Report Number : ICRR0020733

1. Project Data

Project ID	Project Name
P108627	CN - Nanning Urban Environment
Country	**Practice Area(Lead)**
China	Water

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
IBRD-78980	31-Dec-2015	226,510,000.00
Bank Approval Date	**Closing Date (Actual)**	
01-Jun-2010	30-Jun-2016	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	100,000,000.00	0.00
Revised Commitment	97,513,777.74	0.00
Actual	97,513,777.74	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) of the Nanning Urban Environment Project for China is to assist Nanning municipality, in Guangxi Zhuang Autonomous region, in arresting further deterioration of surface water quality in selected urban centers by expanding the coverage of wastewater treatment services, carrying out environmental rehabilitation of rivers, and improving the institutional and regulatory capacities of the municipal agencies (Loan Agreement, Schedule 1).
The Loan Agreement statement of the PDO serves as the basis for this ICR Review. The PDO is the same in both the Loan Agreement and the PAD (page 2).

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

Yes

Did the Board approve the revised objectives/key associated outcome targets?

No

c. Will a split evaluation be undertaken?

No

d. Components

This project consists of three components at approval (PAD page 3).

Component 1. **Wastewater Management**: (Appraisal Estimate US$ 90.64 million, Actual Cost US$ 91.29 million)
This component had two parts:

- Expanding the treatment capacity of the existing Jiangnan Waste Water Treatment Plant (WWTP) from 240,000 m3 per day to 480,000 m3 per day (Jiangnan Phase 2) to reduce the discharge of untreated sewage into the Yongjiang River.
- Establishing wastewater collection and treatment facilities in Binyang, Hengxian, Manshan, Shanglin, and Wuming Counties, including rehabilitation and/or installation of 84.9 km of primary and secondary sewers with diameters ranging from 300 to 1,650 mm; installation of eight sewage lift pump stations; and construction of five WWTPs, with a total treatment capacity of 102,000 m3 per day.

Component 2. **River Rehabilitation**: (Appraisal Estimate US$ 105.71 million, Actual Cost US$ 32.44 million)
This component had one part:

- Improving the storm water drainage capacities and the environmental conditions of the Fenghuang River, the Liangqing River, and the Lengtang River through various river improvement measures, including cleaning up river courses (totaling 14.245 km), restoring retention ponds, enhancing embankments, and providing sewer interceptors.

Component 3. **Technical Assistance**: (Appraisal Estimate US$ 2.05 million, Actual Cost US$ 0.94 million)
This component had two parts:

- Establishing an integrated mini-river basin management system for a section of the Yongjiang River

Basin within the Nanning Municipality.
- Strengthening the project management capacity of the Nanning Project Management Office (PMO), located in the Nanning Development and Reform Commission (DRC), and the project companies through the provision of technical assistance (TA), training, and study tours.

The project incurred 'Other costs' of US $85.44 to cover land acquisition costs, exchange rate gains (or losses), survey and design costs, farming land occupation tax, and hydrodynamic model costs (ICR page 25). The original resettlement cost estimated in the PAD was RMB 462 million (PAD page 85).

Revised Components / Restructuring (from ICR page 4):

- Under Component 1, the total length of sewers and the number of lift pump stations were reduced to 56.46 km (66.5 percent of that originally planned at appraisal) and five pump stations (62.5 percent), respectively, due to "optimization of designs and changes in urban development plans of counties and geological conditions". Also, loan proceeds were reallocated. In particular, about US$13.4 million from the category of 'goods' and US$0.7 million from the category of 'consulting services' were reallocated to the category of 'works' to cover higher construction costs under Component 1. The ICR mentions (page 6) that the actual construction costs for Component 1 were 11% higher (based on Annex 1) than the estimates made at project appraisal, so despite the optimization of design of the WWTPs, there was no loan saving. However, ICR Annex 6 (pg 41) reports a Civil Works cost variation (addition) of USD $14,195,300 to the approved original loan commitment. This variation is in fact 24% higher than originally approved for civil works. ICR Annex 2 (pg 26) reports Planned and Actual Outputs which shows that actual outputs for almost all Civil works (like intercepting sewer and secondary sewer network) were lower than originally planned. Thus it appears that lower pollution targets were achieved and less physical infrastructure was completed at higher costs.

- Under Component 2, the total length of rivers to be rehabilitated was reduced to 10.36 km (73% of that originally planned), due to changes in designs and difficulties in land acquisition. In particular, rehabilitation of 1.63 km of the lower stream of the Fenghuang River was canceled due to significant delay caused by a complex resettlement and land acquisition process. The PMO and the Nanning DRC requested the cancelation through an official letter dated August 11, 2015. The canceled parts would be rehabilitated by the client, using own resources, beyond the project period. Rehabilitation of 2.17 km of the Liangqing River was also canceled because of changes to the engineering design of the river. Instead, Wuxiang Lake was constructed. The change was requested by the PMO during the supervision mission of November 2011. Revision of Component 2 was cited as the most important contributing factor for restructuring and it is linked to lack of adequate assessment of land acquisition costs at appraisal, as noted by 'Other costs' incurred above and mentioned in the ICR page 25.

