Report Number : ICRR0021603

1. Project Data

Project ID	Project Name
P112626	CN - Liuzhou Environment Management II
Country	**Practice Area(Lead)**
China	Water

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
IBRD-80050	31-May-2017	150,000,000.00
Bank Approval Date	**Closing Date (Actual)**	
10-Mar-2011	31-May-2018	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	150,000,000.00	0.00
Revised Commitment	150,000,000.00	0.00
Actual	150,000,000.00	0.00

Prepared by	Reviewed by	ICR Review Coordinator	Group
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2. Project Objectives and Components

a. Objectives

The Project Development Objective (PDO) as stated in the Loan Agreement (Schedule 1, page 5) and in the Project Appraisal Document (PAD, page 3):
" To establish sustainable wastewater collection and treatment services within the urban area boundaries of Liuzhou, and in the Sanjiang, Rong'an, Rongshui, and Liucheng Counties"

This review is based on the two sub-objectives: (i) To establish wastewater collection and treatment services within the urban area boundaries in the selected counties; and, (11) To ensure that these services are sustainable.

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

No

c. Will a split evaluation be undertaken?

No

d. Components

This project was the second phase of the Liuzhou Environmental Management Project aimed at improving and protecting the water quality of the Liujiang River through investments in improved wastewater treatment services. The first phase was completed on June 30,2011. There were three components (PAD, pages 3 and 4).

One: Wastewater management. Appraisal estimate US$265.46 million. Actual cost US$274.93 million. This component financed construction of six wastewater treatment plants and a sewerage system in the fringe areas of Liuzhou central urban area.

Two. Sludge Management. Appraisal estimate US$6.90 million. Actual cost US$7.09 million. This component financed construction of a sludge co-combustion system by adapting the existing rotary kilns of the Yufeng Cement Plant and the storage and processing facilities required for operating the system.

Three. Institutional Development and Capacity Building. Appraisal estimate US$1.91 million. Actual cost US$1.82 million. This component provided technical assistance for; (i) project management support; (ii) strengthening the operation of the existing wastewater facilities and establishing a Monitoring Information System/Geographical Information System for asset management; and (iii) financing workshops, study tours and training for human resource management of Liuzhou Municipal Wastewater Treatment Company, Limited.

e. Comments on Project Cost, Financing, Borrower Contribution, and Dates

Project cost. The appraisal estimate of the project was US$274.27 million. The actual project cost at closure US$283.84 million. The actual cost of component one was higher as the scope of this activity was expanded. The actual cost of component two activities were slightly higher than anticipated at appraisal. Although there were procurement savings which enabled expanding the scope of the

project, the actual cost was three percent higher than estimated and this increase was covered by counterpart funds.

Project financing. The project was financed by an IBRD loan of US$150.00 million. The loan was fully disbursed.

Borrower contribution. The borrower contribution was estimated at US$138.39 million at appraisal. Their actual contribution was US$133.83 million.

Dates. The project was approved on March 2011, became effective on August 23, 2011 and scheduled to close on May 31, 2017. The project was restructured twice. These changes were made through the first Level 2 restructuring on December 10, 2015. (I) The results framework was modified and new indicators were added (discussed in section 9a); (ii) The scope of component one activities was expanded; and (iii) The closing date was extended by six months for completing the wastewater treatment plants; The second Level 2 restructuring on November 2, 2017, extended the project closing date by six months for completing activities that had been subject to unforeseen delays, caused by institutional changes at the Liuzhou Municipal Treatment Company, Limited (LMWTC) (ICR, paragraphs 23 and 67). Following the formation of a Public-Private Partnership in 2007 to provide water supply services, the municipality carried out reforms in 2016 that included a merger of the LMWTC (the entity responsible for wastewater treatment) with the Liuzhou Veoila Water Affairs (the entity responsible for water supply management) and formed the Liuzhou Water Affairs investments. Although the legal identity of the LMWTC remained unchanged, the merger necessitated staff reassignment and LMWTC was understaffed for six months which caused delays. The project closed one year behind schedule on May 31, 2018.

