **At Sub-municipal Level**. Four working groups have been established at the sub-municipal level, i.e. Chongming Working Group, Jiading Working Group, Qingpu Working Group, and SAC Working Group. Working groups in Chongming, Qingpu and Jiading comprise members from relevant government agencies within their respective jurisdiction. SAC Working Group comprises members from SAC's Comprehensive Development division, Crop Office, Animal Husbandry Office, SATESC, SABTS, and Shanghai Bright Holstan Company Limited (SBH). The Working Groups' main roles and responsibilities are: (a) to assist the PCG in coordinating sub-project implementation of the PIAs under their respective administration; (b) to review any amendments to the original sub-project proposals of their respective PIAs, environmental assessment reports, and submission of such documents to other responsible government agencies for further action, if required; (c) to supervise the progress of sub-project implementation by their respective PIAs; (d) to provide policy support and guidance on agricultural and non-point pollution reduction; (f) to develop a replication plan within its own jurisdiction to be included in the project's overall Replication Strategy; and (g) to coordinate and assist their respective PIAs in resolving issues during sub-project implementation.

22. **At Participating Entity Level**. Each PIA will be responsible for sub-project implementation of its activities. Respective institutional arrangement has been made at each PIA and specified in a sub-project specific mini-PIP. The PIAs for sub-projects under Livestock Waste Management Technology Demonstration Component will be the owners of their facilities supported by the project. After the completion of the wetland construction, the wetland system in Jiading will be transferred to Shanghai Jiading Water Engineering Design Co., Ltd., and the wetland systems in Qingqu will be transferred to relevant agencies of Jinze and Liantang town governments.

23. **Designated Account**. The grant proceeds will flow from the Bank into a project designated account (DA), set up at and managed by the SFB, to various Project Implementing Agencies, and finally to contractors or suppliers. The grant will be on-granted from MOF to SFB, which will then on-grant to each PIA. Sub-grant agreements will be signed between SFB and each of the PIA, except for Shanghai Qingpu Liantang and Jinze Town Governments.

C. Monitoring and evaluation of outcomes/results

24. Annex 3 presents the results framework and monitoring program for the GEF project. The key outcome indicators include: (a) quantity of total nitrogen (TN), total phosphorus (TP), BOD, and COD discharged to the water environment of three GEF project sites in the Livestock Waste Management Component; (b) quantity of TN, TP, BOD, and COD discharged to the water environment of six GEF project sites in Wetland Sewage Treatment System Component; (c) quantity of nitrogen, phosphorus, and potassium in soil, and ammonia, COD and TP in surface

water for three demonstration sites in Integrated Agricultural Pollution Reduction Techniques Component; and (d) development of a replication plan addressing the technology demonstrated in the project.

25. In addition, a M&E Plan has been prepared by the Shanghai PMO to meet GEF monitoring requirements. Process indicators, stress reduction indicators and environmental status indicators relevant to International Waters projects are included in the M&E Plan. The M&E Plan also specifies the details of the scope of and activities for M&E. The M&E Plan is included in the PIP. Data collection and analysis will be undertaken by monitoring and evaluation consultants. The Shanghai PMO will ensure the necessary monitoring is undertaken and report the results to the Bank. The project will also report the status of implementation and results of outcome to GEF annually, using the GEF IW Tracking Tool.

D. Sustainability and Replicability

26. **Sustainability**. Sustainability could be ensured by the following elements.

(a) With the development of the rural economy and accelerated urbanization, agricultural and non-point pollution in rural Shanghai has drawn increasing attention from the governments at municipal, district/county levels. The proposed project has been strongly supported by the governments involved, which will work to include this project as part of their overall environmental protection action plans. The integration of this proposed project in the environmental protection action plan ensures its sustainability in these locales.

(b) Mitigation measures to reduce pollution load for sub-projects under the Livestock Waste Management Technology Demonstration component are expected to yield tangible benefits (e.g. waste-to-energy, organic fertilizer, and reduced human health risks), for key stakeholders, specifically farmers and local communities. Such tangible benefits would lead participating farmers and local communities to provide continued support and adequate resources to the systems, thus promoting sustainability of these systems.

(c) Wetland sewage treatment systems are promoted by the government and widely accepted by rural residents. The design for cost-effective, simple operation and low maintenance systems, at a minimal fee, will ensure sustainable operation of village wetland systems. The Jiading wetland system has been listed as one of Jiading district government's priority projects. Adequate consideration and specific plans for sustainability have been made by Jiading district government.

(d) Sustainability of the Integrated Agricultural Pollution Reduction Techniques component depends largely on government policy and farmers' willingness. Shanghai government has adopted a long-term policy promoting use of integrated agricultural pollution reduction techniques, which is also a long-term national target. Participating farmers are certain to appreciate the project benefits, e.g. more environmentally friendly inputs, cost-effective solutions and better-quality produce. Along with enhanced regulatory enforcement, the willingness of farmers to adopt improved practices is expected to increase, thus making sustainability inherent.

27. **Replicability**. The Project is designed to demonstrate proven technologies. The information and experience obtained from overall project implementation will be disseminated through satellite broadcasting network, broadband digital network, and traditional classroom,

workshop, and on-site dissemination. Both Shanghai and the Bank realize that the project is expected to yield only limited direct impact on water quality of the East China Sea because the selected demonstration areas represent negligible fractions of the total pollution load. A noticeable pollution reduction in the East China Sea catchment area can be achieved only through the replication of the demonstrated practices on a much broader scale throughout the Shanghai municipality and in other provinces bordering the East China Sea. Therefore, preparation and implementation of a Replication Strategy has been included in the project as an important sub-component to ensure project replicability. The Replication Strategy will be contributed to by the four sub-municipal Working Groups and implemented in the districts/county where the sub-projects are located as part of their commitment. The Replication Strategy may include other pollution sources in rural Shanghai, such as poultry waste and township/village enterprises. Replication will be further ensured through integration of the project with Shanghai government's mainstream programs and serving as a pilot under the Shanghai 4th TYAPEP (2009 – 2011). This would ensure a greater potential for a municipality-wide and long-term replication in Shanghai.

E. Critical risks and possible controversial aspects

28. The following is a summary of potential risks with recommended relevant mitigation measures to avoid or minimize such risks. No controversy is envisaged.

Table 1: Risks and Proposed Mitigation Measures

Risk	Mitigation	Risk rating
Various activities dispersed in four county/districts are supported with limited resources.	While it is limited to further simplify the project design due to constraints imposed by GEF and the client's strong objection, the task team has (i) ensured strong client commitment on overall support to project implementation and (ii) secured adequate resources for project supervision. All PIAs have specified their respective commitment in the mini-PIPs. Capacity enhancement activities have also been carried out with grant fund during preparation.	S-M
Technical failure risk as a result of (a) inappropriate choice of technology and system, or (b) design, equipment or material failure.	The project introduced proven technologies. The client has recruited specialists under Project Preparation Grant to support bid evaluation, review feasibility study report and assist the client and other stakeholders on technical issues. It was agreed that consultants will be selected for project implementation. Bank team has reviewed technical design, procurement package.	M
Institutional risk due to inadequate collaboration among key participants.	Overall project institutional arrangement has been in place. The Project Coordination Group comprises representatives from the Municipal Finance Bureau, the Municipal Development and Reform Commission, the Municipal Environmental Protection Bureau and the Municipal Agricultural Commission. The APL PMO will serve the Shanghai PMO for this project. Four Working Groups at sub-municipal level were also established with members from relevant government agencies within each working group's respective jurisdiction. Respective responsibilities of agencies involved have been specified in PIP.	M

Risk	Mitigation	Risk rating
Insufficient financial resources to implement the Project.	Provision of counterpart funding in full amount and on a timely basis is agreed to be one of the pre-conditions for participation in the project. Commitment letter from each financing source and each PIA have been obtained.	M
Operational failure risk resulting from: (a) lack of ownership and local community support; (b) operational and management support not available or inadequately accessible; or (c) lack of practical and efficient O&M arrangement.	All project activities were proposed and committed by PIAs and the project as a whole has been integrated into Shanghai municipal government's mainstream programs. The Shanghai PMO has discussed with the sub-municipal Working Groups and PIAs to address these issues. Similar agreement between each PIA and its respective working group is expected. Training will be provided for all operators of the systems under this proposed project to ensure practical and efficient O&M arrangement in place.	M
Failure in scaling up demonstration activities due to: (i) lack of or weak enforcement of agricultural and non-point pollution control policies; and (ii) change of government financial subsidy policy.	Policy risks have been discussed in detail between the Bank team and Shanghai government. Since the project objective and project activities are in line with Shanghai government's overall environmental protection priorities, such policies are likely to be strengthened. Therefore, such policy risks are minimized. Moreover, the project has been integrated into the Government's mainstream programs and serves as a pilot under the Shanghai Fourth Three-year Environment Protection and Construction Action Plan (2009-2011). This would greatly ensure the potential for a municipality-wide, long-term replication in Shanghai.	M
Failure in replication by farmers due to a lack of interest in the new environmentally friendly modern agricultural pollution control technique, such as organic fertilizer, safe-chemical use, bio-pesticides, and non-chemical technologies	In the demonstration, high emphasis is placed on disseminating information on advantages of these techniques, including health, economic and environmental benefits, to create incentives for the farmers.	M
Overall risk rating		**M**

H = High, S = Substantial, M = Moderate

F. Grant conditions and covenants

29. Conditions for effectiveness:

(a) Approval by the relevant competent government agency of the Shanghai Municipality of the final draft of the Feasibility Study Report on River-network Wetland Demonstration Sub-project in Juyuan New Development Area and Waigang Town, both located in Jiading District, satisfactory to the World Bank.

30. Disbursement Conditions:

(b) For Categories (1) through (4), (6) and (8), the World Bank's receipt of evidence satisfactory to the World Bank that a Sub-Grant Agreement has been entered into between the Shanghai Municipality and Project Implementing Agencies (PIA) in respect of PIA's Respective Parts of the Project.

IV. APPRAISAL SUMMARY

A. Economic and financial analyses

Economic Analysis

31. The project is largely a public goods investment with mainly environmental, health, and institutional benefits. Only about 28 percent of the project's total cost represents a private, on-farm investment for demonstration of livestock waste management technologies. Therefore, different economic analysis methodologies were applied for different project activities, i.e. cost-benefit analysis for Livestock Waste Management Technology Demonstration component, and a cost-effectiveness analysis for Wetland Demonstration for Pollution Reduction component and Integrated Agricultural Pollution Reduction Techniques component. Based on assumptions and analysis made as detailed in Annex 9, the economic analysis shows a 15 percent economic internal rate of return (EIRR) for the Livestock Waste Management Technology Demonstration component with a robust EIRR for all sub-projects ranging from 13 percent to 17 percent. It also concludes the cost effectiveness of the technologies introduced for all sub-projects under Wetland Demonstration for Pollution Reduction component and Integrated Agricultural Pollution Reduction Techniques component. Annex 9 provides more details.

Financial Analysis

32. Since this project is largely a public goods investment, financial analysis does not focus on the project's overall financial profitability. For the Livestock Waste Management Technology Demonstration component, financial analysis focused on the financial sustainability of the sub-projects, i.e. whether they can make up for the financial expenditure (including depreciation) upon completion of project implementation. The detailed analysis indicates that all three sub-projects can achieve financial balance, and hence achieve financial sustainability. For the Wetland Demonstration for Pollution Reduction component, the analysis focused on the operating mechanism of the systems for both sub-projects since they will be operated by the government or state-owned company as public infrastructures. For the Integrated Agricultural Pollution Reduction Techniques component, a financial incentive efficiency analysis was carried out, which concluded that—while the current financial incentive program is effective—training, demonstration and extension for organic fertilizer techniques are important to offset the disadvantages of organic fertilizer application. The detailed measurement results are shown in Annex 9.

B. Technical

33. Technical design of the project focused on introducing proven technical solutions and practical demonstrations to address the key issues of agricultural and non-point source pollution. The design was based on: (a) the cost-effectiveness of proposed technologies; (b) the expected environmental performance of the proposed technologies relative to the pollution reduction goals of the project; and (c) the replication potential. The project would demonstrate technology options for each sub-project which are technically sound, financially viable, and environmentally effective. The actual technologies to be demonstrated would be tailored to fit specific conditions of each PIA with its full ownership.

C. Fiduciary

34. **Financial Management**. The Bank has conducted a preliminary assessment of the adequacy of the project financial management (FM) system. The assessment, based on guidelines issued by the Financial Management Sector Board on November 3, 2005, has concluded that the project meets the minimum Bank financial management requirements, as stipulated in OP/BP 10.02. The project will maintain adequate financial management arrangement acceptable to the Bank and, as part of the overall arrangements that the client has in place for implementing the operation, provide reasonable assurance that the proceeds of the Grant will be used for the purposes for which the grant proceed is granted. Financial management risk is defined as the risk that GEF Grant proceeds will not be used for the purposes intended and is a combination of country, sector and project specific risk factors. Taking into account the risk mitigation measures proposed under the project, a "modest" FM risk rate was assigned to the project.

35. **Procurement.** Procurement for the proposed project would be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004, revised October 2006; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, revised October 2006, and the provisions stipulated in the Legal Agreement. The various items under different expenditure categories are described in Annex 8. For each contract to be financed by the Grant, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and time frame are agreed between the client and the Bank and included in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

D. Social

36. Social Assessments (SA) were carried out for all components of the project. The SA preparation institutes consulted the stakeholders involved in the project. The SA showed the supportive attitude to the project from the local communities. Local people believe that the project will contribute to the development of the local economy through the enhancement of environmental quality. The findings of the SA were used to inform the preparation of project feasibility studies. Recommendations from the SA have also been incorporated into the overall project design.

E. Environment

37. The Project is classified as a "Category B" project. An Environment Assessment (EA) report was prepared by East China Normal University (ECNU) in accordance with national policies and regulations as well as the Bank's safeguard policies. This EA Report includes: (a) a consolidated project-wide EA (CEA) report with detailed evaluation covering all proposed project components; and (b) a consolidated Environmental Management Plan (CEMP). The EA report has been prepared, incorporating the Bank's comments, and found to be satisfactory.

38. The EA report covers baseline information on environmental and socio-economic conditions. The EA report has identified and assessed the Project benefits and impacts on the natural and social-economic environments. It also describes alternatives considered as part of feasibility studies for each component. It concludes that the Project will bring significant positive impacts to the natural and socio-economic environments. The EA report did not identify serious

adverse or irreversible environmental impacts, which cannot be effectively mitigated to acceptable levels. All Project investments have been designed to avoid or minimize any adverse impacts on the physical environment. However, some negative impacts may arise during project implementation (mainly during construction), such as negative but limited impacts on soil, air, water, acoustic environments, flora, and solid wastes. These impacts will be temporary and localized, and proper mitigation measures during construction and operation stages can minimize or even eliminate them. Preventive measures during the construction and operation phases were prepared and are noted in the CEMP and in specific EMPs for individual sub-projects.

39. Apart from the consultation conducted to obtain inputs into project design, public consultations were conducted among residents and those affected by the proposed project, including persons from different groups, e.g. gender, socio-economic and educational backgrounds, and occupations. The consultations took different forms: expert consultations, questionnaires, and internet online survey. The majority of those consulted expressed strong support for the project and acceptance of short-term inconveniencies. The main public concerns included noise and flying dust during construction, and wastewater and odor during the operation phase. Public concerns and opinions expressed are addressed in the EA report and incorporated into the project design and environmental mitigation measures.

F. Safeguard policies

Safeguard Policies Triggered by the Project	Yes	No
Environmental Assessment (OP/BP 4.01)	[X]	[ ]
Natural Habitats (OP/BP 4.04)	[ ]	[X]
Pest Management (OP 4.09)	[X]	[ ]
Physical Cultural Resources (OP/BP 4.11)	[ ]	[X]
Involuntary Resettlement (OP/BP 4.12)	[X]	[ ]
Indigenous Peoples (OP/BP 4.10)	[ ]	[X]
Forests (OP/BP 4.36)	[ ]	[X]
Safety of Dams (OP/BP 4.37)	[ ]	[X]
Projects on International Waterways (OP/BP 7.50)	[ ]	[X]
Projects in Disputed Areas (OP/BP 7.60)*	[ ]	[X]
Piloting the Use of Borrower Systems to Address Environmental and Social Safeguard Issues in Bank-Supported Projects (OP/BP 4.00)	[ ]	[X]

40. The safeguard policies triggered by the project include: (a) Environmental Assessment; (b) Pest Management; and (c) Involuntary Resettlement.

(a) **Environmental Assessment (OP4.01).** In order to reflect overall environmental impacts from both positive and negative perspectives, especially for this kind of packaged project, only one CEA and one CEMP documents are required to comply with Bank's EA requirements. ECNU was contracted to prepare CEA report and EMP. Based on individual EA reports for proposed project investments, CEA report and EMP in both Chinese and English languages were prepared to make a comprehensive analysis of the

* *By supporting the proposed project, the Bank does not intend to prejudice the final determination of the parties' claims on the disputed areas*

impacts of all four components. The EA report concluded that the project would bring very positive environmental and social benefits to Shanghai's rural areas and significantly reduce the pollution load, especially nutrients in the surface water flowing to the East China Sea. Key environmental issues have been addressed. Adherence to the EMP during Project implementation will be closely monitored. The key environmental issues and mitigation measures were summarized in the EMP.

(b) **Pest Management (OP4.09).** The Integrated Agricultural Pollution Reduction Techniques Component, to be implemented by Shanghai Agricultural Technology Extension and Service Center, will: (i) disseminate the application of high efficiency, low toxic, low residual effect chemicals and biological pesticides; (ii) prohibit the use of high toxic, high residual effect pesticides and those not recommended on the World Health Organization's *Recommended Classification of Pesticides by Hazard and Guidelines to Classification* (Geneva: WHO 1994-95); (iii) reduce the reliance on organophosphorus pesticides and other synthetic chemical pesticides; (iv) upgrade chemical spraying equipment for increased efficiency; and (v) promote the use of non-chemical technologies for insect and pest control. This component is expected to bring significant benefits with the reduction of non-point sources pollution and food safety by greatly reducing the amount of pesticide use. A Pest Management Plan (PMP) was prepared for the project.

(c) **Involuntary Resettlement (OP4.12).** According to the project proposals, all civil works for Livestock Waste Management Technology Demonstration Component will be conducted on the beneficiaries' own land, thus no land taking will be necessary. Wetland Sewage Treatment System Component will cause involuntary resettlement for wetland construction, and accordingly social safeguards document is needed. Integrated Agricultural Pollution Reduction Techniques Component and Project Management and Dissemination Component will not involve any civil works, so these two components will not trigger the policy, and no RAP is needed. In accordance with Chinese laws and the Bank's requirements, an Abbreviated Resettlement Action Plan (ARAP) was prepared in Chinese and English by Shanghai PMO. The ARAP was approved by the SMG and is available in the project file. A design institute for the component[3] and the Shanghai PMO paid special attention to avoiding or minimizing land taking in the project. As a result, all the land being taken is waste land in the villages under the Qingpu Village Wetland Sewage Treatment System sub-project, and the land taking had very little impact on villagers' livelihoods.

(d) **Information Disclosure.** The ARAP, SA, CEA, EMP, and PMP reports were prepared in both Chinese and English and disclosed at the World Bank's InfoShop in Washington DC in May and September 2009, at the Bank's Office in Beijing, and are available to the public at the Shanghai PMO, district/county working group offices, all participating entities and on relevant websites. Information about the project was disclosed through the Shanghai Environmental Hotline Website in October 2008. Telephone hotlines were established for the public to access relevant documents and offer comments. Disclosure of the CEA report was announced in a local newspaper on April 30, 2009.

[3] The design institute of the village wetland sewage treatment system is Agriculture & Biology College of Shanghai Jiao Tong University.

G. Policy Exceptions and Readiness

41. The GEF project does not require any policy exceptions. Project institutional and implementation structure is in place at the Shanghai municipal level. Training for procurement and financial management staff has been carried out during project preparation with support from the Bank. All sub-projects have been identified with technical design and implementation arrangement reviewed and agreed by the Bank.

Annex 1: Country and Sector or Program Background

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

Country and Sector Background

1. Shanghai Municipality has been China's premier economic, financial, and industrial center. The municipality lies at the heart of a major metropolitan region of the Yangtze River Delta in eastern China, which flows into the East China Sea. The entire metropolitan region, both core city and suburban area, has undergone rapid economic and population growth. In 2006, Shanghai was estimated to have 18.2 million residents and its population is expected to reach 19 million in 2010. Shanghai's economy maintained double-digit economic growth over the past fifteen consecutive years. Though China has also been hit by the current financial crisis, Shanghai is expected to continue to grow moderately during the 11th Five-Year Plan period (2006 – 2010).

2. With increasing population and economic activities, Shanghai faces serious environmental management challenges. One of the major environmental issues of Shanghai is degradation of water quality of two major rivers, Huangpu River and the Yangtze River, which are main sources of raw water supply for the municipality. In rural Shanghai, where infrastructure lags behind the necessity level, household and agriculture wastes are discharged into a water environment without treatment, thus causing pollution. Rural areas account for some 60 percent to 70 percent of the loads of nitrogen, phosphorus, and other organic matters discharged into watercourses, and the pollutants eventually flow into the East China Sea.

3. Deterioration of water quality in the Yangtze and Huangpu rivers significantly affects the water quality of the East China Sea. According to a recent report from the China's State Oceanic Administration (January 2008),[4] areas of sea water where the water quality does not meet the national standard of clean water are expanding: about 71,000 km^2 of the East China Sea did not meet the standard in 2007, which is 4,000 km^2 or 5 percent greater than in 2006. Occurrence of marine red tides, caused by eutrophication of sea water, is also quite common in the East China Sea, especially from May through July. There were 60 cases of marine red tides over a total area of about 9,800 km^2 in 2007.

Table A1-1: Sea Water Quality of the East China Sea

(unit: km^2)

Year	Comparatively Clean	Slightly Polluted	Moderately Polluted	Heavily Polluted	Total
2003	32,370	5,440	8,550	17,170	63,530
2004	21,550	13,620	12,110	20,680	67,960
2005	21,080	10,490	10,730	22,950	65,250
2006	20,860	23,110	8,380	14,660	67,010
2007	22,430	25,780	5,500	16,970	70,680

4. Pollution in the rural areas of Shanghai comes from four major sources. The largest pollution source is livestock waste.[5] The 533 large-scale livestock and poultry farms in Shanghai's suburbs produce about 6.13 million tons of manure each year, and about 40 percent

[4] "Sea Water Environmental Quality of the National Sea Areas," published by the State Oceanic Administration in January 2008.

[5] "Consulting Services for Upper Huangpu River Catchment Management Study" (December 2005) by DHI.

of the manure is discharged into waterways without treatment due to lack of effective treatment facilities. This is equivalent to about 85,000 ton/year of COD_{Cr}, 447,000 ton/year of BOD, 15,000 ton/year of TN, and 3,500 ton/year of TP. The second largest pollution source is untreated wastewater from households in rapidly urbanizing villages and towns in suburban areas. Rapid urbanization has improved the living standards of rural residents, but it has not met environmental protection requirements: more than 60 percent of household wastewater is discharged without treatment. This means about 500,000 m^3 of partially treated household sewage are discharged daily into a water environment. The third pollution source is crop straw. In rural Shanghai, about 1 million tons of crop straws are left on the farmland annually. In the past, people used crop straw to cook at home, but it is no longer a preferred source of fuel due to the wide use of natural gas. Hence, it eventually flows into the waterways. The fourth pollution source is chemical fertilizer and pesticide. According to statistics, farmers in Shanghai tend to use more chemical fertilizers and pesticides than the national average. In 2007, the nitrogen fertilizer volume per unit of farmland was 490.5 kg/hectare for fields used for grain crops, and 666.2 kg/hectare for vegetable fields in Shanghai.

Three-Year Environmental Action Plan

5. The Shanghai Municipal Government has recognized the issues of pollution in the Yangtze River and agricultural pollution control and has addressed these issues in the TYAPEP, which set out targets and prioritizes environmental projects to be implemented during the period of the plans. In the second TYAPEP (2003 – 2005), the following key measures were adopted for livestock waste management: (a) closure of more than 1,100 small and polluted livestock farms to promote economic scales of livestock farms outside of key water source protection areas; (b) establishment of more than 40 organic fertilizer facilities with a processing capacity over 700,000 tons of fresh livestock manure; and (c) promotion of land application of livestock manure. The second TYAPEP also promoted the use of organic fertilizers, integrated pest management techniques, and applications of low-toxicity pesticides to reduce pollution associated with agrichemicals. A ban on open burning of agricultural wastes was also introduced.