- Under Component 3, the preparation of detailed regulations on pollution control was canceled because the National Water Pollution Control Law had not yet been updated. The Nanning Environmental Pollution Board decided to wait for the updated law to be issued because it would serve as the basis for the detailed regulations. This seems to have been a flaw in the project design - including a project activity (preparation of regulations) dependent on a prior action (updated pollution control law) that has not yet been implemented.

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

Project Cost
At appraisal, the total project cost was estimated to be US$ 235.33 million, and included an IBRD loan of US$ 100 million. At closing, the actual project cost was US$ 217.66 million, of which the IBRD loan was US$ 97.54 million (ICR Annex 1 page 25).

Project Financing

Source of Funds	Appraisal Estimate (US$, millions)	Actual/Latest Estimate (US$, millions)	Percentage of Appraisal
Borrower	135.33	120.12	88.76
IBRD	100.00	97.54	97.54

Dates
Approval: 06/01/2010
Original Closing: 12/31/2015
Restructuring: 09/27/2015
Revised/Actual Closing: 06/30/2016 (closing date was extended to complete remaining activities under component 2).

Restructuring
Restructuring (level 2) included the following changes (a) revising the project scope, essentially in Component 2 which reduced the length of the Fenghuang River rehabilitation by 1.63 km or 14% due to a significant delay in construction, related to complex resettlement and land acquisition process; (b) updating project costs and financing plan; (c) reallocating loan proceeds among disbursement categories, particularly from the categories of ‘goods’ and ‘consulting services’ to the category of ‘works’ due to some variation orders during construction in the wastewater management Component 1; (d) extending the loan closing date by six months to complete the remaining work under the river rehabilitation component; and

(e) revising the Results Framework and singling it out from the Project Agreement and converting it into a stand-alone document (ICR pg. xvi) – this was largely related to changes in the estimated water pollution levels and the planned biological load capacity of the treatment plants.

Split Rating Evaluation
The restructuring was done 3 months before the original project closing date, when 92% of the loan amount had already been disbursed, and components 1 and 3 were almost complete. A split rating is not carried out for this ICR Review, since 92% of the weight is assigned to pre-restructuring results, as shown in the ICR (page 18). There is, importantly, a methodological dissonance in the assignment of the ratings pre- and post- restructuring in the outcome table on page 18. The pre-restructuring ratings (92% of the weight) should be based on the pre-restructured PDOs and PDO outcome indicators. They should not be based on lower outcome indicators after the restructuring, which had not been approved yet. It is methodologically inconsistent to state that the first part of the split rating is before restructuring but would use the post-restructuring indicators to assess the outcomes. Specific attention is drawn to the Pre-Restructuring Rating for Efficacy. It is noted as Substantial in the ICR Table, while the Footnote (#12) on the same page indicates a Modest Rating and confirms that "the pre-restructuring rating is 'Modest' because the targets of pollution reduction (mentioned in the Results Framework) were unrealistically high which could not be met". This Review noted this inconsistency between the footnote and the table, and concluded that the pre-restructuring rating should have been Modest. This would lower the disbursement-weighted outcome score to less than 3 and would consequently lead to a Modest rating for efficacy, and an overall Moderately Unsatisfactory rating for the project outcome, also taking into account this ICR Review's Modest rating for efficiency.

3. Relevance of Objectives & Design

a. Relevance of Objectives

The relevance of project objectives when assessed in relation to country conditions, the Bank's Strategy, as well as the borrower's strategy at the time of project closing, remains high.

With the rapid development of Guangxi's tourism sector, and growing trade with ASEAN countries that contributed to expansion of Nanning's economy during the project implementation period, the project's support to Nanning Municipality to arrest deterioration of surface water quality in selected urban centers was relevant to the regional economic conditions and the country's policies at project closing. The average GDP per capita in 2015 was CNY 35190, more than doubling from 2007's CNY 15685. Population in urban areas also continued to grow over the project period. To keep up with this rapid economic development and urbanization, the city needed to make continuous efforts to extend urban services to its citizens (ICR page 11).

In terms of the borrower's strategy and local conditions, the project-financed activities were consistent with those of the Nanning Municipality at project closing. For the wastewater sector, they were in line with the 2014 revised Master Plan for Wastewater Service (2008–2020). The plan covered the total area of Nanning City (429 km2), including urban areas (298 km2). As of 2016, four waste water treatment plants (WWTPs) - Jiangnan, Langdong, Santang, and Wuxiang - served the city. According to the plan, their treatment capacities would expand from 850,000 m3 per day to 2,090,000 m3 per day by 2020. The investments financed under the project were part of the master plan, and they would support the current and future growth of Nanning (ICR page 11).

