CHINA
Guangdong Pearl River Delta Urban Environment Project

GEF Project Brief

East Asia and Pacific Region
EASUR

Date: January 23, 2004
Sector Manager/Director: Keshav Varma
Country Manager/Director: Yukon Huang
Project ID: P075728
Lending Instrument: Specific Investment Loan (SIL)

Team Leader: Thomas L. Zearley
Sector(s): Sewerage (70%), Solid waste management (20%), Sub-national government administration (10%)
Theme(s): Water resource management (P), Environmental policies and institutions (P), Pollution management and environmental health (P), Infrastructure services for private sector development (S)

Global Supplemental ID: P084003
Sector Manager/Director:
Lending Instrument: Specific Investment Loan (SIL)
Focal Area: I - International waters
Supplement Fully Blended? No

Team Leader: Thomas L. Zearley
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Theme(s): Pollution management and environmental health (P) , Water resource management (P), Infrastructure services for private sector development (S)

Project Financing Data

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

For Loans/Credits/Others:
Loan Currency: United States Dollar
Amount (US$m): 165.00 + 10.0 Global Environment Facility (GEF) Grant
Borrower Rationale for Choice of Loan Terms Available on File: ☒ **Yes**
Proposed Terms (IBRD): Variable-Spread Loan (VSL)
Grace period (years): 5 **Years to maturity:** 20
Commitment fee: 0.75% **Front end fee (FEF) on Bank loan:** 1.00%

Financing Plan (US$m): Source	Local	Foreign	Total
BORROWER/RECIPIENT	249.00	13.35	262.35
IBRD	55.10	109.90	165.00
GLOBAL ENVIRONMENT FACILITY	0.00	10.00	10.00
Total:	304.10	133.25	437.35

Borrower/Recipient: PEOPLE'S REPUBLIC OF CHINA
Responsible agency:
GUANGDONG PROVINCE, through the Guangdong Provincial Finance Bureau's World Bank Project Management Office
Address: 26 Cang Bian Road, Guangzhou, China
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P075728 Estimated Disbursements (Bank FY/US$m):									
FY	2005	2006	2007	2008	2009	2010			
Annual	11.00	15.30	38.80	67.10	24.70	8.10			
Cumulative	11.00	26.30	65.10	132.20	156.90	165.00			

P084003 (GEF) Estimated Disbursements (Bank FY/US$m):								
FY	2005	2006	2007	2008	2009	2010		
Annual	0.00	0.90	2.70	3.80	2.10	0.50		
Cumulative	0.00	0.90	3.60	7.40	9.50	10.00		

Project implementation period: 01/01/2004 - 06/30/2009

Expected effectiveness date: 12/01/2004 **Expected closing date:** 12/31/2009

A. Project Development Objective

1. Project development objective: (see Annex 1)

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The project development objective is to promote a regional planning approach to environmental service delivery, to address the serious environmental problems of the Pearl River Delta (PRD) and the South China Sea.

2. Global objective: (see Annex 1)

The project's global environment objective is to improve the environmental condition of the South China Sea large marine ecosystem (LME) by addressing one of the recognized major trans-boundary threats to it - land-based pollution. The South China Sea is one of the World's key LMEs that the Global Environment Facility (GEF) has agreed to help the littoral states manage in a sustainable manner, in order to achieve global environment benefits. GEF-supported analyses of the major threats to it, facilitated by the GEF/UNDP/IMO Partnerships in Environmental Management for the Seas of East Asia and the GEF/UNEP Project on Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand, have identified land-based pollution as one of the most serious trans-boundary threats to the South China Sea and China's Pearl River Delta as one of its land-based pollution "hot-spots", and the largest source of land-based pollution emanating from China. By reducing land-based pollution from the Pearl River Delta, the project will help address this specific threat to the South China Sea, help reverse its degradation, and generate trans-boundary environmental benefits for the millions of people whose livelihood and health depend on it.

3. Key performance indicators: (see Annex 1)

Key performance indicators relating to the development objective are:
(a) Increased percentage of domestic wastewater collection and treatment
(b) Increased pretreatment of industrial wastewater before discharge, and relocation of highly polluting industries
(c) Increased collection and treatment of hazardous wastes
(d) Improved water quality monitoring information, and data sharing for environmental management
(e) Increased collaboration between Guangdong and Hong Kong SAR for environmental management of the PRD and the South China Sea region

B. Strategic Context

1. Sector-related Country Assistance Strategy (CAS) goal supported by the project: (see Annex 1)
Document number: Under preparation **Date of latest CAS discussion:** 12/19/02

CAS Memorandum of January 22, 2003 and Country Program Matrix (FY03-05)

The project will support several important themes and specific goals of the CAS. It will facilitate the urban transition that is underway in China, by helping to enhance the productivity of cities--where the overwhelming majority of jobs will be created--and the provision of improved urban living conditions, which depend crucially on better municipal management and the availability of adequate financial resources. It will also support an environmentally sustainable development process, by improving the

management of water resources and hazardous waste management.

The project will also help China meet one of the most important of the Millennium Development Goals (Goal 7), which is to "improve the environment by implementing national strategies for sustainable development by 2005."

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

This project will be one of the first major elements of a planned large-scale, long-term program of GEF co-financed assistance to the littoral states of Seas of East Asia that will help them accelerate action to address the major threat to these seas posed by severe and worsening land-based pollution. The strategic frameworks for this program are the GEF/UNDP/IMO-catalyzed "Sustainable Development Strategy for the Seas of East Asia", which was endorsed by a Ministerial Forum on the Sustainable Development of the Seas of East Asia in Putrajaya, Malaysia on December 12, 2003, and the emerging GEF/UNEP Strategic Action Plan for Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand.

The project is consistent with the GEF's Operational Program 8, because it will help China reduce land-based pollution of the South China Sea and the Seas of East Asia. Land-based pollution is identified by the "Sustainable Development Strategy for the Seas of East Asia" as one of the region's most urgent trans-boundary marine environmental action priorities. The Strategy identified the Pearl River as China's largest source of land-based pollution of the South China Sea, and Guangdong Province is the most concentrated source of that pollution.

The project is also consistent with the GEF's Operational Program 10, in that it will demonstrate innovative options for reducing the contamination of an international water body – the South China Sea. The project's objectives of identifying joint municipal environmental investments and private-public and private-private investments are both innovative, as also is the proposed use of GEF resources as an incentive for municipalities to undertake joint investments to demonstrate the cost-effectiveness of this innovative approach to environmental investment.

The project is also consistent with the GEF's Strategic Priorities 1 and 3 for the International Waters Focal Area in FY2004-06. With respect to priority 1, the project will support China's efforts to mobilize and make more effective use of resources for implementing policy, promotion of legal and institutional reforms and stress-reducing investments that were previously agreed with GEF assistance and/or equivalent processes. As called for under this strategic priority, the project (a) is fully mainstreamed into the World Bank's China country assistance and lending program, (b) promotes engagement of the private sector, and (c) is consistent with the GEF's principle of incremental cost financing. The pollution-reduction actions that the project will promote will contribute to the GEF's target for FY2004-06 of doubling the number of trans-boundary water bodies within which it has helped to catalyze policy reforms and stress-reduction measures.

With respect to priority 3, GEF assistance is focussed on the demonstration, testing and replication of innovative ways to (a) reduce the barriers to policy reform, (b) achieve more efficient use of public investment resources by promoting inter-municipal collaboration in larger-scale waste management investments, (c) increase private sector investment in, and operation of waste management facilities, and (d) promote international collaboration in reducing land-based pollution of a shared water body. More specifically, the project will pilot test, and demonstrate two particularly innovative GEF financial incentive measures, *viz:* (i) incentives for inter-municipal shared infrastructure development, and for private

investment and/or management contracting and public/private partnerships in the reduction of land-based pollution; and (ii) the potential to use "revolving funds", such as reimbursable no-interest loans and guarantees, to accelerate private sector involvement. It will thus constitute one of the 3-4 pilot demonstrations of such instruments that the GEF has committed to support in FY2004-06.

2. Main sector issues and Government strategy:

Background. Cities in the Pearl River Delta and the South China Sea region have contributed significantly to rapid economic growth and prosperity of the region. The region also has a fragile and deteriorating environment resulting from pollution from emissions, and domestic, industrial and non-point source wastes and storm run-offs. Guangzhou, the capital city of Guangdong Province, is the leading municipality in the PRD, which made the highest contribution to GDP of the Province last year.

Since the opening up of China in 1979, the Pearl River Delta (PRD) region has witnessed phenomenal economic growth with average GDP rising by an average 14.7 percent annually over the period 1990-2000. Along with the two Special Administrative regions (SAR) of Hong Kong and Macau, the Delta region has become a major outlet for manufactured goods to the rest of the world.

Guangzhou showed the highest contribution to the GDP with Yuan 644 billion/year, and the highest average annual salary of Yuan 13,059. According to the 2000 census, the population of Guangdong Province was 86.4 million, of which 39.7 million was in the PRD. Guangzhou had a migrant population of over 4 million in 2000 (about 47 percent of total population).

Sector Issues. Environmental management has not kept pace with economic development; this is evidenced by the severe deterioration in the environment and water quality in local rivers during this period. A discussion of sector issues follows.

Inadequate Attention to Comprehensive Regional Planning. Provincial plans for the PRD are limited to the territory, and environmental investments in Guangdong are based on narrow administrative boundaries rather than drainage catchments. The recently announced 'PRD Clean-up Campaign' calls for the construction of 162 wastewater treatment plants, estimated to cost over Yuan 45 billion. This reportedly includes over 8 and 50 treatment plants in Guangzhou and Foshan, respectively. Considerable opportunities exist to reduce capital fund requirements, operating costs, and derive economies of scale through adoption of a regional planning based on least-cost strategies.

Total wastewater generation (domestic and industrial) in 2000 has been estimated at around 11.5 million m3/day, and projected to rise to about 12.3 million m3/day by 2010, of which 2.1 million m3/day is industrial wastewater. In terms of total wastewater generation, Guangzhou contributes about 25% of the total load; Dongguan, Shenzhen and Foshan follow at 15%; 14% and 13% respectively. Total treatment capacity in the PRD is about 2.6 million m3/day, treating approximately 28% of domestic wastewater. Additional capacity to be installed in the PRD by about 2010 is 8.81 million m3/day. The proposed treatment capacity for the longer term would

appear excessive in relation to requirements. By optimizing investment in WWTP this could liberate funds for both the completion of networks, and the operation and maintenance of the facilities.
Opportunities for megalopolis-wide regional urban planning and strategic planning processes to address issues of the PRD and the South China Sea, involving a range of stakeholders in Guangdong and Hong Kong and Macao SARs, have not been adequately explored. Collaborative efforts between Guangdong and Hong Kong SAR have commenced, but progress has been slow.

Uncoordinated and inadequate monitoring of environmental conditions, and lack of real time data in the PRD, particularly with regard to drinking water standards, river water quality, pollutant contributions from industry, municipal and non-point source pollution, seriously hamper planning, regulation and enforcement of standards by agencies responsible for regulation.

Deteriorating River Water Quality. The Pearl River comprising three major branches: the west river, the north river, and the east river, discharges to the South China Sea via eight outlets forming the distributary channels of the Pearl River Delta (PRD). Today, many sections of the Pearl River, especially in the vicinity of Guangzhou and Foshan, have pollution levels that result in the water quality being lower than Class V. Main pollution sources entering the river system are from untreated domestic and industrial wastewater and non-point source pollution. The water is unsuitable for use as drinking water, for leisure purposes, and for preservation of aquatic life. An accelerated investment program to collect and treat domestic wastewater has commenced.

Inadequate Sludge and Solid Waste Management. While domestic waste collection is reasonably well-organized on a neighborhood basis, the capacity to treat and dispose of wastes varies widely among cities in the PRD. Open dumping of municipal solid waste disposal is common, though this is now changing. Guangzhou has recently developed a modern sanitary landfill, operated by a private service provider. The growing volumes of hazardous wastes pose considerable risks to health, and surface and ground water sources. Though industries are required to dispose of their wastes to set standards, it is believed that a large proportion of industrial wastes is illegally dumped.

Sludge disposal will be a growing problem with the proposed expansion of installed treatment capacity throughout the PRD. The heavy metal content is a concern, although recent data indicate a reducing trend resulting from the implementation of the Province's industrial pollution control action program. Wastewater characteristics indicate that untreated industrial wastewater enters the sewer system and water bodies. Guangdong has started to address this problem through increased monitoring and enforcement, and has approved a plan to relocate highly polluting industries to specially designated locations.

Inadequate Water Quality Monitoring. At present, the provincial and municipal Environmental Protection Bureaus (EPB) are not adequately equipped to carry out effective pollution monitoring, nor to utilize data collected. Water quality monitoring is carried out through monitoring stations of local municipalities, and the data is transferred to the State Monitoring and the Provincial Monitoring Centers. Twelve samples are taken manually each year, and then sent to a laboratory for analysis. Under this procedure, coverage is inadequate, data is unreliable, and

collection of real time data is not possible.

Impacts on Vulnerable Population. Some cities in the PRD are facing growing social pressures from vulnerable populations. One segment of the population – the informal migrants – is particularly vulnerable, as they are often without access to basic environmental infrastructure services, or are provided access at higher prices through intermediaries (e.g., landlords). Ensuring affordable access to services for all segments of PRD's vulnerable population is becoming a major challenge for cities.

Pricing of Urban Services. Charges for water supply and wastewater services are a fraction of the true cost of providing the services. Aside from a small charge for collecting wastes from households to collection points, and a recently introduced garbage fee in Guangzhou, there is no cost recovery for transfer and disposal of municipal solid wastes. With the increasing trend to engage private service providers in environmental infrastructure, availability of adequate funding to pay for these services becomes important.

Guangdong Provincial Government's Strategy. The Province has recognized that sustaining its growth performance is linked to maintaining acceptable environmental conditions in the PRD cities. Although a comprehensive and regional environmental management has not been formulated, individual policy initiatives and investment programs have been developed, and are being implemented, to address domestic and industrial wastewater treatment, sludge management, solid and hazardous wastes management, and management of agriculture and livestock pollution.

Guangdong's strategic plan for wastewater management in the Pearl River Delta is the 'Pearl River Cleanup Campaign', which sets out phased targets for improvements in water quality in river reaches in the Province and urban areas; proportion of domestic and industrial wastewater to be treated; and investments for environmental protection. These objectives would be achieved through:
(i) industrial pollution control: monitoring and control of discharges from 179 key polluting industries, including relocation of the worst polluting industries;
(ii) domestic wastewater treatment: construction of 162 wastewater treatment plants (WWTPs) to treat about 12.23 million m3/day;
(iii) agriculture and livestock pollution control: banning and relocation of poultry industries from water supply catchments of the PRD, and enforcement of provincial and national SEPA guidelines; and
(iv) river rehabilitation: comprising integrated (a) rehabilitation of key rivers, (b) water pollution control and management in Guangzhou, Dongguan and Foshan, (c) integrated rehabilitation of urban creeks, (d) domestic solid waste treatment, and (e) ecosystem development and protection.

