1. Project Data:

- **Country**: China
- **Project ID**: P081776
- **Project Name**: Cn-second Guangdong Pearl River Delta Urban Environment Project
- **Appraisal Project Costs (US$M)**: 187.90
- **Actual Project Costs (US$M)**: 147.13
- **Appraisal Loan/Credit (US$M)**: 96.00
- **Actual Loan/Credit (US$M)**: 70.92
- **Sector Board**: Water
- **Cofinancing (US$M)**:
  - for Board Approval Date: 03/21/2007
  - Closing Date: 12/31/2012
  - 12/31/2013
- **Sector(s)**: Sewerage (39%); Flood protection (31%); Sub-national government administration (20%); Sanitation (10%)
- **Theme(s)**: Pollution management and environmental health (33% - P); Urban services and housing for the poor (33% - P); Environmental policies and institutions (17% - S); Water resource management (17% - S)

2. Project Objectives and Components:

**a. Objectives:**

"The objective of the Project is to assist the Borrower in reducing water pollution in the Pearl River system originating from Foshan and Jiangmen Municipalities [Grant Agreement (GA), page 5]." The statement of the Project objective in the PAD is identical, but adds three sub-objectives as follows: (1) wastewater treatment and sludge disposal; (2) water quality monitoring and sediment removal from waterways; and (3) flood protection and river embankment improvements (Project Appraisal Document -PAD p. 4). This assessment will be based on the objective stated in the Grant Agreement, using as sub-objectives those mentioned in the PAD.

**b. Were the project objectives/key associated outcome targets revised during implementation?**

Yes

If yes, did the Board approve the revised objectives/key associated outcome targets? No

**c. Components:**

The project components planned in the two localities of the Pearl River Delta are developed hereunder:

1. **Original components**:
   1. **Foshan Components**:

Wastewater Management: (Total appraisal cost of US$ 31.70 million, actual cost of US$15.93 million): Activities under this component included (i) the expansion of Zhen’an wastewater treatment plant (Phase III) by 50,000m3/day;
(ii) the construction of interceptors, secondary sewers, and pumping stations; and consultant services for development of GIS-based wastewater network map, and (iii) the enhancement of wastewater management capacities.

**Sludge Treatment and Disposal**: (Total appraisal cost of $ 19.00 million, actual cost of US$ 9.10 million) Intended activities were (i) the construction of a 400 tons/day capacity centralized sludge treatment and disposal facility at Nanzhuang to treat sludge from five wastewater treatment plants in Foshan; (ii) consultant services for design review of facilities, and equipment and other goods for the operation of the facility.

**Flood Protection and Embankment Rehabilitation**: (Total appraisal cost of US$ 63.70 million, actual costs of US$39.51 million). The project intended to make improvements to Fengjiang River north embankment and adjacent areas.

**River Water Quality Improvement**: (Total appraisal cost of $ 29.70 million, actual cost of US$ 22.31 million): Activities included (i) the Foshan Waterway and Foshan Creek sediment dredging, treatment and disposal; and construction supervision services; (ii) construction of four automatic water quality monitoring stations; and (iii) consultant services for development of a water environment management information system and improvement of the Foshan urban management information database.

**Institutional Strengthening and Training**: (Total appraisal cost of US$ 4.64 million, actual cost of US$ 4.81 million). This component aimed to provide technical assistance for (i) project management services including contract management, utility management and tariff setting, and monitoring safeguards implementation; (ii) study of environmental costs for GDP growth and “green” economic planning; and (iii) training and study tours.

(ii) **Jiangmen Components**:

**Wastewater Management**: (Total appraisal cost of US$ 38.35 million, actual total cost of US$ 54.64 million). This component aimed to expand the Wen Cheng Sha wastewater treatment plant by 150,000 m3/day; construction of interceptors, secondary sewers, pumping stations; and improvements in the water quality monitoring system.