3. Relevance of Objectives

Rationale

The PDOs were relevant to China’s development priorities. Rapid growth and urbanization had contributed to the environmental degradation of local waterways in the Guanxi Autonomous Region, with most domestic and industrial discharged directly into the Liujiang River without treatment. At appraisal, the PDOs were consistent with the government's 11th Five-Year Plan for 2006-2010 and the 12th Five-Year Plan for 2011-2015. The 13th Five-Year plan for 2016-2020 underscored the need for sustainable growth and development in China's western regions through efficient development of water resources, equitable public service delivery, protection of the environment and improving ecological security.

The PDOs were also well-aligned with the Bank strategy. At appraisal, they were relevant to a key pillar of the Bank's Country Partnership Strategy (CPS) for 2006-2010 of managing resource scarcity and addressing environmental challenges, by expanding urban wastewater collection and treatment facilities and piloting innovative approaches to management of natural resources. The project

was well-aligned with two pillars of the latest available CPS for 2013-2016: (a) supporting greener growth through enhancing urban environmental services, expanding supply of safe water to small towns and cities, improving sanitation and solid waste management services in selected tier cities and piloting new technologies for addressing environmental challenges in large cities; and (b) promoting inclusive development by focusing on lagging regions and enhancing development of secondary towns through integrated urban planning that included improved service delivery of water supply and sanitation services. The PDO was relevant to the historical experience of the Bank. Following the first phase of the project, the wastewater collection and treatment capacity of the Liuzhou municipality, increased from 100,000 cubic meters to 500,000 cubic meters per day, and the percentage of treated wastewater increased from 15 percent to 75 percent. However, the counties neighboring Liuzhou lacked wastewater treatment plants or collection systems and domestic wastewater from these areas was directly discharged into the rivers without treatment.

However, while there is a clear alignment between the project's development objectives and the government and Bank strategies, the PDOs were pitched at a level that does not adequately reflect a potential solution to a development problem. A shortcoming here was that the objective was not defined such that its achievements would be plausibly traceable to improvements envisioned to arise from an established sustainable wastewater collection and treatment system such as improving and protecting the water quality of the river and thus positive environmental and health effects. While these may be long-term targets, tracking and identifying them is an important aspect of a successful development operation and relevance of objective is therefore rated as Substantial.

Rating
Substantial

4. Achievement of Objectives (Efficacy)

Objective 1
Objective

To establish wastewater collection and treatment services within the urban area boundaries in the selected counties.

Rationale

Theory of change. The causal links between project activities, outputs and outcomes were logical. Construction of wastewater treatment plants, pumping stations and storage and processing facilities for management of wastewater sludge aimed at increasing the capacity for wastewater collection and treatment in the urban area boundaries of Liuzhou and four neighboring counties. These activities were relevant for preventing the discharge of domestic wastewater from these areas directly into the rivers

without treatment. These activities were expected to contribute to the long-term objective of improving the environmental conditions of Liujiang River in Liuzhou city.

Outputs (ICR, paragraphs 29 - 34 and pages 27-41).
These outputs were for the most part realized.
Six wastewater treatment plants were constructed in the areas under the project (Liuzhou city, Sanjiang, Rong'an, Rongshui, Liucheng counties and Shatang town.
The wastewater treatment capacity was exceeded in five of the six plants constructed under the project.

- The wastewater treatment capacity in Liuzhou city increased to 540 cubic meters a day. This exceeded the target of 510 cubic meters/day. The corresponding figures for the other plants were:
- Sanjiang county,10.20 cubic meters/day as compared to the target of eight cubic meters/day.
- Rong'an county, 27.70 cubic meters/day as compared to the target of 23 cubic meters/day.
- Rongshui county, 17.70 cubic meters/day as compared to the target of 15 cubic meters/day.
- Liucheng County, 18.30 cubic meters/day as compared to the target of 15 cubic meters/day.
- The capacity of the Shatang town increased to 8.80 cubic meters/day, short of the target of 12 cubic meters/day. This shortfall was due to the location of a college outside the service area (ICR, paragraph 31).