In addition, GPG plans to adopt a regional approach to planning, and develop appropriate institutional models to promote the construction of shared environmental facilities between municipalities. It also plans to launch a pilot program for inter-municipal/town jointly-managed environmental infrastructure, supported by a GEF grant, as part of the project. Fundamental to this approach is the review and update of the PRD Cleanup Campaign, which now envisages about 162 wastewater treatment plants. Opportunities for shared environmental infrastructure

development between Guangdong and Hong Kong SAR through development of an environmental management framework for the PRD and the South China Sea are currently being explored.

The Guangdong regional hazardous waste management program to be completed by 2005, includes: (a) Guangzhou Hazardous Waste Secured Disposal Center, (b) Guangdong Hazardous Waste Comprehensive Treatment Demonstration Center (Phase I); (c) Shenzhen Hazardous Waste Treatment Station and Secured Landfill (Phase II); and (d) Yuexi Hazardous Waste Treatment Center (Phase I) and Guangdong Toxic Chemical Waste Treatment Center.

Under the Tenth Five-year Plan, the Guangdong EPB is required to install automatic water quality monitoring, and report water quality of surface waters daily and monthly. Implementation of this program began in early 2003.

Gaungzhou has an approved industrial pollution control action plan that includes monitoring and enforcement of industrial wastewater discharges, and
a phased program to relocate the worst polluting industries to special industrial locations. This program is scheduled to be complete in 2010.

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

The project will support Guangdong Province in addressing environmental service delivery and associated investment in an integrated manner, where this provides cost-effective solutions through interventions designed to address the following issues:

(i) *comprehensive and regional planning* through: (a) the review and updating of the PRD wastewater treatment plan to reduce the number of wastewater treatment plants currently planned, and thereby develop least-cost solutions, rationalize planning, reduce capital and operating funds requirements, and achieve economies of scale, (b) develop institutional models for jointly-managed inter-municipal environmental infrastructure, and (c) support initiatives between Guangdong and Hong Kong SAR for development of an environmental management program for the PRD and the South China Sea;

(ii) *jointly-managed environmental infrastructure development* through a pilot program to construct shared environmental infrastructure, with incentives provided through the GEF grant;

(iii) *wastewater management* through enhancing the treatment and collection capacity in Guangzhou and other participating municipalities, in accordance with the respective city master plans, with appropriate revisions to achieve economies of scale;

(iv) *hazardous waste management*, through construction of a regional treatment and disposal facility;

(v) *improved water quality monitoring*, data collection and management, and data sharing with Hong Kong SAR and neighboring countries;

(vi) *industrial pollution control*, through an action plan to control pollution discharges from a number of specified polluting industries and relocation of highly polluting industries, financed with own funds.

Additionally, non-point source pollution from livestock and agriculture wastes is being addressed under a parallel GEF-financed project.

C. Project Description Summary

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

The project would support infrastructure investments, policy and regulatory issues, as well as institutional strengthening and training (IST) at both provincial and city levels, as follows:

(1) *Wastewater Management*: Investments to increase wastewater treatment capacity in Guangzhou and participating cities. Investments in Guangzhou would include capacity enhancement by about 400,000 m3/day in two plants, construction and rehabilitation of sewerage networks and interception of wastewater entering creeks and rivers;

(2) *Hazardous Waste Management in Guangzhou City*: Construction of the first phase of the treatment center and associated landfill of 150,000 cubic meters capacity in Guangzhou.

(3) *Incentive-based Lending for Inter-Municipal Environmental Infrastructure in PRD Municipalities and Towns*: Wastewater treatment and solid waste investments for groups of two or more contiguous municipalities, districts or towns willing to plan, construct and manage shared facilities. Up to now, Memoranda of Understanding have been drafted for development of shared environmental infrastructure between: (i) Municipal Gardens Bureaux of Panyu District and Guangzhou, (ii) Longang District Government of Shenzhen and Shenzhen Greater Industrial Zone Administration Commission, and (iii) Chancheng District Government and Nanhai District Government (of Foshan); and (iii) Longang District Government of Shenzhen and Shenzhen Greater Industrial Zone Administration Commission. Sub projects would be prepared by the above and/or other potential participants, and would be appraised by the Bank up to about one year after Board approval of the project.

(4) *Water Quality Monitoring and Data Sharing:* Setting up 18 new provincial monitoring stations, rehabilitation of 5 existing stations, a range of laboratory and field equipment (including automatic water quality monitors) and improvement of a management information systems to enhance the capacity of the Guangdong Provincial Environmental Protection Bureau to improve its efficiency and effectiveness for pollution control and information sharing with Hong Kong and Macau and with neighboring countries through the UNEP/GEF South China Sea and Gulf of Thailand Project.

(5) *Institutional Strengthening & Training*: Technical assistance for (i) financial/institutional support, water and wastewater utility pricing, equipment and training for project implementing agencies; (ii) project implementation support for detailed design and construction supervision; (iii) public hygiene promotion; (iv) preparation of a sludge management plan for Guangzhou; (v) strategic studies for regional planning and urban development; (vi) public-private partnerships in funding and managing environmental infrastructure; and (vi) training and study tours.

(6) *Industrial Pollution Control Action Plan*: The component comprises implementation of the Guangzhou Municipal Government-approved industrial pollution control program. The program includes increased pollution monitoring of river stretches, increased on-site treatment of industrial wastewater, and relocation of highly polluting industries to specific locations. The program includes a phased relocation of highly polluting industries, (e.g., paper, textiles and food processing) to industrial parks with dedicated utility services and environmental infrastructure. The largest polluting industries would be relocated in the second phase of the program, starting in 2006. The investment costs would be borne by individual industries, and no loan funds are

involved.

Component	Indicative Costs (US$M)	% of Total	Bank financing (US$M)	% of Total	GEF financing (US$M)	% GEF financing
(1) Wastewater Management	334.00	66.1	118.70	61.6	0.00	0.0
(2) Hazardous Waste Management	24.60	4.9	9.95	5.2	0.00	0.0
(3) Inter-Municipal Environmental Infrastructure	113.20	22.4	49.15	25.5	6.80	68.0
(4) Water Quality Monitoring and Information Systems	11.50	2.3	5.20	2.7	2.25	22.5
(5) Institutional Strengthening and Training	8.60	1.7	8.00	4.2	0.95	9.5
(6) Industrial Pollution Control Action Plan (financed with own funds)	0.00	0.0	0.00	0.0	0.00	0.0
Global Components	0.00	0.0	0.0	0.0	0.00	
Total Project Costs	491.90	97.4	191.00	99.1	10.00	100.0
Interest during construction	11.70	2.3	0.00	0.0	0.00	0.0
Front-end fee	1.65	0.3	1.65	0.9	0.00	0.0
Total Financing Required	505.25	100.0	192.65	100.0	10.00	100.0

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

The Guangdong Provincial Government (GPG) and municipal governments recognize the need for progressive policies, development strategies, and reforms to meet the challenges for sustaining economic growth in the PRD. High on the list of priorities is the need to provide the necessary infrastructure, including the necessary environmental infrastructure service levels that contribute to quality of life and the environmental setting. The project would complement the investments through infusion through important policy and institutional reforms, including utility reform. These initiatives are consistent with the national water law, and guidelines for commercialization and prudent management of utilities, promulgated by the central government.

Initiatives would be taken as part of the project to promote policy and institutional reforms under this framework, as follows:

(a) promotion of a regional planning approach to environmental infrastructure development,

(b) adoption of demand management as a strategy to reduce water consumption and, by extension, wastewater generation;.

(c) formation of a financially autonomous wastewater company (established in November 2003), as required under the national law, which would charge tariffs sufficient to recover the cost of services, gradually increased to reach average incremental costs of future services;

(d) promotion of effective models for inter-municipal cooperation in planning, construction and management of urban development and environmental infrastructure, for reasons of economies of scale, least cost and efficiency;

(e) putting in place more effective water quality monitoring, and enforcement of pollution control regulations;

(f) promotion of private sector participation in service provision; and

(g) promotion of public hygiene in the provision of sanitation.

In a parallel activity, supported by GEF there will be regulatory reform to address pollution from agriculture, livestock breeding, and other non-point sources.

3. Benefits and target population:

The project will generate various important benefits. These include: (a) a cleaner environment due to improvement in the water quality in the PRD river systems; (b) reduced health risks due to reduction in water source pollution from wastewater and hazardous wastes; (c) expanded coverage of environmental infrastructure, contributing to improved quality of life for PRD residents including vulnerable migrant populations; (d) reduced need for government transfers due to increased cost recovery for services; (e) institutional reforms creating financially autonomous utility companies; (f) improvements in the quality, quantity and sustainability of public utility services; and (g) continued economic growth in the PRD generating increased employment opportunities, especially for migrants.

The target population is the 14 million residents of Guangzhou metropolitan area (including Guangzhou, Foshan, Shunde and Nanhai) and about 30 million others in the PRD, who would benefit through improved quality of the environment and river systems. Approximately 6.9 million residents of Hong Kong would also benefit through protection of the vital drinking water supply from the PRD, and from reduced water pollution in the South China Sea..

4. Institutional and implementation arrangements:

The Guangdong Provincial Finance Bureau is responsible for the overall coordination of the project. The Guangdong Provincial Government Office for World Bank Projects (GDPMO), which has been established within the Provincial Finance Bureau, has already successfully coordinated implementation of several World Bank-financed projects. Guangzhou city has also set-up its own Project Management Office (GZPMO) to oversee preparation and implementation of its component. Other cities intending to participate in the project would be required to establish their own project management offices in accordance with national practice. Individual components will be implemented by the respective sector agencies. In Guangzhou city, (a) the wastewater treatment component will be implemented by the Guangzhou Tunnel Development Company (GTDC), as the agent of the Guangzhou Sewage Treatment Company (GSTC). The hazardous waste management component will be implemented by the Guangzhou Hazardous Waste Management Center (GHWMC). The Guangdong Provincial Environmental Protection Bureau (GDEPB) will be responsible for implementation of the water quality monitoring component, through its Guangdong Environmental Monitoring Center (GEMC).

GDPMO's responsibilities include: (a) implementation of the institutional strengthening and training component; (b) overall project coordination, management and monitoring: (c) annual budget preparation; (d) project-wide quality assurance; (e) progress reporting to GPG and the Bank, including cost management, project impact and environmental improvement assessment; (f) inter-agency coordination and procurement support; (g) administration of the GEF grant; and (g) sectional training facilitation. The personnel skill mix of the GDPMO and GZPMO would be adjusted from time to time to reflect the needs of the various phases of the project, including completion of preparation and implementation.

The CMC International Tendering Corporation, No. 1 Department, in a joint venture with the GMG International Tendering Company Limited, has been retained as the procurement agency for all aspects of

civil and electrical and mechanical works requiring International Competitive Bidding (ICB).

Onlending Arrangements: The proposed loan of $165 million would be made to the People's Republic of China. The loan would be for 20 years, including 5 years of grace, at the Bank's standard interest rate for LIBOR-based US dollar single currency loans. The proceeds of the loan would be onlent to Guangzhou Municipality (any other municipalities to be determined) through GP on the same terms and conditions as the Bank loan to China. Guangzhou Municipality would onlend the proceeds of the Bank loan to Guangzhou Wastewater Treatment Company for 15 years including 5 years of grace, at an interest rate and a commitment charge not less than the rate and charge applicable to the Bank loan to China.

Monitoring and Evaluation Arrangements: The project would be supervised through Bank missions scheduled for twice a year. Headquarters and World Bank Office, Beijing staff would cooperate in this activity. During implementation, project performance, including the achievement of project outputs and progress towards the attainment of development objectives, would be monitored through the use of semiannual progress reports prepared by the GDPMO. Bank missions would also monitor the progress in implementing the non-Bank financed Industrial Pollution Control Action Plan (IPCAP). The first such monitoring report would be submitted by January 31, 2005, and the last by January 31, 2010. In addition, an implementation completion report, reviewing the planned objectives and the achievements of the project, including costs and benefits derived, and performance and contribution of all parties associated with project execution, would be prepared by the GDPMO and submitted to the Bank within six months of the closing date.

D. Project Rationale

1. Project alternatives considered and reasons for rejection:

(i) A coherent regional development approach has been selected in preference to GPG's narrowly focused master planning and urban development strategy.
(ii) During project identification, the use of an Adaptable Program Lending (APL) instrument was considered, following on the model of Shanghai. There was not sufficient support for this from the central government, as they had not yet gained sufficient confidence on the process. Moreover, in Guangdong, there was only one city- Guangzhou - seeking urgent financing, and to pursue the approach would have resulted in delays, and risked Guangzhou losing interest. Therefore the APL option was rejected.
(iii) The task team's earlier view was that it was necessary to have more than one city for the first investment operation, in order to make an impact. This could still happen during the project implementation phase, as there is general interest. Guangzhou, however, has made a firm commitment to proceed with the Bank whether or not other cities participate. Investments in Guangzhou city, plus incentive-based investments for two or more other towns with shared infrastructure, would be a significant step forward.
(iv) The strategic plan of GPG to construct a multiplicity of small wastewater treatment plants was considered and rejected because it would not capture economies of scale, is expensive, and would not meet the Bank's criteria of least cost options.
(v) Project intervention to treat only municipal wastewater considered and rejected. Without complementary interventions to control pollution from industries, limited benefit would be derived from the Bank intervention. Therefore, the GPG has been requested to prepare an Industrial Pollution Control Action Plan (IPCAP) to be implemented in parallel with the project, to address the worst polluting industries. These investments would be non-Bank financed. This requirement would be incorporated in the legal agreements.
(vi) For hazardous waste management**,** the use of incinerators was considered during the early stages of project preparation. Incineration of some types of hazardous wastes may be appropriate including facilities

such as cement kilns, which have high temperature and long retention period. A hazardous waste incinerator is located in Shenzhen and is used for specific wastes generated in Guangdong Province. Therefore the need for a new waste incinerator was not clear. For inorganic hazardous wastes, however, the most economical treatment solution is disposal in a safe landfill after some degree of treatment/stabilization. The proposed hazardous waste landfill, with pre-processing facilities, is needed to minimize transportation distances and maximize regional waste disposal levels.

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

Sector Issue	Project	Latest Supervision (PSR) Ratings (Bank-financed projects only)	
		Implementation Progress (IP)	Development Objective (DO)
Bank-financed			
Urban environment including wastewater and solid waste	Yunnan Environment Project	S	S
Urban environment including waste water and solid waste	Guangxi Urban Environment Project	S	S
Urban environment: wastewater and tariff reform policy	Second Shanghai Sewerage Project	S	S
Urban environment including wastewater and district heating	Shandong Environment Project	U	S
Urban environment including wastewater and solid waste	Shanghai Environment Project	S	HS
Urban environment including wastewater and solid waste	Sichuan Urban Environment Project	S	S
Urban Environment including wastewater and solid waste	Chongqing Urban Environment Project	S	S
Urban environment including wastewater	Hebei Urban Environment Project	S	S
Urban environment including wastewater and solid waste	Liaoning Environment Project	S	S
River Basin Pollution Control including wastewater and industrial pollution	Huai River Pollution Control Project	S	S
River Basin Pollution Control including wastewater and industrial pollution	Liao River Basin Project	S	S
Urban Transportation	Guangzhou City Center Transport Project	S	S
Urban Development, including pollution management and environmental policies	Shanghai Urban Environment Project (APL1)	S	S
Other development agencies			
The Asian Development Bank and various bi-lateral donors (Austria, Australia, Denmark, Finland, Germany, Japanese, UK) are active in urban environment projects and sector policy dialogues/capacity building initiatives.	ADB has had generally successful investment operations, and is currently expanding its support to the urban sector in China. Other donor agencies have reported		

	satisfactory results with their programs, although they are pressing participating utilities to give more attention to institutional and financial matters.		