**Institutional Strengthening and Training**: (Total appraisal cost of US$ 0.80 million, actual total cost of US$ 0.84 million). This component was to provide technical assistance to enhance operational and business management capacities of the new Jiangmen Biyuan Wastewater Company.

### Revised Components:

In October 2012, the project went through a level two restructuring, triggered by the RMB re-evaluation and increases in labor and material costs, and led to the following changes:

- The construction of a centralized sludge treatment and disposal facility of a capacity of 400 tons/day to treat sludge from five WWTPs was replaced by the construction of four decentralized sludge treatment facilities with a total capacity of 220 tons/day for four WWTPs.
- The loan proceeds were reallocated among the disbursement categories and the financing percentages for selected categories of expenditure were increased to complete the project activities and achieve the PDO. After restructuring, while the project total envelope didn’t change, there were spikes in budgeted costs for goods in activities in Foshan and Jiangmen, which were offset by a decrease in costs for civil works in Foshan, and costs of consultant services and training across the board.

### d. Comments on Project Cost, Financing, Borrower Contribution, and Dates:

**Costs**: The project total costs amounted to US$ 147.13 million or 78 percent of costs at appraisal. Out of the total costs, the IBRD loan contributed in the amount of US$ 70.92 million, or 48.2 percent of approved amount, the other part of the costs was covered by the Borrower’s contribution.

**Financing**: The project was an IBRD Specific Investment Loan in the amount of US$ 96.0 million. Funds were on lent to participating sub-national governments (provinces).

**Borrower Contribution**: At appraisal, the Borrower intended to contribute US$ 91.90 million, but at project closure, disbursed resources amounted to US$ 76.21 million or 83 percent of the amount identified at appraisal.

**Dates**: This was an IBRD special investment loan approved on March 21, 2007 and became effective on June 27, 2007. In October 2012, the project went through a level two restructuring aimed at (a) a reallocation of funds; (b) an increase in the disbursement percentages for selected categories; (c) a one year extension of the Loan Closing date until December 31, 2013 to allow extra time to implement the redesigned sludge treatment facilities and to complete sewer networks; and (d) amendments to the Subsidiary Loan Agreements to reflect certain administrative changes.
that occurred during implementation. The project was closed on new closing term, 12 months after initial closing date. A non-disbursed amount of US$25.0 million was cancelled on May 12, 2014.

3. Relevance of Objectives & Design:

a. Relevance of Objectives:
   **High**
   The project aimed to support the Government’s 11th Five Year Plan, articulated around a “people-centered” strategy, aiming to achieve a “harmonious society” that balanced economic growth with distributional and ecological concerns (PAD). In the Pearl River Delta (PRD) cities of Foshan and Jiangmen, the priority was to rapidly expand the wastewater treatment capacity, and Bank dialogue with the country authorities concluded that this project could bring value added through best practices in the design and implementation of relatively innovative sludge management, dredging and safe disposal of sediments from the rivers, and the establishment of an environmental monitoring system.

   At appraisal, the project supported two prominent themes in the Country Partnership Strategy (CPS) for 2006-2010: (a) managing resource scarcity and environmental challenges especially related to water pollution reduction and conservation; and (b) promoting balanced urbanization and improving the quality of urban life. When the project closed in 2014, the project was still consistent with the Country Partnership Strategy (CPS) for 2013-16, especially through the first pillar aimed at supporting greener growth, by helping China shift to a more sustainable energy path; enhancing urban environmental services; piloting sustainable natural resource management approaches; and demonstrating pollution management.

   The project supported priority areas for the country, and was at the core of the two Bank’s country partnership strategies that overlapped with the project. Relevance of objectives is rated as high.

b. Relevance of Design:
   **Modest**
   The statement of the overall objective in the Loan Agreement was concise and precise, and was identical to the one in the PAD. However, the latter was more comprehensive as it added three project sub-objectives. Activities detailed in the project components aligned logically with the project sub-objectives and the overarching objective. Initial resource allocation was adequate, but in hindsight, substantial savings during implementation were not utilized toward achieving the project objective.

