Report Number: ICRR0023475

1. Project Data

Project ID P133117	**Project Name** Chongqing Small Towns Water Env. Mgmt.
Country China	**Practice Area(Lead)** Water

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
IBRD-84560	31-Dec-2020	79,656,521.70
Bank Approval Date	**Closing Date (Actual)**	
23-Dec-2014	30-Jun-2022	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	100,000,000.00	0.00
Revised Commitment	79,656,521.70	0.00
Actual	79,656,521.70	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 Chongqing Small Towns Water Environment Management Project (CSWEP) as articulated in the Loan Agreement (page 5) was identical to the one stated in the Project Appraisal Document (PAD, paragraph 13) and aimed to:

"reduce flood risks and improve wastewater infrastructure services in selected counties of Chongqing Municipality."

Parsing the PDO. The PDO will be parsed based on the following two objectives:

1. To reduce flood risks in selected counties of Chongqing Municipality.

2. To improve wastewater infrastructure services in selected counties of Chongqing Municipality.

The Outcome will be assessed based on a split rating since the targets of the PDO indicators were revised during implementation.

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

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

Date of Board Approval
09-Dec-2020

c. Will a split evaluation be undertaken?
Yes

d. Components
The PDO was supported by the following five components;

1. Flood management in Tongnan County (appraisal cost: US$42.10 million, actual cost: US$28.02 million). This would include the construction of a 6.84 km river embankment with associated dike-top roads to raise the flood protection level for the new urban expansion area of Dafuba along the Fujiang River to 1-in-20-year floods. Non-structural measures at the county level would be carried out including: (a) strengthening flood early warning and emergency response capacity through provision of water level monitoring and warning facilities; (b) upgrading flood risk mapping and dissemination, safety zoning, raising public awareness, and emergency response planning; and (c) improving land use management planning for flood affected areas.

2. Flood and wastewater management in Rongchang County (appraisal cost: US$46.00 million, actual cost: US$35.27 million). This would include the construction of a river embankment of 13.89 km along the Laixihe River upstream, along with associated dike-top roads and sewage/drainage pipe works (19 km) and improvement of one existing overflow weir on the same river. The river embankment would connect with flood protection works in the same county seat that was built under the Chongqing Small Cities Infrastructure Improvement Project (CSCP). Also, non-structural measures at the county level would be carried out including: (a) improving hydromet monitoring and information management systems through the establishment of a local computer network with the required hardware and software, Geographic Information System (GIS) database and basic supporting facilities for data storage, processing, and communication; (b) strengthening the flood early warning and emergency response capacity through development of flood emergency response plans, capacity-building, and basic facilities at county, township,

and village levels; and (c) upgrading flood risk mapping and dissemination, safety zoning, and raising public awareness.

3. Flood and wastewater management in Shizhu County (appraisal cost: US$50.20 million, actual cost: US$39.24 million). This would include the construction of a 4.84 km long river embankment along the Longhe River, upstream and downstream of a flood protection project for the county seat funded by a previous Bank loan project (CSCP), along with associated 1.9 km of dike-top roads; 16.1 km of sewage/drainage pipes (including wastewater collection pipes in the old urban area); and 5.74 ha of landscaping and improvement of certain existing overflow weirs on the same river. Non-structural measures at the county level would include: (a) improving hydromet monitoring and information management systems through the establishment of telemetry gauging stations; (b) strengthening the flood early warning and emergency response capacity through development of flood emergency response plans, capacity-building, and basic facilities at the county, township, and village levels; (c) upgrading flood risk mapping and dissemination, safety zoning, and raising public awareness; and (d) developing a geographic information system for monitoring, operation, and maintenance of drainage and wastewater network facilities.

4. Flood and wastewater management in Pengshui County (appraisal cost: US$49.00 million, actual cost: US$37.94 million). This would include the construction of a river embankment of 4.69 km on the left side of the Wujiang River with associated dike-top road (4.76 km), which will raise the flood protection level of the county seat's new urban area to 1-in-20-year floods. This component would also include civil works for sewage collection and drainage pipes (4.69 km). Non-structural measures at the county level would include: (a) improving hydromet monitoring and information management systems through the establishment of telemetry gauges and rainfall stations; (b) strengthening the flood forecasting and early warning capacity at the county level through the establishment and operationalization of a flood forecasting system with the required database, data processing, communication and flood forecasting software, and hardware and facilities at the management center; and (c) upgrading flood risk mapping and dissemination, safety zoning, raising public awareness, and emergency response planning.