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

3. Lessons learned and reflected in the project design:

Since its first loan in 1985, the Bank has committed US$2.2 billion under 22 projects for water supply and wastewater operations in China. A 2002 Operations Evaluation Department (OED) Report (China: Review of the Bank's Assistance to the Urban Water Supply and Wastewater Sector, Report No. 24979) rates the **outcome** of the Bank's assistance **moderately satisfactory**, its **sustainability** as **likely**, and its **institutional impact** as **modest.** OED also rates both **Bank performance** and **borrower performance satisfactory.** The key lessons learned and recommendations are:

- the least-cost analysis of future Bank-financed projects should always include improved incentives and support for water demand management;
- tariffs in future Bank-financed projects should be set by the level of average incremental costs, which signals future costs;
- the recent policy of conditioning future Bank financing on the establishment of autonomous wastewater companies be continued;
- future Bank financing should give priority to cities and provinces that are willing to contribute a larger share of planned investments from internal cash generation; and
- the next generation of Bank sector projects should include private sector participation where there is political support in favor of such participation.

All of these lessons and recommendations have been taken into account in conceptualizing the proposed project.

4. Indications of borrower and recipient commitment and ownership:

Guangdong provincial and Guangzhou city commitment to the project is demonstrated by the accelerated project preparation, creation of dedicated project management offices, and the identification of candidate investment projects within an evolving strategic planning framework. Exceptional efforts have been made by the GDPMO to promote inter-municipal environmental infrastructure component. The GDPMO has taken the lead in guiding preparation of the overall strategic framework and the design of the proposed project, while cities like Guangzhou, through their own PMOs, have spent considerable time and resources preparing individual investments for funding under the proposed project. The GDPMO has shown leadership in mobilizing teams of international consultants (with financial support from Canada, France and Singapore) to assist with project preparation. Moreover, the GDPMO held a high-level conference, chaired by the Guangdong Governor, in January 2003 to present the overall strategic framework and the key aspects of the proposed project to key provincial and municipal authorities. The conference's goal was to gain the Governor's and other participants support for the strategic approach to be followed under the project. The GDPMO also published a series of articles in the Guangdong Finance periodical in order to better promote the new project among cities in the PRD.

The Guangdong Provincial Government (GPG) has already commenced collaborative efforts with Hong Kong to develop a framework for control of air and water pollution. Seven committees have been set up to

address various related issues, and annual meetings are being held. Greater cooperation is now planned to develop a comprehensive database of pollution sources in the PRD and South China Sea.

Further, Guangzhou has created a financially autonomous wastewater company to own and operate existing and future wastewater assets. Guangzhou is also exploring options for Private Sector Participation (PSP) in environmental service provision. It already has a Build, Operate and Transfer (BOT) operation in a wastewater treatment facility and a sludge treatment plant, and a private service provider operating a modern solid waste landfill. A private service provider will be selected to operate the hazardous waste treatment center and landfill upon its completion.

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

The Bank brings considerable international experience, in particular in economic and financial analysis and systematic consideration of alternatives. Bank assistance to Guangdong Province will also draw upon its growing experience in addressing regional environmental issues, gained from urban environment projects throughout China (including Hebei, Hubei, Jiangsu, Jilin, Liaoning, Shandong, Sichuan, Yunnan and Zhejiang Provinces, and in the mega-cities of Beijing, Chongqing, Shanghai and Tianjin). In addition, the Bank has addressed issues relating to water bodies and river resources and management, including the clean-up of Dianchi Lake (part of the Yunnan Environment Project), the Huai River Basin in Anhui Province, and the Liao River Basin in Liaoning Province.

Bank involvement should enhance the design and construction quality control of the physical investments, and accelerate institutional and financial strengthening and training. The project will build on the past experience of Guangdong Province and Guangzhou city, which have been sub-borrowers of the Bank for major infrastructure projects.

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

1. Economic (see Annex 4):

○ Cost benefit NPV=US$ million; ERR = % (see Annex 4)
● Cost effectiveness
○ Incremental Cost
○ Other (specify)

Economic Benefits. After many years of neglecting pollution control, the PRD region is suffering from serious pollution problems, especially from water pollution in key urban sections of the Pearl River. For instance, the water quality of many urban sections of the river, especially the section in Guangzhou city, is currently at Category V Standard (according to Chinese national regulations) meaning, amongst other things, that the river is unfit for use as a drinking water source. Environmental costs are high.

In response to the urgent demand for the Pearl River clean-up, the GPG set up its long term environmental objectives for the PRD to include achieving Category III Standard for water quality, which would allow the river system to be used as a source of drinking water supply (with treatment). The investments proposed under the project would provide environmental improvements and associated economic benefits to the PRD at Guangzhou by improving river water quality. The benefits of the project have been identified, and cover a wide range, from public health, amenities, land values, to agriculture and fishery. However, it is difficult to put a value on incremental improvements in environmental quality and even more challenging to attribute such improvements to specific interventions using cost-benefit analysis. Therefore, the cost-effectiveness approach has been adopted in the analysis to enable the project to select the least-cost option towards

achieving well-stated environmental goals in the Guangzhou city area of the PRD.

Project investment selection has been based on several alternative designs, and the least cost design has been selected. A cost effectiveness analysis of the overall project and each individual investment component has been prepared prior to appraisal. The economic viability of each component is based on least cost towards achieving specific water quality or other environmental objectives. Estimates were made for each component of the net present values of project costs (NPV), average incremental cost (AIC), financial internal rate of return (FIRR) and affordability. The component designs with lowest NPV and AIC have been selected to minimize any economic subsidy and ensure that tariffs are affordable, especially to the lowest income groups.

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

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

The base cost estimates of the project reflect preliminary engineering designs and price levels prevailing in December 2003. The unit prices were derived from the following sources: (a) quotations obtained from manufacturers and suppliers; (b) prices of goods and works from recent contracts; and (c) construction costs according to prices published by the Central and Guangdong Governments, all adjusted for inflation. Experience gained from recent sector operations reveal that bid prices have been consistently around 60 percent of estimated costs, resulting in loan savings and excessive commitment charges. The primary reason for this disconnect is attributed to the use of proforma unit prices guidelines provided in the provincial cost schedules. Therefore, adjustments have been made to the proforma unit rates to reduce the disconnection referred to above.

Physical contingencies have been applied to base costs, as follows: civil works, equipment and materials, technical assistance and training —10 percent. Project management and engineering overhead costs of 10 percent are also included. Price contingencies have been applied to expenditures at projected global foreign and local inflation rates, as follows: local: 1.6 percent in 2004; 2.5 percent in 2005; 2.3 percent in 2006; 2.1 percent in 2007 and thereafter; foreign; 0.9 percent in 2004; 2.0 percent in 2005; 1.8 percent in 2006; 1.5 percent in 2007; 1.3 percent in 2008 and thereafter. Base costs have been converted at Y8.00/$1 and the dollar/yuan exchange rate has been assumed to vary in order to maintain purchasing power parity.

The financial objectives set by GM for Guangzhou Sewage Treatment Company (GSTC) are to achieve full cost recovery on its operations. GSTC increased its tariffs by 133 percent in January 2003, to Y0.70/m³ towards meeting the financial objectives for 2003. Financial projections have been completed for GSTC indicating the levels of tariffs required annually to meet the stated objectives. However, in practice, wastewater (and water) companies' tariffs are adjusted only every two or three years, taking into account the tariff requirements of other utilities, e.g., power, gas and telephone. It is possible, therefore, that in the intervening years between tariff adjustments, the utilities may not be able to meet their annual targets. In such eventualities, the agencies' operating revenues would need to be supplemented from the general revenues of the parent municipality in order to remain financially viable. Hazardous waste management services have traditionally been funded from the general revenues of local governments. However, where individual users of the services have been identified, local governments have, as a policy matter, charged such users for the services provided. Local governments expect to rely increasingly on user fees and charges to finance these services in the future. Under the project however, charges would be introduced gradually for treating hazardous wastes. This approach is necessary initially, to encourage enterprises producing hazardous wastes to bring the wastes to the facility rather than dispose them in an environmentally unsafe manner. Under the Inter-municipal Environmental Infrastructure component,

participating cities, districts and towns would commence charging tariffs or fees one year after commissioning of the shared investments. The objective would be to achieve full cost recovery over time for the services provided. The Guangdong Environmental Protection Bureau (GDEPB) would be responsible for the water quality monitoring and the information systems component, and would rely on government subventions to fund their capital and operating budgets.

Fiscal Impact:

Provincial fiscal on-budget receipts and expenditures in 2003 totaled about Y1,322 billion equivalent) and Y1,673 billion equivalent), respectively. The central government, in keeping with the current fiscal arrangements between the central and provinces, provides annual transfers to Guangdong. Taken together, Guangdong enjoys a modest surplus. Receipts and expenditures are both projected to grow at about 10 percent per year in current terms. GPG expects to pass on about 85 percent of the Bank loan to Guangzhou Municipality (GM) and its sub-borrowers. Should GM and its sub-borrowers be unable to fulfill their obligations, GPG would have no difficulty in covering debt service through its own resources as the debt service represented by the project is small compared to total provincial receipts. GPG would provide all funding not met by (a) the proceeds of the Bank loan, (b) municipal contributions, and (c) funds, if any, generated internally by the implementing agencies. Guangdong Finance Bureau (GFB) would independently assess Guangzhou's ability to generate the required counterpart funds from assured sources.

3. Technical:

The following issues would be critically examined during project preparation to develop least-cost sustainable investments to be financed under the proposed project:

(a) The far-field impact of wastewater discharges to the PRD River system would be examined through computer modeling, for the whole river system, and the near field conditions for larger cities such as Guangzhou. The water modeling would also be used to help determine the appropriate treatment process and levels in order to optimize the environmental benefits of the proposed treatment plant investments. Water quality modeling has been done by an International consulting firm (using Danish trust funds) and a local Design Institute.

(b) An important planning and technical issue is to develop least-cost solutions for environmental investments in the PRD. Regional planning approaches would be used to rationalize the current planning of environmental infrastructure, to avoid the proliferation of environmental infrastructure, specifically, wastewater treatment plants. The provision of regional, shared and managed infrastructure facilities would be seriously examined. This will also include a study of institutional models for construction and management of shared facilities across jurisdictions. The findings from this activity would be used to influence and revise GPG's plan to construct some 162 wastewater treatment plants in its PRD Clean-up Program at a cost of over $5 billion.

(c) Use of tunneling as an option for large conveyors to transport wastewater flows designed on the basis of shared management, or for conveying downstream of cities, with lower levels of treatment.

(d) Under the hazardous waste component, three issues would be addressed: the design of a treatment plant for hazardous wastes, physio-chemical treatment and landfill; planning for sufficient disposal capacity within Guangzhou municipality; the siting of the treatment plant, and a secure landfill site from an environmental perspective.

4. Institutional:

4.1 Executing agencies:

The proposed wastewater company of Guangzhou – Guangzhou Sewage Treatment Company (GSTC) – would be a self-funding, self-accounting state-owned enterprise. Its formation, prior to appraisal, represents a major step in utility reform, consistent with stated national policy, and a model for the rest of Guangdong Province**.** The staff of GSTC would be transferred from Guangzhou's existing municipal engineering administration department responsible for sewerage and drainage services. Therefore, while GSTC would start with operations experience, it would as yet lack a "corporate" culture. It would own and operate all existing and proposed investments in the wastewater sector in Guangzhou City. The Guangzhou Tunnel Development Company (GTDC) would implement the wastewater component on GSTC's behalf. GTDC has extensive experience in implementing large works in Guangzhou and has strong management and supervision capabilities. However, all procurement contracts would be signed by GSTC, as well as the borrowing, and repayment of World Bank loan proceeds. The Guangzhou Hazardous Waste Management Center (GHWMC) would implement the hazardous waste management component. The Inter-municipal Environmental Infrastructure component would be implemented by existing sanitation departments of the respective municipal governments and/or towns. It may not be appropriate for a participating district or town to establish a separate wastewater company such as the Guangzhou Sewage Treatment Company. In such cases, the Bank would accept wastewater operations being retained in the existing drainage department provided that the accounts for the wastewater operations are separated from the other activities of that department and maintained on a commercial (i.e. accrual) accounting basis. This would enable the district or town to establish the true cost of the service and bill accordingly to achieve full cost recovery. The Guangdong Environmental Protection Bureau (GDEPB) would implement the environmental water quality monitoring and management information systems component, through its Guangdong Environmental Monitoring Center. GDEPB is also the executing agency for GEF-supported activities to design and implement an animal waste reduction program, under a parallel project supported by the GEF). The water quality testing program will also observe this program's effectiveness and be integrated with GDEPB's institutional development program and the regionally cooperative data collection and sharing approach. All implementing agencies would benefit from technical assistance to be provided under the project to help them improve, as necessary, their accounting and management information systems, again stressing the positive steps taken and planned in utility reform and underpinning tangible moves to market pricing.

4.2 Project management:

The GDPMO, working closely with the Planning, Construction, Environment, Finance commissions and bureaus, and other concerned agencies, has arranged for the project preparation work to be completed to the satisfaction of GPG and the Bank. The GDPMO would be strengthened and the personnel mix adjusted to reflect the needs of the implementation and construction phases of the project. Guangzhou has formed, budgeted and staffed its own project management office (GZPMO), which has been involved throughout project formulation and preparation; it is expected these offices would significantly enhance project launch and subsequent implementation.

4.3 Procurement issues:

The GDPMO, which has considerable experience in preparing and executing World Bank-financed projects, would coordinate and supervise project procurement to be carried out by the three principal project implementing Agencies - the Guangzhou Tunnel Development Company (GTDC) on behalf of GSTC, the Guangzhou Hazardous Waste Management Center (GZHWMC) and Guangdong Environmental Monitoring Center (GEMC). All three agencies have experience of procurement using local

procedures. A specific department in each agency has been established to be responsible for project implementation, including procurement. There is a filing system in each agency for procurement records.

As required by national regulations, GDPMO will select a procurement agent for ICB procurement, in accordance with the procedures specified by the Ministry of Finance (MOF), National Development and Reform Commission (NDRC) and the People's Bank of China.

The GDPMO will prepare a procurement manual to specify the responsibilities of all the units involved in project procurement and working procedures.

Each implementing agency will prepare an action plan to strengthen its procurement capacities. GDPMO will prepare an action plan, consolidating individual action plans from each agency. Activities to be carried out would include training, visits to similar projects, and learning from the experience from other World Bank-financed projects managed by GDPMO.

4.4 Financial management issues:

No major issues were identified during preparation of the Financial Management assessment. (See Annex 14)

5. Environmental: Environmental Category: A (Full Assessment)

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

An extensive environmental assessment (EA) has been carried out for the project. During its preparation and evaluation Chinese national procedures and those required by the Bank Group were diligently followed. Comprehensive environmental assessment (EA) documents comprising an Environmental Assessment Report and Executive Summary have been prepared, incorporating Bank comments, reviewed and found satisfactory. An Environmental Management plan (EMP) is an integral part of the EA process. A detailed Annex covering environmental assessment and impact, together with mitigation measures, has been prepared (Annex 13). The EA documentation well reflects the findings of the Chinese EAs on the various components as well as the preparation and appraisal mission findings.