   The quality of the results framework in Annex 2 of the PAD was mixed, as there was an imbalance in the composition of the outcome indicators. Most indicators were related to the financial sustainability of the infrastructure, and less to the efficacy of the project. While the indicators included in the results framework reflected the impact of most of the project activities in the PDO and included target values derived from different studies conducted during project preparation, additional indicators were necessary to better reflect the impact of all activities funded by the project, and all indicators should have had baseline and annual targets instead of just mid-term review and end-of-project targets. Some of the outcome targets were revised during the level 2 restructuring in October 2012, but as shown in Section 10 below, several of them were at the output rather than outcome level.

   In summary, while the project was adequately designed, the initial and revised results frameworks had weaknesses, and saved resources were neither efficiently allocated nor used.

4. Achievement of Objectives (Efficacy):

   The development objective was to reduce water pollution in the Pearl River system originating from Foshan and Jiangmen municipalities. (Grant Agreement-GA, page 5). Achievements toward the overall objective included progress made in (i) wastewater treatment and sludge disposal, (ii) water quality monitoring, and sediment removal from waterways, and (iii) flood protection and river embankment improvements.

   (i) Wastewater treatment and sludge disposal: **Modest**

   Outputs:
   - Expansion of the capacity of the Zhen’an Wastewater Treatment Plant (WWTP) in Foshan from 200,000 m³/day to 250,000 m³/day, and construction of 7.6 km of associated sewer collection networks. Expanded WWTP became operational in 2010 at the high hydraulic capacity of 95%. These interventions have contributed to increase the amount of wastewater collection and treatment in Foshan from 50% at appraisal to 88% at closing (8% more than expected),
Following the expansion of the Wen Chang Sha WWTP in Jiangmen, wastewater collection and treatment increased from 22% in 2006 to 80% at project closure, 10% more than the target. Sludge was dewatered to 20% solid content using centrifugal filter press, and then shipped by a licensed operator for composting. Decentralized and downsized sludge treatment works (220 tons/day total) at four WWTPs were built using plate and frame filter press for dewatering sludge to 40% solid content.

Outcome

At project closing, wastewater treatment plants in Jiangmen and in Chancheng district in Foshan were serving about 500,000 people and 600,000 people respectively;

The target of improvement of wastewater volume treated per employee (‘000 m3/day/person) was achieved for Foshan (2.32 achieved against target of 1.27) and Jiangmen (2.12 against 1.905);

Sludge was properly treated and safely disposed of, preventing the contamination of groundwater and adjacent waterways around the disposal site as before the project;

The volume target (mass) of biologic oxygen demand (BOD) pollution loads removed by the treatment plant supported under the project (tons/year) was achieved. Achievements were 846 t/y against a target of 476 t/y for Foshan, and 3,528 t/y against a target of 1,954 t/y for Jiangmen.

The target on improvement of consumption of electricity per unit (kWh/m3) for Foshan and Jiangmen was achieved. Levels achieved were 0.15 kWh/m3 for Foshan, and 0.23 kWh/m3 for Jiangmen.

The target for improvement of the unit cash operating cost (RMB/m3) for Foshan and Jiangmen was not achieved as the plants are not yet fully loaded (81% in Jiangmen and 95% in Foshan);

Reductions in pollution discharges entering the PRD river network from Jiangmen and Foshan (COD, NH4-N), were only partially achieved, due to an overestimation of the pollution loads in the WWTPs influents.

Achievements for Foshan were 1,825 t/y for chemical oxygen demand (COD), and 276 t/y for NH4-N, against targets of 2,500 t/y for COD and 150 t/y for NH4-N. Achieved levels for Jiangmen were 6,050 t/y for COD, and 917 t/y for NH4-N, against targets of 14,235 t/y for COD and 1,095 t/y for NH4-N.