5. Project Management and Implementation Support (appraisal cost: US$5.74 million, actual cost: US$3.41 million). This would include the provision of project management and implementation support activities.

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

Project Cost. The total project cost at appraisal was estimated at US$218.60 million. The actual cost according to the ICR Data Sheet (page 2) was US$143.88 million. The lower amount at completion was due to about 20% of savings from both favorable foreign currency exchange and open bid competition (direct communication with the project team). This reduction of the project costs resulted in about US$18.12 million in loan savings (ICR, paragraph 27). Also, US$12.00 million of unused loan proceeds were cancelled.

Financing. The project was financed through a US$100.00 million IBRD loan. The actual amount disbursed was US$79.66 million (ICR Data Sheet, page 2). According to the ICR (paragraph 23) US$12.00 million of unused loan proceeds were cancelled as part of the December 9, 2020 restructuring.

Borrower Contribution. The Borrower was expected to contribute US$118.62 million of counterpart funds. The actual amount disbursed was US$64.22 million (ICR Data Sheet, page 2).

Dates. The project was approved on December 23, 2014 and became effective six months later on June 3, 2015. The Mid-Term Review (MTR) was conducted on December 29, 2017 which was in-line with the PAD which stated that the MTR needed to be conducted no later than June 2018 (PAD Annex 5). The project closed on June 30, 2022 which was 18 months after the original closing date on December 31, 2020. The extension of the closing date was needed to accommodate for delays caused by COVID-19 restrictions and remedial works to stabilize the landslides cause by heavy the storms of 2020 (direct communication with the project team).

The project was restructured twice, both were Level 2 restructurings as follows:

1. On December 9, 2020, when the amount disbursed was US$49.74 million, in order to revise the Results Framework, change components and cost, extend the Loan Closing Date by 12 months from December 31, 2020 to December 31, 2021, cancellation of US$12.00 million of unused loan proceeds, and reallocation of funds between disbursement categories.

2. On December 20, 2021, when the amount disbursed was US$65.90 million, in order to change components and cost, extend the Loan closing date by six months, from December 31, 2021 to June 30, 2022, and change the implementation schedule.

3. Relevance of Objectives

Rationale

Context at Appraisal. Chongqing Municipality (CQM), with an area of 82,400 km2 and a total population of 33.3 million, has had over 45% of its population living in rural areas. Chongqing's has a mountainous topography, in particular in the northeast and southeast wings, the two sub-regions included in the project. These areas of Chongqing continue to be exposed to relatively high risks of events such as river flooding, landslides, soil erosion, and water pollution. Reducing these risks is a high priority to ensure a sustainable basis for economic and social development.

Previous Bank Experience. The Bank has extensive local experience in implementing similar projects in China including the Jiangxi Wuxikou Integrated Flood Management Project and the Qinghai Xining Flood Control and Watershed Improvement Project. The Bank also has regional and global experience in designing and implementing similar projects. This would enable the Bank to provide valuable insights on the implementation of integrated flood risk reduction measures in a variety of developmental settings.

Consistency with Bank Strategies. At appraisal, the PDO was in line with the Bank's twin goals of ending poverty and boosting shared prosperity where both were incorporated and reflected in the project design and prioritization of project interventions. Also, the PDO was in line with the China Country Partnership Strategy (CPS, FY2013-FY2016) which focused on two strategic themes, namely: Supporting Greener Growth, and Promoting More Inclusive Development in China. Specifically, the project supported the following CPS outcomes: (a) enhancing urban environmental services; (b) demonstrating sustainable Natural Risk Management approaches and pollution management; (c) strengthening mechanisms for managing climate change; and (d) enhancing opportunities in small towns and rural areas.

At completion, the PDO was in line with the Bank's Country Partnership Framework (CPF, FY20–FY25), contributing to Engagement Area Two: Promoting Greener Development. Specifically, the project contributed to two areas emphasized by the CPF: climate change and environmental sustainability. The project directly supported Objective 2.5: Promoting Low-Carbon Transport and Cities; under this objective, the Bank would help cities build resilience to natural disasters, especially floods; and support the shift in focus from natural disaster recovery and construction to introducing risk reduction in socio-economic planning. In addition, the project contributed to Objective 2.2: Reducing air, soil, water and marine plastic pollution and Objective 2.4: Strengthening sustainable natural resource management.