Potential Impacts: The environmental impact of the project is on balance substantially positive and the benefits greatly outweigh the negative impacts. The Guangzhou wastewater component will greatly increase wastewater collection and treatment rates within the municipality area and will improve considerably water quality both in the main Pearl River reaches in the Guangzhou urban area and in the urban tributaries. The hazardous waste component will substantially increase the regional availability of facilities for hazardous waste management and provide a new environmentally secure disposal route for the categories of waste treated.

The principal potential adverse impacts during construction of all components include excavation, spoil disposal, noise and disruption of urban services. Operational phase impacts of wastewater treatment include the need to dispose safely of the increasing quantities of wastewater treatment plant sludge and possible poor water quality in the mixing zones of treated wastewater outfalls. The principal adverse impacts of the operational phase of the hazardous waste component are the road transport of hazardous materials and possible generation of leachate at the landfill.

Mitigation Measures: The EA specified the appropriate mitigation measures, environmental

monitoring plans, institutional arrangements and training and equipment requirements together with cost estimates for the implementation of the mitigation measures and monitoring plans. Major mitigation measures for the hazardous waste management component include provisions of a drainage control system to prevent the rain water from entering into the landfill, a rainproof shed during operation and canvas on waste during rain time to prevent rain water from contacting the waste, an impermeable site liner to prevent leachate from infiltrate into the ground and the facility to treat any leachate generated and collected from the landfill. In addition, extensive training will be provide to operators of the hazardous waste disposal facilities to ensure the operators are fully skilled with modern leachate control and treatment technologies and facilities adopted by the landfill. A comprehensive monitoring program will be implemented during the operational phase for groundwater, as well as surface, ambient air quality and noise to detect timely any adverse impacts from landfill operation to allow remedial and corrective actions.

The long-term proposals for sludge disposal for Guangzhou are based on centralized treatment of dewatered sludge with possible uses of treated sludge product in agricultural/horticultural and/or for brick manufacture. Although domestic wastewater treatment plant sludge are understood to be non-hazardous due to the low heavy metal contents as a result of the industry relocation away from the serviced areas, there are uncertainties on related to the sustained market access and/or technologies for brick making and other sludge re-use products. Until such time as the markets to support these uses are sufficiently developed, disposal will be primarily by environmentally secure landfill. Water quality impacts of treated wastewater discharges are minimized by the location of treatment plants in relation to critical river water uses. Construction phase impacts will be minimized through controls of working practices and operational impacts through careful siting of facilities with appropriate buffer zones and controls on noise.

Public Consultation and Feedback: Local people were consulted twice during the EA process, once at the EA TOR stage and the other time during the draft EA report preparation, in accordance with the requirements of OP 4.01. The approaches used for public consultation were: consultation meetings with local government representatives and questionnaire analysis of public opinions supplemented by interviews, focused on the public to be directly impacted by the various project components. Details of these activities with dates, participants, public notifications and locations are provided in tabular form in Annex 13. Feedback from the public consultation program has been collected by the EA team, which in conjunction with design engineers as may be necessary has addressed the concerns and issues raised by the public in the final EA report and EMP.

Information Disclosure: The EA Report and Executive Summary were submitted to the Bank in November 2003, as were draft Resettlement Action plans (RAPs). Both reports were reviewed and found to be satisfactory. Copies were submitted to the Bank group information center in December 5, 2003 and in Project files (Annex 8). Notice of availability of these reports was publicized in local newspapers of the project city in early January, 2004, prior to the appraisal completion date. Details of documents, disclosure dates and locations are provided in tabular form in Annex 13.

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

The EMP includes plans for mitigation of the above impacts of the project components, the

implementation of which will be the responsibility of the implementing agencies, principally GSTC, GTDC and GZHWMC. The EMP includes detailed and comprehensive environmental monitoring plans of the impacts of the project and the effectiveness of mitigation measures during both the construction and early operation phases. These overall monitoring will be the responsibility of the GDPMO and the GZPMO. The EMP also contains training programs for environmental management staff and key component facility operators. The training programs are also to be responsible by GDPMO and GZHWMC. An organizational chart is included in the EMP to identify the agencies/organizations to be involved in environmental management in this project and their specific responsibilities.

During the construction phase, the contractor will be requested contractually to prepare a detailed Management Plan for Spoil Transportation and Disposal for PMO-ESD review and approval prior to the start of construction. During the operational phase, the EMP recommends the city to prepare an Environmental Management System Pan for the sludge management center to ensure the operation of center and the eventual reuse or disposal of treated sludge be performed in accordance with the objective of the project and local regulations.

Details in Annex 13. Specific action plan prepared for Guangzhou Sludge Management.

5.3 For Category A and B projects, timeline and status of EA:
Date of receipt of final draft: January 2004. See Annex 13

The Guangzhou Research Institute of Environmental Protection (GRIEP), which holds a Class A credential for EA, was engaged to prepare the EA for the proposed Guangzhou wastewater treatment and the hazardous waste disposal facility components, as well as the EMP and EA Summary. Its work was supported by international consultants for design review and advisory services, who have substantial experience in preparing EAs for similar Bank-funded projects in China. GDPMO has already submitted a draft EA summary and an Environmental Management Plan for the project construction for distribution to the Banks' Executive Directors.

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

Consultations were undertaken in three ways: bulletins to the press, public opinion questionnaires surveys and stakeholder meetings. The questionnaires surveys covered residents and community committees and the meetings with the public and public officials of relevant agencies which have a stake in this project. The public consultation results show that the project is well received and supported by the public.

Details in Annex 13.

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

Project environmental impact monitoring indicators (given in Annex 1) have specifically been identified within the project and investments (in equipment and training) included in project financing to ensure

attention to environmental issues. The project includes strengthening of a number of institutions in the water and environmental services sectors in Guangzhou.

See also Annex 13.

6. Social:

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

The key adverse social impacts of the project are largely related to land acquisition and demolition of structures for different components of the project. In accordance with local laws, regulations and the World Bank OP 4.12 on Involuntary Resettlement Action Plans (RAP) have been prepared for the different components, including wastewater treatment plants and landfills, and a resettlement policy framework has been prepared for all project components. The RAPs are based on detailed census of the affected people, inventory of affected assets, socioeconomic surveys and extensive consultations with the project-affected people.

The different components of the project would require 1940 mu (1 mu=0.667 ha or 0.1648 ac.) of land, demolition of 1,095,895 m2 of houses, relocation of 1095 enterprises, and 972 shops. These would affect 3,361 people due to land acquisition and 37,034 people in 10,557 households due to house demolition. Both cash compensation and replacement housing would be offered to those who lose their residence as well as affected enterprises. They could choose either one of them. For the employees whose employment would be affected temporarily, cash compensation would be paid for their income losses. The RAPs detail the census, inventory, project resettlement policy, compensation rates and budget, compensation and rehabilitation programs, institutional and monitoring arrangements.

A retroactive review was done for the related resettlement activities which have already been completed (e.g., Liede Wastewater Treatment Plant). That review provided detailed information of the number of affected people and the livelihood rehabilitation status.

The Resettlement Policy Framework, which is a key part of the RAP, has been prepared in accordance with local laws, regulations and World Bank OP 4.12 on Involuntary Resettlement for all project components.

Another key social issue of the project is the affordability of improved wastewater services, especially among glower income households. A willingness-to-pay and affordability survey has been conducted by Zhongshan University. The findings of the survey would be integrated into the new tariffs for wastewater services for Guangzhou to ensure they are affordable.

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

The project was prepared in a participatory manner. The GDPMO, with its team of international and national consultants, have organized various consultative meetings with representatives of the provincial and municipal governments to apprise them of the environmental and development issues. These have facilitated participatory consultations, garnering stakeholder support for the project concept, and educating these stakeholders beforehand on their roles and responsibilities in project execution.

Local consultants have been hired for carrying out social surveys of project affected people, potential beneficiaries and user of project services. The participatory approach for the

resettlement aspects of the project has been dealt with in the RAP, following Chinese and Bank procedures and guidelines closely.

Consultation will continue with communities in the areas directly affected by the project works. All affected households and communities in the project areas have been identified through socio-economic surveys. Project information, including resettlement policies, has been provided to the affected populations through different channels. They are extensively consulted and participated in the preparation of the resettlement and rehabilitation programs.

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

Local government officials, non-government community organizations and business associations in the areas affected have been consulted and participated in the resettlement program preparation. Households directly impacted by works have been surveyed. Neighborhood meetings have been organized to solicit views and concerns as well finalizing the resettlement program. The RAPs contain provisions for continued public and stakeholder consultation, including communities and people to be affected by the project directly, particularly as some of the project components are further and more specifically defined.

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

A financially autonomous consumer/beneficiary-oriented entity has been formed that would, in line with current China policy, be responsible for project implementation and urban service delivery. This would enable a strong consumer orientation, since consumers would be in direct contact with the service provider due to regular payment of tariffs.

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

Internal and external monitoring would be undertaken continuously throughout the implementation period. An independent monitoring organization has been identified in the RAP to monitor implementation and performance of the RAP. Detailed institutional arrangements are included in the RAPs.

7. Safeguard Policies:

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

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

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

An EA, including an Environmental Management Plan (EMP), and RAPs have been prepared by GDPMO in conjunction with Guangzhou Municipality and these would been appraised for their compliance with Bank policies and guidelines, and found satisfactory.

F. Sustainability and Risks

1. Sustainability:

The project is expected to be sustainable in three respects: (a) financially; (b) institutionally; and (c) in achieving its development objectives. Tariff reforms would enhance the financial viability of municipal service providers. Institutionally, the creation of a financially autonomous wastewater company and continued technical assistance for the participating institutions would strengthen utility management and water quality monitoring capacity. The hazardous waste facility is not expected to be financially viable at the beginning of its operation because of initial lowload factors; the culture has to be developed for hazardous waste producers to bring their wastes to the facility. Therefore charges would be kept low initially, and will be increased in time when the practice is well established. Finally, the project addresses an issue of high priority to both the local and the national governments: vital self-interest in achieving environmental conditions necessary for sustained economic growth, which would be a strong motivation to continue implementing the long-term environmental improvement program, and water resources management.

1a. Replicability:

The project has considerable local, national, regional and perhaps even global replication potential. Locally, the fact that it is the first phase of a long-term environmental program means that there is already a plan and a commitment to replicate its successes in the PRD through its participating institutions. Nationally, there is enormous scope in China's many other large metropolitan areas for replicating its policy and institutional reforms, its pioneering concept of joint municipal wastewater and solid waste treatment facilities, and its initiative to expand the role of private-public and private-private partnerships in waste management investment and service provision. National replication will be facilitated by the Chinese Government and by the World Bank's East Asia Infrastructure Operations Unit. The latter will also apply the lessons learned to its regional portfolio of environmental management projects and disseminate them globally through the World Bank's Infrastructure Operations Network.

The World Bank is fully committed to helping design and deliver a comprehensive and long term assistance strategy for environmental management of the Pearl River Delta and this is the first project in an expected series of investments in water quality improvement. Assistance would be both broadened to neighboring regions and deepened to provide follow on investments such as tertiary waste water treatment and industrial waste water minimization. Project funds, supplemented by GEF funds will assist in the development of a long term aggressive water quality improvement program which could be a model for other countries that share the South China Sea. In order to help ensure the likelihood of this replicability, project preparation is being coordinated with the UNDP/GEF/IMO PEMSEA and the UNEP/GEF South China Seas regional program.

The projects' replicability is already evident, as other Chinese regions, e.g., Tai Basin Urban Project, are coming forward with projects that include inter-municipal cooperation. Although GEF funds are limited vis-a-vis the enormous environmental infrastructure requirements, they will provide a catalytic and illustrative role. The replication strategy includes regional and international workshops to discuss plans and

progress. The Bank will also play an active role by sharing project experience with senior government officials, and through publication of project experience in readily available 'public information documents'.

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

Risk	Risk Rating	Risk Mitigation Measure
From Outputs to Objective		
Lax enforcement of pollution control policies and regulations will diminish impact of project investments on river water quality.	M	Preparation, and implementation of a satisfactory Industrial Pollution Control Action Plan to address the worst polluters will be a legal requirement of the project (even though not funded under the project).
Individual project designs are inappropriate or over/under dimensioned.	N	Bank's preparation team will closely review project designs and estimated costs proposed by participating cities and the international consultants to ensure that over design of facilities will be avoided. Also, future service demands of unregistered population will be taken into account.
Provincial and city-level governments will not support proposed shared infrastructure management, least cost solutions or location of wastewater facilities.	M	Bank preparation team and international consultants will inform the GDPMO and municipalities of the advantages of shared jointly-managed infrastructure. Project may not include components for other smaller cities, if the criteria are not met. During project preparation, least cost and environmentally safe solutions will be developed.
Provincial and city-level authorities do not continue to support sector reforms related to creation of autonomous utilities and full cost recovery.	N	Creation of financially autonomous companies, and implementation of tariffs to meet the projects' financial objectives will be a condition of project appraisal.
From Components to Outputs		
Autonomy of wastewater and hazardous waste companies is not realized.	M	Financial and management performance of the new companies will be monitored during project implementation, to ensure compliance with loan conditions. Changes will take place gradually, and Bank's continued association with GPG in this sector could assure this outcome.
Risk of damage to liner in hazardous waste landfill during operation.	M	Extra precautions in the design and construction of the liner, safe operation through an experienced operator procured through a management contract, and setting up a monitoring system with a system of boreholes.
Jointly managed utility services will not be	M	At least one example of jointly-managed

realized in a cost effective fashion because of political or other resistance. Insufficient interest by provincial and local governments to carry out capacity building and strategic studies, and then to implement appropriate reforms.	M	infrastructure will be demonstrated under the project, along with adequate technical assistance. Realistic reforms will be agreed with GPG, and covenanted. Even with some initial resistance, changes will come, as GPG and China are taking a number of measures to address institutional problems that are remnants of the past central planning system, in order to remain competitive.
Overall Risk Rating	M	

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

3. Possible Controversial Aspects:

Public reaction to (a) wastewater tariff increases to maintain the financial viability of the wastewater company, and (b) introduction of fees and charges for hazardous waste disposal.

G. Main Conditions

1. Effectiveness Condition

- Execution of subsidiary loan agreement between Guangzhou Municipality and Guangzhou Sewage Treatment Company, satisfactory to the Bank.

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

Disbursement Condition

- The signing of contracts by the Guangzhou Sewage Treatment Company with consultancy firms for (i) institutional and financial technical assistance; (ii) construction supervision and quality control; and (iii) design review and certification, as a condition of disbursement of the civil works category;

- The signing of contracts on behalf of the Guangzhou Hazardous Waste Management Center with consultancy firms for (i) design review and certification, and construction supervision services; and (ii) regulatory and institutional framework, and bid document selection of operator for the facility, once completed, as a condition of disbursement of the civil works category;

- The signing of contracts on behalf of the Guangdong Environmental Protection Bureau with consultancy firms for (i) database development and management; (ii) automatic monitoring stations' (AMS) data collection; (iii) pollution source investigation, research and data mining; (i) geographic information systems' (GIS) development; (v) database software; (vi) shared air and water quality database on PRD-South China Sea pollution (Guangdong - Hong Kong) including data sharing costs; and (vii) pollution monitoring information sharing in Pearl River stretches near Guangzhou, as a condition of the goods category; and

- Execution of subsidiary loan agreements between municipalities/districts/towns and prospective implementing agencies (to be determined), for the inter-municipal infrastructure component), satisfactory to

the Bank.