The percentage of urban wastewater treated was exceeded in five of the six project areas at project closure.

- 75.10 percent of the urban wastewater was treated in Liuzhou city, exceeding the target of 75 percent.
- 100 percent in Sanjiang county as compared to the target of 70 percent.
- 86 percent in Rong'an county as compared to the target of 70 percent.
- 88 percent in Rongshui county as compared to the target of 70 percent.
- 91 percent in Liucheng County as compared to the target of 80 percent.
- 44.40 percent Shatang town. This was short of the revised target 53 percent for reasons associated with the location of the college outside the service area.

The sludge co-combustion system was developed, and the storage and processing facilities required for operating the system were constructed, as targeted. The quantity of sludge sent for combustion to the Liuzhou Yufeng Cement Factory at project closure was 160 tons a day, short of the target of 260 tons a day. The ICR (page 13) notes that the target was not achieved as the cement factory was unable to process the planned volume of sludge due to the reduced market demand for cement. The ICR notes that alternative arrangements for treatment and reuse of sludge were made during project implementation and the remaining 100 tons of sludge were send to a brick production factory for disposal. Hence the targeted amount of sludge was fully treated and disposed.
The effluent Chemical Oxygen Demand of the Wastewater Treatment Plants were within the limits imposed by the Liuzhou Municipal Government at project closure.

Outcomes.

84 percent of population in the urban areas of Liuzhou municipality had access to wastewater collection and treatment services at project closure. This exceeded the target of 82 percent.
The percent of population with access to wastewater collection and treatment services was exceeded in five of the six project areas at closure.

- 72.10 percent of the population in Sanjiang County as compared to the target of 72 percent.
- 78 percent in Rong'an county as compared to the target of 72 percent.
- 75.50 percent in Rongshui county as compared to the target of 72 percent.
- 75.60 percent in Liucheng County as compared to the target of 72 percent..
- 47.10 percent in Shatang Town, short of the target of 53 percent. As indicated above, the shortfall in target for Shatang town was due to the location of the college outside the service area.

12877 tones a year of Biological Oxygen Compound (BOD) were removed by treatment plants at closure. This was short of the revised target of 16383 tons a year.
The volume of BOD removed in the six project areas were;

- 11539 tons a year in Liuzhou City as compared to the target of 14860.
- 184.60 tons a year in Sanjiang country as compared to the target of 195.
- 268.50 tons a year in Rongshui Country as compared to the target of 312.70.
- 348.80 tons a year in Liucheng County as compared to the target of 364.90.
- 84.50 tons a year in Shatang Town as compared to the target of 180.50.

The ICR (paragraph 32) notes that actual inflow of BOD concentrations to the Wastewater Treatment Plants was lower than estimated at design (discussed in section five). Less total BOD was removed because less BOD was flowing into the project wastewater treatment plants.

Rating
Substantial

Objective 2
Objective

To ensure that the services described above are sustainable.

Rationale

Theory of Change. The causal links between project activities, outputs and outcomes were logical and the intended outcomes were clear. Reducing power consumption of the Wastewater Treatment Plants and collecting wastewater that would otherwise have been discharged directly into the river aimed at

technical sustainability. Managing sludge and ensuring that sludge was reused as a fuel input aimed at environmental sustainability. Capacity building activities for strengthening the technical and managerial skills of the Liuzhou Municipal Wastewater Treatment Company (LMWTC) aimed at institutional sustainability. Financial covenants such as cost recovery rate and debt service coverage ratio of LWMTC aimed at financial sustainability.

Outputs.
In addition to the outputs described above, these outputs were relevant for this objective.

- 18 on-line automatic monitoring stations were installed at project closure for monitoring water quality discharges in the river. This exceeded the target of 14.
- 2,300 staff of the Liuzhou Municipal Wastewater Treatment Company (LMWTC) were trained as targeted on topics such as wastewater facility operation and management, equipment maintenance, wastewater and storm water pipeline network maintenance, water quality monitoring, pump station operation, sludge treatment facility operation and management, construction management and monitoring and enforcing wastewater discharge regulations.