Consistency with Government Strategies/Priorities. At appraisal, the PDO was in line with Chongqing's development strategy of "one circle and two wings." The PDO was also in line with China's 12th Five-Year Plan (FYP) that promoted the development of infrastructure to address the safety, adequacy, and sustainability aspects of drinking water, waste management services, and environmental pollution in rural areas.

At completion, the PDO continued to be in line with the National 14th Economic and Social Development FYP (2021–2025) which highlighted the need to promote integrated flood risk management in small and medium rivers to enhance national water security. The plan also emphasized wastewater management, treatment and reuse and outlined strategies to close remaining gaps in public service provision. In addition, the PDO was in line with the 14th National Water Sector Development and Reform FYP (2021–2025) and National Disaster Prevention and Reduction Plan (2021–2025). Both Plans emphasized the need to mainstream flood risk management by: improving forecasting and early warning systems and capacity as well as combine structural infrastructure interventions with non-structural measures, including improved flood control planning, forecasting and early warning, community awareness, and preparedness. The PDO was also in line with Chongqing Municipal Economic and Social Development 14th FYP which aimed to promote integrated river basin management, including both improved flood management and wastewater management. Finally, the PDO was in line the overall rural-urban integration strategy for Chongqing by reducing the development gap between rural and urban areas.

Summary of Relevance of Objectives Assessment. The PDO was in line with both national and local development priorities, as well as with the Bank's current CPF. The PDO statement was clear, focused, and pitched at an adequate level of ambition. However, it did not fully capture the outcomes and benefits generated by the project. The PDO statement focused solely on flood risk reduction when the project provided a wide range of benefits, such as urban landscape and beautification, among others. Also, the project design was more aligned with improving wastewater infrastructure access rather than wastewater infrastructure services as stated in the PDO. Therefore, Relevance of Objectives is rated Substantial.

Rating

Substantial

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

To reduce flood risks in selected counties of Chongqing Municipality.

Rationale

Theory of Change (ToC). To achieve the stated objective, the project would implement an integrated approach combining both structural and nonstructural measures in four project counties (Tongnan, Rongchang, Shizhu, and Pengshui). Structural measures included the construction of: (a) dikes and associated roads to improve flood protection standards, and (b) two overflow weirs to maintain water levels in rivers during drought periods. Nonstructural measures to reduce flood risks included: (a) improving hydro-met monitoring and information management systems; (b) strengthening the flood early warning and emergency response capacity at the county, township, and village levels; and (c) upgrading flood risk mapping and dissemination, safety zoning, and raising public awareness. These activities were expected to increase structural flood protection standards to 1 in 20 floods; improve the capacity of the flood monitoring system and the flood forecasting system; and improve flood preparedness and emergency response. The expected outcome of the afore-mentioned combined activities would be reduced flood risks in selected counties which would result in: 1. the protection of urban land areas vulnerable to floods; and 2. People benefiting from flood risk reduction. The anticipated long-term impact would be the development of a green, resilient, and inclusive Chongqing municipality.

The achievement of the stated objective was underpinned by the following four critical assumptions: a) Land acquisition and resettlement would be completed in a careful and timely manner, (b) Municipal Project Management Office (PMO) and four county PMOs and Project Implementing Units (PIUs) would be adequately staffed and trained, (c) Cross-sector coordination between water, disaster, and environment departments would be facilitated, and (d) Counterpart funding would be available in a timely manner.

Overall, the activities reflected in the ToC were connected to the intermediate results and to the outcomes in a plausible causal chain. The critical assumptions were logical and realistic.

Outputs/Intermediate Results

(i) Flood control in Tongnan

1. 6.3 km of dike was constructed (target achieved).
2. Flood response and early warning equipment were procured, including 1 rescue boats, 100 life jackets, and 1 drone (target achieved).
3. One flood preparedness plan was developed, land use planning in flood areas was completed, a flood management platform was developed (target achieved).
4. Flood awareness activities were organized (target achieved).

(ii) Flood Control in Rongchang

1. 13.54 km of dike was constructed (target achieved).
2. One overflow dam was rehabilitated (no target provided).
3. Flood response and early warning equipment were procured, including 200 life jackets, 100 flood control set, 2 high-resolution web cameras, and 6 computers (no target provided).
4. A flood management platform was established; flood preparedness plan was completed (target achieved).
5. Flood awareness activities were organized (target achieved).