Implementation Covenants

At negotiations, assurances would be obtained from GP that it would:

- implement or cause to be implemented the Institutional Strengthening and Training (IST) component in accordance with a schedule acceptable to the Bank and discuss and agree any revisions with the Bank ;
- carry out or cause to be carried out the resettlement of persons affected by the project in a manner and according to the Resettlement Action Plan satisfactory to the Bank;
- cause the project agencies to carry out, in a manner satisfactory to the Bank, the findings of the Environmental Assessment and related implementation program;
- maintain the Guangdong Project Management Office (GDPMO) and the Guangzhou Project Management Office (GZPMO) throughout implementation, with functions and responsibilities satisfactory to the Bank, and with competent staff in adequate numbers for the duration of the project; and
- make available a GEF grant of Yuan10 million for each sub-project for implementation of the inter-municipal environmental infrastructure component, as agreed with the Bank;
- carry out or cause to be carried out the time-bound Industrial Pollution Control Action Plan (IPCAP) in accordance with a schedule acceptable to the Bank and discuss and agree any revisions with the Bank.
- by March 31, 2005, arrange for the signing of a contract with a consultancy firm for updating of the PRD Wastewater Master Plan (i.e., PRD Clean-up Campaign), with a detailed study of the Foshan Wastewater Master Plan.

Financial Covenants

At negotiations, assurances would be obtained from Guangdong Province (GP) that it would:

- cause Guangzhou Municipality to onlend part of the loan proceeds to the Guangzhou Sewage Treatment Company, on terms and conditions satisfactory to the Bank;
- arrange to pass on the proceeds of the GEF grant to (i) the Guangzhou Hazardous Waste Management Center for the Hazardous Waste Component for preparation of the regulatory framework and bid document to select a private operator for the treatment center and landfill; (ii) selected cities, districts or towns for inter-municipal environmental infrastructure development for the grant incentive; and (iii) the Guangdong Environmental Protection Bureau for water quality monitoring, preparation of a management information system, software, website development, pollution monitoring in the Guangzhou river section, and updating of the PRD Wastewater Master Plan, and development of a database for air and water pollution in the PRD and South China Sea, in collaboration with Hong Kong SAR;
- operate financial matters in accordance with the guidelines set out in the FMS Manual, and arrange for the following annual audits to be submitted to the Bank within six months after the end of the financial year, commencing with fiscal year 2004: (a) audit of the project accounts maintained by (i) the Guangdong Project Management Office (GDPMO), (ii) the Guangzhou Tunnel Development Company (GTDC); (iii) the Guangzhou Hazardous Waste Treatment Center (GHWTC); (iv) the Guangdong Environmental Protection Bureau (GDEPB); (v) audit of the Special Account; (vi) audit of statements of expenditures (SOE); and (vii) audit of the financial

statements of the Guangzhou Sewage Treatment Company (GWTC);

- commencing with fiscal year 2005, cause (GSTC) to (a) produce revenues sufficient to cover operations and maintenance costs (including depreciation), and the amount by which debt service requirements exceed the provision for depreciation; and (b) incur no additional debt without the Bank's agreement, unless a reasonable forecast shows that the entity would have a debt service coverage of at least 1.3 times;
- cause GSTC to prepare, before September 30, 2005, and in each of the following fiscal years, forecasts satisfactory to the Bank, (a) to review whether it would meet the covenanted requirements set forth above in such year and the following fiscal year, and (b) to furnish the results of such review to the Bank; if any such review would show that the entity would not meet the requirements set out above, the entity would take all necessary measures, including adjustments to the structure of its tariffs and charges, in order to meet the requirements; and
- cause Guangzhou Hazardous Waste Treatment Center (GHWTC) to complete, not later than July 1, 2006, a study of the fees and charges needed for full cost recovery of hazardous waste disposal services to industrial and commercial users, the report of that study shall include a detailed time-bound action plan acceptable to the Bank, enabling such recovery commencing January 1, 2007, and thereafter implement such action plan taking into account the Bank's comments; and
- cause cities, districts or towns participating in the Inter-municipal Environmental Infrastructure component to commence collecting tariffs, fees or charges one year after commissioning of the shared investments with the objective of achieving full cost recovery over time for the services provided.

Reporting and Monitoring

At negotiations, assurances would be obtained from GP that it would:

- cause each implementing agency to prepare semiannual project progress reports; the GDPMO would then send a consolidated report to the Bank by the thirtieth of the following month, commencing January 2005; and
- carry out with the Bank a mid-term review of the project by June 30, 2007, and implement, or cause to be implemented, agreed recommendations.

H. Readiness for Implementation

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

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

I. Compliance with Bank Policies

☐ 1. This project complies with all applicable Bank policies.

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

Thomas L. Zearley	Keshav Varma	Yukon Huang
Team Leader	**Sector Manager/Director**	**Country Manager/Director**

Annex 1: Project Design Summary

CHINA: Guangdong Pearl River Delta Urban Environment Project

Hierarchy of Objectives	Key Performance Indicators	Data Collection Strategy	Critical Assumptions
Sector-related CAS Goal: Facilitate rural-urban transition underway in China by helping *to enhance the productivity of cities, where the overwhelming majority of jobs will be created, and the quality of urban environment and living conditions.*	**Sector Indicators:** Growth in employment and incomes in urban areas. Quality and service coverage levels of environmental infrastructure in urban areas.	**Sector/ country reports:** Occasional Bank urban and environmental reports. Bank urban sector supervision missions.	**(from Goal to Bank Mission)** Future urban development, service delivery and environmental conditions encourage investment and job creation in Chinese cities. Expanded investments in environmental infrastructure and ongoing policy and institutional reforms will lead to sustainable improvements in environmental quality.
GEF Operational Program: Reduce pollution loading to the Pearl River Delta and South China Sea through increased inter and intra-municipal environmental services delivery.	**Outcome / Impact Indicators:** Increased volume of wastewater treated (190,000,000 m^3) and solid waste disposed (10,000,000 tonnes).	Operational reports	Local governments have political will to share common facilities.
Improve water quality data for PRD and South China Sea.	Regional agencies collecting and sharing relevant water quality data.	EPB management reports, international conference.	Commitment and sufficient financial allocations by Guangdong EPB and neighboring jurisdictions.
Reduce pollution loading to the Pearl River Delta and South China Sea through increased private sector participation in environmental services delivery.	Increased volume of wastewater treated (60,000,000 m^3) and solid waste disposed (5,000,000 tonnes).	Operational reports	Local governments have political will to involve the private sector in environmental infrastructure.
Output from each Global Component: Larger volume of least cost municipal wastewater and waste management investments constructed and operated through increased inter and intra-municipal cooperation.	**Output Indicators:** Two or more contiguous municipalities/cities using shared facilities.	Operating and financial reports	Municipal cooperation in constructing and providing environmental service delivery of reduced capital and operating cost.
Strengthening South China	Reliable and relevant water	EPB management reports,	Relevant data will be

Sea regional water quality data monitoring system. Catalyzing regional, e.g. Hong Kong and Macau SAR, pollution reduction measures. Larger volume of least cost municipal wastewater and waste management investments constructed and operated through increased private sector involvement.	quality data readily available and shared. Rate and scale of pollution reduction progress in neighboring jurisdictions. At least one additional facility funded or operated in part with private sector partners	website operations, public documentation. Through regional conferences and international water quality reporting. Operating and financial reports.	generated on a timely basis and readily shared with the public and other interested jurisdictions and agencies. Political will to reduce pollution will be maintained and expanded across neighboring jurisdictions. Inter-municipal cooperation in constructing and providing environmental service delivery of reduced capital and operating cost.
Project Development Objective: Improve the quality of the environment in key cities in the PRD, by following an integrated regional planning approach, in order to facilitate continued economic and social development.	**Outcome / Impact Indicators:** Percentage of samples from key PRD rivers meeting Chinese surface water quality standard (of Class III) increased gradually. Enforcement of environmentally safe manifesting, transporting and treatment of hazardous waste. Increased volume of hazardous waste handled and disposed of in an environmentally safe manner. Strengthened management capacity of provincial and municipal agencies responsible for water pollution control and hazardous waste management.	**Project reports:** Annual project reports with performance indicators. Annual Review. Annual Review. Mid-term Review. Implementation Completion Report. OED Sector Assessment Reports	**(from Objective to Goal)** Provincial and local authorities have political will and regulatory tools to ensure that all major sources of pollution are effectively controlled, and that lax enforcement does not diminish impact of proposed investments on river water quality. Effective management and financing continue beyond project implementation into operational phase.
Output from each Component: Improved and expanded	**Output Indicators:** Increased percentage of	**Project reports:** PMOs to monitor project	**(from Outputs to Objective)** Executing agency will have

wastewater treatment infrastructure in Guangzhou City.	municipal and industrial wastewater intercepted and treated to relevant Chinese treated effluent discharge standard. A 90% increase in treatment of collected wastewater. Collection sewer networks expanded to collect most of the wastewater generated. Increased percentage of total generated wastewater load is captured by the sewer system. Increased percentage of load captured receives appropriate treatment. Increased effectiveness of treatment system in removing pollutants.	progress and submit periodic reports. Bank to conduct regular supervision missions. Joint review of project progress to take place annually and at the project mid-term.	financial and technical capacity to successfully implement project investments. City authorities will support least-cost technical solution or location of treatment plants and discharge infrastructure. Individual project designs are appropriate and not over designed.
Piloting of improved and expanded environmental infrastructure facilities constructed and operated on a shared basis by more than one municipality in PRD region.	Establishment of shared infrastructure facilities that are planned, constructed, and operated in an integrated and cost effective manner. Increased percentage of environmental infrastructure services provided in a cost effective and sustainable fashion.		Provincial and city-level governments will support proposed shared infrastructure management, least cost technical solutions or location of treatment plants and discharge infrastructure.
Improved and expanded hazardous waste treatment facility for Guangzhou metropolitan area.	Increased proportion of hazardous waste generated in the PRD collected, treated and safely disposed. A minimum 50% increases in hazardous waste safely collected and treated in the Guangzhou Region.		Local government support sustained for proposed technical solution or location of hazardous waste treatment facility, and for shared use of facilities. Local authorities are able to create sufficient incentives, and enforce regulations to ensure that special waste is safely transported to proposed project facilities for disposal.
Enhanced water quality	Timely availability of reliable		Provincial authorities (EPB)

monitoring systems and capabilities in PRD.	water quality information for decision-making purposes on investment priorities and regulatory actions.		will have adequate resources for staffing and operating the enhanced water quality monitoring system. Water quality information and new systems used by decision-makers
Strengthened institutional arrangements for planning, financing and managing of wastewater treatment in PRD region.	Guangzhou wastewater utility corporatized, number of regional/inter-municipal wastewater companies formed and financial situation of municipal wastewater utilities participating in project improved.		Provincial and city-level authorities continue to support sector reforms related to creation of autonomous utilities, full cost recovery for services, and piloting of new initiatives for inter-municipal cooperation in provision of municipal services. Staff knowledge gained is incorporated into professional practice at Provincial and municipal levels.
Project Components / Sub-components:	**Inputs: (budget for each component)**	**Project reports:**	**(from Components to Outputs)**
Wastewater management in Guangzhou City	Construction of 1 wastewater treatment plant and extension of an existing one in Guangzhou City to increase the total capacity by 400,000 m3/day --- $334.0 million.	Provincial and Guangzhou PMOs to prepare regular progress reports. PMO provides Bank with periodic progress reports which compare planned and actual progress for each project component in terms of cost and physical works. Monthly (or quarterly) disbursement reports which compare planned with actual disbursements for each component.	Wastewater company in Guangzhou City established, and facilities operated in a sustainable manner.
Hazardous Waste Management in Guangzhou metropolitan area.	Construction of landfill for treatment of about 10,000 tons/year of hazardous waste in Guangzhou City and environs --- $24.6 million.		A company to manage special waste treatment established in Guangzhou City, and operated in a sustainable manner. Possibility for the plant to accept such wastes from nearby towns.
Environmental infrastructure in other PRD towns. MOUs	Incentive-based lending for groups of contiguous towns		Jointly managed water supply, or wastewater treatment

have been signed for three subprojects between: Panyu District Gardens Bureau and Guangzhou Gardens Bureau; Longgang District Government and Shenzhen Great Industrial Zone Administration Commission; and Foshan Chanchen District Government and Nanhai District Government.	willing to construct shared infrastructure (e.g., water supply, wastewater collection and treatment, solid waste landfills, etc.) --- $113.2 million.		plants, or landfills or incinerators constructed, and operated in a sustainable manner, under joint management by two or more towns.
Water Quality Monitoring and Information System.	Installation of water quality monitoring equipment, data collection and decision support systems for the Guangdong Province --- $11.5 million.		Provincial Environmental Protection Bureau has comprehensive database of water quality in PRD rivers, and capability to effectively enforce pollution control.
Institution Strengthening and Training.	Consultant services for project implementation support, institutional strengthening, strategic studies and training --- $8.6 million.		Sufficient interest by Provincial and local governments to carry out capacity building and strategic studies, and to implement appropriate reforms.

Project Performance Monitoring Indicators

The baseline and targets would be reviewed and updated during the Project Launch Workshop.

Indicators (Physical)	2004 Base	2007	2009
1. Wastewater Volume Treated (%)			
2. Compliance with discharge standard (%)			
3. Compliance with water quality objectives (%) in Guangzhou PRD Area (%)			
4. Quantity of hazardous waste treated and disposed of (tons/year)	0		

Indicators (Financial)	2004 Base	2007	2009
Wastewater tariffs implemented to meet financial projections (Yuan per m^3)	0.70	2.0	2.4
Hazardous waste fees and charges implemented to cover costs of collection and disposal			

Annex 2: Detailed Project Description

CHINA: Guangdong Pearl River Delta Urban Environment Project

Project Objectives: Promoting a regional planning approach to environmental service delivery to address the serious environmental problems of the Pearl River Delta* and the South China Sea, is the primary development objective of the project. This would be achieved through support for: (a) industrial and domestic wastewater management, and improved regional planning to develop cost-effective strategies for wastewater treatment; (b) hazardous waste management; (c) development of institutional models to cross traditional administrative boundaries for provision of jointly-managed environmental infrastructure; (d) improved water quality monitoring, data management, and data sharing; and (e) Guangdong-Hong Kong SAR initiatives to develop an environmental management framework to control air and water pollution in the PRD and the South China Sea.

Background: The economic importance of the PRD region is underscored by its capacity to supply 70 percent of the gross provincial output. For the past few years, the growth in GDP averaged over 14 percent per annum, with a contribution to GDP of Yuan 644 billion in 1999. Of the municipalities in the PRD, Guangzhou showed the highest contribution to the GDP with Yuan 644 billion/year, and the highest average annual salary of Yuan 13,059. The PRD region is one of the most populated areas in China. The permanent population in the area grew quickly over the last decades not because of natural increases, but because of the massive in-migration.