Improvement of the cost recovery ratio and debt service ratio for Foshan (cost recovery achievement of 1.6% against a target of 2.33%, and debt service achievement of 1.5% against a target of 0.4%) was not achieved. The above ratios for Jiangmen were not applicable because the Jiangmen Biyuan Wastewater Company was still not autonomous (Cost recovery of 1.3% against a target of 0.7%, and a debt service ratio of 1.5% against a target of 0.4%).

Overall, efficacy toward outcome was substantial, because capacity for wastewater treatment, sludge disposal, and reduction in pollution discharges improved, although sustainability and operating targets were either missed or partially achieved.

(ii) Water quality monitoring, and sediment removal from waterways : Substantial

Outputs:

- 28 km of river dredged compared to 35 km estimated at appraisal;
- 699,600 m3 of wet sediments were dredged and dewatered, resulting in 362,600 m3 (with less than 60% water content) which in turn was disposed of in a specially designed and developed landfill within an abandoned quarry 28 km away. The landfill was then closed at the year end of 2011.

Outcome

The target of compliance rates for key indicators (COD, BOD, N, P) with river quality standards at measurement stations in Foshan and Jiangmen was achieved. Actual levels for Foshan were (i) 21.6 mg/l against a target of 40 mg/l for COD, (ii) 3.2 mg/l against a target of 10 mg/l for BOD, (iii) 1.42 mg/l against a target of 2.0 for NH4-N, and (iv) 0.1 mg/l against a target of 0.4 mg/l for TP. Actual levels for Jiangmen were (i) 12.4 mg/l against a target of 30.0 mg/l for COD, (ii) 2 mg/l against a target of 6.0 mg/l for BOD, (iii) 0.55 mg/l against 1.5 mg/l for NH4-N, and (iv) 0.2 mg/l against a target of 0.30 mg/l for TP.

The removal of polluted sediments arguably helped improve water quality and increased the river ’s discharge capacity although no directly linked indicators are available;

Improved water quality monitoring system helped to better understand the capacity of the river to assimilate pollution loads and plan more effective pollution control measures.

Under this sub-objective, outcome is rated as substantial, because the project helped to improve the standards of water quality, partially through removal of polluted sediments.

(iii) Flood protection and river embankment improvements : Modest

Outputs

- 6.7 km of embankments along the Fenjiang river were improved by intercepting wastewater and redirecting it to the WWTP and elevating the river banks to a sufficient height to protect against a 1 over 50 years flood event.
5. Efficiency:

Modest

Financial analysis: The ICR carried out a project financial sustainability analysis of the wastewater companies in Foshan and Jiangmen managing the WWTPs, by reviewing the level of cost recovery in the sector and the impact of government contribution on their fiscal expenditures, using the financial indicators of (i) full cost recovery rate and (ii) debt service coverage ratio.

In Foshan, the financial analysis found that the current concessional rate is sufficient for the WWTP company to comply with the indicator of debt service coverage ratio established in the financial covenant (1.6 vs. the target of 1.3), but failed to meet the requirements of full cost recovery in 2012 and 2013 (a ratio of 0.9 achieved vs the target of 1 in the financial covenants). An additional analysis shows that controlling the level of debt for capital investment could help the wastewater company to comply with the requirement of full cost recovery. The financial analysis of the entire wastewater sector found also that the current wastewater tariff paid by customers is not sufficient to cover full costs (investment and operations) of the wastewater sector in Chancheng District (collection and treatment).

In Jiangmen, the financial analysis prepared during the ICR exercise found that the wastewater treatment company can cover operation and maintenance costs through the concessional rate paid by the municipal government. Calculation of the full cost recovery and debt service ratios for the company is not possible because the municipal government is responsible for capital investments and debt service payments. Assuming a fictitious payment from the municipal government to the company equivalent to the value of depreciation of assets, the company would comply with the financial covenant of debt service coverage ratio and full cost recovery in 2013. The level of cost recovery in the whole wastewater sector was also analyzed and it was found that revenues from the wastewater tariff can cover the operation and maintenance costs of wastewater treatment and collection, although not the full costs including debt service and depreciation. To meet the requirements of full cost recovery, the wastewater tariff in Jiangmen should be increased annually.