Outcomes.

- Power consumption in Kilowatt hours (kwh) per unit of wastewater treated in Baisha and Longuanshan wastewater treatment plants reduced from 0.25 kwh per unit to 0.24 kwh, as targeted.
- Annual net income of wastewater operations of the LMWTC increased to Chinese Yuan Renminbi (RMB) 272 million. This exceeded the target of RMB 201 million.
- The cost recovery ratio, defined in the Financial Covenants as " total revenue (from operating and non-operating sources, including subsidies) equivalent to not less than the sum of (i) total operating expenses (including depreciation); and (ii) the amount by which debt service requirement exceeds the provision for depreciation (PAD, pages 45 -46), increased from one at the baseline to 1.10 at project closure. The Debt service cost recovery increased from one to 1.20 at closure as targeted. This indicated that LMTC was able to recover Operation and Maintenance (O&M) costs with tariffs but could cover capital investment and debt service cost only with government subsidies (also discussed in section 5).
- The cash flow of LMWTC was negative at Chinese Yuan Renminbi RMB at - 232 million as compared to the target of RMB 7.5 million. The ICR (paragraph 37) notes that this was due to the lower wastewater tariffs than assumed at appraisal. This loss was however covered by government subsidies (which is common practice in China).

Rating
Substantial

Rationale
Outcomes were for the most part realized.

Overall Efficacy Rating
Substantial

5. Efficiency

Cost effectiveness. The ICR (paragraph 45) reports that the Wastewater Treatment Plants had unit costs similar to or lower than in previous similar Bank projects in China. The cost of disposing sludge through cement kilns (and later brick making) was lower than the cost of disposing through landfills (the cost of the former option was RMB 96 as compared to RMB 374 for the latter option) (ICR paragraph 46). An analysis conducted at appraisal (PAD, page 46) of the affordability of water and wastewater tariffs by low income households (low income households defined as those in the lowest income quintile), showed that water and wastewater tariffs represented less than three and four percent of household income levels in the selected counties, and these were within the generally accepted benchmark for affordability (up to five percent). Savings of about 25 percent of the total Bank loan (US$37.00 million) due to competitive bidding were realized and these were used for scaling up project activities. The other non-quantitative benefits of the project were assumed to come reduced environmental pollution and health benefits due to better wastewater management.

Financial Rate of Return (FIRR). A financial analysis was conducted both at appraisal and at closure for the Wastewater Treatment Plants constructed under the project using a non-standard method (ICR, paragraph 49). The ex post FIRR was 7.4 percent as compared to the ex ante FIRR of 13 percent. There were several limitations in the methodology and the analysis did not provide a complete FIRR for the entire wastewater treatment and collection system. The main limitations were: One, the FIRR was calculated only for wastewater treatment plants build under the project and excluded the non-revenue generating components (such as sludge management and urban-suburban wastewater collection components); Two, the entire tariff amount was considered for Operation and Maintenance of wastewater treatment plants (excluding the costs associated with capital investment); Three, the FIRR calculations assumed that tariff increases would rise about 20 percent per year over a 25 year time horizon; and Four, the FIRR method included unrealistic assumptions about the volumes of treated wastewater and the revenue collected as tariffs. However, tariffs were not raised to the extent assumed and the tariffs could cover only the Operational and Maintenance costs, but other costs and costs associated with capital cost and debt service obligations could be covered only with government subsidies.

Administrative and Operational issues. The design of wastewater treatment plants, used Biological Oxygen Compound (BOD) concentrations that were higher than the actual BODs concentrations, observed during the operation. This led to construction of over-sized wastewater processes and equipment at higher costs (also

discussed in section 8a). The ICR (paragraph 45) notes that "it was not possible to estimate the exact impact on project costs but that this issue diminished the project efficiency".