The ICR states that over 51 percent of the source of pollution in Nanning's urban districts was domestic wastewater. One unanswered question remains as to what contribution of the project to industrial wastewater treatment given that the city hosts industries like food processing, electronics, machinery, chemicals, paper, and construction supplies (ICR page 1)

With respect to World Bank's strategy, the project was aligned to the China Country Partnership Strategy (CPS, FY13–16), particularly to the objective of 'enhancing urban environmental services' under Strategic Theme 1, 'supporting greener growth' (ICR page 12). The project was also in line with the Water GP's Integrated Urban Water Management workstream, which aims to help cities change their relationship with water and rehabilitate water ways.

Rating	Revised Rating
Substantial	Not Rated/Not Applicable

b. Relevance of Design

The project design in the PAD included a clear statement of objectives, planned activities and expected outcomes. The causal chain was clear, however, according to the ICR some important factors, like resettlement issues faced during project implementation as well as the overestimation of pollution levels, were not adequately identified. This Review believes the relevance of design was Modest overall based on the arguments presented in the ICR.

The planned activities of the project included expansion of wastewater treatment coverage, environmental rehabilitation of the three rivers, and building of institutional and regulatory capacity. These were consistent with the project's stated objective of arresting surface water quality deterioration. The project was infrastructure-heavy, which was necessary for Guangxi Province in terms of its socioeconomic conditions. Causal chains between the outputs and outcomes were clearly defined - arresting further deterioration of surface water quality by expanding waste water treatment coverage, rehabilitating rivers and improving municipal agencies' capacity. Also, the Technical Assistance component strengthened the city's overall river management capacity, except the shortcoming identified at restructuring regarding formulating regulations before the law had been passed in section 2d. The project had good implementation arrangements, particularly for Component 1. Some project design shortcomings were related to the issues of resettlement

and land acquisition, particularly in the river rehabilitation component, that were underestimated at the design stage. The ICR states (page 8) that two out of three rivers under the river rehabilitation did not have interceptor sewers which made it difficult to quantify their contribution toward reducing pollution discharged to the rivers.

Importantly, according to the ICR, for the wastewater component, the project's original design set the biological load capacities of the treatment plants too high, whereas the actual characteristics of the wastewater received were much lower. Consequently, there may have been over-expenditure on WWTP design and construction, which was already disbursed and completed before the last-minute restructuring of the project to revise the pollution reduction targets downward, since by then the overestimated targets set at the design stage were "unachievable". At project closing, most of the revised PDO-level and intermediate outcome indicators were achieved or exceeded (ICR outcome indicators, pages viii-xiv). Comparing the revised targets with the original targets from the PAD, it appears that almost all targets were significantly revised down, on average by more than 50%, which makes it difficult for this Review to validate this achievement, given that almost all targets were now set lower than the achievement recorded.

The ICR states (page 8) that the intermediate indicators for the river rehabilitation component — that is, reduction of TN (total nitrogen) and TP (total phosphorus) were not appropriate for measuring pollution from domestic wastewater, which was the major source of pollution. However, the ICR does not provide a clear explanation for why the new targets on NH3-N (ammonia) and COD (chemical oxygen demand) were instead "more appropriate" to monitor domestic wastewater. The ICR states that there was no indicator to measure the length of river rehabilitation or cost recovery of wastewater collection and treatment operations in project areas. However, it is not clear how the length of river rehabilitation is linked with the efficacy of wastewater treatment and the achievement of the PDO in arresting further deterioration of surface water quality.

Rating	Revised Rating
Modest	Not Rated/Not Applicable

4. Achievement of Objectives (Efficacy)

Objective 1

Objective

PDO: Arrest further deterioration of surface water quality in selected urban centers in Guangxi Zhuang Autonomous region in Nanning municipality

Rationale

Outputs:

i **. Expanded the coverage of wastewater treatment services**

- Expanded the treatment capacity of the existing Jiangnan Waste Water Treatment Plant (WWTP) from 240,000 m3 per day to 480,000 m3 per day
- Established wastewater collection and treatment facilities in Binyang, Hengxian, Manshan, Shanglin, and Wuming Counties, including rehabilitation and/or installation of 56.5 km (original target was 84.9 km) of primary and secondary sewers; installation of 5 (original target was 8) sewage lift pump stations; and construction of five WWTPs, with a total treatment capacity of 102,000 m3 per day

i **. Carried out environmental rehabilitation of rivers**

- Improved the storm water drainage capacities and the environmental conditions of the Fenghuang River, the Liangqing River, and the Lengtang River through various river improvement measures, including cleaning up river courses totaling 10.363 km (original target was 14.245 km), restoring retention ponds, enhancing embankments, and providing sewer interceptors

i **. Improved the institutional and regulatory capacities of the municipal agencies**

- Established an integrated mini-river basin management system for a section of the Yongjiang River Basin within the Nanning Municipality.
- Strengthened the project management capacity of the Nanning Project Management Office (PMO), located in the Nanning Development and Reform Commission (DRC), and the project companies through the provision of technical assistance (TA), training, and study tours.