Economic analysis: Since project benefits were difficult to quantify, the economic analysis was based on a least-cost analysis of estimated total project costs at appraisal. Following this approach, total project costs were estimated ex ante at US$187.9 million. At project closure, the ICR reported that all activities were completed, except for two activities (which were under implementation at closure, but now completed) and final project costs incurred amounted to US$147.1 million. The differences with the estimated cost at appraisal are mainly due to savings on procurements and favorable exchange rates. Average incremental costs (AIC) of selected alternatives of the WWTPs are almost the same (Foshan) or lower (Jiangmen) than expected at appraisal. The decentralized option for treating sludge, which was implemented as indicated under Section 4, was more economical than the centralized one considered at appraisal. The river rehabilitation component was also cheaper than expected, unlike the river dredging which was US$20 million more expensive than expected.

Administrative and Institutional Efficiency: Weaknesses were observed in four areas: (i) the lengthy project review cycle made project adjustments difficult, resulting in sub-project cancellation, and more simplified review procedures were warranted, (ii) regulation changes and technology development on wastewater treatment sludge management and disposal requirements caused delays on bidding evaluations and resettlement works, and (iii) borrower’s implementing agencies had difficulties with preparing bidding documents, and needed more examples during the preparation of tendering documents, and (iv) improper allocation of the savings accumulated during project implementation (US$25.0 million), which could have been used for an expansion of the project activities in order to strengthen the outcomes identified in the project.

a. If available, enter the Economic Rate of Return (ERR)/Financial Rate of Return (FRR) at appraisal and the re-estimated value at evaluation:

<table>
<thead>
<tr>
<th>Rate Available?</th>
<th>Point Value</th>
<th>Coverage/Scope*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appraisal</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>
6. Outcome:  
**Moderately Satisfactory**  
Relevance of objectives was high, whilst relevance of design was modest. Efficacy was substantial for the first and second sub-objectives, and modest for the third sub-objective. Achievements under the first sub-objective were mixed; most outcome indicators assessing efficacy were achieved, although those measuring sustainability were partially missed. Under the second sub-objective, efficacy was strong as illustrated by achieved outputs and outcome indicators. There were substantive achievements under the third sub-objective, but the rating was modest because of the absence of performance benchmarks at project design and restructuring.

Overall efficiency was modest, because ex-post financial and economic analysis found that the current wastewater tariff paid by customers is not sufficient to cover full costs of the WWTP in Foshan and in Jiangmen, and savings on procurements and favorable exchange rates were not used efficiently.

**a. Outcome Rating:** Moderately Satisfactory

7. Rationale for Risk to Development Outcome Rating:

The ICR identified two areas of strength, and two areas of weakness regarding the risk to development outcome. Factors supporting the sustainability of achieved outcome are the following: (i) both the municipal and provincial governments showed great commitment in keeping up with the environmental management agenda in the region, and (ii) unfinished project activities when the project closed have been completed, including (a) the environmental management system and (b) the infrastructure in the flood protection component and the sludge treatment plants of Nanzhuang and Chengbei, as well as adequate sludge and landfill management.

There are two areas in need of close follow up by the Borrower to sustain achieved outcome: (i) while the wastewater treatment plants are working well, it is important to regularly make tariffs adjustments in order to strengthen the financial autonomy of the wastewater sector, including the needed investments and operation of the sewer network, under the responsibility of the municipal governments, and (ii) the city of Guangzhou in the Pearl River Delta is considered by a recent study as the most vulnerable coastal city in the world to climate change, and the cities of Foshan and Jiangmen belong to the PRD metropolitan area. The conclusions of that study apply to these two cities as well. Additional measures to mitigate flood risks will be indispensable in the near future.