Measures are now planned to address this problem in the larger municipalities. A hazardous waste treatment facility exists in Shenzhen. A hazardous waste treatment facility exists in Shenzhen.

Project Goals: Although concentrating predominantly, in terms of infrastructure investment in the Municipality of Guangzhou, the project aims primarily at developing cost-effective strategies and institutional models which can serve as a "blue print" for the whole PRD region. A major challenge of the project is to develop institutional models enabling environmental service delivery to cross the traditional administrative boundaries between counties and districts within municipalities, and between municipalities themselves, and with Hong Kong and Macau SARs, thus allowing the cost savings associated with economies of scale to be achieved.

Water Resources of Guangzhou: Water resources of Guangzhou, particularly those on the western side of the town are particularly influenced, and are at risk from wastewater discharges. The major intakes supplying nearly 60 percent of Guangzhou's water supply are heavily influenced by urban and industrial pollution.

Integrated water quality data indicate that many sections of the Pearl River in and around Guangzhou have pollution levels worse than Class V. Dissolved oxygen levels are often extremely low, unsuitable for preservation of aquatic life, and gives off foul odors.

Water quality modeling studies (one- and two-dimensional modeling, and near-field and far-field impacts) of current and 2010 scenarios, carried out as part of project preparation, indicate dramatic improvement in overall water quality of the Guangzhou section of the PRD with the

proposed investments. Both average DO and BOD values are generally sufficient to attain Class II (or Class II in the case of BOD) standards, and ammonia levels in general remain at about Class IV. Poor water quality would continue to exists downstream of the junction with Dongiang, and close to Donglang, where there is a marked deficit in oxygen, due to pollution loads from the Beijiang section, principally from Foshan.

Wastewater Management-Existing Situation

Guangzhou Municipality (i.e., old areas, Panyu, Huadu and the counties) alone represented almost 2.8 million m3/day of wastewater in 2000 (approximately 25%) of which 0.7 million m3/day is industrial wastewater. Guangzhou wastewater generation is projected to rise to about 3 million m3/day by 2010. Wastewater characteristics in Guangzhou and Foshan are typically today as follows: SS - 166 mg/l; BOD - 140 mg/l; COD - 300 mg/l; N - 22 mg/l; P - 4 mg/l.

The Guangzhou wastewater master plan provided for development or extension of four major plants at Datansha, Xilang, Liede and Lijiao, and 8 treatment plants, to serve the eastern portions of Guangzhou (and reportedly, over 50 WWTPs for Foshan – the next biggest polluter after Guangzhou).

The current total treatment capacity in Guangzhou is 0.67 million m3/day (i.e., 32% treatment rate), and which expected to rise to about 1.1 million by about 2007. The total capacity of the six treatment plants, to be completed between 2005 and 2010, would be about 1,100,000 m3/day.

Currently, wastewater collection is concentrated primarily in 3 central urban districts of Guangzhou. Wastewater from the remaining districts, with high migrant populations, is discharged directly to urban creeks and rivers. A small minority of the population in these peripheral districts use surface water for their water supply. Without a major increase in both the collection and treatment of wastewater, the situation will at best remain stable, or at worst deteriorate over the next ten years.

Wet sludge from existing and proposed treatment plants (Datansha, Liede I and II, Xilang and Lijiao, and Liede III and Dashadi) will raise the total production of wet sludge to about 1,086 tons/day. Wet sludge production in the Guangzhou Municipality is projected at about 1,500 tons per day. At present, sludge is disposed of in 4 dump sites close to Hong Kong and Macau, at the new solid waste landfill at Xin Feng, and for landfill at Panyu. The Municipality is also constructing a Sludge Treatment Center with a capacity of 900 tons/day. Odor removal and heavy metal stabilization techniques will be adopted for treatment of the sludge. After treatment, the sludge will be combined with clay to manufacture construction materials such as pavement bricks. Leachate tests indicate a reducing presence of heavy metals due to pretreatment by industries and relocation of highly polluting industries, as part of the industrial pollution control plan. While the projected capacity would be adequate for the near-term, capacity increases and/or increased disposal at Xin Feng solid waste landfill would need to be examined.

Hazardous Waste Management

Existing situation: The total solid wastes generated in the Province in 2000 was estimated at 40.34 million tons, comprising 27.66 million tons of domestic wastes (27.2 m. tons);

non-hazardous industrial wastes (16.4 m. tons); 930,000 tons of hazardous solid wastes (0.9 m. tons); medical wastes (0.04 m. tons); abandoned electronic appliances (0.35 m. tons); and plastic materials and agricultural film (0.94 m. tons).

The total solid waste treatment capacity in Guangdong is about 20 million tons, but most facilities are in poor condition. There is one hazardous solid waste secured landfill in Shenzhen with a capacity of 20,000 tons/year. The Guangdong Domestic Waste Treatment Center is one of three treatment units that treat medical waste in a unified way, but with a treatment rate of 16 percent. Large amounts of hazardous waste are currently being co-disposed with domestic solid waste in open dump sites without any liner systems. Some are discharged directly, posing significant pollution and health risks.

It is estimated that about 260,000 tons/year of hazardous waste is produced in Guangzhou. It is also estimated that half as much hazardous waste is produced in the municipality of Foshan. Thus about 40 percent of the hazardous waster produced in the Province would appear to originate form the Guangzhou- Foshan region. Of this, approximately a little under half was being reused and recycled; the remainder was largely treated and disposed, although it is clear that the ultimate disposal routes are generally not to standard. It is suspected that large quantities are currently being dumped illegally.

Treatment options: It is proposed to provide a comprehensive treatment facility for all types of hazardous waste at one site, being the most cost effective solution. The final proposal is to divide the hazardous waste remaining after recycling and reuse would be subjected to three broad treatment and disposal streams:

(a) organic/chemical wastes to be treated by Guangzhou Panyu Luyou at a new specialized incineration unit.
(b) Incineration at Guangzhou Cement Plant
(c) Treatment and disposal (landfilling) at the Guangzhou Hazardous Waste Treatment Center

Water Quality Monitoring and Data Sharing

Importance of effective monitoring and measures to control pollution has become a priority as considerable pressure is brought upon the ecosystem of the South China Sea from pollutants such as organic pollutants, nitrogen, phosphate, Pb, Hg, COD and oil entering from the estuaries. The National Maritime Bureau started data collection in the South China Sea area in 2002, but difficulties exist in data sharing and effective collaboration with Hong Kong SAR. Guangdong and Hong Kong SAR have commenced discussions to develop an environmental management framework for the PRD and the South China Sea region, Development of such a comprehensive database of air and water pollution sources, which can be shared with other regional stakeholders (such as Hong Kong and Macau SARs) is fundamental to regional collaboration in environmental management.

Monitoring stations with various characteristics are spread throughout the reaches of the PRD river system. They have been installed at different times in as *ad hoc* manner, and have different equipment, which are not fully compatible. Data collection is done manually, by the EPBs of local municipalities and analyzed at local laboratories, and the results are transferred to the Provincial

EPB. The Provincial EPB submits the monitoring date to the state environmental organization (SEPA). The GD EPB has commenced publishing environmental data, and efforts are being made to provide more complete information to the public, on more parameters. Enforcement is done by the local EPBs, but this is not very effective, as the monitoring capacity in terms of data collection is not fully installed, real time data is not collected, data analysis and management is not done in an effective manner.

In conformity with a national plan formulated by SEPA, Guangdong has launched a program to create a seamless link to the existing monitoring equipment and integrate all current monitoring systems into a browser-structured system. The new system features would include: advanced and effective information management for the regional water environment; a convenient and useful analysis system for comprehensive analysis of regional water environment information; and a reliable decision support system.

Seven automatic monitoring stations (AMS) have been installed, in a program to install 74 AMSs. The GD EPB plans to improve its comprehensive database, develop an management information system, create a website for information dissemination. This would enable up to date environmental data management and sharing with various stakeholders, enable effective decision-making and enforcement.

Global Environment Facility (GEF) Co-financing.
A project-specific GEF grant of $10 million will provide co-financing to: review and update the PRD Wastewater Treatment Master Plan; provide incentives to encourage jointly-managed inter-municipal environmental infrastructure; to enhance water quality monitoring, data collection and management, MIS development, and data sharing with Hong Kong SAR; and public private participation in environmental services provision.

The GEF grant will be allocated to three main components, municipal cooperation, water quality data collection and dissemination, and increased private sector involvement in environmental management. Table 3 outlines the proposed allocation of the GEF grant. For the municipal cooperation component three broad activities would be supported: support to joint district-district wastewater and waste management facilities, support to joint municipal-municipal wastewater and waste management facilities and a review (rationalization) of the PRD Wastewater Treatment Master Plan. The public-private partnership component would support activities to select private sector service provides, and preparation of a regulatory framework for environmental infrastructure (e.g., contracting mechanisms could act as a model for other municipal activities)..

two key activities: support to the private sector operation of the Guangzhou hazardous waste treatment facility (the contracting mechanisms could act as a model for other municipal activities) and future support of private sector selection and contract management for environmental infrastructure. The water quality monitoring component would support website development and information management systems and sharing data with Guangzhou and Hong Kong.

Details of the GEF Grant allocation summary and detail, conforming broadly to agreed categories are indicated below (amounts vary with the five components, above, due to assignments of key

agency responsibilities):

Activity	US$
Environmental Monitoring and Information Sharing	
Environmental Monitoring and Data Sharing	
(i) MIS, software, and applications	1,200,000
(ii) Website development and information dissemination	200,000
(ii) Shared air & water quality database on PRD-South China Sea pollution (Guangdong-Hong Kong), including data sharing costs	200,000
(iii) Conference on PRD-South China Sea environmental management framework (Guangdong-Guangzhou-Hong Kong)	50,000
(iv) Pollution monitoring information sharing, in Pearl River stretches near Guangzhou (by Guangzhou EPB)	200,000
Subtotal	*1,850,000*
Public- Private Partnership	
(i) Preparation of regulatory framework, and bid document to select a private service provider for pretreatment facility and landfill	400,000
(ii) Hazardous waste survey and market assessment	50,000
(iii) Preparation of a bid document to select operator or BOT for wastewater management	400,000
Subtotal	*850,000*
Inter-municipal Jointly-managed environmental infrastructure	
(i) Study and workshops on overcoming constrains to inter-municipal cooperation among PRD cities	100,000
(ii) Subprojects that support inter- or intra municipal cooperation in provision of shared environmental infrastructure	6,800,000
(iii) Updating of PRD Wastewater treatment master plan, with detailed study of Foshan wastewater master plan (to support joint inter-municipal infrastructure)	400,000
Subtotal	*7,300,000*
Total	***10,000,000***

By Component:

Project Component 1 - US$334.00 million

Wastewater Management (Total Cost $334.0 million)

The component would comprise primarily wastewater collection and treatment in Guangzhou (and other municipalities). In Guangzhou wastewater investments would include: (a) first stage of the new treatment plant at Dashadi with capacity of 200,000m3/d, (the first stage of 500,000m3/d ultimate capacity), (b) Liede III, comprising expansion of the existing plant by 200,000m3/d, to bring installed capacity to 640,000m3/d, and (c) about 500 km of trunk sewers to convey wastewater from the drainage catchments of Dashadi and Liede III, and four other drainage

catchments (i.e., Xilang, Lijiao, Datansha and Liede II).

The entire 39 hectare area of land reserved for the Dashadi WWTP will be released by the Government. The site will be planned in such a manner to accommodate the total ultimate capacity of 500,000 m3/day treatment capacity, with a provision for primary sedimentation, should be needed in the future. The drainage ditch traversing the site will be diverted to the northern edge of the site, to facilitate the optimal use of the available land. Liede III will be constructed on land already reserved for this complex.

Leachate tests conducted thus far indicate a low and decreasing level of heavy metals. Leachate tests will be conducted to assess the quality of sludge, particularly to determine the existence of heavy metals, in order to determine the appropriate treatment prior to disposal. Sludge from the treatment plants will be treated initially at the new Sludge Disposal Center to be completed next year. Should the levels of metals in the sludge prove to be low and decreasing, sludge would be disposed in the Xin Feng solid waste landfill.

Project Component 23 - US$24.70 million

Hazardous Waste Management (Total Cost $ 24.7 million) (No GEF Co-financing - complementary activity)
The Guangzhou Hazardous Waste Treatment Center (GHWTC), would have a pre-processing treatment center comprising a collection and transferring area, a physical/chemical treatment workshop, stabilization/solidification workshop, and a secure landfill to treat hazardous wastes and incinerator ash. The facility would have a final capacity of 850,000 m3, adequate for 25 years operation, and would be developed in three phases with capacities of 150,000 m3, 310,000 m3 and 400,000 m3. The first phase of 150,000 m3 will be constructed under the project.

The landfill will also serve as the ultimate disposal site for the two treatment streams (i.e., both the organic/chemical wastes treated at Panyu, and the incineration at the Guangzhou Cement Company). Hazardous wastes will be transported to the treatment facility by those industries that produce these wastes or a newly created or licensed collection company. It will also function as a regional center accepting hazardous waste from neighboring municipalities. In addition to improved treatment and disposal, improved systems will be set up to register industrial waste producers, and to manage and control hazardous waste service providers involved in transport, recycling and treatment of hazardous waste.

Under current regulations, industries producing hazardous wastes are legally obliged to take measures to treat the wastes in an environmentally safe manner. Guangdong Provincial EPB also will also enact and enforce regulations requiring industries in Foshan, and surrounding municipalities to use the facility. A tariff will be levied per tone or m3 of hazardous wastes delivered to the treatment center. The Guangzhou EPB will set up a monitoring and inspection system to enforce the mandated requirement, and adopt a structure of fines to be levied on offenders.

Upon completion of construction, operation of the facility will be contracted out to a private service provider, who will be selected under a competitive bidding process. The project will

finance the preparation of a regulatory framework, the bidding document to invite bids from prospective contractors, and the transaction cost.

The facility will be located at Liangtian, on a 22 hectare site close to the Xin Feng solid waste landfill. In view of the prevailing topography, particular attention will be paid to engineer the design to prevent rainwater runoff mixing with the leachate, to avoid any adverse impacts to ground water and water course downstream. Continuous monitoring will be incorporated to measure leakage of any leachate.

Project Component 3 - US$ 45.20 million

Inter-Municipal Environmental Infrastructure (Total Cost $ 113.2 million)

This component would finance jointly-owned and managed environmental infrastructure on as pilot operation. Through the implementation of the pilot subprojects, potential benefits would be demonstrated, and institutional models would be developed, facilitating replication. In order to assure replication, a revolving credit facility will be created by the GPG with seed funds provided from the proceeds of the loan, and additional matching funds to finance future subprojects. The Facility will onlend these funds at terms that would enable revolving, and encourage continued construction of jointly-managed environmental infrastructure.

Proposed infrastructure must meet safeguards requirements, and be: (a) designed to improve water quality of the rivers and water bodies, (b) owned and managed by two or more cities, districts or towns, (b) revenue earning investments, and (c) environmental infrastructure (i.e., wastewater treatment plant, wastewater interceptors, water supply source augmentation including transmission for bulk supply of raw or treated water; water supply treatment plant; municipal solid waste landfill).