Outcomes:
According to page 12 of the ICR, the three original indicators agreed at appraisal for measuring the achievement of the PDO--namely, "to assist the Nanning Municipality in arresting further deterioration of surface water quality in selected urban centers"--include (a) reduction in pollution discharge into surface water; (b) percentage of the population in participating areas of the Nanning Municipality served by wastewater collection and treatment services; and (c) development of a strategic study on the ecological water environment and the implementation of pollution control action plans. The extent to which these were achieved as reported in the ICR is presented below:

(a) reduction in pollution discharge into surface water
Wastewater management component:

- Pre-restructuring - there is little reporting in the ICR on achievement towards original targets. For example, the ICR states that 10,305 tons/year of BOD (biochemical oxygen demand) pollution loads were removed by the treatment plants, exceeding the target indicator of 9,715 tons/year that was added during restructuring. However, this indicator was not tracked pre-restructuring, and hence its

achievement provides little evidence for the project's efficacy as originally planned and designed. The ICR confirms that "although almost none of the WWTPs met the original targets that were agreed on at appraisal (achievement was between 30 percent and 78 percent), these targets were based on an overestimation of biological load at design" (page 14). The ICR acknowledges that there was significant variance in each WWTP's performance. Operational Data for WWTPs for 2015 (ICR Annex 3.7 pg 36) reports only COD (chemical oxygen demand data (also Table 2, page 12). Operational Data for WWTPs for other indicators--specifically, BOD (biochemical oxygen demand), TP (total phosphorus), and TN (total nitrogen)--are not presented in the ICR, and would have been useful for analysis of results. In line with the guidelines, the project is accountable for original PAD targets until the restructuring and the significant scaling down of targets were approved, and hence efficacy is rated as modest for pre-restructuring stage.

- Post-restructuring (3 months before the original closing date, with 92% disbursed) - the data and achievements presented in the ICR are related to the revised targets, which were 24%-80% lower than the original targets pre-restructuring in the PAD. The ICR also notes (page 13) that "surface water quality is dependent on many factors, including the pollution discharged through wastewater. Even though the quality of the surface water cannot be totally attributed to the project, the new WWTPs would have contributed towards reducing pollution being discharged to the water bodies." Thus, there is lack of clear evidence of the extent to which achievements (vis-a-vis the significantly scaled-down targets) can be attributed to the project. As indicated by the Note in Section 12: "When insufficient information is provided by the Bank for IEG to arrive at a clear rating, IEG will downgrade the relevant ratings."

River rehabilitation component:

- According to the ICR (page 14), the river rehabilitation cleaned up solid waste dumps along the river system, which contributed to the river's clean-up.
- The ICR states (page 8) that, at restructuring, the intermediate indicators for the river rehabilitation component, that is, reduction of TN (total nitrogen) and TP (total phosphorus) were considered as not appropriate for measuring pollution from domestic wastewater, which was the major source of pollution, and were replaced with targets for NH3-N (ammonia) and COD (chemical oxygen demand). Based on the revised indicators, the targets were over-achieved. However, the newly introduced targets were only added 5 years into the project (near closing), hence there is little or no evidence prior to restructuring on how the water quality improved based on these new indicators.
- The ICR states that there was no indicator to measure the length of river rehabilitation and hence a PDO indicator was added at project restructuring to measure the total length of river rehabilitated under the project. A decrease in the likelihood of pollution being discharged along the rehabilitated length of the river is expected. It is not clear how the length of river rehabilitation is linked with the improvement of surface water quality and the direct achievement of the PDO in arresting further deterioration of surface water quality. Additionally, the ICR confirms (page 14) that "since the intercepting sewer was installed only in the Fenghuang River, contributions from the other two rivers were not measurable. The indicators for these two rivers were, therefore, removed in the project restructuring", further diluting the evidence for project efficacy.

(b) percentage of the population in participating areas of the Nanning Municipality served by wastewater collection and treatment services

- 89% of the population in participating areas of Nanning Municipality was served by wastewater collection and treatment services. This achievement exceeds the original target of 77.1% and the revised target of 75.5% set during restructuring.

(c) development of a strategic study on the ecological water environment and the implementation of pollution control action plans

- A water monitoring system for the Yongjiang River was established; pollution control action plans for Fenghuang River, Liangqing River and Lengtang River were developed; and a strategic study on improving water ecological environment of the Yongjiang River reach was developed, contributing towards institutional capacity building.
- The preparation of detailed regulations on pollution control was canceled because the National Water Pollution Control Law had not yet been updated. The Nanning Environmental Pollution Board decided to wait for the updated law to be issued because it would serve as the basis for the detailed regulations. This seems to stem from a shortcoming in the project design, i.e., the inclusion of a project activity (preparation of regulations) that was dependent on a prior action (updated pollution control law) that had not yet been implemented.

Three more PDO indicators were added at the project restructuring:
(a) number of direct project beneficiaries, with percentage of female beneficiaries - the project reached 3 million direct beneficiaries at closing. Of this, 49% were female.
(b) length of urban rivers in the project area rehabilitated (already discussed above) - the total length rehabilitated for three rivers was reduced by 3.88 km (27% from the original length at appraisal).
(c) cost recovery of wastewater collection and 13 treatment operations in Nanning districts and county seats served by the Guangxi Nanning Water Company - The ICR states that there was no indicator to measure cost recovery of wastewater collection and treatment operations in project areas. It is noted that the PAD had an intermediate outcome indicator for the Annual income of the Guangxi Nanning Water Co. (page 23). The cost recovery of wastewater collection and treatment operations in Nanning Districts and County Seats served by Guangxi Nanning Water Company was at 100%.