6. The issues were carried over to the following plan, the third TYAPEP (2006 – 2008), which aimed to significantly increase reuse of livestock wastes, and reduce the unit use of chemical pesticides by 8 percent and of nitrogen-based fertilizers by 10 percent. In particular, the plan strengthened the issuance of pollution discharge permits for livestock farms and expanded and established five organic fertilizer facilities with an increased annual production capacity of 80,000 tons. To reduce non-point source pollution, it promoted: (a) the use of organic fertilizer, (b) integrated pest management techniques including the use of effective low-toxicity and low-residue pesticides, and (c) comprehensive utilization of crop straw.

7. The investments under the second and third TYAPEPs have largely achieved their intended objectives in water pollution control. By the end of 2008, Shanghai was able to treat about 75 percent of its wastewater, improve water quality of rivers in urban areas, reduce unit consumption of pesticides and chemical fertilizers in its agricultural production, and curb significantly pollution discharges from livestock wastes.

8. The fourth TYAPEP (2009 – 2011) aims to reduce the use of nitrogen-based fertilizers and chemical pesticides by 10 percent and further improve environmental performance of 38 large livestock farms. Proposed new areas for livestock waste management in SMG's fourth

TYAPEP are: (a) piloting of livestock waste treatment facilities and associated application systems in large farms including land applications; (b) demonstration of livestock manure biogas projects; and (c) procurement of transportation vehicles for livestock wastes. For agricultural wastes, it continued to promote applications of organic fertilizer and integrated pest control techniques with low-toxicity pesticides. It enforces further the ban on open burning of agricultural wastes. On rural environmental quality, the fourth TYAPEP proposes a particular target of treating wastewater from at least 60,000 households to improve water quality of rivers. In this regard, the plan calls for the identification and adoption of economically feasible wastewater treatment techniques. It is estimated that the investment needed for the implementation of the fourth TYAPEP will be about RMB82 billion, of which RMB24.6 billion will focus on water quality issues.

Shanghai APL and GEF Project

9. In addition to these efforts initiated by the SMG, the Bank has been supporting the municipality in addressing its complex environmental issues. One of the Bank-financed projects is the Shanghai Urban Environment Project, which was launched in 2003. It is the first APL in China, with a total loan amount of US$700 million, and it is divided in three phases. The program objective is to improve environmental conditions in the greater Shanghai Municipality by progressively developing and implementing integrated environmental management measures municipality-wide. During the implementation of the first phase of the APL, a study, "Upper Huangpu Catchment Management Plan," was conducted, and the issue of agricultural and non-point source pollution in the rural areas was identified.

10. This proposed project is a stand-alone GEF-funded project, but it will support the broad program development objective of the APL. Whereas the APL focuses mostly on priority investments and institutional reforms in the water sector (including water supply, wastewater, and solid waste management), the GEF project will complement the efforts by mitigating agricultural and non-point source pollution discharged to a water environment. The GEF project also aims to take a comprehensive approach by demonstrating a number of innovative sub-projects. A project implementation plan by the client included a replication strategy so that the technology introduced through the GEF project will be widely disseminated among the farms after the project ends.

Annex 2: Major Related Projects Financed by the Bank and/or Other Agencies

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

Project	Sector Issue	Performance Rating	
		Development Objective	Implementation Progress
Bank-Financed Projects in Shanghai			
Shanghai APL1 (Ln. 4705)	Urban environment, pollution management and environmental health, access to urban services for the poor, environmental policies and institutions.	Satisfactory	Satisfactory
Shanghai APL2 (Ln. 4801)	Urban environment, pollution management and environmental health, access to urban services for the poor, environmental policies and institutions.	Satisfactory	Satisfactory
Bank-Financed Projects in China			
Ningbo Water and Environment (TF 56692)	To reduce land-based pollution along the Cixi coast and the East China Sea, promote the replication of innovative, simple and effective wastewater treatment techniques, and encourage coastal zone conservation.	Satisfactory	Satisfactory
Hai River Basin Integrated Water and Environment Management (TF 53183)	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.	Highly satisfactory	Highly satisfactory
Livestock Waste Management in East Asia (TF 56519)	To reduce the major negative environmental and health impacts of rapidly increasing concentrated livestock production on water bodies and thus on the people of East Asia. Its global environment objective is to reduce livestock-induced, land-based pollution and environmental degradation of the South China Sea.	Satisfactory	Satisfactory

Other MDB's and Agencies	
Global Program of Action for the Protection of the Marine Environment from Land-based Activities (by GEF).	This Global Program is a source of conceptual and practical guidance for devising and implementing sustained action to prevent, reduce, control and/or eliminate marine degradation from land-based activities
Global People, Land Management, and Environmental Change Project (by UNEP).	This project will develop sustainable and participatory approaches to biodiversity conservation within agricultural systems
AWI Pilot Projects (by FAO).	The objective of these pilot projects is to provide local institutions and decision-makers in China, Thailand and Vietnam with tools in order to ensure the sustainability of livestock development.

Annex 3: Results Framework and Monitoring

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

Result Framework

PDO	Project Outcome Indicators	Use of Project Outcome Information
Demonstrate effective and innovative pollution reduction activities in Shanghai's rural areas in order to reduce the rural/ agricultural pollution load (especially nutrients) in the surface water flows to the East China Sea	1. Demonstration of pollution reduction technologies 2. Reduced pollution of TN, TP, BOD and COD discharged from the sub-project sites in Livestock Waste Management Technology demonstration Component 3. Reduced pollution of NH3-N, TP, BOD, and COD discharged from the sub-project sites in Wetland Demonstration for Pollution Reduction Component 4. Increased replication farm area using demonstrated technologies 5. Development of a replication strategy for disseminating demonstrated technologies	Recommended best practices in planning and implementation of agricultural, non-point, and rural pollution control programs and projects, and dissemination of the outcomes for sustainable development in rural sector
Intermediate Outcomes	**Intermediate Outcome Indicators**	**Use of Intermediate Outcome Monitoring**
Livestock Waste Management Technology Demonstration Component		
Increase collection and treatment of livestock solid and liquid wastes	Average quantity of livestock solid and liquid waste treated at livestock farms in Jinshan, Shenye and Qianwei	Monitoring the progress of physical works and the PIAs operational performances
Wetland Demonstration for Pollution Reduction Component		
Increase collection and treatment of rural household wastewater	Average volume of rural household wastewater treated at wetland wastewater treatment systems in participating villages	Monitoring the progress of physical works and the PIAs operational performances
Integrated Agricultural Pollution Reduction Techniques Component		
Promote proper usage of fertilizers, insecticides and pesticides	1. Number of farmers receiving skill development programs on fertilizer, insecticides and pesticides 2. Quantity of organic fertilizers used 3. Extent of low residue and low toxicity pesticides used 4. Usage of green test control techniques	Monitoring the progress of purchase of equipment, and efficiency and quality of skill development programs.
Project Management and Dissemination Component		
Improve management capacity of PMO and PIAs Promote agricultural pollution reduction techniques through training and workshops	1. Number of subprojects satisfactorily implemented 2. Number of training courses conducted 3. Number of farmers who participated in the training and workshops.	Monitoring the progress of project management and dissemination programs.

Arrangements for Results Monitoring

			Target Values			Data Collection and Reporting		
Project Outcome Indicators	**Unit**	**Baseline 2010**	**YR1 2011**	**YR2 2012**	**YR3 2013**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**
1. Demonstration of pollution reduction technologies	no.	0	6	8	8	Semi-annual report	PIA	Shanghai PMO
2. Reduced pollution of (a) TN, (b) TP, (c) BOD, and (d) COD discharged from sub-project sites in Livestock Waste Management Technology Demonstration Component	ton/yr	(a) 0 (b) 0 (c) 0 (d) 0	3.53 0.31 70.50 116.58	17.98 4.15 362.41 771.43	30.60 7.80 606.50 1,347.50	Semi-annual report	PIA	Shanghai PMO
3. Reduced pollution of (a) NH3-N, (b) TP, (c) BOD, and (d) COD discharged from sub-project sites in Wetland Demonstration for Pollution Reduction Component	ton/yr	(a) 0 (b) 0 (c) 0 (d) 0	1.46 0.44 23.45 42.50	1.85 0.56 31.26 56.20	1.87 0.57 33.21 59.28	Semi-annual report	PIA	Shanghai PMO
4. Increased replication farm area using demonstrated technologies (cumulative)[6]	mu	0	8,000	16,000	16,000	Semi-annual report	PIA	Shanghai PMO
5. Development of a replication strategy for disseminating demonstrated technologies		none	drafted	reviewed	finalized	Semi-annual report	PIA	Shanghai PMO
Intermediate Outcome Indicators								
Livestock Waste Management Technology Demonstration Component Average quantity of livestock solid and liquid waste treated at livestock farms in Jinshan, Shenye and Qianwei	tons/d	0	10,800	69,400	126,000	Semi-annual report	PIA	Shanghai PMO
Wetland Demonstration for Pollution Reduction Component Average volume of rural household wastewater treated at wetland wastewater treatment systems in participating villages	m^3/d	0	199	504	504	Semi-annual report	PIA	Shanghai PMO
Integrated Agricultural Pollution Reduction Techniques Component								

[6] The base year for this indicator as well as intermediate outcome indicators related to Integrated Agricultural Pollution Reduction Techniques Component is 2009.

Number of farmers receiving skill development programs on fertilizer, insecticides and pesticides	per. times	0	550	1,100	1,100	Semi-annual Report	PIA	Shanghai PMO
Quantity of organic fertilizer used	ton/yr	0	1,200	2,400	2,400	Semi-annual report	PIA	Shanghai PMO
Extent of low residue and low toxicity pesticides used (against the total pesticides used at the pilot sites)	%	0	80	90	90	Semi-annual report	PIA	Shanghai PMO
Usage of green test control techniques (at the pilot sites)	no.	0	description	description	description	Semi-annual report	PIA	Shanghai PMO
Project Management and Dissemination Component								
Number of subprojects satisfactorily implemented (cumulative)	no.	0	3	7	8	Semi-annual report	PIA	Shanghai PMO
Number of training courses conducted	no.	0	5	10	10	Semi-annual report	PIA	Shanghai PMO
Number of farmers who participated in training and workshops	no.	0	1,000	2,000	2,000	Semi-annual report	PIA	Shanghai PMO

Annex 4: Detailed Project Description

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project[7]

A. Component 1: Livestock Waste Management Technology Demonstration (US$9.748 million or RMB63.362 million/ GEF grant US$2.408 million)

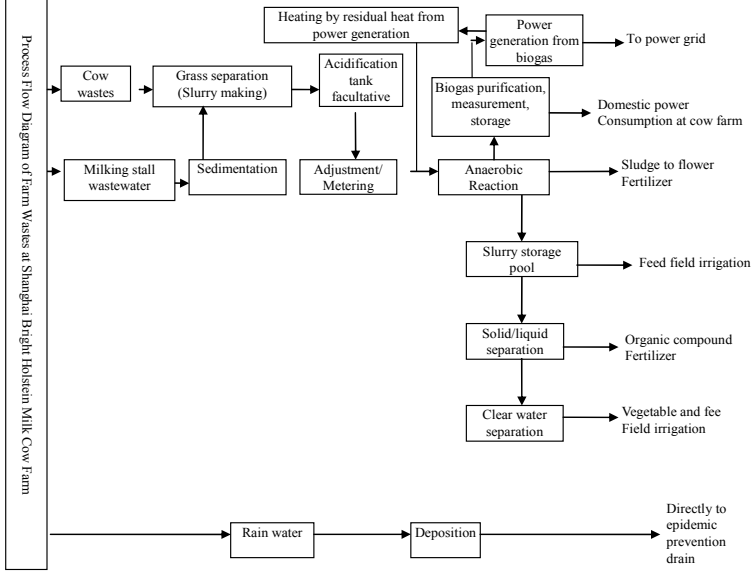
1. The component consists of three separate project sites representative of the three sub-components as follows.

(a) Livestock Waste Management on Large-Scale Farm (US$5.468 million or RMB35.542 million/ GEF grant US$1.458 million)

2. *Current Situation.* There are currently about 5,000 cows on the Shanghai Bright Holstan Jinshan Dairy Farm, consisting of 3,000 milk cows and 2,000 replacement heifers in a free stall dairy housing facility. The dairy currently manages manure in a two-step process: first composting and then pelletizing the finished product for sale to crop farmers. The compost process requires adding an additional 40 percent of saw dust to the total manure volume to reduce water concentration to a level that allows the material to compost. Based on observation the farm is currently a source of non-point pollution because the composting process is not protected from rainfall and appropriate canals to divert the run-off from the freshly collected waste are not in place in most areas of the operation. This results in run-off into the waterway adjacent to the farm.

3. *Proposed Waste Treatment Works*. This sub-component will support the establishment of a dairy waste treatment facility on a large sized dairy farm and will treat 256 t/day of cow wastes and be implemented by Shanghai Bright Holstan Company Limited (SBH). The project consists of a primary solid-liquid separator, an acidification tank, a 22-day HRT mesophilic anaerobic CSTR, and a "wet" type scrubbing biogas collector. Biogas is combusted in two 250 kW reciprocating engine generators that will be inter-connected with Shanghai Electric for energy sale to the grid. These engines will be operated for 18 hours/day and estimated to generate about 425 kWh/hr output or 7,700 kWh/day. Waste heat

Figure A4-1: Process Diagram: Jinshan Dairy Farm



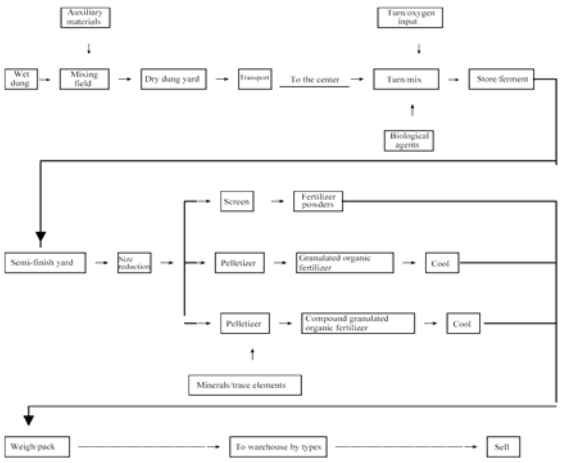
[7] The exchange rate used here if RMB6.5 = US$1. It is different from the exchange rate on the cover page, as it is the projected three-year average exchange rate.

from the engines will be transferred to the CSTR to maintain mesophilic operating temperatures. A biogas fired hot water boiler will also be included to provide back-up heat for the CSTR when the engines are not in operation. Sludge from the CSTR will be dewatered through a secondary solid-liquid separator. An estimated 14 tons/day of solid fraction from the CSTR will undergo additional processing as an organic fertilizer. About 238 m^3/d liquid fraction will be further treated on site through a series of lagoons prior to conveying to the existing Langxia Wastewater Treatment Plant for final disposal. Some liquid fraction may be used for fodder crops on farm either through pipes or a trucking scheme. This has taken into consideration factors such as climate, precipitation, evaporation, and seasonal requirements for liquid application.

(b) Livestock Waste Management on Medium-Scale Farm (US$1.139 million or RMB7.403 million/ GEF grant US$0.550 million)

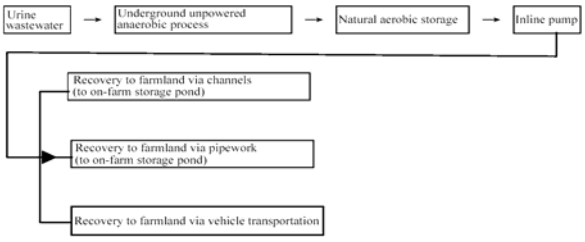
4. *Current Situation*. Shanghai Shenye Dairy Cooperative (SSDC) is a 1,600 milk cow dairy farm where cows are housed in free stalls and solid wastes are collected manually and stockpiled on the farm. The free stalls are hose washed. Waste from the milk parlor is hose flushed. All hose flushed liquids are currently held in an under-sized, single-cell lagoon. Both solid and liquid wastes were observed to run off the farm and pollute the local environment including surface water, as there is no clear waste management or nutrient management plan in place.

Figure A4-2: Solid Waste Management System



5. *Proposed Waste Treatment Works*. The proposed livestock waste treatment center consists of the following two independent systems: (a) a solid waste management system of composting and pelletizing process, with a capacity of treating 50 tons of waste per day; and (b) a liquid waste management system, comprised of a series of anaerobic and facultative lagoons with a 40 day HRT capable of treating 30 tons of livestock wastewater per day, prior to final disposal through land application. Both systems will reduce human health risks posed by pathogens and virus transmission from livestock to humans. The sub-component will be implemented by SSDC.

Figure A4-3: Liquid Waste Management System



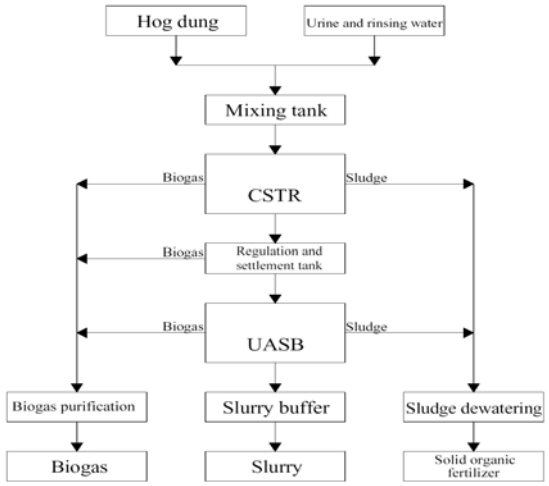
(c) Integrated Livestock and Agricultural Waste Management (US$3.142 million or RMB20.423 million/ GEF grant US$0.400 million).

6. *Current Situation*. Qianwei village has a newly constructed a 4,000 sow-farrow-finish farm with an estimated generation of 3,000 tons/year of pig waste. The village also generates

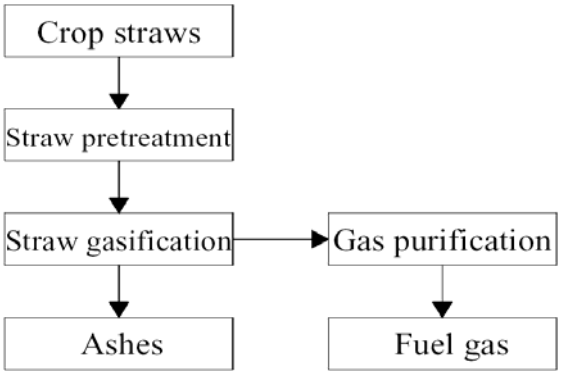
about 800 tons/year of municipal solid waste, mainly food wastes from the tourist trade visiting the village; and 2,500 tons/year of crop straw.

7. *Proposed Waste Treatment Works*. This sub-component will be implemented by Qianwei Village Committee of Shuxin Town in Chongming County. The proposed waste treatment works consist of a main system and an auxiliary system. The main system will have a series of inter-connected digesters. The first digester is a heated (mesophilic) mixed concrete tank with

FigureA4-4: Main System - Anaerobic Digesters



FigureA4-5: Auxiliary System - Gasification Process



separate gas storage also referred to as a CSTR. The CSTR will digest the pig waste and MSW, both of which are thicker and more suitable for this type of digester. The second type of digester is a UASB, which will digest the pre-treated liquid from crop straw waste. Crop straw pre-treatment requires soaking the crop straw in the effluent from the CSTR in order to acidify and transfer the volatile solids in the crop straw into the liquid phase. Biogas from the CSTR and UASB is collected in separate gas storage. From the gas storage, biogas will be scrubbed to remove corrosive hydrogen sulfide gas and purified biogas is then combusted in a 100 kW reciprocating engine generator for energy production. A second 100 kW engine generator is being purchased for the Project as a back-up engine. Electric power will be used by the village and some gas will be used as a household cooking fuel. About 29.4 m^3/d liquid fraction will be stored in 12 on-farm storage ponds for a maximum of 40-day storage for land application through sprinkler irrigation, which has taken into consideration factors such as climate, precipitation, evaporation, and seasonal requirements for liquid application. The auxiliary system consists of two sub-systems, a gasification plant to produce fuel gas, and a small biomass briquetting plant designed specifically for treating rice chaff. About 30 m^3/d liquid fraction will be further treated by a series of lagoons of 40 days HRT prior to final disposal through land application.

B. Component 2: Wetland Demonstration for Pollution Reduction (US$3.352 million or RMB21.729 million/ GEF grant US$0.950 million)

(a) Rural Town River-Network Wetland Demonstration (US$1.468 million or RMB9.542 million/ GEF grant US$0.350 million)

8. *Current Situation*. Jiading district is one of the 18 districts/county of Shanghai. It has an area of 458.8 km^2 and a population of 486,400. Jiading comprises 14 towns, 3 sub-districts, and a municipal-level industrial zone. Most of the towns have farm lands. The district is located about 20 km to the northwest of downtown Shanghai. The proposed sub-project site is located on 66.5 hectares in Juyuan New Development Area of Waigang Town, with an area of 50.95 km^2 and a resident population of 38,000; it is surrounded by Gujing River, Miaojing River and Lianqi River. The river ecosystem has been seriously deteriorating to the extent of almost complete loss of ecological function due to water conservancy works installed for flood prevention, drainage and irrigation. Diffuse pollution rising from farmland drainage, aquaculture activities, rural sewage discharge, river sediment release and aquatic biological decay, and point pollution from household sources are worsening the river water quality year by year. Pollution caused largely by high contents of organic substance, nitrogen and phosphorous has resulted in the deterioration of water quality to Class V or worse—far below the executive environmental objective of Class III as defined in the water quality standard of the Chinese Government. The environmental pollution situation in the river network area is now accorded high attention by both Jiading District Government and the Shanghai Municipal Government.

9. *Proposed Pollution Control Works*. The proposed project would use the river network wetland to control and reduce non-point pollution, and a constructed wetland to tackle point pollution to improve the river water quality from Class V to Class IV by national surface water quality standard. The sub-component will be implemented by Shanghai International Automobile City New Anting United Development Company Limited (SIACNUD).

10. *Construction activities*. The proposed waste treatment works consist of: (i) river network wetland ecological restoration engineering; and (ii) construction of a vertical submerged wetland to collect and treat household sewage.

(i) River network wetland ecological restoration engineering. The river network wetland would cover an area of 66.5 ha and play an important role in providing water resources, micro-climate adjustment, water source reservation, flood control and drought prevention, reduction of pollutants and biodiversity preservation. A total length of about 4,850 m of river courses—including Gujing, Miaojing, Lianqi and natural interconnected waterways—would be restored. The geographical location of the proposed sub-component and the design of vegetation buffer are shown in Figure A4-6 and Figure A4-7, respectively. The construction activities of river-network wetland ecological restoration engineering are shown in Table A4-1. Key features are described below:

- Riverside belts and vegetation buffers of about 47,300 m^2 would be built along river banks. Filtration of plants would help stop the sediments carried by surface runoffs and prevent erosion of river courses. Vegetated revetments would be able to provide ecological functions of water and soil reservation, water purification, biodiversity preservation and landscape.
- About 88,600 m^2 of river beds would be restructured (dredging, disposal of the river sediment, etc.) to produce deep ponds and shallow shoals and bed patterns of different widths to provide diversified habitats for aquatic biota.
- About 265 meters of dead-end waterway connection and expansion of river cross section would be carried out to improve water flow in the river network.