In view of the innovative nature of this initiative, incentives are proposed, with support from a GEF grant and loan funds, to encourage municipalities, districts and towns to collaborate to construct jointly-owned environmental infrastructure. Incentives would be in the form of capital grants, increased disbursement for civil works, and support for incremental operating costs for these subprojects. In addition to being financed under the project, the first 3 to 4 projects approved for funding would receive a capital cost grant of Yuan 10 million, disbursed from the GEF allocation of $6.8 million for this component, an enhanced disbursement of 65 percent for civil works, finance for incremental operating costs, amounting $6.5 million, on a declining basis of 50 percent, 30 percent and 20 percent, in the first, second and third year, respectively. Provision is made to finance other subprojects that would be identified in the future. Subprojects to be identified in the future that meet the criteria would be eligible for financing from the budget provision made in the project, higher disbursement for civil works, and incremental operating costs. There would be no GEF grant support for subprojects to be identified in the future.

Three subprojects were identified at appraisal, and MOU have been prepared, outlining indicative capital costs, arrangements for capital cost sharing, implementation, management and operational arrangements. Feasibility studies for these three subprojects are currently being completed. They include: (a) Panyu District Gardens Bureaus and the Guangzhou Gardens Bureau, for sharing wastewater treatment facilities at Lijiao, (b) between the Longgang District Government and Shenzhen Great Industrial Zone Administration Commission, and is intended to improve water quality of the Pingshang River in Shenzhen, and (c) Foshan Chancheng District Government and Nanhai District Government, for joint construction of a wastewater treatment plant. Further details are provided below:

Luoxi Island Wastewater Discharged into Lijiao Wastewater Treatment System. The subproject is to be developed under cooperation between the Guangzhou Municipal Gardening Bureau and Panyu District Municipal Gardening Bureau. Wastewater from Luoxi Island, which has developed rapidly in recent years. Wastewater which is currently discharged untreated to Pearl River, will be intercepted and conveyed to the Lijiao Wastewater treatment plant in Guangzhou. The conveyor will be designed for a planned wastewater flow of 60,000 m3/d for the service area of about 9.38 km2. The project includes about 17.5 km of sewers of diameters 400 mm -1100 mm, a siphon, and three pumping stations with total capacity of 1300 liters/sec. Total base cost is estimated at Yuan 121.5 million.

Shenzhen Pingshang River Wetland Treatment Works. The subproject is to be developed under cooperation between the Longgang District Government and Shenzhen Great Industrial Zone Administration Commission, and is intended to improve water quality of the Pingshang River in Shenzhen.Shenzhen already has good experience operating two smaller wetlands to improve river water quality. Wetland works of total area of 47.9 ha are to be constructed at Pingshang river in Longgang District from the entrance of Chi'au river to the entrance of Dunzi river in Great Industrial Zone, comprising 25.3 ha of rehabilitation of riverside natural wetlands and 22.6 ha of artificial wetlands. It is proposed to treat about 230,000 m3/day average river flow period (and 60000 m3/d in dry river flow period), with preliminary treatment and traverse through wetlands. The design is based on the high efficiency vertical flow wetland treatment technology, and is expected to achieve the following improvements in water quality parameters at a loading on wetland treatment of 0.33-1.0 m2/m3/d. The parameters at the inlet to wetland and at the outlet (in parentheses) are: COD 30-50 (15-25); BOD 15-25 (3-6); NH3-N 1-14 (0.8-1.2); and TP 1.5-2.0 (0.18-0.22). Shenzhen agencies have indicated that they plan to use own funds to finance the subproject; hence this subproject would be eligible for the GEF grant only. Total base cost is estimated at Yuan 123.4 million.

Foshan Zhen'an WWTP Third Phase Extension Works. The subproject is to be developed under cooperation between the Chancheng District Government and

Nanhai District Government. The subproject is the third phase extension of the Foshan Zheng'an wastewater treatment plant, to meet the planned capacity requirement of 150,000 m3/d of the two districts This subproject includes a sewer system to collect urban wastewater from an area of about 40 km2, comprising the southern part of Chancheng District and the Shikeng area of Nanhai District. Total base cost is estimated at Yuan 225.0
million.

Provision for Subprojects to be Identified. An amount of Yuan 120 million will be provided in the project costs for subprojects that would be identified and prepared in the future.

Project Component 4 - US$11.50 million

Water Quality Monitoring and Data Sharing (Total Cost $ 11.5 million)
The component would comprise the following: (a) renovation and updating of 5 existing monitoring stations; (b) construction of 18 new automatic monitoring stations (7 regional, 7 municipal level, and 4 in the estuary); (c) a provincial control center including hardware and software and applications; (d) a website with information and data; and (e) a decision support system including management information system, databases, pollution control monitoring applications, and GIS.

Project Component 5 - US$8.60 million

Institutional Strengthening and Training (Total Cost $ 8.6 million)
The project would support a range of institutional strengthening and training activities including, some activities supported by the GEF grant: (a) financial/institutional support, training & equipment for the Guangzhou Wastewater Treatment Co; (b) financial/institutional support, training & equipment for institutions (to be identified) in connection with the inter-municipal environmental infrastructure program; (c) metropolitan and regional planning; (d) metropolitan Guang-Fo development and management strategies (e) construction supervision and project management services and (f) training for management and operational staff and study tours.

Other institutional strengthening and capacity building under the project (but included in each component), include: (a) preparation of a regional air and water pollution database; (b) review and updating of the PRD wastewater treatment master plan (Pearl River Clean-up Campaign); (c) development of a regulatory framework for private sector participation (PSP) for operation of the hazardous waste facility; and (d) preparation of bidding documents for private sector service provision for other utilities.

Annex 3: GEF Incremental Cost Analysis
CHINA: Guangdong Pearl River Delta Urban Environment Project

The Program and Project Area

China's Pearl River Delta (PRD) is one of the largest and most complex urban systems in Asia. It is home to over 40 million people who live in 25 administratively-defined cities in Guangdong Province and in two Special Administrative Regions (Hong Kong and Macau). The PRD has ranked at or near the top nationwide in economic growth over the past decade (averaging 14.7% per annum during 1990-2000), mostly due to large inflows of direct foreign investment, initially in low value-added manufacturing and more recently in higher value-added manufacturing and services. The program encompasses all of this area and is mainly overseen by Guangdong Province with cooperative agreements between other jurisdictions such as Hong Kong and Macau.

The Delta is also complex geographically. Three major branches of the Pearl River (Zhu Jiang) join at the city of Guangzhou, the river's political, economic and cultural hub. The Pearl is China's third longest river, and second only to the Yangtze in annual average flow. It discharges into the South China Sea through eight principal tributaries across flat terrain, which is criss-crossed by numerous canals and streams.

The project area for the Guangdong Pearl River Delta Urban Environment Project which is the first phase of a larger scale and longer term program, is mainly within Guangzhou and consists of civil works (wastewater treatment and hazardous waste) for the city and capacity building and institutional strengthening activities for the program area such as environmental data collection (provincial scale), industrial pollution abatement programs (provincial and city level). The program area is all of the Pearl River Delta, including the city of Guangzhou.

The GEF Guangdong Pearl River Delta Urban Environment Project would support activities in the entire program area with a key focus of reducing, as fast as possible, total pollution loading to the South China Sea. Efforts would focus mostly within Guangdong province but they would be structured in a manner to encourage replicability in the rest of China and similar activities in other countries discharging wastes into the South China Sea.

The Pearl River Delta's Environmental Condition and Causes

Environmental protection policies and investments have not kept pace with economic growth, and the PRD's rapid economic growth has come at a heavy environmental cost. Many of the lower reaches of the Pearl River, especially around Guangzhou, the water quality standards are Class V or worse, and therefore unfit for drinking water source and unsuitable for irrigation, aquaculture or recreational use.

Domestic and industrial wastewater discharges, urban storm-water runoff and agricultural and livestock farm run-off are the main pollution sources. Most municipal wastewater is collected, but discharged into the river systems without treatment. Environmentally safe sludge disposal is just beginning, with the first plant under construction in Guangzhou. Growing volumes of hazardous wastes also present considerable risks to health, surface and ground water sources. Regional treatment facilities are needed, plus complementary activities such as waste minimization and safe transportation of dangerous goods.

Charges for water supply and wastewater are a fraction of the true cost of providing these services, which is draining municipal resources and reducing operational performance. Charges for hazardous waste disposal are low or non-existent in Guangzhou. Only a small fraction of the waste is properly disposed.

At present, every town builds and manages its own urban utility system and potential economies of scale and operation are not realized. The recently announced Provincial waste water management program of constructing more than 162 wastewater treatment plants to clean up the PRD river system perpetuates this fragmented approach to planning, investment and operation. While the Guangdong Provincial Government (GPG) and municipalities recognize that regional planning approaches present opportunities for inter-municipal cooperation, jointly managed facilities, reduced costs, and economies of scale for provision of environmental infrastructure, they have not addressed the institutional challenges inherent in this approach. The problem is compounded by the lack of a strategic framework at the provincial, metropolitan and city levels for planning and implementing least-cost priority investments and policy/institutional reforms.

Little private sector participation in environmental investments and service provision has been mobilized. In all of Guangdong Province there is just one private water supply concession (in Tanzhou), one private wastewater treatment plant (in Guangzhou), one privately-operated municipal solid waste landfill (for Guangzhou), and a proposed Build-Operate-Transfer sludge treatment plant, also for Guangzhou. No initiatives have been taken to facilitate entry of private service providers for the distribution of drinking and wastewater collection, where the greatest gains in efficiency and service levels are possible.

Guangdong Provincial Government Strategy.

Guangdong Province (GP), through its provincial Environmental Protection Bureau (GDEPB), has recently announced a plan to clean-up the PRD, the main feature of which is a proposed eight-year, US$5 billion program of investment in wastewater treatment facilities. However the program perpetuates the fragmented approach to infrastructure planning, contains too many treatment plants, is too ambitious and costly, and fails to realize potential economies of scale. Preliminary reviews of the plan suggest that better rationalization of treatment plants could yield a 35% decrease in overall costs.

Guangdong Province is also preparing master plans for municipal and industrial solid waste management. These plans are also likely to suggest a fragmented and non least-cost approach.

Nevertheless, the GPG is committed to achieving increased sustainable development of the PRD and expanding provision of urban environmental services, including the use of innovative forms of private involvement. It realizes that environmental infrastructure investment should be guided by a regional development strategy that better reflects the goals of sound environmental management and fiscal sustainability across PRD as a whole. However this is difficult and capacity-building assistance and incentives are needed to help achieve those outcomes.

The Project's Global Environment Objective

The South China Sea, into which the Pearl River flows, is one of World's Large Marine Ecosystems (LMEs). The GEF, especially concerned with such a critical international water body is helping the littoral states to better manage this shared resource. Analyses of the major threats to the Sea, facilitated by the GEF/UNDP/IMO Partnerships in Environmental Management for the Seas of East Asia and the GEF/UNEP Project on Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand, have identified land-based pollution as one of the most serious threats and the Pearl River Delta as a critical land-based pollution "hot-spot". This project's global environment objective is to improve the environmental condition of the South China Sea LME by helping Guangdong province reduce land-based pollution of the Sea from the Pearl River Delta area.

Baseline Scenario

This scenario comprises of previously agreed plans and initiatives of the Chinese Government to address water related problems at national and local levels. It reflects the likely situation concerning the Pearl River Delta and its key cities in the absence of GEF support.

Under the baseline scenario, the GPG and its many cities and towns will make substantial investments in wastewater treatment and in improving solid and hazardous waste management in the next fifteen years that will reduce the volume of pollution entering the South China Sea. Some of these facilities will however be delayed by jurisdictional squabbles; neighboring municipalities will each build their own, inadequately sized facilities that will waste investment resources, raise operating costs and threaten their sustainability. Also, little effort will be made to involve the private sector in service provision, even though this is often the least-cost and most efficient option. The project in the absence of the GEF project would co-finance Phase one of the Program and would consist of the following components:

- The Dashadi and Liede III wastewater treatment and network expansion
- The regional hazardous waste facility
- An industrial pollution control program
- Related capacity building activities

The longer term program described in the baseline would suffer from the following strategic shortcomings:

- minimal action to accelerate private sector involvement
- absence of collaborative sharing of environmental data with other municipalities and other countries

- an ad-hoc system of water-quality monitoring
- inefficiencies resulting from municipalities desire to build their own facilities
- insufficient management and technical operator capacity

GEF Alternative

The proposed GEF Program for the Guangdong/Pearl River Delta Urban Environment Project will encourage a more comprehensive integrated approach than outlined under the baseline scenario by addressing its strategic shortcomings. This will help give direction and ensure that various plans of the agencies involved in the Pearl River Delta are coordinated and properly integrated.

Under the GEF Alternative Scenario, the proposed project would constitute the first-phase of a cost-effective, long-term and very large-scale environmental management program that will address the key weaknesses of the Baseline Scenario and thereby achieve significantly larger and more cost-effective environmental improvements in the PRD and in the South China Sea, into which it flows. The GEF Alternative project would support a larger volume of collaborative, least-cost municipal waste management investments; be funded from a wider variety of sources, including the private sector; and would promote greater financial sustainability of these investments than the Baseline Scenario. To achieve these outcomes, the project would support the implementation of physical investments, policy and institutional reforms, and financial management improvements. Its over-arching goal would be to achieve the maximum sustainable environment benefits for the PRD area and the South China Sea by identifying and funding the most environmentally efficient, least-cost investment program that can be afforded and sustained with sound financial management. The project and program will commence with the highest priority investments in the city of Guangzhou, which is the largest contributor to pollution in the PRD, with smaller cities also implementing jointly-managed environmental infrastructure investments on a pilot basis. It would also demonstrate innovative service delivery and financing approaches, including private sector provision of environmental infrastructure and services. The Guangdong component of the parallel World Bank/GEF Livestock Waste Management Project would address this specific issue as an integral part of the provincial environmental management program.

GEF support would catalyze three key, innovative aspects of the GEF Alternative strategy. First the GEF would promote the planning and construction of shared municipal wastewater treatment and waste management facilities. This collaborative approach to wastewater and waste management would achieve significant capital and operational cost savings, which in turn would accelerate investment in wastewater treatment and landfill development, and expand the volume of investment and enhance its financial sustainability. These actions would achieve faster and larger reductions in pollution loads. Second, the GEF would stimulate greater private sector involvement in waste management and wastewater treatment investment and operation by (i) encouraging the municipalities to actively seek private sector partners, and (ii) assisting potential private sector investor/operators to prepare facility management investment and operational service proposals for consideration by the municipalities and ensuring that such proposals are evaluated solely on their technical and financial merits and implemented when they are both

least-cost and financially sustainable options. Third, the GEF would provide additional funding for water quality testing that would improve the collection and dissemination of water quality data that would enable a collaborative sharing of data with other municipalities and other countries.

The GEF's support for Phase One of the PRD Environment Program through this project would also promote greater inter-municipal cooperation and private sector involvement in the subsequent phases of the Program by piloting and demonstrating innovative ways to achieve these two objectives and by promoting their replication in subsequent phases of the Program.

The global environment objective of the GEF Alternative would be faster improvement of water quality in the Pearl River Delta and reduced pollution of the South China Sea. This objective will be achieved by (a) allocating public pollution reduction investment resources more efficiently and by operating public waste management facilities more efficiently and sustainably; and (b) accelerating private sector investment in waste management and participation in waste management operations. In combination, these advances will allow Guangzhou City to treat an additional 250 million m3 of waste water over the next 15 years than under the Baseline Scenario. This outcome will be monitored through a comprehensive and replicable water quality testing regime. Key outputs of the GEF assisted project components would be the number of facilitated agreements to share waste treatment facilities among the municipalities and the expanded service levels achieved through private sector involvement.