The ICR repeatedly presents over-achievement of targets based on new or revised indicators that were formally approved only 3 months before the original project closing date, and without presenting a clear case for how these new or revised indicators and their related baselines were established (given that the project was already well underway). Volume of “BOD” pollution loads removed by the treatment plans was added as a PDO indicator (#4) near project closing. However, Table 2 of the ICR (page 12) explains over-estimation using “COD” concentration in inflow. Also, Table 3.7 of the ICR (page 36) presents operational data of WWTPs for 2015 with only “COD” data in inflow.

The ICR statement (page 17) is methodologically inconsistent with the guidelines: "Judging the PDO

achievement only from the perspective of pollution reduction (the third indicator), the pre-restructuring rating would be 'modest'. However, the pollution reduction targets were unrealistically set given the characteristics of receiving wastewater, which is a weakness of the design and M&E of the project, it will be unfair to rate the PDO achievement against the unrealistic targets. Although the project was restructured late in the implementation, other fundamental elements of the project, such as the choice of WWTP technology and priority activities for intervention and balance of focus on infrastructure in relation to institutional and regulatory capacity of government agencies, contributed to the achievement toward the PDO. Therefore, the achievement toward the PDO is rated 'Substantial' for both pre-restructuring and post-restructuring." This Review finds this statement inconsistent with the harmonized OPCS and IEG guidelines for the split rating of restructured projects with revised outcomes, as the original targets (92% of the weight) remained in effect until the restructuring was approved. Moreover, while taking into account the "other fundamental elements of the project", the most direct measure of the achievement of the PDO was clearly in terms of "pollution reduction".

Based on the above findings, the disbursement-weighted rating for Efficacy is Modest.

Rating
Modest

5. Efficiency

Economic Efficiency
At appraisal, economic analysis was carried out for the wastewater management and river rehabilitation components based on (i) least-cost analyses and (ii) quantification of economic benefits, according to the PAD (page 63). Each of these is analyzed in further detail:

Cost-Effectiveness Analysis
Wastewater Management Component: At appraisal, the least-cost methodology was adopted for the wastewater management component, specifically, to select the most appropriate wastewater treatment process. Analysis was based on design parameters, such as pollutant content and volume of influent. The WWTPs were designed based on PAD page 30 Table 4.3: Design Influent Constituent Concentrations. The ICR states that (page 31) the original analysis could have identified a different solution had the actual pollutant content been better investigated and confirms that "the least-cost analysis of the wastewater component was not redone at project closing as the baseline condition had changed - the actual pollution situation at project closing differed from the pollution assumptions at appraisal". Hence, these ICR statements do not provide a basis of evidence that confirms the project as least cost.
River Rehabilitation Component: At appraisal, the least-cost methodology was adopted for the river rehabilitation component, specifically, to select between the alternatives of forced drainage with pump

stations and increased regulating capacity along the rivers. The ICR states that "as the two subcomponents were slightly revised during project implementation to cover shorter stretches of the rivers, reliable comparison of cost estimates at appraisal to actual costs at closing was not fully possible." Additionally, apportioning a share of O&M costs proportionally across the length and catchment areas of the rivers does not appear to be a reliable method, given the differing characteristics and degrees of severity at various points along the river. The project team provided further clarification that at appraisal, a least cost method was applied to determine the investments which resulted in a total cost of CNY 859.2 million for the two river systems. During implementation, there was a reduction in the length of the river rehabilitation and only 72.7% of the planned investments (total of 10.36 km) were carried out. However, in terms of costs, only about 65% of the planned costs were incurred, indicating that the principle of cost effectiveness was maintained.

Cost-Benefit Analysis
River Rehabilitation Component: At appraisal, for the river rehabilitation component, the direct economic benefits of flood control and land appreciation were quantified. Indirect economic benefits, such as the economic value of reducing pollution discharged into the rivers, were not quantified. The land appreciation benefits were expected to arise from implementing flood protection, thereby upgrading the land for residential and commercial development. The ICR states that "the increase in the land value, however, cannot be fully attributed to the river rehabilitation component. It is also difficult to quantify the increase in the land value due to the project" (page 32).
The ICR also states that at appraisal, the flood control benefits due to the river rehabilitation were estimated based on potential economic losses in floods. The methodology in footnote 13 on page 33 is not very clear. According to the ICR, these benefits were reassessed at project closing and they were higher mainly due to the increased value of property. This however provides inadequate evidence.

Overall, most of the economic efficiency discussion in the ICR is based on the PAD, and there is little update and weak evidence presented in the ICR.