Table A4-1: River Network Wetland Ecological Restoration

No.	River	Starting-Ending Point	Length（m）	Riverside Belt (m^2)	Vegetation Buffer（m^2）	River Bed Restructuring (m^3)	Waterway Connection	
							(m)	(m^3)
1	Miaojing	Gujing-Lianqi	1103.96	6624	4756	41590		
2	Gujing	Lianqi-Miaojing	855.88	5136	3062	13430	72.5	3290
3	Shenzhaijing	Miaojing-Lianqi	486.43	2919	1740	7046		
4	Natural waterways		2404.22	14425	8602	26567	192.5	7277
Subtotal			4850.49	29104	18160	88633	265	10567
Total			4850.49	47264 m^2		Earth volume: 99200m^3; Restoration area: 36136 m^2		

Figure A4-6: Geographical Location of Jiading Wetland

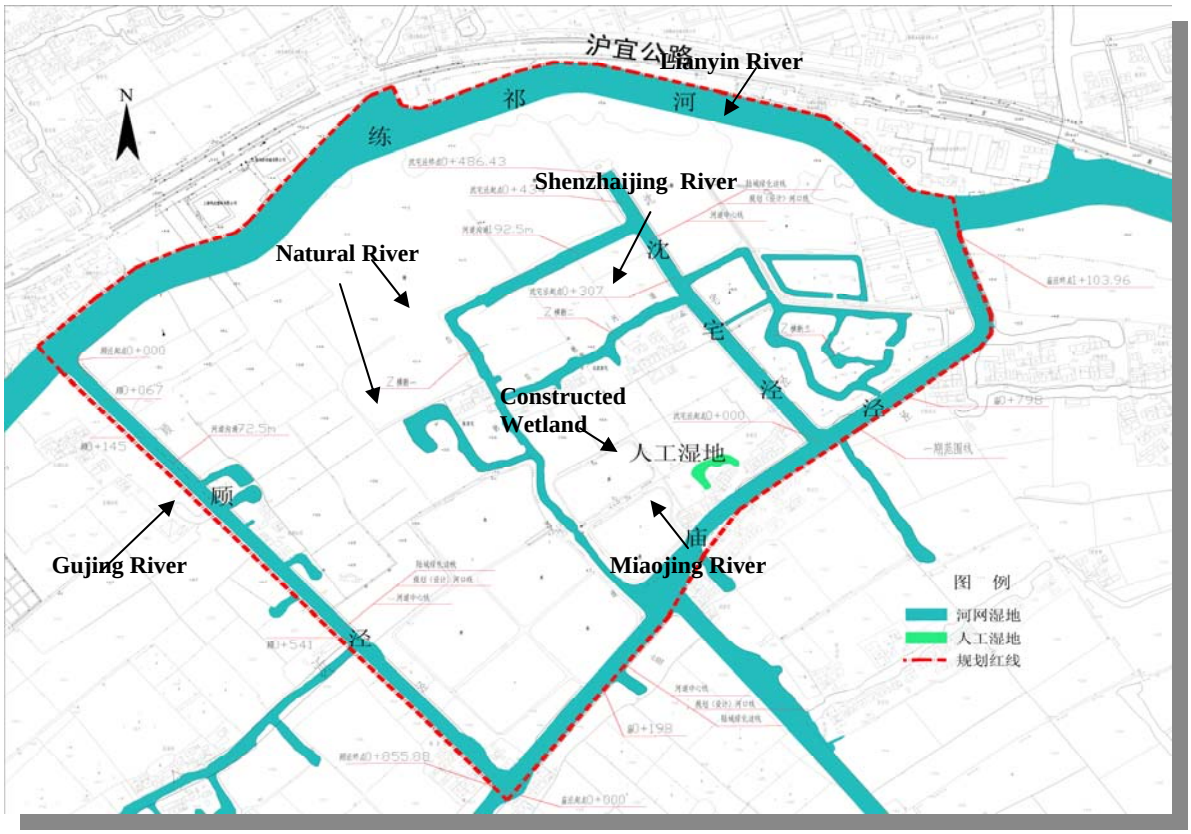
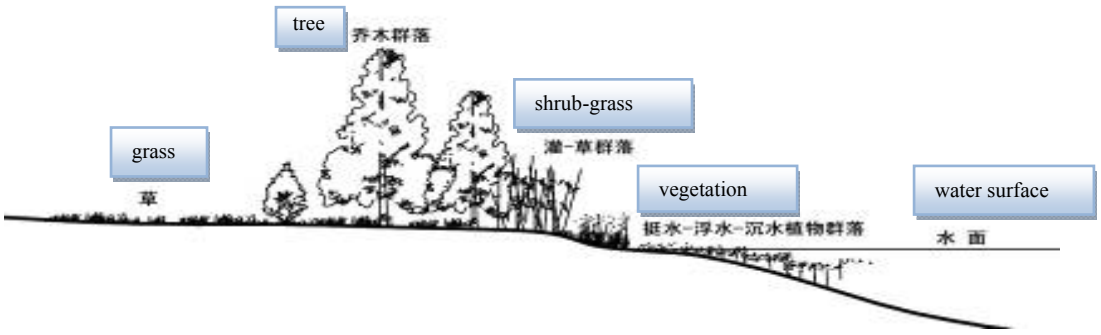


Figure A4-7: Vegetation Buffer



(ii) Construction of a vertical submerged wetland to collect and treat household sewage. Qinggang village is the only administrative village in the demonstration area; it has 30 households and 105 residents. The total sewage volume of the village was estimated to be 12 m^3 /d with daily per capita water consumption of 120L. Vertical submerged reed-coarse sand constructed wetland would be adopted to collect and treat the sewage. The effluent quality was designed to meet the Class III national surface water quality standard. Land occupation of the constructed wetland was calculated to be 120 m^2. The treatment process is shown below:

Sewage → grille → constructed wetland → discharge

12. *Pollution reduction*. The annual amount of pollutants reduced by the river network wetland and the constructed wetland were projected are shown in the following table.

Table A4-2: Annual Reduction of Pollutants

Item	Pollution type	COD_{CR} (kg)	BOD_5 (kg)	TN (kg)	TP (kg)
1	Diffuse pollution				
1.1	Total amount	14,190.00	7,095.00	1,026.20	72.30
1.2	Removing rate (%)	35	35	30	25
1.3	Reduction	4,966.50	2,483.25	307.86	18.08
2	Point source pollution				
2.1	Total amount	1,314.00	788.40	109.50	1.30
2.2	Removing rate (%)	90	96.6	92.5	90
2.3	Reduction	1,182.60	761.59	101.29	1.17
3	Total reduction	6,149.10	3,244.84	409.15	19.25

13. *Projected water quality improvement*. According to the data provided by Jiading Water Resources Bureau, about 776,000 m^3 of Class II-III water are diverted annually from the Yangtze River to the rivers in the demonstration area and the annual rainfalls average 243,700 m^3. Therefore, the annual water catchments of rivers in the demonstration area are about 1,019,700 m^3. The projected water quality improvement when the sub-component is in operation is shown in Table A4-3.

Table A4-3: Projected Water Quality Improvement

Water Quality Indicator	COD (mg/L)	TN (mg/L)	TP (mg/L)
Before construction	70	5.03	0.355
When the sub-component in operation	26.67	1.46	0.20
Environmental quality standard for surface water (GB3838-2002, Class IV ≤)	30	1.5	0.3

14. *Replication potential.* Experience from this sub-component could be replicated in the design and implementation of the Shanghai Northern Suburb Wetland (8.5 km^2) under consideration and to more and larger-scale wetlands in Jiading and beyond. Shanghai Municipality is a typical tidal river network area, with a total of 33,127 river courses, 24,915 km in total length covering a total surface water area of 569.6 km^2. Successful implementation of this sub-component will serve as a good example of water quality improvement and ecological remediation in rivers for Shanghai and other provinces bordering the East China Sea to eventually reduce pollution into the East China Sea.

(b) Village Wetland Sewage Treatment System (US$1.875 million or RMB12.187 million/ GEF grant US$0.600 million)

15. *Current Situation*. At present, less than 40 percent of the total wastewater discharges from rural households in Shanghai are properly treated to meet stipulated government standards, which implies that at least 500,000 m^3/day of rural sewage is discharged into the water environment without any treatment. This is the major source of rural diffuse pollution in Shanghai. The proposed sub-projects will be in Jinze and Liantang Towns of Qingpu District. Both towns are located on the lakeshore of Dingshanhu Lake in downstream Taihu Lake Watershed, which is the drinking water supply source and ecological conservation zone in the upstream Huangpujiang River for Shanghai. The villages surrounding Dingshanhu Lake are small and scattered, little household sewages are collected for centralized treatment. They are directly discharged into the Dingshanhu Lake without any treatment, resulting in heavy pollution of the Dingshanhu Lake and surrounding water bodies.

16. *Proposed Waste Treatment Works*. Proposed waste treatment works for decentralized treatment of rural household sewage would include restructuring improper septic tanks and construction of sewage pipe networks and treatment facilities in four natural villages under the two towns. Ecological approaches will be integrated with project measures to achieve both social and economic benefits and set an example for ecological rural sewage treatment systems. The project construction period is about one year. When the system is in operation, the effluent is expected to meet the Class 1(B) standard in the *Discharge Standards of Pollutants for Municipal Wastewater Treatment Plants* (GB 18918-2002). Qingpu District will replicate successful practices in 35 other natural villages under the two towns; this will help greatly satisfy the requirements of Shanghai Taihu Lake Watershed Water Environment Comprehensive Treatment. Shanghai Qingpu Jinze and Liantang Town Governments will be responsible for implementation and operations of the systems under their respective jurisdictions, once they are completed and transferred.

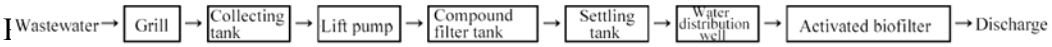
17. *Construction activities*.

(i) Sub-project site. The sub-project is located in Jintian, Qianwan and Beiwangbang natural villages of Liantang Town, and Xiezhuang natural village of Jinze Town. The basic information of the four natural villages is given in the following table.

Table A4-4: Information of the Four Natural Villages

No.	Name of Natural Village	Name of Administrative Village	Household Number	Population (person)	Design Sewage Volume (m^3/d)
1	Jintian	Jinqian	155	918	117
2	Qianwan	Jinqian	260	641	82
3	Beiwangbang	Taibei	440	1,224	156
3.1	Beiwangbang (South)				81
3.2	Beiwangbang (North)				75
4	Xiezhuang	Lianhu	300	1,077	147
4.1	Xiezhuang (East)				78
4.2	Xiezhuang (West)				69
	Total		1,155	3,860	502

(ii) Waste water treatment process. The treatment process of compound bio-filter tank plus high load constructed wetland as shown below was agreed.

(iii) 

- Grills are set up at the front end of the collection system to trap coarse suspended materials and thus protect the lift pump and subsequent operations.
- Wastewater flows into collecting tank that functions mainly to balance water quantity and quality.
- The collecting tank is furnished with a lift pump to lift wastewater into the compound bio-filter tank.
- The compound bio-filter tank consists of filter bed (filtration structure and filter media), water distributor and discharge system. When wastewater flows down through compound filter media covered by bio-membranes, the pollutants contained are absorbed and decomposed by microorganisms, thereby purifying wastewater and removing the majority of organic pollutants, phosphorus and part of ammonia nitrogen.
- The effluent from the compound bio-filter system enters the settling tank to remove by sedimentation the bio-membranes fragments from the compound bio-filter.
- The effluent is then distributed and transferred to the high load constructed wetland system for further removal of pollutants.

18. *Design qualities of influent & effluent.* The project is mainly targeted at household wastewater discharged from toilets, bathrooms, kitchens and daily washes of households. The design influent & effluent qualities of the treatment facilities are determined through field surveys and investigations in these natural villages. The treated water from the facilities will be discharged into adjacent rivers. According to requirements of Qingpu District and in compliance with Class 1(B) standard defined in the *Discharge Standards of Pollutants for Municipal Wastewater Treatment Plants* (GB 18918-2002), the major indicators are shown below.

Table A4-5: Major Indicators of Design Qualities of Influent and Effluent

Item	COD (mg/L)	BOD_5 (mg/L)	SS (mg/L)	NH_3-N (mg/L)	TP (mg/L)	pH
Design quality of influent	350	180	200	25	4	6-9
Design quality of effluent	60	20	20	8 (15)	1	6-9

Note: Figure in bracket is the limit when water temperature is below 12°C.

19. *Technical analysis*.

(i) The treatment effect of compound bio-filter tank. Compound bio-filter tank is one of the core techniques of the process which helps greatly reduce pollutants. It uses four types of high-effect media: vesuvianite, ceramic, aerated particulates and a novel stuffing – a patent technology by Shanghai Jiao Tong University (Patent No. 200610025392.2). On August 12, 2009, the Shanghai Jiao Tong University entered into an management agreement with Qianwei Village to provide training to Qiangwei village in respect of the operation, repaire and maintenance of the system established under the sub-project. These medias are mixed in certain proportions to receive higher organic volumetric loads (e.g. 3kg COD/m^3.d), thus enhancing the treatment effect of the system.

(ii) Phosphorus removal in the high load constructed wetland system. Submerged constructed wetland will play an important role in the process. Aerated particulates used as main substrate media of the constructed wetland will not only adsorb phosphorus, but facilitate slow release of aluminum ions that combine with phosphorus to settle it down resulting in phosphorus removal. Additionally, the four medias used in the compound bio-filter tank are also capable of phosphorus adsorption which will reduce the generation of phosphorus-contained sludge in the constructed wetland so as to avoid jam of the constructed wetland in operation.

(iii) Treatment effect of the whole system. To ensure the treatment effect of the Qingpu village wetland sewage treatment system sub-component, analysis was conducted on the one-year operational data of the demonstration system constructed by Shanghai Jiao Tong University that used the same treatment process in Caojiabang Village of Songjiang District in Shanghai. The demonstration system had a treatment capacity of 60m^3/d, covering a land area of 300 m^2 to treat sewage from 235 households. The project was put into operation in late November 2007. The removal rates of various pollutants in different units and year-round running results of the whole system are shown in the following tables respectively. The running results showed that the effluent could be able to meet Class 1(B) standard in the *Discharge Standards of Pollutants for Municipal Wastewater Treatment Plants* (GB 18918-2002).

Table A4-6: Removal Rates of Various Pollutants in Different Treatment Units

Parameter		Compound Bio-filter Tank			High Load Constructed Wetland			Total removal rate (%)
		Influent (mg/L)	Effluent (mg/L)	Removal rate (%)	Influent (mg/L)	Effluent (mg/L)	Removal rate (%)	
COD	Range	251~445	121.9~289.6		121.9~289.6	52.7~85.5		
	Average	321.1	164.4	48.8	164.4	59	64.22	81.63
TP	Range	2~5.9	1.1~3.8		1.1~3.8	0.5~1.8		
	Average	3.36	2.17	35.42	2.17	0.98	54.84	70.83
NH_4^+-N	Range	15.1~33.2	6.6~20.7		6.6~20.7	4.0~13.7		
	Average	20.5	12.1	40.98	12.1	8	33.88	60.98

Table A4-7: Monthly Running Results of the Whole System (January – September 2008)

	January			**February**		
	inlet (mg/L)	outlet (mg/L)	Removal rate (%)	inlet (mg/L)	outlet (mg/L)	Removal rate (%)
COD	405.6	82.33	79.70			
TP	4.9	1.6	67.35			
NH_4^+-N	25.43	12.47	50.96			
	March			**April**		
	inlet (mg/L)	outlet (mg/L)	Removal rate (%)	inlet (mg/L)	outlet (mg/L)	Removal rate (%)
COD	339.66	65.76	80.64	298.55	56.85	80.96
TP	4.76	1.55	67.44	3.6	1.08	70.00
NH_4^+-N	25.84	9.18	64.47	22.5	9	60.00
	May			**June**		
	inlet (mg/L)	outlet (mg/L)	Removal rate (%)	inlet (mg/L)	outlet (mg/L)	Removal rate (%)
COD	317.14	58.12	81.67	314.73	53.23	83.09
TP	2.98	0.8	73.15	2.97	0.77	74.07
NH_4^+-N	20.52	6.8	66.86	17.73	7.25	59.11
	July			**August**		
	inlet (mg/L)	outlet (mg/L)	Removal rate (%)	inlet (mg/L)	outlet (mg/L)	Removal rate (%)
COD	299.9	54.07	81.97	336.8	64	81.00
TP	2.47	0.61	75.30	2.1	0.5	76.19
NH_4^+-N	16.67	5.94	64.37	18.9	5.7	69.84
	September					
	inlet (mg/L)	outlet (mg/L)	Removal rate (%)			
COD	314.4	51.4	83.65			
TP	2.4	0.6	75.00			
NH_4^+-N	18.6	5.55	70.16			

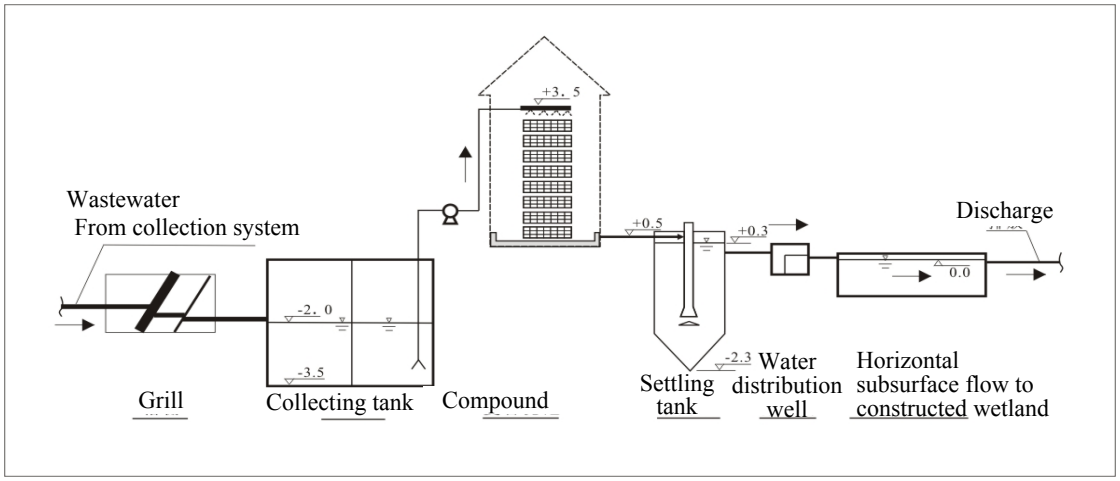
Note: No monitoring was conducted for February when students were at spring break.

(iv) Meeting 1(B) standard of GB18918－2002 and annual 85 percent compliance in winter is challenging when the water temperature drops below 10^0 C. To minimize potential risk, a return-sludge pump will be added in the settling tank to pump sludge back into the collecting tank to create a partially aerobic environment suitable for denitrification to ensure nitrogen removal and discharge standard compliance of the system in winter. See

following figure.

Figure 2 Sludge Pumped back to the Collecting Tank

(v)



Qingpu District Water Resources Bureau issued a Guideline for Implementation of Rural Sewage Treatment in Qingpu District according to Shanghai Municipal Taihu Basin Rural Sewage Treatment Plan, specifying the managerial responsibilities of relevant government agencies. Qingpu District Water Resources Bureau was assigned the responsibility for construction management and the town governments for operation management.

Table A4-8: Responsibility Assignment for Implementing Rural Sewage Treatment

Category	Qingpu Dist. Development and Reform Commission	Qingpu Dist. Environmental Protection Bureau	Qingpu Dist. Construction & Transportation Commission	Qingpu Dist. Financial Bureau	Qingpu Dist. Water Resources Bureau	Governments of Jinze and Liantang Towns
Position	Leading Agency	Trade Management	Construction Approval	Funding Supervision	Construction Management	Operation Management
Responsibility	Whole process project oversight, providing check, supervision, instruction, service, project initiation and approval and funding approval	Preparation of pollution control planning; coordination of related agencies and town governments in undertaking sewage treatment; review of EIA report	Approval of preliminary design documents	Working with Qingpu District Development and Reform Commission and Qingpu District Water Resources Bureau to examine and approve project implementation plan; project fund use management and supervision	Responsible for overall sub-component implementation; guiding preparation of technical plans by Jinze and Liantang Towns and submission to Shanghai Water Resource Bureau for review; review of annual working plans of both towns; checking, supervision, guidance and service to project implementation;	Responsible for implementation the sub-component and operation of rural sewage treatment systems under respective jurisdiction once they are completed and transferred. Operational tasks will include ensuring funding and management for long-term operation

C. Component 3: Integrated Agricultural Pollution Reduction Techniques (US$20.412 million or RMB132.678 million/ GEF grant US$0.900 million)

20. This Component will be implemented by the Shanghai Agricultural Technology Extension and Service Center (SATESC), which was established in 1995 by merging five government agencies, i.e. Shanghai Agricultural Technology Extension Station, Shanghai Plant Protection and Quarantine Station, Shanghai Soil and Fertilizer Station, Shanghai Seed Management General Station and Shanghai Edible Fungus Technology Extension Station. The SATESC is a quasi-government body with functions of agricultural research, technical extension, technical training, laboratory service, and regulatory enforcement of the agricultural sector. The following three demonstration sites were selected to promote organic fertilizer, scientific application of agricultural chemicals and conduct monitoring activities:

- Shanghai Jinshan Langxia Modern Agricultural Park. This demonstration site is located in Jinshan District, covering a total of 2,400 mu of land, involving Nanlu village, Nantang village, Youhao village and Yinglong 7th farm. Crops at the demonstration site are paddy rice, winter wheat and vegetables.
- Zhujiajiao Production Base. This demonstration site is located in Zhujiajiao town of Qingpu District, covering a total of 2,630 mu of land, involving Wangjin village, Xinshen village and Zhangma village. Crops at the demonstration site are paddy rice, winter wheat and vegetable.
- Changjiang Farm. The demonstration site is located in Pingdong 3rd team and Qianjiang 7th team of Changjiang Farm in Chongming County, covering a total of 3,700 mu of land. Crops at the demonstration site are paddy rice and winter wheat.

(a) Demonstration of the Use of organic fertilizer (US$16.028 million or RMB104.182 million):

21. This sub-component will demonstrate innovative techniques to reduce the utilization of chemical fertilizers by promoting the alternative use of organic fertilizer at the three selected demonstration sites. Organic fertilizers are expected to come from organic fertilizer plants within Shanghai municipality, including Shanghai Bright Holstan Jinshan Dairy Farm and SSDC supported under the proposed Project. About 25 percent – 30 percent reduction in chemical fertilizer use is expected, based on SATESC's studies and experience; this will reduce chemical fertilizer-based pollution significantly and help gradually rehabilitate the soil structure at demonstration sites. The sub-component will also promote accurate fertilizer application and use of crop-specific and nutrient-customized fertilization to improve the efficiency of chemical fertilizer and develop more ecologically friendly and sustainable agriculture. Manure application techniques will be demonstrated.

(b) Demonstration of the Scientific application of agricultural chemicals (US$3.443 million or RMB22.380 million/ GEF grant US$0.044 million):

22. The sub-component will promote the reduction of pollution from agricultural chemicals (insecticides and pesticides) at the three selected demonstration sites by: (i) using high efficiency, low toxic, and low residual effect chemicals; (ii) using eco-friendly biological pesticides; (iii) upgrading sprayers; and (iv) using non-chemical technologies for insect and pest control, such as insect net, moth-killing lamp, sticky paper, and sex-alluring agent.

(c) Monitoring and extension (US$0.942 million or RMB6.123 million/ GEF grant US$0.856 million):

23. This sub-component will set up about 120 check points at the three selected demonstration sites for on-site examination and to collect samples for laboratory testing to monitor the effect of the demonstration of such technologies that are demonstrated in this sub-component. The three demonstration sites under the Component have also been selected as monitoring sites for the Shanghai Municipal long-term early warning system for epidemics of plant disease, insects and pests. The sub-component will provide training for participating farmers and technicians and will extend successful experience to localities beyond the demonstration sites to other parts of Shanghai through training, workshops and SATESC extension network. The sub-component will support establishment of regular technology fairs as a platform for the private sector, diverse service providers, regulatory agencies, farmers, input suppliers and researchers to provide experience; introduce best practices, discuss regulatory options, and promote new technologies.

D. Component 4: Project Management and Dissemination (US$1.176 million or RMB7.644 million/ GEF grant US$0.530 million)

(a) Project Management (US$0.300 million or RMB1.950 million/ GEF grant US$0.050 million):

24. This sub-component will be implemented by Shanghai PMO and all PIAs to support operations of the institutional structure, including Project Coordination Group and the Shanghai PMO at municipal level, Working Groups at county/district level and those at the PIAs for efficient project management and implementation. The sub-component aims to develop and strengthen the overall implementation capacity of the various levels of project management entities in procurement, financial management, M&E, reports preparation, etc., through provision of adequate budget for technical assistance, consultant services, training and to cover incremental operating expenses.

(b) Replication strategy development, monitoring and evaluation (US$0.330 million or RMB2.145 million/ GEF grant US$0.330 million):

25. Shanghai PMO is responsible for implementation of this sub-component, which will develop a project replication strategy. Details will be added to the replication strategy outline prepared by a consultant team during project preparation and a draft replication strategy will be prepared in the first year of project implementation. This draft strategy will be reviewedtested for applicability and improvement during the second year of project implementation, and then finalized at the completion of the project implementation. Development of the replication strategy will be contracted out to an independent institution selected by the Shanghai PMO in accordance with TORs acceptable to the Bank. The final replication strategy will incorporate replication plans of all participating district/county Working Groups. A monitoring and evaluation system will be established at all PIAs. Results monitoring of project outcome indicators will be carried out by an independent monitoring team hired by the Shanghai PMO in accordance with TORs acceptable to the Bank. Unlike Sub-component 3 (c), this sub-component is to monitor the entire project, not just one sub-component, based on the agreed outcome indicators in result monitoring and the M&E plan, prepared by the PMO.