Efficiency Rating
Modest

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

	Rate Available?	Point value (%)	*Coverage/Scope (%)
Appraisal	✓	13.00	97.00 ☐Not Applicable
ICR Estimate	✓	7.40	97.00 ☐Not Applicable

* Refers to percent of total project cost for which ERR/FRR was calculated.

6. Outcome

The relevance of the PDO to the government and the Bank strategy is Substantial. Efficacy of the two objectives - to establish wastewater collection and treatment services within the urban area boundaries in the selected counties and to ensure that the services are sustainable - are rated as Substantial, as the outcomes were realized for the most part. Efficiency is Modest, as the non-standard method used for estimating the project FIRR did not give the full picture of the project financial performance. Taking these ratings into account, outcome is rated as moderately satisfactory.

a. Outcome Rating
Moderately Satisfactory

7. Risk to Development Outcome

Financial risk. There is risk to development outcome associated with financial sustainability. The ICR (paragraph 5) notes that historically in cities like Liuzhou wastewater tariffs have been insufficient to recover full costs and local governments provide subsidies to wastewater companies (typically to cover capital costs and debt servicing obligations) and in some cases to cover operational and maintenance costs, when revenues collected from tariffs are insufficient. The ICR (paragraph 3) notes that although the Liuzhou Municipal

Wastewater Treatment Company was established to take over wastewater management from the Liuzhou government and given the right to collect wastewater tariffs, tariff collection by the company was limited. While wastewater tariffs did increase from Chinese Yuan Renminbi (RMB) 0.5 per cubic meter in 2007 to RMB 0.8 per cubic meter in 2009, this increase was well below full cost recovery level (estimated to be more than double at RMB 1.7 per cubic meter). (ICR, paragraph 3). The ICR notes that this is however common practice in China, with government subsidies covering costs associated with capital costs and debt servicing obligations.

Environmental risk. The ICR (paragraph 89) notes that the wastewater systems constructed under the project have enough capacity to collect and treat wastewater for the next five to seven years. However, there is a risk that the water quality in the river could degrade, due to discharges of domestic and industrial wastewater from upstream of Liuzhou.

8. Assessment of Bank Performance

a. Quality-at-Entry

This project was prepared based on the experience from an ongoing project (Liuzhou Environmental Management Project) (PAD, para 17). Lessons incorporated at design, included incorporating sludge management and reuse of sludge management, having a single Municipal Wastewater Treatment Company linked to county towns through operational arrangements,and addressing issues associated with raising counterpart funding in small towns (the counties had received grants as part of the stimulus package at appraisal. (PAD, paragraph 17). The implementation arrangements were appropriate. The Liuzhou Municipal government had previous experience with managing Bank projects. Several risks were identified at appraisal, including financial sustainability of the municipal wastewater treatment company. Mitigation measures were incorporated at design including financial covenants. With mitigation measures, the overall project risk was rated as Moderate at appraisal (PAD, page 9). The Project Management Office was housed at the technical Secretariat of the Leading Group, an agency formed at the municipal group under the ongoing project (PAD, paragraph 20). The arrangements made at appraisal for safeguards and fiduciary compliance were appropriate (discussed in Section 10).
There were shortcomings at entry. The wastewater treatment plants were designed to national standards and did not match the situation in Liuzhou in terms of Biological Oxygen Demand concentrations (BOD). The actual low BOD concentration was lower than expected and this made it difficult to fully achieve the BODs targets.
The design did not include activities aimed at raising consumer awareness of the benefits of wastewater tariffs. The ICR (paragraph 50 notes that non-payment of tariffs is largely an awareness issues, as residents in recently-urbanized areas were not accustomed to paying wastewater fees, as they were not fully aware of the benefits of wastewater services.
As indicated in section five, the methodology used for calculating the Financial Rate of Return was non-standard (including tariff subsidies from the government as revenue of the wastewater treatment company) and had limitations. While the method used may be common as noted in the ICR (paragraph 64)

in China, it would have been helpful to get a realistic picture of the Financial Rate of Return, using both standard and non-standard methods.
There were shortcomings in M&E design (discussed in section 9a).