Financial Efficiency
The ICR (annex 3) states that financial analysis was carried out at appraisal to demonstrate financial sustainability of the wastewater component. Specifically, financial forecasts demonstrated that the project was affordable to Guangxi Nanning Water Company (GMWC) and that the company would be financially sound. At appraisal, the financial internal rate of return (FIRR) was estimated to be above 6 percent. At project completion, GNWC demonstrated financial viability as it could recover costs. Based on the actual performance, the FIRR was estimated to be above 10 percent. Other analysis conducted at appraisal and at the end of the project showed that the project was fiscally affordable to the Nanning Municipality. Furthermore, the tariffs were affordable to low-income households, at appraisal and project closing. This was partly because the compensation mechanisms for financing and operating the wastewater facilities had changed from user fees to government compensation to cover costs. The project team further clarified that GNWC is listed in Shanghai Stock Exchange since 2015. As a listed company in a stock exchange it constantly makes efforts to maintain financial sustainability and take economic decisions.

Administrative and Implementation Efficiency
The project implementation efficiency was substantial for the WWTPs' civil works. However, the project encountered significant delays in the river rehabilitation component and the related resettlement. The

administrative efficiency is low given that major restructuring approvals regarding the project indicators and addressing the resettlement delays were postponed until a few months before the original closing date, instead of being handled soon after the MTR.

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		0	0 ☐Not Applicable
ICR Estimate		0	0 ☐Not Applicable

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

6. Outcome

The relevance of objectives was substantial. The relevance of design was modest. While recognizing the project's physical and capacity-building achievements, the efficacy and efficiency of achieving the core intent of the PDO--to "arrest further deterioration of surface water quality"--were both modest. This results from (a) the over-estimated performance indicators, that remained in effect up until restructuring, which occurred with only 3 months left before project closing and 92% of the funds disbursed; and (b) the weak base of evidence, such as doubts about attribution to the project, least-cost analysis not carried out at closing, indicators that were presented in the PAD but not measured in the ICR, and others. The split evaluation approach in the ICR used the lower post-restructuring indicators for the pre-restructuring period since the over-estimated pre-restructuring ones are "unfair". If the prescribed and correct methodology is used, and when weighted by the disbursement shares pre- and post-restructuring (92% and 8%, respectively), the efficacy rating would be lowered to modest.

a. Outcome Rating
Moderately Unsatisfactory

7. Rationale for Risk to Development Outcome Rating

The main risk for the project are the social safeguards and related resettlement challenges. This presented moderate risk to the project and the restructuring attempted to mitigate this risk to the extent possible.
In terms of political ownership and government commitment, the project presented low risk.
The financial and technical aspects of the project presented low risk at appraisal. However, with the revision of the expected pollution levels to be treated, there are likely inefficiencies and over-dimensioning of the plants. This may lead to higher maintenance costs for the amount of influent pollution loads and overall higher costs of operations.

a. Risk to Development Outcome Rating

Modest

8. Assessment of Bank Performance

a. Quality-at-Entry

According to the PAD (page 4), "serious scrutiny was given to the design parameters of the wastewater treatment facilities to avoid overestimates of demand, capacity, and costs, which have led to many cases of financially unsustainable utility operations and underutilization of loans in China. Early in the design phase, relations between baseline analysis and design assumptions were clarified. Feasibility studies were modified based on analysis of the current service coverage and standards in reality, and reasonable projections for future service requirements." However, it appears that this lesson did not come through as the ICR makes the case for serious "unachievability" of WWTP pollution loads.

The World Bank team incorporated lessons learned from the previous Guangxi Urban Environment Project in design, preparation, and implementation arrangements. Specifically, the previous project had a long implementation period of over 10 years due to a 3-year delay in completion of detailed designs and procurement processing. This delay was largely solved by several of the current municipal officials in the project management office (PMO), who were then retained in the PMO during implementation of the Nanning project. The project made rapid progress early on and delivered the largest component in the first two years.

According to the ICR, key shortcomings were the biological design load capacities that were applied to the WWTPs, which were much higher than the actual pollution concentrations. Moreover, the team underestimated the resettlement challenges in the project areas, which delayed component 2.

Quality-at-Entry Rating

Moderately Satisfactory

b. Quality of supervision

The World Bank supervised the project twice a year, covering implementation, safeguards, procurement, and financial management aspects. The ICR states that some shortcomings in supervision arose, particularly with regard to inconsistent documentation at the early stage of project implementation and that the World Bank team could have initiated the discussion on project restructuring much earlier. The MTR did not highlight the need for restructuring. This is surprising given that the subsequent issues with implementation, biological load capacity targets and resettlement issues should have been initiated at MTR stage. Toward the end of the implementation, the World Bank's support efforts intensified, particularly on the land acquisition and resettlement issues that were delaying the implementation of the river rehabilitation component. The project level 2 restructuring was delayed significantly, and occurred almost at original project closure timeline.

Regarding fiduciary and safeguards compliance, the procurement and financial management specialists based in the Beijing office supervised implementation of all fiduciary aspects of the project specified in the legal agreement and carried out adequate field visits to review physical progress. No substantive deviation from the guidelines was observed, although variation orders were not handled as stipulated in the World Bank's Procurement Guidelines, as per the ICR (page 21).