(c) Training and dissemination (US$0.546 million or RMB3.549 million/ GEF grant US$0.150 million):

26. This sub-component will be implemented by the Shanghai Agricultural Broadcasting Television School (SABTS), which was established in 1980, and is the school designated by Shanghai Municipal Government for technical training and education for all farmers in Shanghai. Equipped with distance education facilities, satellite and internet coverage of about 100 township training sites and 12 district/county campuses, the SABTS demonstrated its competence and capacity for the implementation. This sub-component will provide training for the participating entities, local farmers, school students, professionals and government officials throughout the project implementation period. Booklets, posters, exhibits, project knowledge competition and project specific training materials will be prepared for public awareness-raising campaigns and targeted training. Examples of targeted training would be for operators of the constructed systems and facilities, and for project implementing staff. The sub-component will disseminate information and experience obtained from overall implementation within the project scope, to sector-wide coverage and to the general public in Shanghai and China through the School's satellite broadcasting network, broadband digital networkon-line course on internet, and traditional classroom and on-site dissemination. A project website will be developed as a platform for information circulation, experience dissemination and a link to other associated webs such as World Bank, GEF, PEMSEA and IW:LEARN. The project will have a specific budget line ($52,000) to support IWLEARN activities, such as production of distance promotion courseware and network maintenance. AMoreover, video program has been planned to video-record the stages of implementation of all sub-projects as a means for training and education and a tool for replication in future. Seminars, workshops and an international technical exchange and dissemination conference will be organized with the aim of replicating the demonstrated technologies and practices under the project in Shanghai, China and beyond. Stakeholders from throughout China, including other coastal cities and national environmental authorities, will be invited to attend a series of workshops in Shanghai to share experiences for agricultural and non-point pollution treatment techniques. 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. The sub-component will finance Shanghai representatives to attend conferences sponsored by GEF and PEMSEA, such as the biennial GEF International Waters Conference and the triennial PEMSEA East Asia Seas Congress. The project will participate in IW:LEARN activities, and project technical details would be included in the UNEP Best Practices and Success Stories Global Network. The SABTS will serve as the information center of the project. In collaboration with GEF and PEMSEA, the SABTS will also present exhibits about other efforts throughout East Asia in reduction of marine pollution and protect marine ecosystems.

Annex 5: Project Costs[8]

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

Component	GEF US$ million	Government US$ million	Beneficiaries US$ million	Total US$ million
1. Livestock Waste Management Technology Demonstration	**2.408**	**5.415**	**1.925**	**9.748**
(a) Livestock Waste Management on Large-scale Farm	1.458	3.322	0.687	5.467
(b) Livestock Waste Management on Medium-scale Farm	0.55	0.231	0.358	1.139
(c) Integrated Livestock and Agricultural Waste Management	0.4	1.862	0.88	3.142
2. Wetland Demonstration for Pollution Reduction	**0.95**	**1.275**	**1.118**	**3.343**
(a) Rural Town River-network Wetland Demonstration	0.35	-	1.118	1.468
(b) Village Wetland Sewage Treatment System	0.6	1.275	-	1.875
3. Integrated Agricultural Pollution Reduction Techniques	**0.9**	**7.155**	**12.357**	**20.412**
(a) Demonstration of the Use of Organic Fertilizer	-	3.895	12.132	16.027
(b) Demonstration of the Scientific Application of Agricultural Chemicals	0.044	3.175	0.225	3.444
(c) Monitoring and Extension	0.856	0.085	-	0.941
4. Project Management and Dissemination	**0.53**	**0.396**	**0.25**	**1.176**
(a) Project Management	0.05	-	0.25	0.3
(b) Replication Strategy Development, M&E	0.33	-	-	0.33
(c) Training and Dissemination	0.15	0.396	-	0.546
(i) Production of Distance Promotion Courseware & Network Maintenance	0.05	0.012	-	0.062
(ii) Production of Other Teaching Materials, Training, and Dissemination	0.10	0.384	-	0.484
Total Project Costs	4.788	14.241	15.650	34.679
Total Financing Required	4.788	14.241	15.650	34.679

1. The Project financing plan is expected to cover all required financing, including base costs and contingencies. The financiers would include the GEF, government, and beneficiaries (participating entities and the participating farmers). A local bank is a potential financier who may provide loans to eligible borrowers if requested. The above table indicates the project cost by financiers and by Project component.

[8] The exchange used here is RMB6.5 = US$1. It is different from the exchange rate on the cover page, as it is the projected three-year average exchange rate.

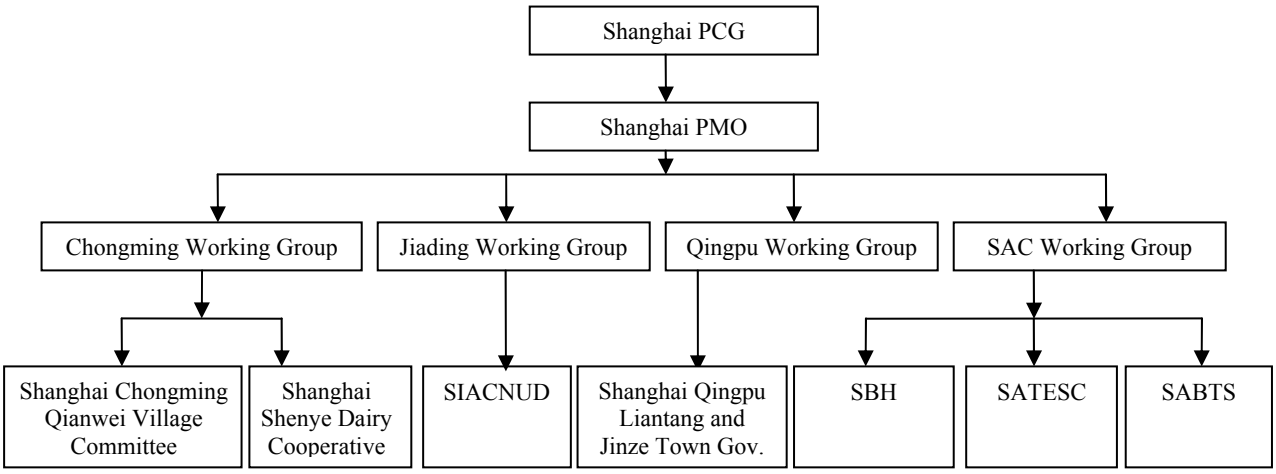
Annex 6: Implementation Arrangements

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

1. The SANPR is a stand-alone GEF Grant-funded project, but it will support the broad project development objective of the APL3. Both SANPR and the APL3 will be appropriately coordinated and sequenced to ensure optimum results. Through the mutual relationship between GEF, UNDP, UNEP, and the Bank, the project is institutionally linked to WB/GEF Strategic Partnership for Sustainable Development of the Large Marine Ecosystems of East Asia, its financing arm, Strategic Partnership Investment Fund for Pollution reduction in the Large Marine Ecosystems of East Asia, and its regional agency, PEMSEA.

2. Figure A6-1 illustrates the Project's institutional and implementation arrangement as agreed with Shanghai PMO and all PIAs.

Figure A6-1: Institutional and Implementation Diagram



3. **At Shanghai Municipal Level**. The Project Coordination Group (PCG) has been established. It is chaired by the Shanghai Development and Reform Commission (SDRC) and comprised of representatives from the SDRC, the Shanghai Municipal Finance Bureau (SFB), the Shanghai Environmental Protection Bureau (SEPB) and the Shanghai Agricultural Commission (SAC). The principal functions of the PCG are: (a) to provide guidance on municipal policies and priorities concerning agricultural and non-point pollution reduction for the project; and (b) to integrate the activities of various agencies involved in the project and to ensure an inter-agency coordinated approach to project implementation.

4. The Shanghai PMO is a primary focal point for the Bank and the PIAs for the project, and it is placed under the direct supervision of the PCG. Responsibilities of the Shanghai PMO are: (a) to serve as the secretariat of the Shanghai PCG in project preparation and implementation; (b) to act as a coordinating body for the project activities implemented by various agencies; (c) to implement the project's two sub-components (project management and replication strategy development) under Project Management and Dissemination Component; and (d) to serve as the project's focal point for the Bank.

5. **At Sub-municipal Level**. Four working groups have been established at the sub-municipal level, i.e. Chongming Working Group, Jiading Working Group, Qingpu Working Group, and SAC Working Group. Working groups in Chongming, Qingpu and Jiading comprise members from relevant government agencies within their respective jurisdiction. SAC Working Group comprises members from SAC's Comprehensive Development division, Crop Office, Animal Husbandry Office, SATESC, SABTS, and Shanghai Bright Holstan Company Limited (SBH). The Working Groups' main roles and responsibilities are: (a) to assist the PCG in coordinating sub-project implementation of the PIAs under their respective administration; (b) to review any amendments to the original sub-project proposals of their respective PIAs, environmental assessment reports, and submission of such documents to other responsible government agencies for further action, if required; (c) to supervise the progress of sub-project implementation by their respective PIAs; (d) to provide policy support and guidance on agricultural and non-point pollution reduction; (f) to develop a replication plan within its own jurisdiction to be included in the project's overall Replication Strategy; and (g) to coordinate and assist their respective PIAs in resolving issues during sub-project implementation.

6. **At Participating Entity Level**. Each PIA is responsible for sub-project implementation of its respective activities. Respective institutional arrangements have been made at each PIA and specified in sub-project specific mini-PIPs. The PIAs for sub-projects under Livestock Waste Management Technology Demonstration Component will be the owners of their respective facilities supported by the project. After the completion of the wetland construction, the wetland system in Jiading will be transferred to Shanghai Jiading Water Engineering Design Co., Ltd., for operation as public infrastructure, and the wetland systems in Qingpu will be transferred to relevant government agencies of Jinze and Liantang town governments. The following PIAs will be responsible for implementing respective sub-components, except Project Management sub-component (Component 4-a), which will be implemented by Shanghai PMO and all PIAs involved. Replication Strategy Development, M&E (Component 4-b) will be implemented by Shanghai PMO.

(a) SBH for Livestock Waste Management on Large Scale Farm (Component 1-a)
(b) SSDC for Livestock Waste Management on Medium Scale Farm (Component 1-b)
(c) Shanghai Chongming Shuxin Town Qianwei Village Committee for Integrated Livestock and Agricultural Waste Management (Component 1-c)
(d) SIACNUD for Rural Town River-Network Wetland Demonstration (Component 2-a)
(e) Shanghai Qingpu Liantang and Jinze Town Governments for Village Wetland Sewage Treatment System (Component 2-b)
(f) SATESC for Integrated Agricultural Pollution Reduction Techniques (Component 3)
(g) SABTS for Training and Dissemination (Component 4-c)

7. **Designated Account**. The grant proceeds will flow from the Bank into a project designated account (DA) to be set up at and managed by SFB, to various Project Implementing Agencies, and finally to contractors or suppliers. The grant will be on-granted from MOF to SFB, which will then on-grant to each PIA. Sub-grant agreements will be signed between SFB and each of the PIA, except for Shanghai Qingpu Liantang and Jinze Town Governments.

Table A6-1: Project Implementation Timeframe

No.	Sub-project	2010	2011	2012	2013
1	**Livestock Waste Management Demonstration**				
(a)	Livestock Waste Management on Large-scale Farm	★	★	★	
(b)	Livestock Waste Management on Medium-scale Farm	★	★		
(c)	Integrated Livestock and Agricultural Waste Management	★			
2	**Wetland Demonstration for Pollution Reduction**				
(a)	Rural Town River-network Wetland Demonstration	★	★	★	
(b)	Village Wetland Sewage Treatment System	★			
3	**Integrated Agricultural Pollution Reduction Techniques**	★	★		
(a)	Demonstration of the use of Organic Fertilizers	★	★		
(b)	Demonstration of the Scientific Application of Agricultural Chemicals	★	★		
(c)	Monitoring and Extension	★	★	★	
4	**Project Management and Dissemination**				
(a)	Project Management	★	★	★	★
(b)	Replication Strategy Development, M&E	★	★	★	★
(c)	Training and Dissemination	★	★	★	★

Annex 7: Financial Management and Disbursement Arrangements

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

Introduction

1. The Bank Financial Management Specialist (FMS) has conducted an assessment of the adequacy of the financial management system of the Project, based on guidelines issued by the Financial Management Sector Board on November 3, 2005, and concluded that the project meets the minimum Bank financial management requirements, as stipulated in OP/BP 10.02. The project will maintain adequate financial management arrangements acceptable to the Bank and, as part of the overall arrangements that the client has in place for implementing the operation, provided reasonable assurance that the proceeds of the grant will be used for the purposes for which the grant proceed is granted. Financial management risk is defined as the risk that GEF grant proceeds will not be used for the purposes intended and is a combination of country, sector and project specific risk factors. FM risk rating is substantial before and modest after, taking into account the risk mitigation measures proposed under the project.

2. Funding sources for the project include GEF grant and counterpart funds. The grant proceeds will flow from the Bank into a project designated account (DA) to be set up at and managed by SFB, to various Project Implementing Agencies (PIAs), and finally to contractors or suppliers. The grant will be on-granted from MOF to SFB, which will then on-grant to each PIA. Sub-grant agreements will be signed between SFB and each of the PIA, except for Shanghai Qingpu Liantang and Jinze Town Governments.

Country Issues

3. To date, no Country Financial Accountability Assessment has been carried out by the Bank for China, although dialogue with the Government of China in respect of the Country Financial Accountability Assessment exercise has been initiated. However, based on studies and material produced by others, Bank observations of developments in the areas of public expenditures, accounting and auditing, and Bank experience with China projects in the past several years, the Bank noted that substantial achievement in the aforementioned areas has been made and further improvement is expected in the next few years. This is a work in progress and as economic reform program further unfolds, the Government of China has come to realize the importance of establishing and maintaining an efficient and effective market mechanism to ensure transparency and accountability, and minimize potential for fraud or corruption.

4. Due to rather unique arrangement by the Government of China, funding (particularly Bank loan/grant) of Bank-financed projects is controlled and monitored by the MOF and its extension at sub-national levels (i.e. finance bureaus at provincial, prefecture and county levels). However, project activities are usually carried out by implementing entities of a specific industry or sector due to the level and complexity of expertise involved. While this segregation of duties provides added fiduciary assurance, the above arrangement usually requires more coordination on the project, as the multi-level management of the funding and implementation mechanism sometimes works to the detriment of smooth project implementation.

Summary of Project Description

5. The estimated total cost of the proposed Project is approximately US$34.679 million. Proposed GEF grant is US$4.788 million. The development objective and the global

environment objective of the proposed Project are to demonstrate effective and innovative pollution reduction activities in Shanghai's rural areas in order to reduce the rural/ agricultural pollution load (especially nutrients) in the surface water flows to the East China Sea.

Audit Arrangements

6. The Bank requires that project financial statements be audited in accordance with standards acceptable to the Bank. In line with other Bank financed projects in China, the project will be audited in accordance with International Auditing Standards and the Government Auditing Standards of the People's Republic of China. Shanghai Municipal Audit Office (SMAO) has been identified as the auditor for the project. Annual audit reports will be issued by SMAO and subject to reviews by the China National Audit Office (CNAO). The Bank currently accepts audit reports issued by CNAO or provincial/regional audit bureaus/offices for which CNAO is ultimately responsible.

7. The annual audit report of project financial statements will be due to the Bank within six months after the end of each calendar year. This requirement is stipulated in the Grant Agreement. The responsible agency and timing are summarized as follows:

Audit Report	Submitted by	Due Date
Consolidated project financial statements	Shanghai PMO	June 30 of each calendar year

Risk Assessment and Mitigation

8. The following risks with corresponding mitigating measures have been identified during the assessment:

Risk	Risk Rating Before Mitigating Measures	Incorporated Risk Mitigating Measures	Risk Rating After Mitigating Measures	Conditions of Negotiations, Board or Effectiveness
Inherent Risk				
Country level	Modest	Continuous dialogue with related government entities and technical assistance from the Bank will help the government to improve its public sector financial management. In short-term, annual audit requirements will reduce the risk that project funds are not used for its intended purposes. For those areas where government system cannot be used, Bank's specific requirements will be embedded into project financial management system.	Modest	
Entity Level	Substantial	The project has eight PIAs. None of them has experience with the Bank-financed projects. Training program related to Bank FM and disbursement requirements will be provided to the PIAs before the project implementation.	Modest	
Project Level	Modest	The project has four components and eight PIAs. Each PIA will be responsible for handling the	Modest	

		execution of 1 to 2 contracts for 1 to 2 subprojects.		
Control Risk				
Budgeting	Substantial	There are some existing budgeting controls at PIAs although not specifically focused on the project activities. The FMS will work with each PIA to strengthen its budgeting process over the project components/activities.	Modest	
Accounting	Modest	Accounting policies and procedures for Bank-financed projects are already in place and were issued by the MOF. The PIAs will comply with those policies and procedures of MOF. Periodic supervision from task team will be performed to ensure these procedures are still functioning as designed.	Modest	
Internal Control	Substantial	Although each PIA does not have existing project-specified internal controls, a project Financial Management Manual (FMM) will be developed by the Shanghai PMO to align with all the PIAs on the project related internal controls procedures including project accounting, reporting and funds flow etc.	Modest	FMM is a condition of negotiation.
Funds Flow	Modest	Since the flow of withdrawal applications and grant proceeds will only go through SFB, this simplified fund flow arrangement will benefit the smooth and efficient project implementation. SFB has experience with Bank-financed projects and its involvement and review function will mitigate FM risks.	Low	
Financial Reporting	Substantial	The format and contents of financial statements have been stipulated by MOF and all the PIAs will use them for project financial reporting. Since the project has eight PIAs, the consolidation of the financial statements by the Shanghai PMO is relatively complicated.	Modest	
Auditing	Modest	The external auditor, SMAO, has experience with previous Bank-financed projects.	Low	
Overall	Substantial		Modest	

9. Therefore, the overall FM risk-rating assigned to this Project at the appraisal stage is modest, provided the proposed mitigating measures are carried out. The FMS will monitor the effectiveness of the measures and project FM risk during project implementation.

Disbursement Arrangements

10. Four disbursement methods are available for the project: advance, reimbursement, direct payment and special commitment. Supporting documents required for Bank disbursement under different methods will be documented in the Disbursement Letter issued by the Bank. Applications will be supported by:

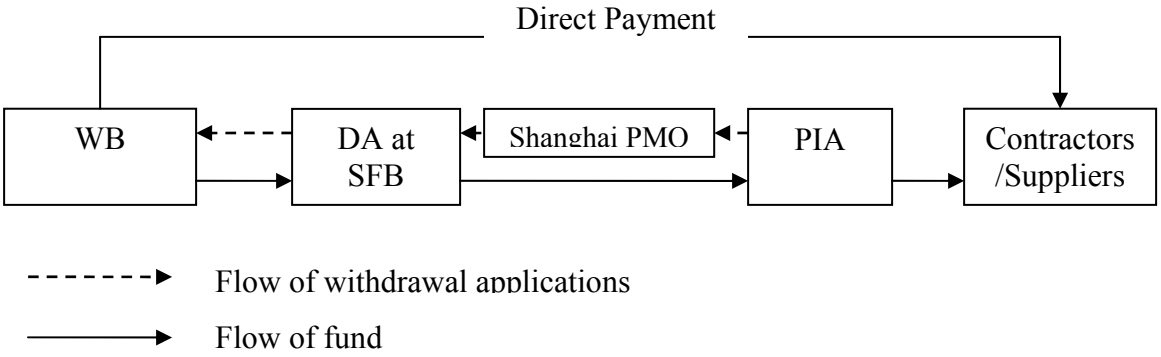
(a) The list of payments against the contracts, and records evidencing eligible expenditures (e.g., copies of receipts, supplier invoices) for the contracts subject to the Bank prior review are indicated in the table below:

Expenditure Category	Contracts Equal to or More than US$ Equivalent
Civil Works	2,000,000
Goods	200,000
Firm Consultant	100,000

(b) Statement of Expenditures (SOEs) for any other expenditure.

11. One segregated designated account denominated in US dollars will be established at a commercial bank acceptable to the Bank and managed by SFB. The ceiling of the DA for the Grant will be finalized later in the Disbursement Letter to be issued by the Bank.

12. SFB will be directly responsible for the management, maintenance and reconciliation of the DA activities of the project. Supporting documents required for Bank disbursements will be prepared and submitted by respective PIAs through the Shanghai PMO to the SFB for further disbursement processing. The flow of funds and withdrawal applications for the Grant proceed is as follows:



13. Counterpart funds will be contributions from local government appropriations and each PIAs' own funds. The flow of counterpart funds will go through the government process and will be part of project financial accounting.

14. The GEF Grant would be disbursed against eligible expenditures as shown in the following table.

Category	Amount of the Grant Allocated (in US$)	Percentage of Expenditures to be Financed (Taxes Inclusive)
(1) Goods and works under Livestock Waste Management on Large Scale Farm Sub-	1,458,000	100%

component		
(2) Works under Livestock Waste Management on Medium Scale Farm Sub-component	550,000	100%
(3) Goods and works under Integrated Livestock and Agricultural Waste Management Component	400,000	100%
(4) Goods and works under Rural Town River-Network Wetland Demonstration Sub-component	350,000	100%
(5) Goods and works under Village Wetland Sewage Treatment System Sub-component	600,000	100%
(6) Goods and services under Integrated Agricultural Pollution Reduction Techniques Component	900,000	100%
(7) Goods and services under Project Management Sub-component and Replication Strategy Development, M&E Sub-component	380,000	100%
(8) Goods, services, training and workshops under Training and Dissemination Sub-component	150,000	100%
Total	**4,788,000**	

15. The following Project activities costing about US$2.5 million with an estimated GEF Grant financing of about US$0.785 million (16 percent of the total GEF Grant amount) have been requested by the Shanghai PMO and agreed by the Bank for retroactive financing: (a) construction of livestock waste treatment center on Shanghai Shenye Cooperative (category (2)); (b) construction of livestock waste treatment facility in Qianwei Village (category (3)); (c) construction of wetland sewage treatment system in Beiwangbang village (category (5)); (d) construction of wetland sewage treatment system in Qianwan village (category (5)); and (e) attending International Wasters 5th biennial Conference and PEMSEA East Asia Seas Congress (category (8)). These Project activities are expected to start after September 1, 2009. The relevant procurement methods applicable to these Project activities would be followed including prior review requirement if applicable. This will be specified in the Grant Agreement.

Financial Management and Reporting Arrangements

Strengths

16. SFB is familiar with the management of designated account and withdrawal application procedures for Bank financed projects.

Weaknesses and Action Plan

17. None of the eight PIAs has experience with Bank-financed projects. Since the PIAs do not have existing project-specified internal controls, a project FMM has been developed by the Shanghai PMO and reviewed by the Bank to align with all the PIAs on the project specified internal control procedures including accounting, reporting and funds flow, etc. In addition, proper training program related to the financial management and disbursement for the Bank financed projects should be provided to the PIAs after the project becomes effective.

Implementing Agencies

8. The Project Coordination Group (PCG) has been established. It is chaired by the Shanghai Development and Reform Commission (SDRC) and comprised of representatives from the SDRC, the Shanghai Municipal Finance Bureau (SFB), the Shanghai Environmental Protection Bureau (SEPB) and the Shanghai Agricultural Commission (SAC). The principal functions of the PCG are: (a) to provide guidance on municipal policies and priorities concerning agricultural and non-point pollution reduction for the project; and (b) to integrate the activities of various agencies involved in the project and to ensure an inter-agency coordinated approach to project implementation.

9. The Shanghai PMO is a primary focal point for the Bank and the PIAs for the project, and it is placed under the direct supervision of the PCG. Responsibilities of the Shanghai PMO are: (a) to serve as the secretariat of the Shanghai PCG in project preparation and implementation; (b) to act as a coordinating body for the project activities implemented by various agencies; (c) to implement the project's two sub-components (project management and replication strategy development) under Project Management and Dissemination Component; and (d) to serve as the project's focal point for the Bank.

18. Four working groups have been established at the sub-municipal level, i.e. Chongming Working Group, Jiading Working Group, Qingpu Working Group, and SAC Working Group. Working groups in Chongming, Qingpu and Jiading comprise members from relevant government agencies within their respective jurisdiction. SAC Working Group comprises members from SAC's Comprehensive Development division, Crop Office, Animal Husbandry Office, SATESC, SABTS, and Shanghai Bright Holstan Company Limited (SBH). The Working Groups' main roles and responsibilities are: (a) to assist the PCG in coordinating sub-project implementation of the PIAs under their respective administration; (b) to review any amendments to the original sub-project proposals of their respective PIAs, environmental assessment reports, and submission of such documents to other responsible government agencies for further action, if required; (c) to supervise the progress of sub-project implementation by their respective PIAs; (d) to provide policy support and guidance on agricultural and non-point pollution reduction; (f) to develop a replication plan within its own jurisdiction to be included in the project's overall Replication Strategy; and (g) to coordinate and assist their respective PIAs in resolving issues during sub-project implementation.