Incremental Costs

In order to achieve these additional global environment benefits, GEF support is requested for the following project components: 1) encouragement of inter-municipal environmental infrastructure (urban wastewater and waste management) in Guangdong; 2) Water Quality Monitoring and Information Systems, and; 3) facilitation of private sector involvement in environmental infrastructure and operations (see Table 2 below).

In the case of component (1) GEF resources totalling $6.8 million are requested to finance the incremental costs of promoting innovative, collaborative, more cost-effective and more sustainable joint municipal environmental infrastructure investments by helping to identify the first of these options and by providing modest incentives to the concerned municipalities to collaborate on jointly designing, constructing and operating several joint facilities. This GEF component will have measurable efficiency outcomes by increasing the total amount of wastewater treated over fifteen years from 1 Billion m3 to 1.15 Billion m3, i.e. supporting an incremental global benefit of 150 million m3 extra of waste water treated. This represents about a 15% decrease in the total amount of waste entering the South China Sea from the Program area by 2019. This GEF component will also support increases in daily municipal solid waste disposal capacity by a similar 10% improvement. The GEF investment incentive funds would only be committed if and when viable joint municipal projects were identified by the GEF-supported identification efforts. This GEF support would catalyze both a greater volume of environmental investment and a greater number of financially sustainable investments than the municipalities would make or could sustain under the Baseline (business-as-usual) Scenario.

GEF co-financing for component (2) of $2.25 million would enhance water quality monitoring facilities and staff capacity and strengthen both the project's impact assessment and the PRD's contribution to the UNEP/GEF South China Sea Project's M & E program. This would result in greater international environment quality data and allow for better targeted pollution reduction interventions. Regional and international pollution reduction conferences would be organized to bring together the parties impacting the South China Sea. These workshops would provide a forum to discuss pollution reduction plans and report on achievements, and help to speed-up the reduction of pollution loading to the South China Sea. The first of these ongoing meetings is proposed to be in Guangzhou in early 2005.

In the case of component (3), GEF resources are requested to finance the incremental costs of identifying and preparing viable proposals for private sector involvement to finance and operate additional environmental infrastructure facilities, which total $0.95 million. Without GEF support for this component (business as usual), the PRD's constituent municipalities will be reluctant to explore and develop such innovative options and will not fully tap the potential for joint municipal and/or private sector environmental investment and service provision. GEF support would thus supplement scarce public sector environmental investment resources with private sector investments and thereby accelerate pollution reduction in the PRD and from the PRD area into the South China Sea. This component is estimated to result in an extra 60 million m3 of waste-water treated over the next 15 years, a 5% decrease in total pollution loading to the South China Sea by 2019.

Through this combination of incremental activities, GEF support would catalyze an innovative regional (PRD-wide) and more comprehensive approach to water quality improvement. No single municipal investment program is capable of providing all of the treatment facilities and behavioral modifications needed to have a marked improvement to the South China Sea water quality. For example, complementary action on industrial livestock waste and other directed interventions to increase water treatment capabilities and reduce industrial waste discharges is also needed. The GEF Alternative will thus be the first of what is planned to be a series of such integrated yet independently delivered water quality improvement interventions.

The following incremental cost matrix summarizes the positive impacts that GEF support have on the pace and scale of pollution abatement programs within the Pearl River Delta. The Baseline Scenario is based on the Guangdong PRD Environmental Strategy Plan. This plan outlines an investment program of about 162 wastewater treatment plants estimated to cost about $5 billion. For wastewater and landfill development, total expenditures under the GEF scenario are estimated to be the same as the baseline scenario. However, through more efficient use of capital and faster development, the GEF Alternative Scenario results in a 20% decrease in the total pollution loading from the region to the South China Sea by the 2019. This is a staggering amount of avoided pollution. These improvements are brought about through component 1, inter-municipal cooperation, and component 3, increased private sector involvement.

The second component, water quality monitoring, has a baseline scenario cost of $9.25 million and a $11.5 million cost for the GEF Alternative Scenario, of which $2.25 million would be co-financed by the GEF. Provincial and municipal governments have committed to this increased

investment level and to support the international aspects of data collection and dissemination if the GEF support is forthcoming.

Table 2 presents both 'program' (i.e. some 162 wastewater treatment plants over 15 years within the PRD) and 'project' (Phase 1 of the program - this specific investment activity involving at least one wastewater treatment plant). The GEF assistance is not expected to change the overall costs of the program, but rather enhance the efficiency and treat an additional 250,000,000 m^3 of wastewater.

Table 2: Incremental Cost Matrix

	Cost Category	**US$ Million**	**Domestic Environment Benefit**	**Global Environment Benefit**
1. Urban Wastewater and Solid Waste Management in Guangzhou City and Inter-Municipal Environment Infrastructure	Baseline	WWT 5,000 (program cost) MSW 300 (program cost)	1.25 Billion m3 of wastewater treated 100 million tonnes of MSW disposed	1.25 billion m3 of WW treated and resulting pollution reduced Reduced water pollution from waste properly managed
	With GEF Alternative - a 15% increase in WW treated and a 10% increase in solid waste treated	WWT 5,000 (Program cost) MSW 300 (program cost)	1.44 Billion m3 of wastewater treated 110 million tonnes of MSW disposed; reduced pollution	1.44 Billion m3 of Waste Water treated Reduced water pollution from waste properly managed
	Increment	6.8 (project cost)	190,000,000 m3 extra WW treated	Reduced water contamination from an extra 190,000,000 m3 WW treated and 10,000,000 tonnes of waste landfilled
2. Water Quality Monitoring and Information Systems	Baseline	9.25 (project cost)	Modest expansion of existing data collection system	Greater international environment quality data Better targeted interventions
	With GEF Alternative	11.50 (project cost)		
	Increment	2.25		
3. Private Sector Involvement in Environment and	Baseline	WWT 5,000 (program cost)	1.25 Billion m3 of wastewater treated	1.25 Billion m3 of WW Treated and resulting pollution

Infrastructure		MSW 300 (program cost)	100 million tonnes of MSW disposed	Reduced water pollution from waste properly managed
	With GEF Alternative - a 5% increase in WW treated and a 5% increase in solid waste treated	WWT 5,000 (program cost) MSW 300 (program cost)	1.31 Billion m3 wastewater treated 105 million tonnes of MSW disposed; reduced pollution	1.31 Billion m3 of WW Treated Reduced water pollution from waste properly managed
	Increment	0.95 (project cost)	60,000,000 m3 extra WW treated	Reduced water contamination from an extra 60,000,000 m3 WW treated and 5,000,000 tonnes of waste landfilled
Total	Baseline	5,305,000,000		
	With GEF Alternative	5,315,000,000		
	Increment	10,000,000		

Annex 4: STAP Review
CHINA: Guangdong Pearl River Delta Urban Environment Project

STAP Review Comments on the brief of the GEF project by:

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The Pearl River Delta (PRD) is one of the most populated and industrialized areas in China. The water quality in many parts of the PRD has rated Class V or worse, particularly near large cities like Guangzhou, although in the upper reaches of the Pearl River in the main branches the water quality is generally good.

In recent years there has been a major emphasis on building wastewater treatment plants in the PRD. However, there is still a long way to go before water pollution in the PRD will be abated. One important reason for this slow progress is because of China's general lack of experience to address environmental problems with modern management skills and to involve private sectors in public works. In this sense, the integrated regional planning approach as evidenced by Project Components 2-4 is most noteworthy. The willingness of the Guangzhou municipality to support/participate in this undertaking is also most encouraging. Thus, I fully recommend approval of this proposed GEF project.

In the following, I have four technical comments for the authors to consider when finalizing the proposal:

1. As it presently stated the Project development objective is "***to improve the quality of the urban environment in key cities in the Pearl River Delta (PRD)****, by following an integrated regional planning approach, in order to facilitate continued economic and social development*". However, it is not clear that the 8 points stated in the next paragraph of the proposal are all direct progress-measures to the objective shown in bold face above. I would suggest rewording the objective to bring up the importance of demonstrating to the public and local officials the effectiveness of the '*integrated regional planning approach*'.

2. If the global objective of the Project is to be related to the South China Sea, the important land-based pollutants are principally POPs and nutrients. However, river-borne dissolved/particulate pollutants have significant impacts on the marine environment and ecosystems only in shallow coastal water with depths less than, say, 50 m. For the South China Sea Proper, it is the atmosphere-borne pollutants, i.e., in the form of aerosols, which exert influences. Thus, rationales given here, as well as related arguments stated elsewhere in the brief, need to be re-worded to reflect this fact.

3. The brief sounded apologetic, in my view unnecessary, when it stated under Section B.3

that "….the project would be processed even with this one city….". The city referred to here is Guangzhou. As an administrative unit, the word "city" in China encompasses a large region with many district level and small-city level administrations. Although they are all under the jurisdiction of Guangzhou City, implementation of integrated regional planning approach advocated by the proposed GEF Project does not come by any easier. I would suggest the proposal simply sets its minimum goal to implement the approach in Guangzhou City.

4. Lastly, usage of English needs to be checked. For example, it is better to say "low-wage", not "low-cost", migrant workers. The word "distributaries", rather than "tributaries", should be used when referring to river branches through which the Pearl River discharges its water to the sea.

Response to Review comments by SU Jilan, Second Institute of Oceanography State Oceanic Administration, Hangzhou, Zhejiang, China. STAP Review.

Dr. SU Jilan's support of the project is very welcome. His agreement with the project's integrated approach, and practicalities of starting with Guangzhou are encouraging. Also, the need to focus on modern management skills and involvement of the private sector is supported.

With regards to the four specific technical comments, they will be reflected in the project's final design and documentation.

1. The project's broad objective "to improve the quality of the urban environment in key cities in the Pearl River Delta' will be broadened to also include "and highlight the need for an integrated approach to environmental management".
2. The point that a keen focus is needed on POPs and nutrient loading for attainment of measurable water quality improvement in the South China Sea is very valid. Programs are underway to address these issues through other means, e.g. the regional livestock waste management project being supported by GEF. This project is intended to start with improved wastewater treatment and hazardous waste management as part of an overall comprehensive, multi-level effort. As suggested the rationale will be revised to reflect these facts.
3. The suggestion to be more positive on the exemplary role of the city of Guangzhou is appreciated. As related to point two, efforts will be made during project implementation to maximize the municipal governments and public learning that derives from the project. Guangzhou is certainly the best place to start within the Pearl River Delta region.
4. As recommended the project team will change "low-cost" to "low-wage" and "tributaries" to "distributaries" where warranted.

Again, the project team expresses its appreciation of Dr. SU Jilan's comments and his depth of understanding in the water quality of the South China Sea and its current impacts.

a) Response to comments from Secretariat and other Agencies

The project design should include a replication strategy, stakeholder participation plan, M&E indicators.

The project has a detailed replication strategy. First, the collected and collated water quality data will be made available broadly and consistently. The data will be presented in a user-friendly manner both on a readily accessible web-site and in annual environmental status reports. Data collection and distribution will endeavor to use common, and readily available, equipment and software to help other neighboring jurisdictions and countries set up similar and compatible systems.

The project is starting with the city of Guangzhou. Guangzhou (the capital of Guangdong) is an important city for piloting any activities within the region since results are quickly and easily seen by neighboring cities. Water quality data will be presented by cities which will enable quick comparisons. Guangzhou is also able to discuss regional approaches with Hong Kong SAR.

On specific project aspects such as private sector involvement in facility operations and joint municipal development of environmental infrastructure this project has clear terms of reference for any contract development to be carried out in a manner that includes a common structure which can be easily replicated by other cities. There are also specific funds identified for ongoing training programs where the lessons from Guangzhou's efforts will be discussed among other neighboring municipalities.

Stakeholder participation programs have been developed in at least four broad areas; siting and operation of wastewater treatment facilities, siting and operation of the hazardous waste facility, design and progress of the industrial pollution control program (IPCP), and collection and dissemination of Pearl River water quality. In the wastewater and hazardous waste facilities stakeholder participation has been built into the ongoing environmental management system EMS. This EMS forms part of the reviewed and legally binding environmental impact assessment. Although the public will be presented with the progress of industrial activities to reduce pollution on the web-site and annual environmental reports, the key stakeholder will be neighboring industries who the project intends to work with to reduce their overall pollution loadings. This will be done through technical workshops, in-house waste audits, and other technical and policy fora. Public stakeholder participation will occur mainly through existing and strengthened municipal (and higher levels of government) programs. This includes easy access to the web-site (with a question and answer section), schools educational program, annual municipal 'state of the environment' reporting.

The project has a comprehensive monitoring and evaluation program. Specific items to be monitored include; quantity of wastewater treated; efficiency of wastewater treatment, amount and efficiency of hazardous waste treated, number of operating contracts for environmental infrastructure that include private sector involvement, and number of intra and inter-municipally developed environmental infrastructure programs. These items will be monitored through various means such as regular project supervision, monthly/annual reports, real-time water quality data.

The Bank agreed to develop a strategic framework for other GEF supported interventions in the Region. The Bank also agreed to explore closer links between livestock waste reduction programs.

During project preparation discussions were held with Ministry of Agriculture representatives to design a

complimentary agricultural waste program (livestock and run-off). A plan is now in place to monitor agricultural waste reduction programs (integrating them with the water quality objectives outlined in this project) and report the results to the general public and the agricultural community. The GEF is supporting a regional livestock waste management project which can also be monitored through the water quality monitoring program being supported through this project.

Guangdong Province also agreed to hold at least one (and likely an annual event) regional (i.e. international) workshop or conference for all jurisdictions bordering the Pearl River Delta (including municipalities and countries). This forum will be used to develop regional pollution reduction strategies and disseminate best practices.

The implementation of a revolving fund to support environmental infrastructure was also discussed. The first pilot activities in the project are designed to be initial project suitable for support from a revolving capital fund. Discussions are still underway with GEF to broaden the fund (outside of the Pearl River Delta) and increase its size.

The Province of Guangdong (EPB) agreed to prepare a livestock management action plan. This plan, where appropriate, would be integrated into activities supported by this project. Capacity building activities for relevant agencies would be supported by this project where staff capacities overlap in EPB – this would help maximize any synergies between the two GEF supported activities. The Guangdong EPB also agreed to carryout pilot activities in the livestock waste area, e.g. emissions trading.

The Bank would investigate institutional coordination and support.

The Bank has an extensive investment program in the Pearl River Delta area. Already a second PRD is under preparation and discussion has started on a third. The lessons learned from the GEF supported activities are already being incorporated in follow-on project designs. There is keen interest within the PRD and within all urban areas of China, especially those along the eastern sea-board, to see how inter-municipal cooperation can be made to work and how best to involve the private sector in the development and operation of environmental infrastructure.

The Bank will actively participate in the international conferences being proposed by Guangdong Province. The Bank has also facilitated discussions with Hong Kong SAR, PEMSEA and UNDP. Information on the program (the overall objective of improving the water quality in the PRD in general – and specifically the mechanics and objectives of this project) is being widely distributed.