**a. Risk to Development Outcome Rating:** Moderate

8. Assessment of Bank Performance:

**a. Quality at entry:**

Bank management utilized the country team's high technical level, its strong partnership with the two municipalities, and its experience in the country. The option for a successor project was adequate, as building on achieved outcome by the completed project could increase impact. The project interventions focused on wastewater treatment and on activities where sound knowledge and best international practices could be applied. Investment selection was based on economic rationality and lower costs rather than guided by political criteria. The project design relied heavily on considerable economic and sector work funded by donors' and Bank's budgets.

While implementing arrangements were strong, the provision for M&E was tentative. While critical risks related to the achievement of project outcomes were identified, risks related to potential overestimation of pollution loads to be removed by the WWTPs should have been identified, given that this was a well-known and common problem in the region. Project design was deeply affected by shortcomings in the design of the results framework and the unrealistic financial covenants pertaining to full cost recovery in the wastewater sector. The team failed during appraisal and restructuring phases to set up realistic indicators with well-defined baseline and targets. Performance in this area was below expectations, given the quality of the Bank team members, and the large experience they had of the country and the sector.

**Quality-at-Entry Rating:** Moderately Unsatisfactory

**b. Quality of supervision:**
The Bank showed proactivity in restructuring the project in 2012 to re-design the sludge management component, extend the project period for one year and improve the results framework by adding more quantifiable indicators to measure utility efficiency and by dropping the indicator on increased land use rights. The Bank provided expertise to resolve the issues causing delays such as procurement irregularities and financial management weaknesses. During supervision missions, the Bank reviewed the remedial actions being taken by the PMOs and provided on-the-job training of financial management practices.

However, the above Bank’s support to PMOs was insufficient, as the latter continued to witness weaknesses, including delays on bidding evaluations and resettlement works, and in preparing bidding documents. The Bank should have worked unilaterally or in conjunction with the Borrower to support more effectively implementing agencies, notably through enhanced technical and training.

**Quality of Supervision Rating**: Moderately Satisfactory

**Overall Bank Performance Rating**: Moderately Satisfactory

9. Assessment of Borrower Performance:

a. **Government Performance**:

Provincial and local authorities showed strong leadership by taking the option of a decentralized approach to manage the project, by making the necessary institutional reforms, and by providing counterpart funding estimated at US$91.9 million to support or complement project activities. The decentralized arrangement favored a more fluent implementation as it avoided extra clearance processes. The provincial and municipal governments also played a key role in the selection of project activities, and including those activities that were more technically complex.

There are two key weaknesses that the Government should have handled differently in the pursuit of project outcome: (i) the two municipal governments could have made stronger efforts to further adjust tariffs to improve the financial autonomy of the wastewater sector, (ii) by proper allocation of the savings accumulated during project implementation, the Government could have planned an expansion of the project activities in order to strengthen the outcomes identified in the project.

**Government Performance Rating**: Moderately Satisfactory

b. **Implementing Agency Performance**:

Implementing agencies (decentralized sector agencies in Foshan and Jiangmen) were effective in project design and implementation, they maintained strong commitment toward achieving the PDO, and they were proactive in dealing with the startup delays and slow procurement approvals and in achieving effective results. However, there were some delays, notably in the execution of environmental and social safeguards measures.

While the quality of monitoring and reporting on the project outcomes and output indicators was good, the Implementing Agencies fell short in designing and monitoring the indicator #1 (reductions in pollution discharges entering the PRD river network from Jiangmen and Foshan), and this could not help in setting more realistic targets at an earlier point during project implementation.

**Implementing Agency Performance Rating**: Moderately Satisfactory

**Overall Borrower Performance Rating**: Moderately Satisfactory

10. M&E Design, Implementation, & Utilization:

a. **M&E Design**:
The project had a comprehensive and detailed results framework and monitoring arrangements presented in the annex 3 of the PAD, which included target values derived from different studies conducted during project preparation, such as the Environmental Assessment or the Financial Analysis. However, there were difficulties in setting performance indicators: (i) the targets set up for indicator #1 overestimated the amount of pollution to be removed by the plants, (ii) the indicator #2 in the PAD should have included quantifiable indicators related to utility benchmarks, and (iii) the indicator #4 was not directly attributable to the project and should not have been used as a PDO indicator. Finally, to meet the standards, all indicators should have had annual targets instead of just mid-term review and end-of-project targets.