19. Each PIA is responsible for sub-project implementation of its respective activities. Respective institutional arrangement has been made at each PIA and specified in sub-project specific mini-PIPs. The following is a list of all PIAs:

Location	PIA Name
Jinshan	SBH
Chongming	SSDC
	Shanghai Chongming Shuxin Town Qianwei Village Committee
Jiading	SIACNUD
Qingpu	Shanghai Qingpu Jinze and Liantang Town Governments
Songjiang	SABTS
Changning	SATESC

Budgeting

20. Although the cost table has been prepared for the project and the project will prepare its annual implementation plan, the budgeting system within the project is usually not well maintained or monitored. The FMS will work with the related entities to improve their budgeting systems during project implemenation.

Accounting

21. The administration, accounting and reporting of the project will be set up in accordance with the "Accounting Regulations for Trust Funds Projects" issued in January 2001 by MOF. The Regulations provide in-depth instructions of accounting treatment of project activities and cover the following:

(a) Chart of account
(b) Detailed accounting instructions for each project account
(c) Standard set of project financial statements
(d) Instructions on the preparation of project financial statements

22. The standard set of project financial statements mentioned above has been agreed between the Bank and MOF and applies to all trust fund projects and includes the following:

(a) Balance sheet of the project
(b) Statement of implementation of grant agreement
(c) Statement of designated account
(d) Notes to the financial statements

23. Each PIA will be managing, monitoring and maintaining its respective project accounting records for its respective sub-components. Original supporting documents for project activities will be retained by each PIA. In addition, each PIA will prepare its own financial statements, which will then be reviewed, approved and consolidated by the Shanghai PMO before sending to the Bank for review and comment on a regular basis**.**

24. The Financial Management Manual (FMM) will provide detailed guidelines on financial management including internal controls, accounting procedures, fund and asset management, withdrawal application procedures, financial reporting and auditing arrangement. The Shanghai PMO is responsible for developing the project FMM by consulting with the SFB and submitting to the Bank for review and comments. The final version of the FMM will be completed before the project negotiations.

25. All PIAs will use their existing manual or computerized accounting information software.

Internal Auditing

26. There is no independent Internal Audit department for the project. However, this will not impact the project's financial management as the management and monitoring from PIAs, the Shanghai PMO and relevant finance bureau—as well as annual external audits—will serve as the mechanism to ensure that financial management controls are functioning appropriately.

Financial Reporting

27. The format and content of the project financial statements represent the standard project financial reporting package agreed to between the Bank and MOF, and have been discussed and agreed to with all concerned parties.

28. Each implementing agency will prepare financial statements on its implemented sub-components, which will then be used by the Shanghai PMO for preparing consolidated project financial statements and submitted to the Bank for review and comment on a regular basis. The interim un-audited project financial statements should be submitted as part of progress report to the Bank on a semi-annual basis.

Financial Covenants

29. No specific financial covenants are applicable to the project except for those standard financial covenants such as project audit and interim financial reports.

Supervision Plan

30. The supervision strategy for this project is based on its FM risk rating, which will be evaluated on regular basis by the FMS and in consultation with relevant task team leader. The supervision will be made in accordance with the guidelines provided by the Financial Management Practice which was issued by the Financial Management Sector Board on November 3, 2005.

Annex 8: Procurement Arrangements

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

E. General

1. Procurement for the proposed project will be carried out in accordance with the World Bank's "Guidelines: Procurement under IBRD Loans and IDA Credits" dated May 2004, revised October 2006; and "Guidelines: Selection and Employment of Consultants by World Bank Borrowers" dated May 2004, revised October 2006, and the provisions stipulated in the Legal Agreement. The various items under different expenditure categories are described in general below. For each contract to be financed by the Grant, the different procurement methods or consultant selection methods, the need for pre-qualification, estimated costs, prior review requirements, and time frame are agreed between the Borrower and the Bank in the Procurement Plan. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

2. **Procurement of Works**: Works procured under this Project will include: civil works in Component 1: Livestock Waste Management Technology Demonstration on large-scale and medium-scale farms in Jinshan District and Chongming County respectively, and in Qianwei Village of Shuxin Town in Chongming County; Component 2: Rural Town River-Network Wetland Demonstration in Jiading District and Village Wetland Sewage Treatment Systems in four villages in Qingpu District (systems in two villages in Liantang town will be financed by the GEF grant and the systems in other two villages will be financed by counterpart fund). NCB and post-qualification procedure apply as the estimated contract prices are small and below the ICB threshold of US$20 million.

3. The procurement for NCB civil works will be done using the MOF's Model Bidding Documents (MBD) for Procurement of Works agreed with the Bank.

4. **Procurement of Goods:** Goods procured under this Project will include: equipment in Component 1: Livestock Waste Management Demonstration on Large-scale Farm Sub-component, and Integrated Livestock and Agricultural Waste Management Sub-component in Qianwei Village of Shuxin Town in Chongming County, Component 3: Integrated Agricultural Pollution Reduction Techniques and Component 4: Project Management and Dissemination. NCB procedure applies as the estimated contract prices are below the ICB threshold of US$1 million. The contract value below US$0.1 million may be procured through Shopping procedure.

5. The procurement will be done using the MOF's Model Bidding Documents (MBD) for Procurement of Goods agreed with the Bank.

6. **Procurement of non-consulting services:** Not Applicable

7. **Selection of Consultants:** Consultant services, training and study tour cost may be disbursed under project Component 3: Integrated Agricultural Pollution Reduction Techniques and Component 4: Project Management and Dissemination. QCBS procedures apply as the estimated contract prices are above or equivalent to US$0.2 million and CQS procedures apply as the estimated contract prices are below US$0.2 million. The contract value below US$0.1 million may be procured through Individual Consultant (IC) procedure and Single Source Selection procedure subject to Bank prior approval.

8. The procurement will be done using the Bank's Standard Request for Proposal, December 2008.

9. **Operating Costs:** NA

10. **Others**: NA

11. The procurement procedures and SBD/MBD to be used for each procurement method, as well as model contracts for works and goods procured, are presented in the Procurement Management Methods prepared by the Shanghai PMO for the project.

F. Assessment of the agency's capacity to implement procurement

12. Procurement activities will be carried out by each PIA, assisted by the procurement agents and coordinated by the Shanghai PMO. The Shanghai PMO has experience in the Bank-financed APL environment projects in Shanghai for many years. The procurement staff in each PIA is new to the Bank financed procurement policies and procedures. A training workshop was delivered by Bank procurement specialist for PIA procurement staff in March 2009.

13. An assessment of the capacity of the PIAs to implement procurement actions for the project was carried out by a Bank procurement specialist in March 2009. The assessment reviewed the organizational structure for implementing the project and the interaction between the project's staff responsible for procurement and the municipal relevant unit for administration and finance.

14. The key issues and risks concerning procurement for implementation of the project have been identified in the assessment report. The issues and risks include lack of experience in the Bank-financed procurement and inconsistency of internal NCB procurement policies and procedure with the Bank guidelines, which will be addressed in the procurement section of the Grant Agreement. The corrective measures which have been agreed are: participation in various procurement workshops, on-the-job-training, using experienced procurement agents, and preparing and updating procurement management methods by the Shanghai PMO for procurement staff to follow.

15. The overall project risk for procurement is moderate.

G. Procurement Plan

16. The Borrower developed a procurement plan for project implementation. This plan has been agreed between the Borrower and the Bank Team during the project preparation and finalized at negotiations and is available at the Shanghai PMO. It will also be available in the project's database and in the Bank's external website. The Procurement Plan will be updated at least annually or as required to reflect the actual project implementation needs and improvements in institutional capacity.

H. Frequency of Procurement Supervision

17. In addition to the prior review supervision to be carried out from Bank office in Beijing, the capacity assessment of the PIAs has recommended once-a-year supervision missions to visit the field to carry out post-review of procurement actions, if a few post-review contracts have been signed during the period.

I. Procurement activities subject to Bank Prior Review

18. **Goods, Works, and Non Consulting Services.** NCB contracts estimated to cost US$2 million equivalent or above for Works, and Design, Supply and Installation Equipment and Plant per contract, and US$200,000 equivalent or above for Goods per contract and all direct contracting (if any) will be subject to prior review by the Bank.

19. **Consulting Services**. Consultancy services estimated to cost US$100,000 equivalent or above for consultant firms per contract and single source selection of consultants (firms and individuals if any regardless of contract value) will be subject to prior review by the Bank.

20. In addition to above paragraphs 18 and 19, the first contract to be procured by each PIA is also subject to prior review by the Bank.

21. All TOR, preliminary design, detailed construction design and drawings for bidding documents shall be submitted for the Bank prior review. This includes all contracts including contracts subject to Bank post review.

22. **Short lists composed entirely of national consultants**. Short lists of consultants for services estimated to cost less than US$300,000 equivalent per contract may be composed entirely of national consultants in accordance with the provisions of paragraph 2.7 of the Consultant Guidelines.

Table A8-1: Thresholds for Prior Review and Procurement Method

Category	Prior Review Thresholds Proposed (US$)	Procurement Method Thresholds Proposed (US$)				
		ICB	NCB	Shopping	QCBS	CQS
Goods	>=200,000 and all DC	>=1,000,000	<1,000,000	<100,000		
Works	>=2 million	>=20 million	<20 million	<200,000		
Consulting Service (Firm)	>=100,000 and all SSS				>=200,000	<200,000
Consulting Service (Individual)	All SSS					

Table A8-2: Contract Package

Contract Name	Contract No.	Contract Price	Contract Price	GEF Finance	Procurement method	Bank Review	Start Bidding	Contract Duration
		US$10,000	Y10000	US$10,000		Prior or Post	MM/YY	Months
1-1: Jinshan Dairy Farm								
CW-Jinshan cow waste treatment	JS1	167	1,088	145.8	NCB	Prior	Jun-10	12
Bio-gas electricity generation equipment	JS2	262	1,704	-	NBF	N/A	Jun-10	12
Technical support	IS3	117	762	-	NBF	N/A	Jun-10	12
Total		**549**	**3,554**	**145.8**		-		
1-2 Shenye Dairy Farm								
CW-Chongming pig waste treatment	SY1	68	440	55	NCB	Prior	Apr-10	10
Equipment	SY2	31	200	-	NBF	N/A	Apr-10	10
Technical support	SY3	15	100	-	NBF	N/A	Apr-10	10
Total		**114**	**740**	**55**				
1-3: Qianwei								
CW Bio-gas tank	QW1	153	992	-	NBF	N/A	Dec-07	8
CW Bio-gas network pipe	QW2	77	500	-	NBF	N/A	Apr-08	8
Bio-gas electricity generation equipment	QW3	85	550	40	NCB	Prior	Feb-10	10
Total		**314**	**2,042**	**40**				
2-1 Jiading Wetland								
CW-Jiading wetland construction	JD1	121	784	35	NCB	Prior	Nov-10	8
Technical support	JD2	26	170	-	NBF	N/A	Jun-10	10
Total		**147**	**954**	**35**				
2.2 Qingpu Wetland								
CW Beiwangbang village wetland construction	QP1	60	390	30	NCB	Prior	Mar-10	4
CW Qianwan village wetland construction	QP2	40	260	30	NCB	Post	Mar-10	4
CW Jintian, Xiezhuang village wetlands construction	QP3.1, 3.2	88	569	-	NBF	N/A	Mar-10	4
Total		**188**	**1,219**	**60**				
3. SATESC								
Serial liquid united instrument	AT1	51	330	49	NCB	Prior	Jul-10	12
Data collection & monitor	AT2	21	135	18	CQS	Prior	Apr-10	18
Training	AT3	21	136	18	CQS	Prior	Apr-10	18
Workshops	AT4	5	33	5	SOE	Post	Apr-10	24
Subsidy, IOC & services	AT5	1,944	12,635	-	NBF	N/A		
Total		**2,041**	**13,268**	**90**				
4.1 TV School								
TV Network Development	BT1	10	65	10	CQS	Prior	Apr-10	32
Attending international conference and study tour	BT2	3	20	3	SOE	Post	Apr-10	32
Organizing International workshop	BT3	2	13	2	SOE	Post	Jan-12	12
TV training	BT4	40	257	-	NBF	N/A	Jan-09	32
Total		**55**	**355**	**15**				
4.2 Project Management								
Project management	PM1	5	33	5	SOE	Prior	Apr-10	32
Project management	PM2	25	162	-	NBF	N/A	Apr-10	32
Replication strategy development, M&E	PM3	33	215	33	QCBS	Prior	Nov-10	24
Total		**63**	**410**	**38**				
Total Project Cost		**3,468**	**22,542**	**478.8**				

Note: PM1 will be implemented by Shanghai PMO.
Bidding for QW1 and QW2 was completed but construction has not started yet;
NBF: Non-Bank Financing; SOE: Statement of Expenditure.

Annex 9: Economic and Financial Analysis

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

Economic analysis

1. ***Project activities:*** This project consists of following project activities under four components:

(a) Components 1: Livestock Waste Management Technology Demonstration includes: (i) Livestock Waste Management on Large Scale Farm (SBH); (ii) Livestock Waste Management on Medium Scale Farm (SSDC); (iii) Integrated Livestock and Agricultural Waste Management (Chongming Qianwei Village Committee).

(b) Component 2: Wetland Demonstration for Pollution Reduction includes: (i) Rural Town River-Network Wetland Demonstration (SIACNUD); (ii) Village Wetland Sewage Treatment System (Qingpu Jinze Town and Liantang Town Governments).

(c) Component 3: Integrated Agricultural Pollution Reduction Techniques will be implemented by SATESC.

(d) Component 4: Project Management and Dissemination will be implemented by Shanghai PMO and all PIAs. Of which, the training and dissemination sub-component will be implemented by SABTS.

2. ***Economic Benefits:*** The project is largely a public goods investment with mainly environmental, health, and institutional benefits. About 72 percent of the project's total cost goes to demonstration of wetland sewage treatment system, integrated agricultural pollution reduction techniques and project management, dissemination and capacity building. The quantifiable economic benefit for these investments is the reduction of pollutants derived from implementation of the Wetland Demonstration for Pollution Reduction Component. Implementation of the Integrated Agricultural Pollution Reduction Techniques component is to demonstrate available and new agricultural pollution reduction techniques in an integrated approach by providing subsidy to participating project sites and strengthening SATESC's testing and analytic capability for monitoring and extension which however yields limited tangible economic benefit. Only about 28 percent of the project's total cost represents a private, on-farm investment for demonstration of livestock waste management technologies. For this component, the main economic benefits are organic fertilizer, energy (biogas, electricity), and the reduction of various pollutants. Therefore, different economic analysis methodologies are used for different project activities.

3. ***Cost-Benefit Analysis on Livestock Waste Management Technology Demonstration Component.*** The following assumptions are used in economic analysis for the component:

(a) Type and value of benefit. Type and value of benefit by five sub-projects in component 1 and component 2 are calculated and summarized in the following table.

Table A9-1: Economic Benefits

Subproject	Type and Value of Benefits (annually)	
	Organic Fertilizer and Energy	**Environmental Value**
(i) Livestock Waste Management on Large-Scale Farm	● 3,548,000 kWh biogas electricity ● 3,708 tons organic fertilizer produced by biogas residual increased ● 12,000 ton organic fertilizer produced by manure directly reduced	● reduction of 15,000 tons of CO_2 ● reduction of 975.7 tons of COD ● reduction of 381.2 tons of BOD ● reduction of 20.7 tons of TN
(ii) Livestock Waste Management on Medium-Scale Farm	● 6,000 tons of solid organic fertilizer ● 10,500 tons of liquid organic fertilizer	● reduction of 94.5 tons of COD ● reduction of 56.7 tons of BOD ● reduction of 4.2 tons of TN ● reduction of 0.315 tons of TP
(iii) Integrated Livestock and Agricultural Waste Management	● 1,801 tons of solid organic fertilizer ● 11,093 tons of liquid organic fertilizer ● 1, 240,000kwh of biogas electricity ● 350 tons of rice hull cakes ● reduction in the cost of waste treatment	● reduction of 29,000 tons of CO_2 ● reduction of 277.3 tons of COD ● reduction of 168.6 tons of BOD ● reduction of 5.7 tons of TN ● reduction of 0.599 tons of TP

(b) Economic Price. The economic price of the organic fertilizer and energy (biogas, electricity) is based on their market values, while the economic benefit of the environmental value is estimated in accordance with the economic value of the reduced pollutants. To be specific, the economic prices of organic fertilizer, biogas, biogas-generated electricity and rice hull cakes are measured by the current market prices in Shanghai municipality under the scenario without financial subsidies. The economic price of biogas per cubic meter is estimated through the conversion of the market price of the saved coal. The economic price of CO_2 is based on the price offered by a clean development mechanism project. The following table summarizes the economic prices used in the analysis.

Table A9-2: Economic Prices Used in Economic Analysis

Products	Unit	Economic Price (RMB)
Solid organic fertilizer	ton	420
Liquid organic fertilizer	ton	5
Biogas	m^3	1.5
Biogas electricity	kWh	0.6
Rice hull cake	ton	1,000
CO_2	ton	102

(c) Calculation period. The calculation period for all sub-projects is set at 20 years, and takes a "with and without project" scenario.

(d) Conclusions**.** Based on the above assumptions, the economic analysis shows a robust economic internal rate of return for all sub-projects under component 1. The EIRR of the

component 1 as a whole is 15 percent. Project economic benefits are summarized in the following table.

Table A9-3: Summary of Economic Analysis

Sub-project	EIRR
Livestock waste management on large-scale farm	15%
Livestock Waste Management on medium-scale farm	13%
Integrated Livestock and Agricultural Waste Management	17%
Component 1 as a Whole	**15%**

4. ***Cost-Effectiveness Analysis on Wetland Demonstration for Pollution Reduction Component.***

(a) Rural Town River-network Wetland Demonstration (Jiading district). This sub-project will mainly focus on river water pollution (92.5 percent of the total engineering investment). There are two feasible disposal measures, that is, watercourse network wetland and artificial wetland. Shanghai feasibility study team affords the comparison data on the unit cost between these two disposal measures. It shows that the purified cost is RMB0.59/ton and RMB0.78/ton for watercourse network wetland and artificial wetland respectively (Table A9-3). It means that the measure adopted by the project (river-network wetland) is cost effective.

Table A9-3: Cost Comparison of Two Wetland Programs

Items	River-network Wetland (Project Supported)	Artificial Wetland (Program for Comparison)
Investment for disposal facilities (RMB'0000)	725	1,222
Disposal capacity (ton/day)	2,794	2,800
Operating cost (RMB'0000)	25	21.46
Unit operating cost (RMB/ton)	0.25	0.21
Depreciation(RMB/ton)*	0.34	0.57
Total unit cost (RMB/ton)	0.59	0.78

*Assumed at 95 percent depreciation rate, 20 years.

(b) Village Wetland Sewage Treatment System (Qingpu district). There are two recommended approaches. The main difference lies in wastewater pre-disposal technology. One is natural energy aeration and artificial wetland, and the other is composition of bio-filter and artificial wetland. With a similar treatment effect, the investment and operating cost of these two technologies differ significantly. The compound bio-filter and artificial wetland approach is selected based on its lower investment, operating and maintenance (O&M) cost and unit disposal cost. The following table shows the differences, with Jintian village (one of the project villages) as an example.

Table A9-4: Cost Comparison of Two Wastewater Pre-disposal Technologies

No.	Items	Wastewater Pre-disposal Technologies	
		Natural Energy Aeration +Artificial Wetland	Compound Bio-filter +Artificial Wetland
1	Wastewater disposal(RMB'0000 ton/day)	0.0117	0.0117
2	Electricity (kWh/day)	3	3
3	Unit price of electricity (RMB/kWh)	0.908	0.908
4	Land rent (m^2)	500	500
5	Unit price of land rent (RMB/m^2/year)	1.20	1.20
6	Workers(person)	2	2
7	Salary (RMB/person/year)	3,600	3,600
8	Total investment (RMB'0000)	123.24	97.34
9	Depreciation rate (%)	4.8	4.8
10	Residual rate for fixed investment (%)	4	4
11	Repair rate (%)	1.5	1.5
Annual O&M Cost and Unit cost			
1	Land rent (RMB'0000)	0.06	0.06
2	Electricity (RMB'0000)	0.10	0.10
3	Salary (RMB'0000)	0.54	0.54
4	Depreciation (RMB'0000)	5.68	4.49
5	Repair (RMB'0000)	1.85	1.46
6	Management, sales and other cost (RMB'0000)	0.66	0.53
7	Annual operating cost (RMB'0000)	3.21	2.69
8	Annual total cost (RMB'0000)	8.89	7.18
9	Unit O&M cost (RMB'0000)	0.751	0.630
10	Unit cost (RMB/ton)	2.08	1.68

5. ***Cost-Effectiveness Analysis on Integrated Agricultural Pollution Reduction Techniques Component.*** Implementation of this Component is to demonstrate available and new agricultural pollution reduction techniques. One of main techniques is to promote the use of organic fertilizer. According to laboratory tests, the nutrient content of organic fertilizer is N=1.2%; P_2O_5=0.9%; K_2O=2.1%. It means that there are 12 kg of N, 9 kg of P_2O_5 and 21 kg of K_2O in 1 ton of organic fertilizer. In comparison, there are 460 kg of N in 1 ton of urea; 120 kg of P_2O_5 in 1 ton of calcium superphosphate; and 600 kg of K_2O in 1 ton of Potassium Chloride. The current market prices for urea, calcium superphosphate and Potassium Chloride are RMB2,200/ton, RMB400/ton and RMB4,500/ton respectively while the direct economic value of 1 ton of organic fertilizer is RMB245 (RMB57.4 for N, RMB30 for P_2O_5 and RMB157.5 for K_2O). However under the project, production of 1 ton of organic fertilizer will reduce 0.12 ton of COD on average, which is equivalent to an additional economic value of RMB240 (=0.12 ton x RMB2,000/ton) based on current conservative pricing practices for trading of pollutant emission rights in China. Then, the total economic value of organic fertilizer will be RMB485/ton, higher than its current economic cost (about RMB345/ton).

Financial Analysis

6. Since this project is largely a public goods investment, financial analysis does not focus on the project's overall financial profitability.

7. ***Financial Analysis on Livestock Waste Management Technology Demonstration Component.*** All three sub-projects under Livestock Waste Management Technology Demonstration Component will generate financial revenue and be operated by respective entities. Financial analysis focuses on the financial sustainability of the sub-projects, i.e. whether they can make up for the financial expenditure (including depreciation) upon completion of project implementation. Based on detailed analysis, all three sub-projects can achieve financial balance, and hence achieving financial sustainability. The detailed measurement results are shown in Table A9-5.

Table A9-5: Financial Revenue by Subprojects

Subproject	Annual Financial Revenue
Livestock Waste Management on Large-Scale Farm	**RMB3.98 million f**rom: (1) Sale of 3,708 ton of solid organic fertilizer with RMB500/ton; (2) 3,548,000 kWh of biogas electricity with RMB0.6/kwh
Livestock Waste Management on Medium-Scale Farm	**RMB2.4 million** from: (1) Sale of 6,000 ton of solid organic fertilizer with RMB220/ton (additional RMB200/ton subsidy).
Integrated Livestock and Agricultural Waste Management	**RMB2.28 million** from: (1) Sale of 1,801 ton of solid organic fertilizer with RMB220/ton (additional RMB200/ton subsidy); (2)11,093 ton of liquid organic fertilizer with RMB5/ton; (3) 1,240,000 kWh of biogas electricity with RMB0.6/kwh; (4) 154,000 m3 of biogas fuel with RMB1.5/m3; (5) 350 ton of rice hull cakes with RMB1,000/ton.

Table A9-6: Assessment of Financial Sustainability (RMB'000)

Subproject	Annual O&M Cost	Annual Depreciation	Total Annual Cost	Annual Financial Revenue	Net Financial Revenue
Livestock Waste Management on Large-Scale Farm	152	169	321	398	77
Livestock Waste Management on Medium-Scale Farm	143	35	178	240	62
Integrated Livestock and Agricultural Waste Management	130	97	227	228	1

8. ***Financial Analysis on Wetland Demonstration for Pollution Reduction Component.*** Since both sub-projects will be operated by the government or state-owned company as public infrastructures, the analysis focuses on operating mechanism of the systems for both sub-projects.