Overall quality of Supervision would be moderately unsatisfactory given these factors above. However, the challenges with restructuring the project at such a late stage when all the funds have been nearly disbursed are recognized.

Quality of Supervision Rating
Moderately Unsatisfactory

Overall Bank Performance Rating
Moderately Unsatisfactory

9. Assessment of Borrower Performance

a. Government Performance

According to the ICR (page 22), the Nanning Municipal Government and the Nanning Finance Bureau were supportive of the project and committed to the PDO of arresting the deterioration of surface water quality in selected urban centers. They had some experience with the World Bank's procedures through previous projects, and they incorporated the lessons learned in the preparation of this one. They supported the implementing agencies to ensure the quality of implementation throughout the project period. The counterpart fund was allocated on time most of the time, and they communicated with the World Bank team effectively. However, the monitoring of pollution targets was inadequate.

Government Performance Rating
Moderately Satisfactory

b. Implementing Agency Performance

According to the ICR (page 22), the PMO and four project implementation units (PIUs) were responsible for day-to-day management of project activities. The PMO functioned as a contact for the World Bank team and coordinated the efforts of different agencies and PIUs. Its staff was committed and efficient in their responses. They prepared semiannual progress reports and submitted them to the World Bank team on time. However, there were serious shortcomings. According to the ICR (page 22), the external monitoring consultants hired by the PMO did not report the issues accurately enough for the PMO to take timely action. In addition, after agreeing on the need for project restructuring, it took the PMO about a year to request the project restructuring, which contributed to the delayed restructuring of the project. Moreover, variation orders under Components 1 and 2 were not handled properly, despite advice from the World Bank team.

Implementing Agency Performance Rating
Moderately Unsatisfactory

Overall Borrower Performance Rating
Moderately Unsatisfactory

10. M&E Design, Implementation, & Utilization

a. M&E Design

There is some deficiency in this based on the evidence presented in the ICR and the need for significant revision of the results framework and indicators. The ICR (page 8) states that "while most indicators were appropriate for measuring performance and achievements toward intermediate outcomes, some were not so appropriate" without providing a clear rationale. For example,

- The ICR states that targets for pollution reduction in the wastewater management components were set very high. However, comparing the revised targets with the original targets from the PAD, it appears that almost all targets were significantly revised down by 50% which questions the credibility of the original project design and appraisal document.
- The ICR also states that the intermediate indicators for the river rehabilitation component — that is, reduction of TN (total nitrogen) and TP (total phosphorus) were not appropriate for measuring pollution from domestic wastewater, which was the major source of pollution. However, the ICR does not provide a clear reasoning or explanation for why the new targets on NH3N and COD were "more appropriate" to monitor domestic wastewater.
- The ICR states that there was no indicator to measure the length of river rehabilitation or cost recovery of wastewater collection and treatment operations in project areas. However, it is not clear how the length of river rehabilitation is linked with the efficacy of wastewater treatment.

b. M&E Implementation

The ICR notes (page 8) that there was a lack of relevant data collection for pollution indicators, until restructuring took place. During the implementation, the Results Framework was revised in three ways:

- To modify or add indicators and set targets at the PDO level
- To update targets corresponding to wastewater-related indicators for all six WWTPs
- To modify indicators related to river rehabilitation to reflect better the outputs from project activities

The changes made during restructuring 3 months before the original project closing are so significant that the M&E Implementation during the course of the project is questionable.

c. M&E Utilization

The ICR states (page 8) that with the revisions made to the PDO level indicators during the project restructuring, the Results Framework was able to capture the performance and achievements toward the PDO more holistically and the client also used the Results Framework to measure the progress and outcomes of the project. However, given how late the project was restructured and the M&E data was utilized for revising the project indicators, it does not provide evidence of good M&E data utilization during the course of project implementation.

M&E Quality Rating

Negligible

11. Other Issues

a. Safeguards

The project was classified as Category A.
At appraisal, it triggered three safeguard policies: Environmental Assessment (OP 4.01), Involuntary Resettlement (OP 4.12), and Indigenous People (OP 4.10).

- For **Environmental safeguards**, the ICR states that an Environmental Assessment (EA) summary, a consolidated EA, and a consolidated Environmental Management Plan (EMP) were prepared, and disclosed both in China and at WBG HQ in March-April 2009. During project implementation, an external party carried out environmental monitoring independently and found implementation of the EMP and compliance achieved both Satisfactory and in line with World Bank policies (page 9).
- For **Social safeguards**, the ICR states that the number of project-affected peoples totaled about 8,000. Separate Resettlement Action Plans (RAPs) for the project counties and Nanning City, as well as a consolidated RAP and a Resettlement Policy Framework, were prepared and disclosed in China and at

WBG HQ in January and April 2009. All resettlement activities followed the Chinese regulations and the World Bank policies. Although land acquisition and resettlement for the entire wastewater management component was completed by the end of June 2013, delays occurred under the river rehabilitation component, particularly with regard to land reallocation for Nanxiang Village and resettlement site construction in Wuxiang New District. The main causes for the delays constituted part of the reason for cancelation of a part of the river rehabilitation component because they would have extended the work beyond the project period.