<table>
<thead>
<tr>
<th>DPO</th>
<th>The development objective is to reduce water pollution in the Pearl River system originating from Foshan and Jiangmen municipalities through a package of key initiatives, including wastewater treatment and sludge disposal, water quality monitoring, sediment removal from waterways, and flood protection and river embankment improvements.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Results indicators</td>
<td>March 2007-October 2012</td>
</tr>
<tr>
<td>1</td>
<td>Evidence of reductions in domestic source pollution entering the PRD river network from Foshan municipality (via technical and social audits).</td>
</tr>
<tr>
<td>2</td>
<td>Evidence of reductions in domestic source pollution entering the PRD river network from Jiangmen municipality (via technical and social audits).</td>
</tr>
<tr>
<td>3</td>
<td>Evidence of improvement in the effectiveness in operations, management and finances of wastewater utility services assisted under the project.</td>
</tr>
<tr>
<td>4</td>
<td>Evidence of improved river water quality at measurement stations in Foshan municipality.</td>
</tr>
<tr>
<td>5</td>
<td>Evidence of improved river water quality at measurement stations in Jiangmen municipality.</td>
</tr>
<tr>
<td>6</td>
<td>Increases in land use rights for residential commercial and industrial properties adjacent to project areas.</td>
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<td>7</td>
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</table>

**b. M&E Implementation:**

As reported by the ICR, data on water quality was collected at wastewater treatment plants, and in representative stations along the waterways, and financial data from the two wastewater utilities was also periodically gathered in order to monitor their performance. The implementation progress was monitored and information related to these
Indicators was collected and reported in progress reports. The Bank kept track of progress of physical, financial, environmental and resettlement and land acquisition aspects, which were reported in the semi-annual progress reports.

To improve the results framework, the restructuring in November 2012 revised one PDO Indicator (#2), while another one was dropped (#4). A Core Sector Indicator was introduced (Indicator #5) to comply with a new corporate mandate and to correct the overestimation of the targets in indicator #1. Target values and baselines were also revised.

c. M&E Utilization:

The information provided by the ICR under the M&E utilization heading is correct, but does not provide substantive content, which appropriate to this heading. However, the data and information provided under the M&E implementation heading above was used to monitor the project progress. That is why the components were slightly revised, and the results matrix revamped, although these changes were ineffective, because the achieved budget savings were not reallocated efficiently, and that part of the results matrix remained inappropriate until the project closure.

M&E Quality Rating: Modest

11. Other Issues

a. Safeguards:

Social Safeguards: The Project triggered OP 4.12 on resettlement. A Resettlement Action Plan for the Foshan component was prepared and disclosed on April 27, 2006. Implementation of the Plan started in 2006 and was completed by loan closing. In February 2014, the Foshan PMO submitted a summary report of resettlement implementation prepared by the external monitoring institution of the Project and compliance with OP 4.12 was found satisfactory. A total of 15 households were re-located, compared to 10 originally planned, and the number of affected people was significantly lower than planned due to attentive design. The Jiangmen component did not include resettlement.

Environmental Safeguards: The ICR reported extensively on how environmental safeguards were dealt with throughout the project life: (i) before project approval, the Environmental Impact Assessment (EIA) and the Environment Management Plan (EMP) were reviewed, found satisfactory and disclosed. Environmental impacts and mitigation measures were fully considered at every project phase. The Bank’s OP 4.01 on Environmental Assessment was also triggered. (ii) a supplemental EMP was prepared and disclosed when the sludge treatment component was redesigned, (iii) Training was carried out on key environmental safeguard compliance requirements, and environmental management measures were included in the bidding and contract documents, (iv) public consultation and information disclosure were continuous processes during the entire project cycle, and (v) the monitoring results showed that the effluent, ambient air quality, odor and noise, and sludge complied with the relevant environmental standards during the operation of WWTPs.

b. Fiduciary Compliance:

Financial Management: The ICR reported that financial management largely followed Bank procedures and all project audit opinions were unqualified. However, some small issues related to weak financial management practices were disclosed by the external auditors, and project accounting practices and project management coordination mechanisms and communication caused delays in disbursements.