(iii) Flood Control in Shizhu
1. 5 km of dike was constructed (target achieved).
2. 4 overflow dams were removed and 4 overflow dams were upgraded (target achieved).
3. Flood response and early warning equipment were procured, including 1 GPS measurement, 10 bumps, 2 rescue cars, and 300 life jackets (no target provided).

4. Flood preparedness plan was developed; flood management platform was developed; hydrological information and flood early warning system were developed (target achieved).
5. Flood awareness activities were organized (target achieved).

(iv) Flood control in Pengshui
1. 4.69 km of dike was constructed (target achieved).
2. Flood response and early warning equipment were procured, including 1 rescue boat, 20 talkers, and 20 explosion-proof lights (no target provided).
3. Server for hydrological data was developed; flood management platform was developed (target achieved).
4. Flood awareness activities were organized (target achieved).

Outcome

This outcome was achieved through a combination of structural and non-structural measures. The project supported dike construction which reduced the probability of flood, with the flood protection standard improved from below 1-in-20-year prior to the project to 1-in-20-year after the project. The project also improved flood response capacity and awareness of people in the flood-prone areas. By project completion the following outputs/intermediate outcomes were achieved and directly contributed to the achievement of the project outcomes: 29.57 km of dikes were fully completed (Intermediate Outcome1 IO1, target achieved). Four project counties had prepared flood risk maps and disseminated the maps to raise awareness of risks (IO2, target achieved). In addition, Pengshui, Shizhu, and Rongchang prepared or upgraded their flood emergency preparedness plans (IO3, target achieved). Finally, 5,027 people participated in flood awareness activities, slightly exceeding the target of 5,000 (IO4).

By project completion, 1.125 km2 of land had improved flood protection which was below the final original target at 2.16km2 (baseline was 0). Flood protection standards in Tongnan, Shuzhu, and Pengshui Counties as well as the downstream section in Rongchang County have all increased from 1-in-10-years to 1-in-20-years flood risks (target achieved). Also, and as a result of the project activities, 10,667 people benefitted from flood risk reduction which was below the original target of 15,700. The ICR (paragraph 36) noted that the final targets of flood protected area and population were reduced by about 50% during restructuring, partly due to design change in Tongnan to develop a wetland park. This approach was in line with globally advanced integrated flood risk management concept that combines "gray and green infrastructure to provide multiple benefits beyond flood protection, such as urban biodiversity, improved air quality, and amenity."

Finally, the project improved integrated flood risk management systems in all four project counties where flood risk management platforms were established. Specifically, Shizhu and Pengshui improved their hydrological monitoring system and early warning system, and Tongnan incorporated flood risk in its land and spatial planning and management.

Summary of Efficacy Assessment. While the evidence provided point to the success of the project in reducing flood risks in selected counties of Chongqing Municipality, the project fell short of meeting its targets for its two outcome indicators. Therefore, the efficacy with which this outcome was achieved is rated Modest.

Rating
Modest

OBJECTIVE 1 REVISION 1
Revised Objective
To reduce flood risks in selected counties of Chongqing Municipality.

Revised Rationale
Theory of Change (ToC). The ToC mentioned above applies since the PDO was not revised, only two PDO outcome targets were revised downwards.

Outputs/Intermediate Results

The same information mentioned above applies.

Outcome

This outcome was achieved through a through a combination of structural and non-structural measures. The project supported dike construction which reduced the probability of flood, with the flood protection standard improved from below 1-in-20-year prior to the project to 1-in-20-year after the project. The project also improved flood response capacity and awareness of people in the flood-prone areas. By project completion the following outputs/intermediate outcomes were achieved and directly contributed to the achievement of the project outcomes: 29.57 km of dikes were fully completed (IO1, target achieved). Four project counties had prepared flood risk maps and disseminated the maps to raise awareness of risks (IO2, target achieved). In addition, Pengshui, Shizhu, and Rongchang prepared or upgraded their flood emergency preparedness plans (IO3, target achieved). Finally, 5,027 people participated in flood awareness activities, slightly exceeding the target of 5,000 (IO4).