(a) Rural Town River-network Wetland Demonstration. A state-owned company (Shanghai International Automobile City Newanting United Development Co., Ltd.) will be responsible for the construction of this project and the constructed facility will be transferred to Shanghai Jiading Water Engineering Design Co., Ltd for the operations as public infrastructure.

(b) Village Wetland Sewage Treatment System. According to *Qingpu District Rural Household Wastewater Disposal Implementation Plan*, the Qingpu District Water Resources Bureau will be responsible for construction management and the participating town governments (i.e. Liantang and Jinze) will be responsible for operations of the systems once they are completed and transferred. Both participating town governments have committed funds from budgetary allocation for operating these transferred facilities under their respective jurisdiction as public infrastructures.

9. ***Financial Incentive Efficiency Analysis on Organic Fertilizer Promotion.*** Shanghai Municipal Government attaches great importance to protection of rural ecology and development of circular agriculture and ecological agriculture. By 2010, the government's target is to: (a) reach 1 million *mu* where commodity organic fertilizer is used; (b) reduce use of chemical fertilizer on per-*mu* basis by 15 percent from 2005 level; (c) reduce use of medium- and high-toxic chemical pesticides by 10 percent; and (d) cover 90 percent of towns where waste water treatment facilities are constructed. Government policy environment has been in great favor of the promotion of organic fertilizer. To encourage the farmers to use organic fertilizer, Shanghai Municipal Government has been providing users with a financial subsidy (RMB200/ton) to cover the difference between the market price of organic fertilizer (RMB420/ton) and the economic value of organic fertilizer (about RMB245/ton) with a margin of RMB25/ton. While the current financial incentive program is effective, training, demonstration and extension for organic fertilizer techniques are important to offset disadvantages of organic fertilizer application such as the difficulties in controlling nutrient release and in calculating the input demand and fertilizer efficiency.

Annex 10: Safeguard Policy Issues

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

A. **Social Safeguard Policy Issues**

Involuntary Resettlement (OP 4.12)

1. Among four project components, one will cause involuntary resettlement, the impact of which could be determined during project preparation. In accordance with Chinese laws and the Bank's requirements, an Abbreviated Resettlement Action Plan was prepared in Chinese and English by Shanghai PMO. The ARAP was approved by the Shanghai Municipal Government and available in the project file. A design institute of the component[9] and the Shanghai PMO paid special attention to avoiding or minimizing land taking for the project. As a result, most of the land to be taken is waste land in the village and the land taking will have very little impact on villagers' livelihoods.

2. ***Scope of impacts.*** The table below summarizes the impacts of land acquisition and resettlement.

Sub-component	Land Leasing in Four Villages (m^2)	House Demolition (m^2)	Relocated Households (No.)
Village Wetland Sewage Treatment System	1200 (300 each)	0	0

3. ***Policy objectives and legal framework***. The individual RAPs were prepared in line with relevant Chinese laws and regulations, and World Bank OP 4.12 on Involuntary Resettlement. Key considerations and activities in the design of the project and preparation of the ARAP included:

(a) Acquisition of land and other assets, and relocation of people, will be minimized as much as possible.

(b) Plans for taking of land and other assets and provision of rehabilitation will be carried out in consultation with the affected persons.

(c) Financial resources for resettlement will be made available as and when required.

(d) Special consideration will be given to vulnerable groups, if any.

(e) Institutional arrangements will ensure effective and timely design, planning, consultation and implementation of the ARAP.

(f) Effective and timely supervision, monitoring and evaluation of the implementation will be carried out.

4. ***Compensation Standards***. Most of the land to be taken is collective waste land or open land along rivers. The project owner plans to lease the land from the villages, while the land property remains in the village collectively. The prices of such leasing arrangement are in line with the local regulation and have been determined through wide consultation.

[9] The design institute of the village wetland sewage treatment component is Agriculture & Biology College of Shanghai Jiao Tong University.

5. ***Implementation arrangements***. A multi-level organization has been established for the implementation of the ARAP. An independent monitor will be selected for resettlement implementation. The PIAs will be responsible for internal monitoring and will provide semi-annual internal monitoring reports to the Shanghai PMO and the Bank.

6. ***Budget and funding arrangement***. The Borrower will provide sufficient budget from their counterpart funding to conduct the resettlement of the sub-projects.

7. ***Public participation***. Project-affected persons and organizations have been informed about the project and its impact through meetings during the preparation of the ARAP. Comments and recommendations received from these meetings have been incorporated as appropriate in the ARAP and the feasibility studies. Public participation will continue during ARAP implementation. Project information will be provided to the affected persons through bulletins and posters.

8. ***Reporting***. Monitoring and evaluation results of the ARAP will be included in the project's semi-annual progress reports.

9. ***Grievance Redressing Mechanism***. A grievance mechanism was established during the preparation of the ARAP. All relevant telephone numbers was disclosed to Project Affected People (PAPs). The PAPs could, therefore, prosecute any resettlement aspect if needed. All prosecuted cases will be recorded in paper.

Indigenous People (OP 4.10)

10. It is confirmed that the project will not trigger the Bank's Indigenous People Policy.

Social Assessment

11. Social Assessments (SA) were carried out for all components of the project. The SA preparation institutes consulted the stakeholders of the project. The SA showed the supportive attitude to the project from the local communities. Local people believe that the project will contribute to the development of the local economy through the enhancement of environment quality. The findings of the SA were used to inform the preparation of project feasibility studies. Recommendations from the SA have also been incorporated into the overall project design.

B. Environmental Safeguard Policy Issues

Environment Assessment

12. The Project is classified as a "Category B" project considering the type, location, sensitivity, scale of the proposed project, and the nature and magnitude of its potential environmental impacts. An Environment Assessment report was prepared by East China Normal University (ECNU) in accordance with national policies and regulations as well as the Bank's safeguard policies. The EA Report includes: (a) a consolidated project-wide EA (CEA) report with detailed evaluation covering all proposed project components; and (b) a consolidated Environmental Management Plan (CEMP). The EA report has been prepared, incorporating the Bank's comments, and found to be satisfactory.

13. Applicable regulatory discharge and environmental standards have been used as the primary reference to determine the extent and level of impacts. The EA applies methodologies set out in various technical guidelines issued by MEP (Ministry of Environmental Protection). The scope of the project covered by the EA is based on project feasibility study reports for each

of the project components. The EA covers baseline information on environmental and socio-economic conditions. The EA has identified and assessed the Project benefits and impacts on the natural and socio-economic environment. It also describes alternatives considered as part of feasibility studies for each component. It concludes that the Project will bring significant positive impacts on the natural and socio-economic environments. The EA did not identify any serious adverse or irreversible environmental impacts that cannot be effectively mitigated to acceptable levels. All Project investments have been designed to avoid or minimize any adverse impacts on the physical environment. However, some negative impacts may arise during project implementation (mainly during construction), such as negative but limited impacts on soil, air, water, acoustic environments, flora, and solid wastes. These impacts will be temporary and localized, and proper mitigation measures during construction and operation can minimize or even eliminate them. Preventive measures during the construction and operation phases were prepared and are noted in the EMP.

14. ***Environmental Benefits***. The project as a whole is substantially positive in environmental terms, with the benefits greatly overweighing the negative impacts. The implementation of the project will result in a potential annual pollutant load reduction of about 1,407 tons of COD, and the project will play an important role in improving the surface water quality, especially for the Huangpu River, Yangtze River Mouth and East China Sea. By utilizing the bio-gas, it will also produce electricity of 4,788,000 kWh and reduce the discharge of CO_2 by 23,575 tons per year, thus contributing to the alleviation of global warming. It will also decrease the incidence of water-borne and zoonotic disease, not only within the livestock raising communities but also for other water users living downstream of the livestock raising areas.

15. ***Alternative Analysis***. During project preparation, alternative locations and technical processes and designs have been identified, evaluated and compared with the objective to avoid or otherwise minimize potential adverse environmental and social impacts and to maximize project benefits. The EA teams worked closely with the project planners/ owners and feasibility study teams to compare and evaluate alternatives; optimal alternatives were selected based on the avoidance of or least adverse social and environmental impacts as well as other economic, technical, and financial considerations for the least-cost solutions. A "without project" scenario was also considered as an alternative. Below is a summary of the major alternatives that were considered. Alternative analysis for the Livestock waste management technology demonstration include: with and without project, alternative locations, and alternative treatment processes. Alternative analysis for the wetland sewage treatment system include: with and without project, alternative locations, and alternative treatment processes. Details are in the CEA report.

Potential Environmental Impacts and Mitigation Measures

16. The project development objective and global environment objective are to demonstrate effective and innovative pollution reduction activities in Shanghai's rural areas in order to reduce the rural/ agricultural pollution load (especially nutrients) in the surface water flows to the East China Sea. The overall environmental impacts are clearly positive. However, some negative impacts may result from project implementation, mainly during the construction phase. These impacts include limited negative impacts on soil, air, water, acoustic environment, flora, solid wastes and surrounding communities. These impacts will be temporary and localized, and proper mitigation measures during construction and operation stage can minimize or even eliminate

them. Preventive and mitigation measures during the construction and operation phases were prepared and are noted in the EA/EMP.

17. ***Construction phase.*** Some project components will have short-term impacts, such as noise, air and water pollution, flora impacts, increased traffic, soil erosion and waste management. These concerns are relatively minor, and measures to reduce them to acceptable levels, and monitor their effective implementation have been discussed and detailed in the EA and EMP. In addition, mitigation measures related to contractors will be included in bid documents and contracts.

18. ***Operation phase***. The main environmental negative impacts are noise, wastewater, odor and solid wastes, appropriate mitigation measures (e.g. setup minimum buffer zone to residential areas, noise and odor treatment, and good maintenance practices) are detailed in the EMP.

Environmental Management Plan

19. In order to ensure the maximization of environmental benefits as well as avoidance, minimization or mitigation of potentially negative environmental impacts, an EMP was developed as a separate and stand-alone document. The EMP involves practical and cost-effective measures necessary to mitigate the project-related impacts by incorporating them in the design and by implementing them during the construction and operation phases. It includes policy bases, applicable environmental standards, and environmental management systems, mitigation measures, monitoring plans, institutional arrangements, capacity building, and estimated budget for mitigation measures and monitoring programs during the construction and operation phases. An EMP summary table was designed for each sub-project. The table includes potential impacts, mitigation measures, implementation schedules, implementation and supervisory agencies, monitoring indicators, frequencies and locations, and the EMP budget for the construction and operation phases. Generic measures for environmental management of construction were also designed as technical specifications to be included in contracts.

20. ***Supervision and Reporting***. The Bank will supervise the project's environmental aspects once a year. Project progress reports from the Shanghai PMO will include a section/chapter on the EMP. The EMP report should include environmental monitoring report, project progress, training, mitigation measures for the adverse impacts, etc., along with any revision proposed to the EMP to achieve its objectives. The EMP Implementation report (including environmental monitoring report, project progress, training, mitigation measures for the adverse impacts, etc.) will be furnished to the Bank by March 31 of each year, along with any revision proposed to the EMP to achieve its objectives.

21. ***Funding Arrangements***. The costs associated with EMP measures are included in the project cost estimates; component-specific costs are provided in the EMP. The environmental monitoring will be conducted by external environmental monitoring stations, and monitoring activities will be financed by counterpart funds. The total environmental protection investment, including environmental management and mitigation measures, is estimated at about RMB8.75 million.

22. ***Capacity Building***. To ensure above measures/plans are implemented efficiently, the EMP includes training programs for professional, managerial and technical personnel from project proponents and operational units, contractors, and construction supervisors. The training will cover basic knowledge of environmental protection and pollution control, contents of

respective EIAs and the requirements of the EMPs, environmental management and monitoring, and reporting requirements.

23. ***Monitoring***. An environmental monitoring program for the construction and operation phases is in the EA as a component of the EMP. The monitoring program covers air, surface water quality, noise level, sewage, soil and sludge, etc. The program specifies relevant parameters, frequencies, time, locations, responsible agencies and estimated costs. Professional environmental monitoring units, using standard methods recognized by regulatory authorities, will be contracted to monitor the parameters specified in the EMP, and will also review overall compliance status. Environmental monitoring will provide key and timely information, especially on environmental impacts and mitigation, to the borrower and the Bank to evaluate the success of environmental management, and the environmental benefits brought by the project.

Public Consultation and Information Dissemination

24. Apart from the consultation conducted to obtain inputs into project design, public consultations were conducted for residents and those affected by the proposed project, and included persons from different groups, gender, socioeconomic and educational backgrounds, and occupations. The consultations took different forms: expert consultations, questionnaires, and an internet online survey. The majority of those consulted expressed strong support for the project and acceptance of short-term inconveniences. The main public concerns included noise and flying dust during construction, and wastewater and odor during the operation phase. Public concerns and opinions expressed are addressed in the EA and incorporated into the project design and environmental mitigation measures.

25. ***Information disclosure***. Information about the project was disclosed through the Shanghai Environmental Hotline Website in October 2008. Telephone hotlines were established for the public to access relevant documents and offer comments. Disclosure of EAs was announced in a local newspaper on April 30, 2009, and EAs were made available at the Shanghai PMO, PIAs, and on websites. The final English version EA/EMP were submitted to the Bank and disclosed through the InfoShop in May 2009.

Pest Management (OP 4.09)

26. The Integrated Agricultural Pollution Reduction Techniques Component, to be implemented by the SATESC, will: (a) disseminate the application of high efficiency, low toxic, low residual effect chemicals and biological pesticides; (b) prohibit the use of high toxic, high residual effect pesticides and those not recommended on the World Health Organization's *Recommended Classification of Pesticides by Hazard and Guidelines to Classification* (Geneva: WHO 1994-95); (c) reduce the reliance on organophosphorus pesticides and other synthetic chemical pesticides; (d) upgrade chemical spraying equipments for increased efficiency; and (e) promote the use of non-chemical technologies for insect and pest control. This component is expected to bring significant benefits through the reduction of non-point source pollution and to food safety by greatly reducing the amount of pesticides. A Pest Management Plan (PMP) was prepared for the project. The monitoring and evaluation results of the PMP will be included in the project semi-annual progress reports.

Annex 11: Project Preparation and Supervision

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

	Planned	Actual
PCN review	03/28/08	04/04/08
Initial PID to PIC		12/16/08
Initial ISDS to PIC		12/16/08
Appraisal	06/30/09	08/15/09
Negotiations	02/08/10	02/08/10
Board/RVP approval	04/27/10	
Planned date of effectiveness	07/27/10	
Planned date of mid-term review	n/a	
Planned closing date	12/31/13	

Key institutions responsible for preparation of the project:
Shanghai Project Management Office
Shanghai Investment Consulting Co., Ltd.

Bank staff and consultants who worked on the project included:

Name	Title	Unit
Takuya Kamata	Task Team Leader	EASIN
Hiroaki Suzuki	Former Task Team Leader	FEU
Weiguo Zhou	Co-Task Team Leader	EASCS
Yiren Feng	Environmental Specialist	EASCS
Jun Zeng	Social Development Specialist	EASCS
Dawei Yang	Procurement Specialist	EASCO
Haixia Li	Financial Management Specialist	EASCO
Jiang Ru	Operations Officer	EASER
Toyoko Kodama	Operations Officer	EASIN
Margaret Png	Senior Counsel	LEGEM
Wen-Jun Tan	Counsel	LEGCF
Rita E. Cestti	Sr. Rural Development Specialist/ Peer Reviewer	OPCQC
Riikka Rajalahti	Sr. Agricultural Specialist /Peer Reviewer	ARD
Cornelis de Haan	Livestock Advisor/ Peer Reviewer	Consultant
Robert Crooks	Agriculturist/ Peer Reviewer	Consultant
Kurt Roos	Livestock Waste Management Specialist	Consultant
Yang Yang	Wetland Specialist	Consultant
Wanlong Lin	Economist	Consultant
Eddie Ke Siong Hum	Environmental Engineer	Consultant

Nicolas Kotschoubey	Consultant	Consultant
Vellet E. Fernandes	Program Assistant	EASIN
Xuemei Guo	Program Assistant	EACCF
Xin Chen	Sr. Program Assistant	EACCF

Estimated Approval and Supervision costs:

Remaining costs to approval: US$5,000

Estimated annual supervision cost: US$50,000

Annex 12: Documents in the Project File

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

A. World Bank Report

1. Identification Mission Aide Memoire, December 2006
2. Technical Mission Aide Memoire, January 2008
3. Preparation Mission Aide Memoire, June/July 2008
4. Pre-appraisal Mission Aide Memoire, September 2008
5. Technical Mission Aide Memoire, March 2009
6. Appraisal Mission Aide Memoire, August 2009
7. Project Identification Form, October 2007
8. Request for Project Preparation Grant, October 2007
9. Decision Note of Concept Review Meeting, April 2008
10. Summary of Discussion for Quality Enhancement Review Meeting, March 2009
11. Financial Management Assessment, March 2009
12. Procurement Capacity Assessment, April 2009
13. Decision Review Meeting Minutes and Conditional Clearance to Proceed to Appraisal from Safeguards, September 2009
14. Detailed Project Cost Tables, September 2009

B. Shanghai Project Management Office

1. Feasibility Study Report, March 2009
2. Procurement Management Manual, April 2009
3. Project Implementation Plan, August 2009
4. Project Financial Management Manual, August 2009
5. Environmental Impact Assessment Report, August 2009
6. Environmental Management Plan, August 2009
7. Pest Management Plan, August 2009
8. Monitoring and Evaluation Plan, September 2009
9. Social Assessment Report, September 2009
10. Abbreviated Resettlement Action Plan, September 2009

Annex 13: Statement of Loans and Credits

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

			Original Amount in US$ Millions						Difference between expected and actual disbursements	
Project ID	FY	Purpose	IBRD	IDA	SF	GEF	Cancel.	Undisb.	Orig.	Frm. Rev'd
P093963	2008	CN-Guiyang Transport	100.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00
P086515	2007	CN-3rd National Railway	200.00	0.00	0.00	0.00	0.00	200.00	18.67	0.00
P088964	2007	CN-Guangxi Integrated Forestry Dev	100.00	0.00	0.00	0.00	0.00	76.11	-21.39	0.00
P081776	2007	CN-GUANGDONG/PRD2	96.00	0.00	0.00	0.00	0.00	96.00	5.67	0.00
P091020	2007	CN-Fujian Highway Sector Investment	320.00	0.00	0.00	0.00	0.00	320.00	43.50	0.00
P092618	2007	CN-LIAONING MED CITIES INFRAS 2	173.00	0.00	0.00	0.00	0.00	173.00	0.00	0.00
P083322	2007	CN-SICHUAN URBAN DEV	180.00	0.00	0.00	0.00	0.00	170.70	28.54	0.00
P077752	2007	CN-SHANDONG ENVMT 2	147.00	0.00	0.00	0.00	0.00	118.81	-22.36	0.00
P095315	2007	CN-W. Region Rural Water & Sanitation	25.00	0.00	0.00	0.00	0.00	25.00	0.00	0.00
P096285	2007	CN-MSE Finance	100.00	0.00	0.00	0.00	0.00	100.00	100.00	0.00
P075613	2007	CN-Shaanxi Ankang Road Development	300.00	0.00	0.00	0.00	0.00	290.00	7.39	0.00
P084742	2006	CN-IAIL III	200.00	0.00	0.00	0.00	0.00	106.86	6.09	0.00
P081348	2006	CN-HENAN TOWNS WATER	150.00	0.00	0.00	0.00	0.00	139.63	14.63	0.00
P081255	2006	CN-Changjiang/Pearl River Watershed Reha	100.00	0.00	0.00	0.00	0.00	95.61	17.27	0.00
P075732	2006	CN-SHANGHAI URBAN APL2	180.00	0.00	0.00	0.00	0.00	144.90	18.23	0.00
P085124	2006	CN-Ecnomic Reform Implementation	20.00	0.00	0.00	0.00	0.00	18.44	4.61	0.00
P085333	2006	CN-5th Inland Waterways	100.00	0.00	0.00	0.00	0.00	65.42	25.59	0.00
P086629	2006	CN-Heilongjiang Dairy	100.00	0.00	0.00	0.00	0.00	91.76	16.93	1.67
P093906	2006	CN-3rd Jiangxi Hwy	200.00	0.00	0.00	0.00	0.00	151.92	-8.08	0.00
P096158	2006	CN-Renewable Energy II (CRESP II)	86.33	0.00	0.00	0.00	0.00	71.95	30.50	0.00
P099992	2006	CN-Liaoning Medium Cities Infrastructure	218.00	0.00	0.00	0.00	0.00	175.65	-17.77	0.00
P070519	2006	CN-Fuzhou Nantai Island Peri-Urban Dev	100.00	0.00	0.00	0.00	0.00	98.25	22.00	0.00
P057933	2005	CN-TAI BASIN URBAN ENVMT	61.00	0.00	0.00	0.00	0.00	29.77	17.16	0.00
P086505	2005	CN-NINGBO WATER & ENVMT	130.00	0.00	0.00	0.00	0.00	85.89	-4.61	0.00
P067828	2005	CN-Renewable Energy Scale-up Program	87.00	0.00	0.00	0.00	10.00	2.40	8.90	0.00
P068752	2005	CN-Inner Mongolia Highway & Trade Corrid	100.00	0.00	0.00	0.00	0.00	28.66	-21.76	0.00
P069862	2005	CN - Agricultural Technology Transfer	100.00	0.00	0.00	0.00	0.00	70.38	29.82	0.00
P081346	2005	CN-LIUZHOU ENVIRONMENT MGMT	100.00	0.00	0.00	0.00	0.00	55.04	-5.41	0.00
P081161	2005	CN-CHONGQING SMALL CITIES	180.00	0.00	0.00	0.00	0.00	144.82	40.16	0.00
P071094	2005	CN - Poor Rural Communities Development	100.00	0.00	0.00	0.00	0.00	72.21	44.01	0.00
P075730	2005	CN-HUNAN URBAN DEV	172.00	0.00	0.00	0.00	0.00	155.62	56.46	0.00
P065035	2004	CN-Gansu & Xinjiang Pastoral Development	66.27	0.00	0.00	0.00	0.00	16.93	7.01	0.00
P073002	2004	CN-Basic Education in Western Areas	100.00	0.00	0.00	0.00	0.00	31.32	28.83	0.00
P065463	2004	CN-Jiangxi Integrated Agric. Modern.	100.00	0.00	0.00	0.00	0.00	54.61	32.08	0.00
P066955	2004	CN-ZHEJIANG URBAN ENVMT	133.00	0.00	0.00	0.00	0.00	85.34	40.08	0.00
P077137	2004	CN-4th Inland Waterways	91.00	0.00	0.00	0.00	0.46	47.17	26.46	25.96
P075728	2004	CN-GUANGDONG/PRD UR ENVMT	128.00	0.00	0.00	0.00	0.64	74.46	28.70	0.00

P069852	2004	CN-Wuhan Urban Transport	200.00	0.00	0.00	0.00	1.00	62.13	60.79	0.00
P081749	2004	CN-Hubei Shiman Highway	200.00	0.00	0.00	0.00	1.00	9.19	-8.14	0.00
P058847	2003	CN-3rd Xinjiang Hwy Project	150.00	0.00	0.00	0.00	0.00	12.25	12.25	0.00
P040599	2003	CN-TIANJIN URB DEV II	150.00	0.00	0.00	0.00	0.00	126.17	83.35	4.08
P076714	2003	CN-2nd Anhui Hwy	250.00	0.00	0.00	0.00	0.00	20.54	-0.30	0.00
P070191	2003	CN-SHANGHAI URB ENVMT APL1	200.00	0.00	0.00	0.00	0.00	76.34	45.66	0.00
P068058	2003	CN-Yixing Pumped Storage Project	145.00	0.00	0.00	0.00	0.00	44.14	33.57	0.00
P071147	2002	CN-Tuberculosis Control Project	104.00	0.00	0.00	0.00	0.00	41.63	29.49	0.00
P068049	2002	CN-Hubei Hydropower Dev in Poor Areas	105.00	0.00	0.00	0.00	0.00	10.18	8.52	0.00
P064729	2002	CN-Sustainable Forestry Development	93.90	0.00	0.00	0.00	0.00	12.11	5.81	0.00
P070459	2002	CN-Inner Mongolia Hwy Project	100.00	0.00	0.00	0.00	0.00	7.84	3.84	0.00
P056596	2001	CN-Shijiazhuang Urban Transport	100.00	0.00	0.00	0.00	0.00	30.86	30.86	0.00
P051859	2001	CN-LIAO RIVER BASIN	100.00	0.00	0.00	0.00	0.00	12.17	11.97	0.00
P047345	2001	CN-HUAI RIVER POLLUTION CONTROL	105.50	0.00	0.00	0.00	0.00	10.36	10.36	-2.08
P064730	2000	CN-Yangtze Dike Strengthening	210.00	0.00	0.00	0.00	0.00	64.12	64.12	47.78
P042109	2000	CN-BEIJING ENVIRONMENT II	349.00	0.00	0.00	25.00	26.51	146.62	173.13	10.02
P049436	2000	CN-CHONGQING URBAN ENVMT	200.00	0.00	0.00	0.00	29.50	43.85	73.35	-5.46
P045910	2000	CN-HEBEI URBAN ENVIRONMENT	150.00	0.00	0.00	0.00	0.00	27.83	27.83	7.87
P036953	1999	CN-Health IX	10.00	50.00	0.00	0.00	0.40	6.04	4.32	4.32
P042299	1999	CN-Tec Coop Credit IV	10.00	35.00	0.00	0.00	5.84	9.59	12.82	0.00
P051856	1999	CN-Accounting Reform & Development	27.40	5.60	0.00	0.00	0.00	5.23	5.02	4.74
P003507	1996	Ertan II Hydroelectric Project	400.00	0.00	0.00	0.00	0.15	33.33	5.78	0.00
		Total:	8,203.40	90.60	0.00	25.00	75.50	4,597.15	1,312.31	98.90