- On **Indigenous Peoples**, the ICR notes that a Social Assessment was carried out during project preparation. The assessment concluded that the Zhuang people were mostly economically integrated and culturally assimilated and therefore unlikely to be adversely affected by the project. Moreover, before implementation, open consultation ascertained that the Zhuang people were supportive of the project activities. No Indigenous Peoples' Plan was therefore prepared for the project.

b. Fiduciary Compliance

According to the ICR (page 10), the project had an adequate financial management system that could provide accurate and timely information on the progress of the implementation and determine that the loan proceeds were used for the intended purposes. Two incidents were however mentioned in the ICR: One concerned the project management and contract administration - the PMO originally intended to conclude a consulting contract with a particular firm. However, it was delayed for more than 14 months because of the firm's possible connection with a debarred firm. After several consultations with the World Bank team, the PMO decided to terminate the contract because the firm's services were no longer needed. The unallocated funds were finally put towards works after project restructuring. The second incident concerned the handling of some variation orders the PMO proposed to be financed through counterpart funding, though the contract was financed by the World Bank, and the contractor was selected through World Bank procurement procedures.

c. Unintended impacts (Positive or Negative)

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d. Other

According to the ICR (page 10) two issues in resettlement and land acquisition under the river rehabilitation component were unresolved at the time of project completion.

- Four village groups in Nanxiang Village (Village Groups Nos. 1, 2, 9, and 11) had not yet received the official certificate for commercial land they had been granted. Village Group No. 1 received the certificate

in December 2016. Village Groups No. 2 and 9 are expected to receive the certificates by December 2017, and Village Group No. 11 by December 2018. The issuance of the certificate for these groups was delayed because of the incomplete documentations that they submitted.

- Under the Liangqing and Lengtang Rivers rehabilitation, 10 households in the residential area of Tianyu were planned to be resettled by the end of 2016. However, after the project closing, these households decided to receive full monetary compensation and build new houses in the village, instead of relocating to apartments in Tianyu Huayuan. Therefore, all the 10 households were fully compensated by December 2016.

12. Ratings

Ratings	ICR	IEG	Reason for Disagreements/Comment
Outcome	Moderately Satisfactory	Moderately Unsatisfactory	The evidence base was weak for both efficacy and efficiency. To avoid being "unfair", the ICR's split rating inappropriately applied the much lower, post-restructuring targets in assessing and rating pre-restructuring achievements, which methodologically should be based on the original, pre-restructuring targets, that over-estimated effluent volumes.
Risk to Development Outcome	Modest	Modest	---
Bank Performance	Moderately Satisfactory	Moderately Unsatisfactory	The delayed restructuring and its negative effects were a serious shortcomings. The project was restructured at 3 months before original project closing, 5 years after project became effective, and after 92% of the loan had been disbursed.
Borrower Performance	Moderately Satisfactory	Moderately Unsatisfactory	The delayed restructuring and its negative effects were serious shortcomings, as explained above.
Quality of ICR		Substantial	---

Note
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

Following lessons emerged from the project (ICR pages 22-23):

- **Timely restructuring is good practice in project implementation.** Restructuring should be carried out as soon as the need materializes in order to enable the proper accounting of project activities and an assessment of project performance that is based on accurate and adequate evidence.
- **Project implementing entities need to be trained as early as possible in fiduciary and safeguards requirements in order to improve the efficiency of project implementation.** Ideally before project effectiveness, the Bank should share the rules for handling variation orders with the client, and the client should report to the Bank the planning, design and other changes that are necessitating those variation orders. Project implementation staff need to be trained well in resettlement and land acquisition and resettlement aspects, to ensure the proactive handling of any issues and adequate coordination with other agencies.
- **The planning and optimization of municipal infrastructure is needed in order to yield savings in capital and O&M costs.** For example, the design and size of WWTPs can be optimized by carefully aligning the design parameters with influent water characteristics and the existing facilities in the services areas (e.g., whether these have septic tanks or combined sewer systems). It is also important to have a balance between infrastructure investments and institutional or regulatory capacity-building.
- **Assigning sole responsibility to a single utility can effectively enhance technical competencies, financial sustainability, and project management efficiency.** Under the project, GNWC, which was made responsible for the Jiangnan and five smaller WWTPs, proved highly competent in management and O&M, and in generating enough revenue to cover operation costs.
- **IRBM's innovative management mechanism for dealing with municipal water environment and pollution control provides a good example for other cities in China.** It takes a comprehensive approach that includes modification and enforcement of laws, and capacity building of local governments. Moreover, it addresses uncoordinated and fragmented activities by defining the roles and responsibilities of various agencies.

14. Assessment Recommended?

No

15. Comments on Quality of ICR

The overall quality of the ICR was substantial. It was an outcome-driven narrative. However, there was some inconsistency with guidelines for rating the project outcomes pre- and post- restructuring resulting in change of overall rating from MS to MU. An improvement could have been a brief discussion/explanation of the various pollution indicators, the relevance of the measurement methodology and an updated economic analysis.

a. Quality of ICR Rating

Substantial