Quality-at-Entry Rating
Moderately Unsatisfactory

b. Quality of supervision

14 Implementation Status Results (ICR) reports were filed over an eight-year project implementation period (ICR, page 3). The ICR (paragraph 84) notes that supervision missions were conducted regularly.
These missions included field visits to construction sites. The team included multidisciplinary experts with skills in financial, procurement, environmental, social, technical and monitoring and evaluation aspects).
The team engaged with the municipality to find alternative solutions for sludge disposal. The team was diligent in ensuring compliance with fiduciary procedures. For instance, when fiduciary issues arose during the bidding process for expansion of the two wastewater plants in Liuzhou, they were addressed in a timely manner (ICR, paragraph 86). The support provided by the team aided in safeguards and fiduciary compliance (discussed in section 10).
Given that the volume of Biological Oxygen Demand concentrations were lower than expected at design. the targets pertaining to BODs could have been adjusted during implementation.

Quality of Supervision Rating
Moderately Satisfactory

Overall Bank Performance Rating
Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

There were two key outcome indicators at design: The first, the percentage of population in the participating urban areas of Liuzhou Municipality that had access to wastewater collection and treatment facilities, was appropriate for monitoring performance. The second, the annual net income (after tax) of the wastewater operations of the Liuzhou Municipal Wastewater Treatment Company - was inappropriate. The indicator did not take into account cost considerations and hence was inappropriate for monitoring performance with respect to financial sustainability of the company (ICR, page 9). The M&E design also lacked indicators to measure improvements in the surrounding environment, such as the water quality of the river.

Three key outcome indicators added following the first restructuring, were appropriate. These included two core indicators, the number of people provided with wastewater collection and treatment services" and "the volume

(mass) of Biological Oxygen Compound load removed by the treatment plants under the project and an additional indicator associated with the "Cost Recovery Ratio" of the company. An additional indicator was included to monitor the cost recovery ratio of the Liuzhou Municipal Wastewater Treatment Company.
The definition of the cost recovery ratio followed the financial covenant in the PAD (Annex 9, paragraph 8) as: "Total revenue (from operating and non-operating sources, including subsidies) equivalent to not less than the sum of (I) total operating expenses (including depreciation) and (ii) the amount by which debt service requirement exceeded the provision for depreciation."

The Project Management Office was responsible for coordinating data at the project level. Baseline data for results indicators were specified and the indicators were clearly defined at appraisal (PAD, paragraph 25).

b. M&E Implementation

The ICR (paragraph 23) notes that data for monitoring performance was collected regularly by the Liuzhou Municipal Wastewater Treatment Company (LMWTC) from the operational data collected from the LMWTC facilities and management systems and were regularly checked by the supervision team. The ICR also notes that LMWTC continues to regularly monitor the quality of wastewater treatment Plant effluent before discharging into the Liujiang River to ensure compliance with Chinese Class 1A (for Guangtang Wastewater Treatment Plant) and IB (for all other wastewater treatment plant's) discharge standards.

c. M&E Utilization

The ICR (paragraph 76) notes that the M&E framework was utilized by the Liuzhou Municipal Wastewater Treatment Company, Limited, not only for monitoring project performance but also for an input for decision-making, during implementation. For example, during project restructuring, information provided in the M&E was used as inputs for decisions taken, such as increasing the capacity of the treatment capacity and including additional indicators for monitoring financial sustainability.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

The project was classified as a Category A project. Three safeguard policies were triggered: Environmental Assessment (OP/BP 4.01); Physical Cultural Resources (OP/BP 4.11): and Involuntary Resettlement (OP/BP 4.12) (PAD, page 13).

Environmental Assessment. The PAD (paragraph 47) notes that potential environmental impacts during operation, included flue gas emissions from mixed calcinations of sludge, outflows from wastewater treatment plants due to accidents and/or failure of safe sludge and impacts due to dredging activities. The PAD (paragraph 47) notes that individual environmental assessments were prepared at appraisal for the six wastewater treatment plants and the sludge management and sewerage components. Based on these assessments, a consolidated environmental assessment and an environmental management plan was prepared and publicly-disclosed at appraisal. The ICR (paragraph 78) notes that there was compliance with environmental safeguards.