CHINA
STATEMENT OF IFC's
Held and Disbursed Portfolio
In Millions of US Dollars

		Committed				**Disbursed**			
		IFC				**IFC**			
FY Approval	Company	Loan	Equity	Quasi	Partic.	Loan	Equity	Quasi	Partic.
2002	ASIMCO	0.00	10.00	0.00	0.00	0.00	10.00	0.00	0.00
2006	ASIMCO	0.00	0.00	4.12	0.00	0.00	0.00	3.61	0.00
2005	BCCB	0.00	59.21	0.00	0.00	0.00	59.03	0.00	0.00
2003	BCIB	0.00	0.00	12.04	0.00	0.00	0.00	0.00	0.00
2006	BUFH	8.14	0.00	0.00	0.00	8.14	0.00	0.00	0.00
2005	Babei	0.00	5.00	0.00	0.00	0.00	5.00	0.00	0.00
	Babei Necktie	11.00	0.00	0.00	6.00	8.94	0.00	0.00	4.88
1999	Bank of Shanghai	0.00	21.76	0.00	0.00	0.00	21.76	0.00	0.00
2000	Bank of Shanghai	0.00	3.84	0.00	0.00	0.00	3.84	0.00	0.00
2002	Bank of Shanghai	0.00	24.67	0.00	0.00	0.00	24.67	0.00	0.00
2005	BioChina	0.00	3.70	0.00	0.00	0.00	3.13	0.00	0.00
2002	CDH China Fund	0.00	2.02	0.00	0.00	0.00	0.00	0.00	0.00
2005	CDH China II	0.00	17.99	0.00	0.00	0.00	11.38	0.00	0.00

2006	CDH Venture	0.00	20.00	0.00	0.00	0.00	0.51	0.00	0.00
-2005	CT Holdings	0.00	0.00	40.00	0.00	0.00	0.00	0.00	0.00
2004	CUNA Mutual	0.00	10.53	0.00	0.00	0.00	0.00	0.00	0.00
2006	Capital Today	0.00	25.00	0.00	0.00	0.00	0.32	0.00	0.00
2005	Changyu Group	0.00	18.07	0.00	0.00	0.00	18.07	0.00	0.00
1998	Chengdu Huarong	3.36	3.20	0.00	3.13	3.36	3.20	0.00	3.13
2004	China Green Ener	20.00	0.00	0.00	0.00	15.00	0.00	0.00	0.00
2004	China Re Life	0.00	0.27	0.00	0.00	0.00	0.27	0.00	0.00
1994	China Walden Mgt	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00
2006	Chinasoft	0.00	0.00	15.00	0.00	0.00	0.00	10.00	0.00
2004	Colony China	0.00	15.31	0.00	0.00	0.00	9.29	0.00	0.00
2004	Colony China GP	0.00	0.84	0.00	0.00	0.00	0.49	0.00	0.00
2006	Conch	81.50	40.93	0.00	0.00	81.50	0.00	0.00	0.00
2006	Dagang NewSpring	25.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2002	Darong	10.00	0.24	0.00	8.00	6.67	0.24	0.00	5.33
2006	Deqingyuan	0.00	2.85	0.00	0.00	0.00	2.85	0.00	0.00
1994	Dynamic Fund	0.00	2.21	0.00	0.00	0.00	2.01	0.00	0.00
2007	Epure	0.00	10.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	Fenglin	17.64	0.00	6.00	13.47	13.64	0.00	6.00	12.53
2006	Fenglin HJ MDF	0.23	0.00	0.00	3.27	0.00	0.00	0.00	0.00
2005	Five Star	0.00	0.00	7.00	0.00	0.00	0.00	0.00	0.00
2006	GDIH	50.85	0.00	0.00	0.00	50.85	0.00	0.00	0.00
2003	Great Infotech	0.00	1.73	0.00	0.00	0.00	1.03	0.00	0.00
2006	Hangzhou RCB	0.00	10.85	0.00	0.00	0.00	0.00	0.00	0.00
2005	HiSoft Tech	0.00	4.00	0.00	0.00	0.00	3.00	0.00	0.00
2006	HiSoft Tech	0.00	4.34	0.00	0.00	0.00	1.74	0.00	0.00
2004	IB	0.00	52.18	0.00	0.00	0.00	52.18	0.00	0.00
2004	Jiangxi Chenming	40.00	12.90	0.00	18.76	40.00	12.90	0.00	18.76
2006	Launch Tech	0.00	8.35	0.00	0.00	0.00	8.33	0.00	0.00
2001	Maanshan Carbon	5.25	2.00	0.00	0.00	5.25	2.00	0.00	0.00
2005	Maanshan Carbon	11.00	1.00	0.00	0.00	5.00	1.00	0.00	0.00
2005	Minsheng	15.75	0.00	0.00	0.00	7.00	0.00	0.00	0.00
2006	Minsheng & IB	25.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2001	Minsheng Bank	0.00	23.50	0.00	0.00	0.00	23.50	0.00	0.00
2005	Minsheng Bank	0.00	2.80	0.00	0.00	0.00	2.79	0.00	0.00
2001	NCCB	0.00	8.94	0.00	0.00	0.00	8.82	0.00	0.00
1996	Nanjing Kumho	0.00	3.81	0.00	0.00	0.00	3.81	0.00	0.00
2004	Nanjing Kumho	31.38	2.23	0.00	0.00	31.38	2.23	0.00	0.00
2006	Neophotonics	0.00	0.00	10.00	0.00	0.00	0.00	10.00	0.00
2001	New China Life	0.00	5.83	0.00	0.00	0.00	5.83	0.00	0.00
2005	New Hope	0.00	0.00	45.00	0.00	0.00	0.00	0.00	0.00
1995	Newbridge Inv.	0.00	0.22	0.00	0.00	0.00	0.22	0.00	0.00
2005	North Andre	8.00	6.74	0.00	0.00	0.00	4.25	0.00	0.00
2003	PSAM	0.00	2.01	0.00	0.00	0.00	0.00	0.00	0.00
	RAK China	13.00	0.00	0.00	0.00	13.00	0.00	0.00	0.00
2006	Renaissance Sec	0.00	0.00	20.04	0.00	0.00	0.00	0.00	0.00
2006	Rongde	0.00	35.00	0.00	0.00	0.00	31.38	0.00	0.00
	SAC HK Holding	0.00	1.60	0.00	0.00	0.00	1.00	0.00	0.00

2003	SAIC	12.00	0.00	0.00	0.00	12.00	0.00	0.00	0.00
2006	SBCVC	0.00	20.00	0.00	0.00	0.00	2.00	0.00	0.00
2000	SEAF SSIF	0.00	3.74	0.00	0.00	0.00	3.37	0.00	0.00
	SH Keji IT	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2004	SHCT	38.18	0.00	0.00	28.64	29.04	0.00	0.00	21.78
2004	SIBFI	0.14	0.07	0.00	0.00	0.00	0.07	0.00	0.00
1998	Shanghai Krupp	19.25	0.00	0.00	36.75	19.25	0.00	0.00	36.75
2006	Shanshui Group	50.00	5.50	2.20	0.00	50.00	5.50	0.00	0.00
1999	Shanxi	12.61	0.00	0.00	0.00	12.61	0.00	0.00	0.00
	SinoSpring	0.00	0.00	20.00	0.00	0.00	0.00	0.00	0.00
	Stora Enso	20.83	0.00	0.00	4.17	11.00	0.00	0.00	0.00
2005	Stora Enso	29.17	0.00	0.00	20.83	0.00	0.00	0.00	0.00
2006	Stora Enso	50.00	0.00	0.00	175.00	0.00	0.00	0.00	0.00
2006	TBK	4.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00
2006	VeriSilicon	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
	Wanjie High-Tech	9.89	0.00	0.00	0.00	9.89	0.00	0.00	0.00
2004	Wumart	0.00	1.62	0.00	0.00	0.00	1.62	0.00	0.00
2003	XACB	0.00	17.95	0.00	0.00	0.00	0.64	0.00	0.00
2004	Xinao Gas	25.00	10.00	0.00	0.00	25.00	10.00	0.00	0.00
2006	Zhejiang Glass	50.00	24.96	0.00	18.00	0.00	0.00	0.00	0.00
2003	Zhengye-ADC	10.43	0.00	0.00	4.87	10.43	0.00	0.00	4.87
2002	Zhong Chen	0.00	4.78	0.00	0.00	0.00	4.78	0.00	0.00
2006	Zhongda_Yanjin	21.89	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total portfolio:	733.58	577.30	181.40	340.89	470.95	371.06	29.61	108.03

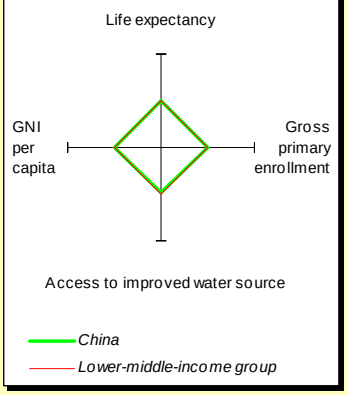
		Approvals Pending Commitment			
FY Approval	Company	Loan	Equity	Quasi	Partic.
2002	SML	0.00	0.00	0.00	0.00
2004	NCFL	0.00	0.00	0.02	0.00
2007	Xinao CTC	0.04	0.01	0.00	0.14
2004	China Green	0.00	0.00	0.01	0.00
2006	Launch Tech	0.01	0.00	0.00	0.00
2005	MS Shipping	0.00	0.01	0.00	0.00
2003	Peak Pacific 2	0.00	0.01	0.00	0.00
	Total pending commitment:	0.05	0.03	0.03	0.14

Annex 14: Country at a Glance

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

POVERTY and SOCIAL	China	East Asia & Pacific	Lower-middle-income
2006			
Population, mid-year *(millions)*	1,311.8	1,900	2,276
GNI per capita *(Atlas method, US$)*	2,000	1,863	2,037
GNI *(Atlas method, US$ billions)*	2,623.6	3,539	4,635
Average annual growth, 2000-06			
Population *(%)*	0.6	0.9	0.9
Labor force *(%)*	1.0	1.3	1.4
Most recent estimate (latest year available, 2000-06)			
Poverty *(% of population below national poverty line)*	..	..	..
Urban population *(% of total population)*	41	42	47
Life expectancy at birth *(years)*	72	71	71
Infant mortality *(per 1,000 live births)*	23	26	31
Child malnutrition *(% of children under 5)*	8	15	13
Access to an improved water source *(% of population)*	77	79	81
Literacy *(% of population age 15+)*	91	91	89
Gross primary enrollment *(% of school-age population)*	113	114	113
Male	113	115	117
Female	112	113	114

Development diamond*

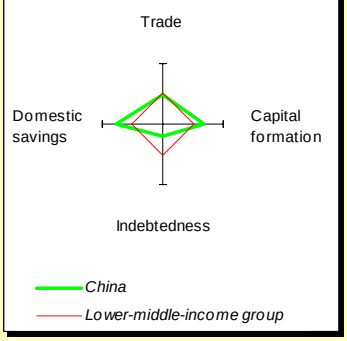


KEY ECONOMIC RATIOS and LONG-TERM TRENDS

	1986	1996	2005	2006
GDP *(US$ billions)*	295.7	856.1	2,243.9	2,644.7
Gross capital formation/GDP	38.6	40.4	43.9	44.6
Exports of goods and services/GDP	11.8	20.1	37.3	40.1
Gross domestic savings/GDP	35.8	42.5	49.4	52.5
Gross national savings/GDP	35.9	41.3	51.0	54.1
Current account balance/GDP	-2.8	0.8	7.2	9.4
Interest payments/GDP	0.2	0.5	0.1	..
Total debt/GDP	8.0	15.0	12.6	..
Total debt service/exports	8.2	8.7	3.0	..
Present value of debt/GDP	..	..	12.3	..
Present value of debt/exports	..	..	30.6	..

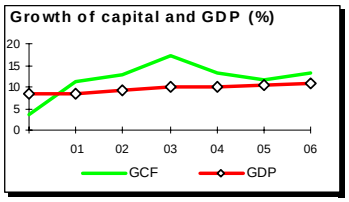
	1986-96	1996-06	2005	2006	2006-10
(average annual growth)					
GDP	10.1	9.0	10.4	10.7	10.6
GDP per capita	8.6	8.2	9.7	10.1	9.9
Exports of goods and services	10.0	21.8	24.3	23.3	17.4

Economic ratios*

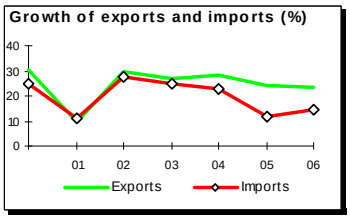


STRUCTURE of the ECONOMY

	1986	1996	2005	2006
(% of GDP)				
Agriculture	27.1	19.5	12.5	11.7
Industry	44.0	47.5	47.5	48.4
Manufacturing	35.2	33.5	33.5	..
Services	28.9	33.0	39.9	39.9
Household final consumption expenditure	49.3	43.5	36.1	33.2
General gov't final consumption expenditure	14.9	14.0	14.5	14.3
Imports of goods and services	14.7	18.0	31.7	32.2



	1986-96	1996-06	2005	2006
(average annual growth)				
Agriculture	4.3	3.5	5.2	5.0
Industry	13.5	10.1	11.7	12.5
Manufacturing	12.8	10.2	12.1	..
Services	9.4	9.8	10.5	10.3
Household final consumption expenditure	10.9	7.8	5.8	6.3
General gov't final consumption expenditure	10.4	9.5	11.6	10.9
Gross capital formation	11.9	10.2	11.6	13.2
Imports of goods and services	11.9	18.5	11.4	14.3



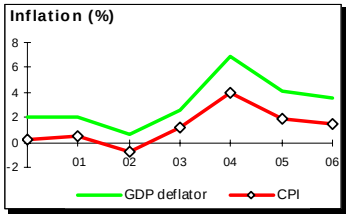
Note: 2006 data are preliminary estimates.

This table was produced from the Development Economics LDB database.

* The diamonds show four key indicators in the country (in bold) compared with its income-group average. If data are missing, the diamond will be incomplete.

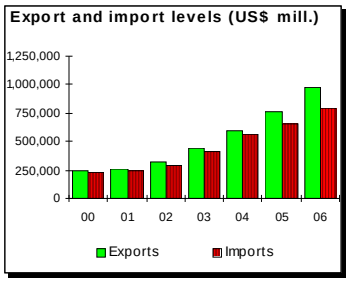
PRICES and GOVERNMENT FINANCE

	1986	1996	2005	2006
Domestic prices				
(% change)				
Consumer prices	..	8.3	1.8	1.5
Implicit GDP deflator	4.6	6.4	4.2	3.6
Government finance				
(% of GDP, includes current grants)				
Current revenue	0.0	10.5	17.2	18.4
Current budget balance	-17.7	0.2	2.4	3.0
Overall surplus/deficit	-24.8	-1.4	-1.3	-0.7



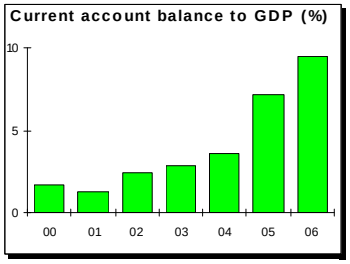
TRADE

	1986	1996	2005	2006
(US$ millions)				
Total exports (fob)	30,942	151,048	761,999	969,073
Food	4,448	10,231	22,481	25,722
Mineral fuels, lubricants, and related materials	3,683	5,931	17,621	17,776
Manufactures	19,670	129,123	712,960	916,147
Total imports (cif)	42,904	138,833	660,118	791,614
Food	1,625	5,672	9,388	9,997
Fuel and energy	504	6,877	63,957	89,002
Capital goods	16,781	54,763	290,628	357,107
Export price index *(2000=100)*	59	122	104	107
Import price index *(2000=100)*	76	108	118	124
Terms of trade *(2000=100)*	77	113	88	87



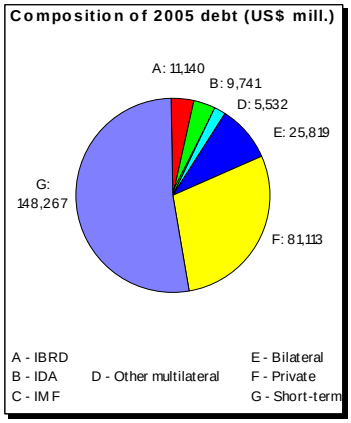
BALANCE of PAYMENTS

	1986	1996	2005	2006
(US$ millions)				
Exports of goods and services	34,952	171,678	836,888	1,061,681
Imports of goods and services	43,453	154,127	712,090	852,769
Resource balance	-8,501	17,551	124,798	208,912
Net income	-23	-12,437	10,635	11,755
Net current transfers	378	2,129	25,385	29,200
Current account balance	-8,146	7,243	160,818	249,867
Financing items (net)	6,419	24,462	46,198	-2,842
Changes in net reserves	1,727	-31,705	-207,016	-247,025
Memo:				
Reserves including gold *(US$ millions)*	..	111,717	831,427	1,046,465
Conversion rate *(DEC, local/US$)*	3.5	8.3	8.2	8.0



EXTERNAL DEBT and RESOURCE FLOWS

	1986	1996	2005	2006
(US$ millions)				
Total debt outstanding and disbursed	23,719	128,817	281,612	..
IBRD	965	7,616	11,140	11,415
IDA	774	7,579	9,741	9,997
Total debt service	2,973	15,756	27,361	..
IBRD	66	840	1,139	1,443
IDA	8	73	296	316
Composition of net resource flows				
Official grants	155	245	332	..
Official creditors	1,165	4,401	844	..
Private creditors	3,693	6,454	5,144	..
Foreign direct investment (net inflows)	1,875	40,180	79,127	..
Portfolio equity (net inflows)	0	0	20,346	..
World Bank program				
Commitments	1,120	1,900	1,277	0
Disbursements	607	2,097	1,131	1,170
Principal repayments	0	364	1,004	1,144
Net flows	607	1,734	127	27
Interest payments	75	549	430	615
Net transfers	532	1,185	-303	-588



Note: This table was produced from the Development Economics LDB database. 9/28/07

Annex 15: Incremental Cost Analysis

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

A. Problem Statement

1. Non-point pollution from urban and agricultrual run-off has been recognized as a large and growing problem that contributes to marine pollution in East Asia's large marine ecosystems. Such discharges have been cited as a main cause of hypoxia and eutrophication problems in the Yangtze River estuary, Hangzhou Bay, and the East China Sea, as well as water quality degradation in the Huangpu River, which is one of the main drinking water sources for Shanghai. Four major sources of agricultural and non-point pollution sources in Shanghai are identified as untreated livestock wastes, untreated sewage from rapidly-urbanizing villages and towns, crop straw, and fertilizer and pesticide runoff.

2. It is estimated that lack of effective treatment facilities has left about 40 percent of 7.6 million tons of livestock wastes untreated and directly discharged into local waterways annually in Shanghai. In addition, insufficient household wastewater treatment capacity means that only 40 percent of household wastewater generated in rural Shanghai is treated, in many cases only partially. Furthermore, the availability of natural gas in rural Shanghai has helped rural residents avoid using crop straw as a biomass fuel. As a result of this change, about 1 million tons of crop straw annually remains unattended on farmland and eventually flows into the waterways. Also, excessive applications of chemical fertilizers and pesticides in rural Shanghai generate significant water pollution load from fertilizer and pesticide runoffs.

B. Baseline Scenario

3. Shanghai Municipal Government has recognized the need and mobilized IBRD loans (Shanghai Urban Environment Project - APL) and domestic resources to implement a US$1.5 billion investment program with an objective of improving environmental conditions in the Greater Shanghai Municipality. Progressive development and implementation of integrated, metropolitan-wide environmental management measures are promoted under the investment program. Specifically, under the second phase of the investment program, Shanghai is pursuing innovative ways of extending such measures to its less affluent, growing districts outside the core city (home to about 50 percent of the population) with a focus on sanitation (wastewater) and solid waste management.

4. SMG started addressing agricultural and non-point source pollution in its 2nd Three Year Action Plan for Environmental Protection (TYAPEP, 2003 – 2005). Regarding livestock wastes, key measures adopted include: (a) closure of over 1,100 small and polluted animal farms to promote economic scales of animal farms outside of key water source protection areas; (b) establishment of over 40 organic fertilizer facilities with a processing capacity over 700,000 tons of fresh animal manure; and (c) promotion of land application of animal manure. The 2nd TYAPEP also promoted the use of organic fertilizers, integrated pest management techniques, and applications of low-toxicity pesticides to reduce pollution associated with agrichemicals. A ban on open burning of agricultural wastes also was introduced.

5. In its 3rd TYAPEP (2006 – 2008), SMG aimed to significantly increase reuse of livestock wastes, and reduce unit use of chemical pesticides by 8 percent and nitrogen-based fertilizers by 10 percent. In particular, it strengthened the issuance of pollution discharge permits for animal

farms and expanded and established five organic fertilizer facilities with an increased annual production capacity of 80,000 tons. To reduce agricultural pollution, it promoted: (a) the use of organic fertilizer, (b) integrated pest management techniques including the use of effective low-residue pesticides, and (c) comprehensive utilization of crop straw.

6. The investments under the 2nd and 3rd TYAPEPs have largely achieved their intended objectives in water pollution control. By the end of 2008, Shanghai was able to treat about 75 percent of its wastewater, had improved water quality of rivers in urban areas, reduced unit consumption of pesticides and chemical fertilizers in its agricultural production, and curbed significantly pollution discharges from livestock wastes.

7. The 4th TYAPEP (2009 – 2011) aims to reduce the use of nitrogen-based fertilizers and chemical pesticides by 10 percent and further improve environmental performance of 38 large livestock farms. Proposed new areas for livestock waste management in SMG's 4th TYAPEP (2009 – 2011) are: (a) piloting of livestock waste treatment facilities and associated application systems in large farms, and piloting land applications; (b) demonstration of livestock manure biogas projects; and (c) procurement of transportation vehicles for livestock wastes. For agricultural wastes, the plan continued to promote applications of organic fertilizer and integrated pest control techniques with low-toxicity pesticides. It enforced further the ban on open burning of agricultural wastes. On rural environmental quality, the 4th TYAPEP proposes a particular target of treating wastewater from at least 60,000 households to improve water quality of rivers. In this regard, the plan calls for the identification and adoption of economically feasible wastewater treatment techniques. It is estimated that the investment needed for the implementation of the 4th TYAPEP amounts to about RMB82 billion, of which RMB24.6 billion will focus on water quality issues.

Livestock Waste Management

8. As noted earlier, SMG's efforts to curb livestock waste management are three-fold: (a) to close down small animal farms and promote medium- and large-size animal farms outside of key water source protection areas; (b) to require wastewater discharge from animal farms in compliance with local environmental standards; and (c) to promote organic fertilizer production from livestock wastes. In practice, the first measure has been largely completed. However, SMG has noted the second measure is less effective as animal farms have yet to identify feasible technologies for wastewater treatment and have failed to meet the local effluent discharge standard. It is also noted that biogas production from livestock waste treatment is seldom used in Shanghai even though SMG has been trying to promote the usage of biogas production. High investment costs with relatively low efficiency in power generation and lack of financial incentives are major concerns of the farm owners. Without the GEF project, it is expected that the candidate large farm will continue to struggle to meet local standard with its existing anaerobic wastewater treatment facility but is highly unlikely to consider a waste management system including biogas capture and power generation.