Procurement: Procurement was generally carried out in accordance with the procedures stipulated in the legal agreements, Bank guidelines, and the agreed procurement plan. Procurement for four transactions had to be re-bid or re-evaluated and caused delays up to 12 months. Availability of more experienced staff and consultants and more coordination between the different project implementation units could have avoided procurement processing disruptions.

c. Unintended Impacts (positive or negative):
d. Other:

<table>
<thead>
<tr>
<th>12. Ratings:</th>
<th>ICR</th>
<th>IEG Review</th>
<th>Reason for Disagreement /Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Outcome:</strong></td>
<td>Moderately Satisfactory</td>
<td>Moderately Satisfactory</td>
<td></td>
</tr>
<tr>
<td><strong>Risk to Development Outcome:</strong></td>
<td>Moderate</td>
<td>Moderate</td>
<td></td>
</tr>
<tr>
<td><strong>Bank Performance:</strong></td>
<td>Moderately Satisfactory</td>
<td>Moderately Satisfactory</td>
<td></td>
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<tr>
<td><strong>Borrower Performance:</strong></td>
<td>Moderately Satisfactory</td>
<td>Moderately Satisfactory</td>
<td></td>
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<tr>
<td><strong>Quality of ICR:</strong></td>
<td>Satisfactory</td>
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</table>

**NOTES:**
- When insufficient information is provided by the Bank for IEG to arrive at a clear rating, IEG will downgrade the relevant ratings as warranted beginning July 1, 2006.
- The "Reason for Disagreement/Comments" column could cross-reference other sections of the ICR Review, as appropriate.

**13. Lessons:**

IEG supports three lessons developed in the ICR, which are reformulated below:

(i) **The Results Framework deserves close attention during the entire project cycle**: Without a solid and clear results framework, it is difficult to measure the success of a project. Formulating relevant, measurable outcome indicators is critical for project design and implementation, and the achievement of project objectives. On the contrary, if outcome indicators are flawed during project life, performance measurement becomes an issue, and this is an impediment to objective achievement.

(ii) **Financial and institutional sustainability of complex operations like Wastewater Treatment Plants and centralized vs decentralized sludge treatment are complex themes that need more research and analysis**. Projects supporting the urban environment sector address a multifaceted problem, ranging from institutional sustainability and financial viability of the companies set up to manage wastewater treatment, to sludge disposal. Before deeper research and experimentation is concluded, the Bank’s projects in this domain should pursue less ambitious goals.

(iii) **There is need for deeper analytical work to address the problem of water and sewerage influent characteristics at the design stage**: Incorrect measurement of the influent characteristics has led to a flawed results matrix, and this seems to be an issue at the regional level. As this matter seems to be a systemic issue, resources should be sought to address it definitively, not only for China, but for other countries and similar projects.

**14. Assessment Recommended?**

- **Yes**
- **No**

**Why?**
A PPAR reviewing the two projects (PRD1 and PRD2) of the urban environment program in China would provide an opportunity to assess the technical issues raised in the ICRR, especially those related to the institutional and financial sustainability of WWTPs, and the problem of influent characteristics.

**15. Comments on Quality of ICR:**
This ICR was candid and comprehensive in reporting facts pertaining to project design and implementation. There was clear and complete reporting of the outputs generated, and special attention to the financial and economic analysis of the project outcome. However, the ICR was weak in analyzing the overall achievements of the project, and in isolating the outputs and outcomes attributable to this project. Finally the project performance rating for efficiency was mislabeled as "Moderate," when it should have been termed "Modest."

**Quality of ICR Rating:** Satisfactory