Physical Cultural Resources. The PAD (paragraph 53) notes that the project activities include rehabilitation of Zhuotou Pond and access to the Jianpan Hill sewer. In the center of the pond there is a natural stone islet with an ancient calligraphy stone carving which is protected as a city-level cultural relic. The environment management plan included protective measures for the preservation of the relic. The ICR (paragraph 78) notes that there were no issues associated with physical cultural resources during implementation.

Involuntary Resettlement. A Resettlement Action Plan was prepared both in English and in Chinese at appraisal (PAD, paragraph 55). The ICR (paragraph 79) notes that a subsequent Resettlement Action Plan was prepared for land acquisition and resettlement related to the expansion of the two wastewater plants in Baisha and Jila village. The ICR (paragraph 72) notes that there were difficulties associated with acquiring land acquisition for rehabilitation of the Zhu'er Creek (due to legacy issues and the local government's masterplan for urbanization) and for expansion of the Baisha wastewater treatment plant. However the Liuzhou Municipal Treatment Company and the Liuzhou Municipal Government were proactive and the required land was acquired without affecting project implementation.

b. Fiduciary Compliance

Financial management. According to the PAD (paragraph 42), a financial management assessment was conducted at appraisal. The assessment concluded that the financial management arrangements were satisfactory. The ICR (paragraph 71) notes that there were no financial issues during implementation and that there was compliance with financial management.

Procurement management. The PAD (Annex 8, paragraph 10) notes that an assessment of the implementing agency's capacity to address procurement issues conducted at appraisal, concluded that the procurement risk was moderate. A procurement plan was prepared at appraisal. The ICR (paragraph 70) notes that during the procurement process for the expansion of the two wastewater treatment plants, two bidding qualification criteria were not followed. These were rectified and there was compliance with procurement management.

c. Unintended impacts (Positive or Negative)

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d. Other

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11. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Satisfactory	---
Bank Performance	Moderately Satisfactory	Moderately Satisfactory	---
Quality of M&E	Substantial	Substantial	---
Quality of ICR		Substantial	---

12. Lessons

The ICR (page 26) draws three lessons from the experience of implementing this project (with some adaptation of language).

One. A careful consideration of local conditions and analysis based on local data is required for design of wastewater treatment plants. In this project, the wastewater treatment plants were designed based on national standards, rather than wastewater influent local data. This resulted in oversized wastewater treatment plants, with the actual capacity for wastewater treatment plants exceeding the requirements.

Two. A careful consideration of local conditions is required for aspects pertaining to financial sustainability of wastewater treatment plants. Projects should clearly define and indicate how investment costs, operating costs and debt servicing are expected to be covered and by whom. Lack of clarity on these points can lead to incorrect definition of indicators.

Three. Raising awareness and involving the beneficiaries from the initial stages of preparation can be helpful for the financial sustainability of wastewater services. In this project, the focus was on collecting and treating domestic wastewater. Limited attention was paid to engaging and educating the beneficiaries, which resulted in ab inability of the counties to raise tariffs for wastewater services.

The IEG draws the following lesson.
Flexible arrangements can aid in realizing project outcomes. The design of this project aimed at reuse of sludge to a cement factory. Since the cement factory was unable to receive the planned volume of sludge due

to reduced market demand for cement, the design made alternative arrangements for reuse of sludge through a brick production factory. This ensured not only full treatment and disposal of sludge, but also ensured that sludge management was consistent with the environmental sustainability objectives.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR is well-written and provides a candid description of the financial sustainability considerations in the country context. It also candidly discusses the issues associated with removal of Biological Oxygen Demand. The ICR is consistent with the guidelines regarding the ratings. The ICR draws reasonably good lessons from the experience of implementing this project.
The ICR is however long at 26 pages (about ten pages more than the recommended text).

a. Quality of ICR Rating

Substantial