9. The third measure is also facing difficulties in implementation because best practices in organic fertilizer production are yet to be fully adopted in Shanghai. A common practice of organic fertilizer production simply involves a separation of solids and liquids of livestock wastes. The solid portion is processed as low-quality organic fertilizers, and the liquid portion is treated and then discharged either into the local river system or onto agricultural land. Fertilizer production efforts of the candidate medium farm are of a good example. The farm has an

anaerobic wastewater plant and uses a natural process to compost animal wastes in uncovered lagoons with an average of 56 days of retention time. In addition to occupying a large land area and generating odors, the lagoons often overflow and discharge directly into the neighboring river system. This is particularly serious during the rainy season. At Qianwei, the candidate village for demonstrating integrated agricultural waste management, there is a composting plant in its animal farm, which mixes crop straw and rice chaffs with livestock wastes to produce fertilizer. This methodology increases quantity but lowers the quality of fertilizers. Without support of the GEF Project, it is expected that these common practices will continue in Shanghai for the short term.

Rural Sewage Treatment

10. As noted, only about 40 percent of rural sewage is treated. For areas with no access to municipal wastewater treatment plants, it is common for farmers in Shanghai to use three-compartment septic tanks to handle their sewage. These tanks either have no discharging outlets, which allow sewage seeps through soil and thus contaminates surface and ground water bodies, or discharge into neighboring water bodies. In other cases, sewage is simply directly discharged without treatment into the local river system. Without the GEF Project, it is expected that SMG will to continue finance the construction of wastewater treatment plants to manage rural sewage issues under its 4th and following TYAPEPs. The challenge faced by this approach is its high capital and operating costs, in particular due to high costs associated with collection and treatment of relatively low volume but widely distributed rural sewage. Shanghai will need time to identify and demonstrate rural sewage treatment technologies that have low capital and investment costs, with simple processes and easy maintenance for rural areas that cannot be readily covered by existing or new wastewater treatment plants.

Agricultural Pollution Reduction Techniques

11. Since its 3rd TYAPEP, Shanghai has invested greatly in production and promotion of organic fertilizers, integrated pest control techniques and low-toxicity pesticides as measures to reduce agricultural pollution. As noted above, the use of organic fertilizers is successful but still faces technical challenges such as low quality and lack of adoption of best practices of fertilizer application (i.e., without consideration of crop and soil). Similarly, best practices of pest control are also yet to be fully demonstrated in Shanghai. Most importantly, a systematic adoption of these approaches in agricultural production is yet to be demonstrated and promoted in Shanghai. Without the GEF project, it is expected that the current practices will continue to prevail in Shanghai in the short term.

Results Dissemination

12. In Shanghai, the Shanghai Agricultural Broadcasting Television School is the key entity responsible for training agricultural technicians and disseminating knowledge, agricultural technologies and best practices through local radio and television channels, its classes, internet and in-situ demonstration. Currently, the school has programs related to applications of fertilizers and chemicals but has no program on agricultural and non-point pollution reduction technologies and best practices. Internationally, Shanghai has not been actively involved in technical exchange and dissemination on agricultural and non-point pollution treatment techniques. Without the GEF project, Shanghai will not have the opportunities to participate in GEF-related activities such as PEMSEA and will have no access to the IW:LEARN activities.

C. GEF Scenario

Livestock Waste Management

13. With GEF support, SMG will demonstrate best practices for organic fertilizer production at the selected large animal farm in Jinshan, and the medium animal farm and the Qianwei animal farm in Chongming. In Jinshan, a mesophilic anaerobic Completely Stirred Tank Reactor will be demonstrated to support the farm's production and recovery of biogas for power generation. The treated waste will be further processed through a mechanical liquid solids separator, which will remove some phosphorus and nitrogen from the liquid fraction. The liquid effluent will be further treated on site through a series of lagoons prior to conveying to the existing Langxia Wastewater Treatment Plant for final disposal. Some liquid fraction may be used for fodder crops on the farm either through pipes or a trucking scheme. The solid fraction will be composted and sold as an organic fertilizer and soil amendment.

14. In the medium animal farm, the collected solids will be composted using a windrow method to produce compost, which will be marketed as an organic fertilizer and soil amendment. The liquid waste will be stored in the existing lagoon for land applications. Management measures will be adopted to prevent any discharge from the lagoon during the rainy season. For land applications, a nutrient management plan will also be developed based on nitrogen and phosphorus availability relative to crop needs.

15. For the Qianwei Village, the candidate village for demonstrating integrated agricultural waste management, the project will support improvinv waste management practices. In particular, the project will demonstrate animal waste treatment with a heated Completely Stirred Tank Reactor to produce biogas. It will also support the village to demonstrate an Upflow Anaerobic Sludge Blanket, which digests organic fractions of the crop straw to produce biogas under anaerobic conditions. The pre-treated crop straw (solids) will be applied to land as a soil enhancer. The performance of the gasification system for crop straw waste will help SMG evaluate the potential of scaling up the adoption of this system in Shanghai. The gas produced from the CSTR, UASB, and gasification system will be transferred to two 100-kW reciprocating engines with attached generators.

Rural Sewage Treatment

16. In Jiading, SMG will restore a river-network wetland of about 1.2 million m^2 on existing river banks to help stop the sediments carried by surface runoffs; prevent erosion of river courses; provide ecological functions of water and soil reservation; water purification; biodiversity preservation and landscape; and provide diversified habitats for aquatic biota. A 120 m^2 vertical submerged reed-coarse sand artificial wetland will also be constructed to treat 12 m^3 /d sewage from Qinggang Village of 30 households and a population of 105. As a part of a much larger eco-project in Jiading District, SMG planned the wetland for ecological restoration purpose. With GEF support, this wetland will be constructed to demonstrate the effect of a river-network wetland and wetland technologies for rural town sewage treatment. Constructed wetland is a man-made and controlled system which forms a compound ecological system consisting of stuffing, microorganisms and plants that are able to purify sewage through various physical, chemical and biological processes. It is expected that constructed wetland will have the advantages of high efficiency, low construction and operational costs and low power

consumption. For a similar reason, the project will support Qingpu to demonstrate a new wetland system for treatment of village sewage.

17. To illustrate effectiveness of the proposed wetland treatment systems, the project will support regular environmental monitoring at the rural town and village constructed wetlands. This monitoring will also provide early warning of unexpected system failure or pollution accidents. Emergency monitoring plans will be developed and implemented to identify mitigation measures and minimize the risk of such events.

Agricultural Pollution Reduction Techniques

18. Building on existing SMG programs for investment and promotion of agricultural pollution reduction techniques, the GEF project will support SMG to identify and demonstrate solutions to technical challenges faced by the municipality. Specifically, the GEF project will demonstrate best practices in fertilizer applications in addition to SMG's efforts to promote the use of organic fertilizers. The demonstration will focus on accurate fertilizer application and use of crop-specific and nutrient-customized fertilization to improve efficiency of chemical fertilizer and develop more ecologically friendly and sustainable agriculture. Similarly, the project will promote scientific application of agricultural chemicals based on results of an early warning network for outbreaks of plant diseases and pests infestations. Integrated pest management approaches will be demonstrated to promote accurate uses of non-chemical pest management techniques, eco-friendly biological pesticides, and high efficiency, low toxic, and low residual effect chemicals. In addition, the project will support activities to monitor the effect of the demonstration of such technologies through on-site examination and sample analysis at qualified laboratories.

Results Dissemination

19. The GEF project will support SMG to develop and implement a replication strategy to disseminate lessons and experience learned from this project locally, nationally, regionally and globally.

20. Through the Shanghai Agricultural Broadcasting Television School, findings of this project will be integrated into training courses designed for local farmers, school students, technicians, professionals and government officials during project implementation. Successes of this project will also be publicized in Shanghai and China through the School's satellite broadcasting network and internet. In addition, it is planned that a series of workshops will be organized in Shanghai to share experiences for agricultural and non-point pollution management techniques with the municipality as well as nationally. Representatives from PEMSEA and other interested international organizations will be invited to attend local workshops and help disseminate the experience and workshop documents.

21. Regionally, SMG will participate in activities sponsored by the Bank/GEF Investment Fund and PEMSEA (such as the PEMSEA East Asia Seas Congress) with the assistance of the World Bank. Globally, SMG will disseminate results of this project at GEF-organized activities such as the biennial GEF International Waters Conference. In addition, the project will participate in IW:LEARN activities, and project technical details would be included in the UNEP Best Practices and Success Stories Global Network.

D. Incremental Costs and Summary

22. The table below summarizes the results of the incremental analysis of this project. As the table shows, it is estimated that a total cost of US$15.429 million is incremental to SMG's efforts to reduce rural and agricultural pollution to its rivers and then to the East China Sea. While the US$15.429 million will finance project activities to generate global environmental benefits, they will bring also positive impacts on the local water environment (and on economic performance of the large, medium and Qianwei village farms), SMG and PIAs agreed to provide a total of US$29.891 million to co-finance implementation of this project.

Baseline Scenario	GEF Scenario	Incremental Costs
Component 1: Livestock Waste Management Technology Demonstration		
As noted, SMG has adopted measures to consolidate its livestock facilities and required animal farms to properly manage their wastes. However, information from the participating large, medium and Qianwei animal farms shows their wastewater management operations have deficiencies in their treatment efficiency and effectiveness.	The GEF project will support SMG to demonstrate best practices in livestock waste management that will enable the farms to meet effluent discharge standards, produce good quality organic fertilizers, and utilize biogas, electricity generated during treatment process.	The total allocation of US$9.748 million is incremental to SMG's efforts to better manage livestock waste from the municipality's animal farms.
Component 2: Wetland Demonstration for Pollution Reduction		
Under its 4th TYAPEP, SMG will continue to construct new municipal wastewater treatment facilities while exploring appropriate technologies of economically feasible wastewater treatment techniques for rural wastewater treatment.	The GEF project will support the demonstration of innovative wetland treatment systems for rural sewage, which is of high efficiency, low construction and operational cost with low power consumption. Results of this demonstration will influence future investment of SMG in rural sewage treatment.	The total allocation of US$3.343 million for this component is incremental as this investment is of demonstration in nature and in addition to SMG's investment in municipal wastewater treatment facilities.
Component 3: Integrated Agricultural Pollution Reduction Techniques		
Shanghai has invested greatly in production and promotion of organic fertilizers, integrated pest control techniques and low-toxicity pesticides as measures to reduce agricultural pollution. However, it faces technical challenges in improving quality of organic fertilizers, best practices in applications of agricultural chemicals, and has not been actively monitoring effectiveness of its investment.	Building on existing programs in Shanghai, the GEF project will support SMG to demonstrate solutions to technical challenges it faced in promote integrated agricultural pollution reduction techniques. As a key activity, the project supported monitoring activities that are often neglected activity under the SMG's existing programs.	Among the US$20.412 million allocated for this component, about US$19 million are contribution from SMG and project beneficiaries' existing programs on organic fertilizer and IPM promotion. So the incremental cost for this component is about US$1.412 million.
Component 4: Project Management and Dissemination		
Project management, Monitoring and Evaluation No activities under the baseline scenario.	Project management activities will be carried out to ensure successful implementation of this project.	The total allocation of US$0.380 million is incremental as the proposed GEF activities will not be performed under the baseline scenario.
Replication and dissemination Minimal activities under the baseline scenario as SMG has yet to fully participate in any regional and global cooperation initiatives.	Full participation in regional knowledge management activities organized by the Bank/GEF Investment Fund, PEMSEA; and disseminate knowledge through the IW:LEARN, the GEF and other channels.	The total allocation of US$0.546 million is incremental as the proposed GEF activities will not be performed under the baseline scenario.

Annex 16: Strategic Partnership Investment Fund

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

1. In 1995, twelve East Asian countries came together with a common vision to ensure the sustainable development of their shared waters.[10] This partnership of governments, with the support of the GEF, UNDP, and International Maritime Organization (IMO), created the *Partnerships in Environmental Management for the Seas of East Asia* (PEMSEA). One of the main achievements of the countries through their contribution to PEMSEA has been the development and adoption of the Sustainable Development Strategy for the Seas of East Asia (SDS-SEA), which was endorsed by each of the twelve countries in December 2003. The SDS-SEA is significant as the first, and the broadest, partnership agreement in the region to address the management of the regional seas. One of the highest priorities for action in the SDS-SEA is the reduction of land-based pollution that has an impact on the marine environment.

2. The countries of East Asia have recognized that a coordinated and innovative approach with a strong focus on scaling up investment is urgently needed to implement the SDS-SEA. GEF's new operational modality—the Strategic Partnership—has provided East Asia with an opportunity to undertake the necessary actions with coordinated support from GEF and the World Bank. The *WB/GEF Strategic Partnership Investment Fund for Pollution Reduction in the Large Marine Ecosystems of East Asia*, a US$80 million grant financing facility managed by the World Bank, was approved by GEF in November 2005. The IF forms the key financing arm of the East Asia Seas Strategic Partnership.

3. The objective of the IF is to scale up investments in coastal land-based pollution reduction in East Asia through co-financing of projects that remove technical, institutional, and financial barriers which currently limit efficient investment in pollution reduction. The US$80 million grant financing provided by GEF is expected to leverage between US$800 million and US$1.5 billion in counterpart financing from the World Bank and other sources, including the public and private sectors. The IF has adopted a coordinated approach to monitoring such that the contribution of all projects to the overall objectives of the IF can be measured. Tables A16.1 and A16.2 below show the overall IF indicators and the expected contribution of the project.

Projects under the Fund

4. The GEF - Ningbo Water and Environment Project (GEF-NWEP) was the first project to be financed by the IF. This project provided a significant environmental enhancement to the IBRD-financed NWEP, which was approved by the World Bank in March 2005. Under NWEP, Cixi City, located on the coast of Hangzhou Bay and the East China Sea, would construct two wastewater treatment plants with a total treatment capacity of 150,000 m^3/d. The GEF-NWEP would enhance Cixi's wastewater treatment strategy and coastal management through the provision of a constructed wetland to provide tertiary treatment at the larger wastewater treatment plant. This pilot was expected to prove the technical and economic viability and increased environmental benefits of wetland treatment compared with the chemical tertiary treatment process more conventionally used in China. In addition, the project would support innovations in coastal management in China through the conservation of a natural coastal

[10] The original 12 countries included Brunei Darassalam, Cambodia, China, Indonesia, Japan, DPR Korea, R.O. Korea, Malaysia, Philippines, Singapore, Thailand and Vietnam. Three additional countries joined in 2005 (Lao PDR, Myanmar and Timor-Leste) making a current total of 15.

wetland for non-point source pollution control, establishment of a wetland education center, and policy reform to support coastal wetland conservation and management.

5. The GEF – Second Shandong Environmental Project (SDEP2), the second project to be financed under the IF, was approved by the World Bank in February 2007. The GEF co-financing takes place within the Yantai wastewater component of SDEP2. GEF support would initiate and facilitate implementation of the proposed major institutional and technological task to demonstrate to Chinese municipalities the rationale of proper management of wastewater facilities. The key objectives are: to (a) demonstrate in the *pilot-size septic-tank project* the feasibility of institutional and technical arrangements ensuring improvement of local environment status; and (b) disseminate among Bohai Declaration signatories and beyond the feasibility of positive impact on reduction of pollution load annually discharged to the Bohai and Yellow Seas.

6. The GEF – Liaoning Medium Cities Infrastructure Project (LMC-2) was approved by the World Bank in June 2007 and is the third project financed under the IF. The LMC-2 project financed four wastewater projects and three solid waste leachate projects and will have a significant impact on reducing pollution into the Bohai Sea. GEF co-financing would be provided to promote institutional innovations to ensure the sustainability of environmental infrastructure. The key objectives are: to (a) improve public utility regulation and management, including a province-wide utility performance benchmarking system; (b) formulate strategic solid waste sector plans in three cities to ensure sustainable services including leachate minimization and treatment; and (c) develop strategic wastewater sector plans in three cities to ensure sustainable municipal wastewater management including industrial pollution control. The LMC-2 project will also help disseminate experiences, and provide examples, of innovative approaches to reducing land-based sources of marine pollution.

7. The GEF – Manila Third Sewerage Project (MTSP), approved by the World Bank in June 2007, is the fourth project financed under the IF. It builds on the IBRD Manila Third Sewerage Project, which supports wastewater collection and treatment in Metro Manila. The GEF project is designed to remove barriers to investment in sewerage and sanitation and to pilot cheaper treatment technology for disposal of seepage. Identifying roles of different agencies in the wastewater sector and gaps and overlaps in their responsibilities is also an important task of the GEF project. Metro Manila has seventeen local government units, which need to coordinate their efforts in improving sanitation services with many government agencies and the private sector, such as the Department of Environment and Natural Resources, the Laguna Lake Development Authority, the Pasig River Rehabilitation Commission, and the Metropolitan Waterworks and Sewerage System and its two concessionaires. The GEF project will also enhance the capacity of local government units to raise fund to finance municipal wastewater collection and treatment.

8. The GEF – Vietnam Coastal Cities Project, approved by the World Bank in April 2009, is the fifth project to be financed under the IF. It builds on the IDA Coastal Cities Environmental Sanitation Project, which contributes to improving the environmental sanitation and to enhance the quality of life for residents in the project cities. The GEF project was designed to pilot and promote the replication of a new and more efficient wastewater treatment technology, which would contribute to improving the health and habitat conditions of globally significant marine and coastal ecosystems along the coastline of Vietnam and, through global oceanic circulation, other areas of the Pacific Ocean. The key objectives of the project are: (a) reduction of sewage

pollution loads through the development and establishment of low cost wastewater treatment technologies producing environmental incremental benefits; (b) improvement of the management of service providers; and (c) enhancement of the dialogue between public institutions and citizens through a program of dissemination and replication of project outcomes to other cities of the region.

9. The proposed GEF – Shanghai Agricultural and Non-point Pollution Reduction Project is the sixth project to be financed under the IF. The project will be a stand-alone project, but it will support the broad program and institutional objective of the Shanghai Urban Environment Project – APL. Whereas the APL focuses mostly on investments and institutional reforms in the water sector—including water supply, wastewater, and solid waste management—this project will complement the efforts by mitigating agricultural and non-point source pollution discharged into a water environment. The SANPR will aim to take a comprehensive approach by implementing a number of innovative sub-projects in rural areas of Shanghai. The project development objective is to demonstrate effective and innovative pollution reduction activities in Shanghai's rural areas in order to reduce the rural/ agricultural pollution load in the surface water flows to the East China Sea through: (a) construction of livestock waste management facilities in large, medium and village based farms; (b) building wetlands in rural town and villages; (c) promoting integrated agricultural pollution reduction techniques; and (d) strengthening replication and dissemination.

Replication Potential and Strategy

10. **Replication Potential**. With the development of the rural economy and accelerated urbanization, agricultural and non-point pollution in rural Shanghai has drawn increasing attention from the governments at municipal and district/county levels. The proposed project has been strongly supported by the governments and forms a part of Shanghai's TYAPEP. The integration of the project ensures replicability and sustainability.

11. Moreover, the proposed project is designed to demonstrate proven technologies that are not common in the target areas but are widely used in China and in the world. Mitigation measures to reduce pollution load for sub-projects under the Livestock Waste Management Technology Demonstration component will yield tangible benefits, including technology to convert waste to energy, production of organic fertilizer, and a reduction of health risks for key stakeholders, especially farmers and local communities. Furthermore, wetland sewage treatment systems are promoted by the government and widely accepted by rural residents. Design for cost-effective, simple operation and low maintenance systems plus minimal fee will ensure sustainable operation of such systems. Finally, replicability and sustainability of the Integrated Agricultural Pollution Reduction Techniques component depend largely on government policy and farmers' willingness. Shanghai government has adopted a long-term policy promoting use of integrated agricultural pollution reduction techniques. It is expected that participating farmers would recognize the project benefits, e.g. more environmentally friendly inputs, cost-effective solutions and higher quality products, and would adopt the techniques demonstrated in the project.

12. **Replication Strategy**. The information and experience obtained from overall project implementation will be disseminated through satellite broadcasting network, broadband digital network, and traditional classroom, workshop, and on-site dissemination. Both Shanghai and the Bank have realized that the project is expected to yield only limited direct impact on water

quality of the East China Sea because the selected demonstration areas represent negligible fractions of the total pollution load. A noticeable pollution reduction in the East China Sea catchment area can only be achieved through the replication of the demonstrated practices throughout the Shanghai municipality and in other provinces bordering the East China Sea. Therefore, preparation and implementation of a Replication Strategy has been included in the project as an important sub-component to ensure project replicability. Replication will be further ensured through integration of the project with Shanghai government's mainstream programs and serving as a pilot under the Shanghai 4th TYAPEP (2009 – 2011). This would ensure a greater potential for a municipality-wide and long-term replication in Shanghai. In the broader East Asia region, the Bank's partner in the Investment Fund, PEMSEA, would participate in disseminating lessons learned and good practices developed under SANPR Project.

Table A16-1: Arrangements for Results Monitoring at the Level of the Investment Fund (Extracted from Fund Brief approved by GEF Council in November 2005)

	Target Indicators		Project Reporting to Fund			Fund Reporting to GEF	
Outcome Indicators	**2010**	**2015**	**Frequency and Reports**	**Data Collection Instruments**	**Responsibility for Data Collection**	**Frequency and Reports**	**Responsibility for Data Collection**
Increased investment in pollution reduction (US$ million)	350 to 500	800 to 1,500	Annual PPR and Bank disbursement reports	PMO project implementation records, Bank disbursement data	PMO; Bank task team	Report annually to GEFSEC; Report to GEF Council at time of request for subsequent tranche	Fund Management Team with data derived from World Bank project task team reporting
Reduction in discharge of BOD to seas of East Asia (tons)	150,000	300,000	Annual PPR	Measurements by project implementing units, government statistics	PMO; Bank task team		
Result Indicators							
Removal of barriers to pollution reduction:							
Number of cost-effective technologies/ techniques demonstrated in specific country contexts	5	12	Annual PPR	Commissioning reports on investments	PMO; Bank task team		
Number of institutional and/or regulatory reforms approved and implemented	4	10	Annual PPR	Register of government regulations/decrees	Government agencies, PMO, Bank task team		
Financing through revolving funds:							
Number of countries that have established a revolving fund	1	4	Annual PPR	PMO project implementation records	PMO; Bank task team		
Minimum amount of capital invested in revolving funds (US$ million)	15	60					
Dissemination of demonstrated technologies, techniques and mechanisms:							
Products: Number of publications	6	12	Annual PPR	PMO project implementation records	PMO; Bank task team		
Products: Number of project websites	6	12					
Events: Number of country workshops	6	12					
Events: Number of regional conferences/workshops participated in	2	5					
Mainstreaming of SDS-SEA in World Bank EAP operations:							
Number of Strategic Partnership Council meetings participated in by World Bank staff (events/year)	2	2	N/A	N/A	N/A		
Number of World Bank CAS which include Fund	3	5					

Table A16-2: GEF-Shanghai Agricultural and Non-Point Pollution Reduction Project Contribution to the Fund Targets

	Target Indicators	Explanation
Outcome Indicators	**Implementation Period**	
Increased investment in pollution reduction (US$ million)	15	Incremental investment.
Reduction in discharge of BOD to seas of East Asia (tons)	639.7	The project is expected to yield only limited direct impact on water quality because the selected demonstration areas represent negligible fractions of the total pollution load. A noticeable pollution reduction in the East China Sea catchment area can only be achieved through the replication of the demonstrated practices.
Result Indicators		
Removal of barriers to pollution reduction:		
Number of cost-effective technologies/ techniques demonstrated in specific country contexts	8	Including 3 for livestock waste management, 3 for wetlands, 1 for organic fertilization, 1 for agricultural chemicals.
Number of institutional and/or regulatory reforms approved and implemented	-	Not applicable to the project.
Financing through revolving funds:		
Number of countries that have established a revolving fund	-	Not applicable to the project.
Minimum amount of capital invested in revolving funds (US$ million)	-	Not applicable to the project.
Dissemination of demonstrated technologies, techniques and mechanisms:		
Products: Number of publications and videos	7	1 overall project video, 3 specific-technology videos; and 3 training materials
Products: Number of project websites	1	1 project website to be developed at Shanghai Agricultural Broadcasting Television School
Events: Number of country workshops	2	2 municipal workshops including 1 international conference tentatively scheduled for 2012;
Events: Number of regional conferences/workshops participated in	4	Participation in IW5, IW6, PEMSEA East Asia Seas Congress in 2009 and 2012;
Mainstreaming of SDS-SEA in World Bank EAP operations:		
Number of Strategic Partnership Council meetings participated in by World Bank staff (events/year)	-	Fund level indicator, not applicable to individual projects.
Number of World Bank CAS which include Fund	-	Fund level indicator, not applicable to individual projects.

Annex 17: Maps

CHINA: GEF Shanghai Agricultural and Non-point Pollution Reduction Project

[To be inserted]