By project completion, 1.125 km2 of land had improved flood protection fully achieving the revised target after restructuring (baseline was 0). Flood protection standards in Tongnan, Shuzhu, and Pengshui Counties as well as the downstream section in Rongchang County have all increased from 1-in-10-years to 1-in-20-years flood risks (revised target achieved). Also, and as a result of the project activities, 10,667 people benefitted from flood risk reduction, exceeding the revised target of 7,760. The ICR (paragraph 36) noted that unexpected population growth in all four project counties after restructuring contributed to exceeding the target. The ICR (paragraph 36) stated that the final targets of flood protected area and population were reduced by about 50% during restructuring, partly due to design change in Tongnan to develop a wetland park. This approach was in line with globally advanced integrated flood risk management concept that combines "gray and green infrastructure to provide multiple benefits beyond flood protection, such as urban biodiversity, improved air quality, and amenity."

Finally, the project improved integrated flood risk management systems in all four project counties where flood risk management platforms were established. Specifically, Shizhu and Pengshui improved their hydrological monitoring system and early warning system, and Tongnan incorporated flood risk in its land and spatial planning and management.

Summary of Efficacy Assessment. The evidence provided point to the success of the project in reducing flood risks in selected counties of Chongqing Municipality. The project met or exceeded its PDO indicators and as well was its intermediate results as noted above. Most importantly, the effectiveness of the flood protection measures was tested during the summer 2020 rains. In Tongnan, the water depth of the Fujiang River reached 247.15 meters above sea level in August 2020, against a 20-year flood protection depth of 248 meters above sea level. That water depth lasted for almost 40 days without causing flooding and associated social and economic losses in Tongnan County. Therefore, the efficacy with which this objective was achieved is rated Substantial.

Revised Rating
Substantial

OBJECTIVE 2
Objective
To improve wastewater infrastructure services in selected counties of Chongqing Municipality.

Rationale
Theory of Change (ToC). To achieve the stated objective, the project implemented an integrated approach combining both structural and nonstructural measures in four project counties (Tongnan, Rongchang, Shizhu, and Pengshui). Structural measures included construction of new sewage/drainage pipe works to improve wastewater infrastructure services. Nonstructural measures to improve wastewater services included developing a geographic information system (GIS) for monitoring, operation, and maintenance of drainage and wastewater network facilities. These activities were expected to increase wastewater infrastructure and improve wastewater management. The expected outcome of the afore-mentioned combined activities would be improved wastewater infrastructure services in selected counties. The anticipated long-term impact would be the development of a green, resilient, and inclusive Chongqing municipality.

The achievement of the stated objective was underpinned by the following four critical assumptions: a) Land acquisition and resettlement would be completed in a careful and timely manner, (b) Municipal Project Management Office (PMO) and four county PMOs and Project Implementing Units (PIUs) would be adequately staffed and trained, (c) Cross-sector coordination between water, disaster, and environment departments would be facilitated, and (d) Counterpart funding would be available in a timely manner.

Overall, the activities reflected in the ToC were connected to the intermediate results and to the outcomes in a plausible causal chain. However, the stated activities were geared more towards improving wastewater infrastructure access rather than wastewater infrastructure services as stated in the PDO. The critical assumptions were logical and realistic.

Outputs/Intermediate Results

1. 13.65 km of wastewater pipeline were constructed in Rongchang (target achieved).
2. 13.3 km of wastewater pipeline were constructed in Shizhu (target achieved).
3. 6.14 ha of greening areas were developed in Shizhu (no target provided).
4. GIS was developed for wastewater drainage pipeline monitoring, operation, and maintenance in Shizhu (target achieved).
5. 4.83 km of wastewater pipeline were constructed in Pengshui (target achieved).
6. 4.69 km of dike-top road and rainwater drainage pipe were constructed in Pengshui (target achieved).

Outcome

- By project completion, the project reached 73,471 people with improved sanitation facilities (PO3) exceeding both the revised target of 70,280 and the original target of 67,200, exceeding both targets was in part due to population growth that exceeded expectations at appraisal and restructuring.
- Prior to the project intervention, people without wastewater access directly discharged their wastewater into the surface water system (ICR, paragraph 41). The project supported the construction of 31.3 km of roads on top of the dikes in the project counties (IO5, target achieved) and 30.14 km of sewage pipeline along those roads (IO6, target achieved). As a result, the wastewater would be collected and fully treated as pipelines constructed under the project were all connected to existing wastewater treatment plants.
- Surface water quality within the project area (for example, Laixi River and Wujiang River) improved from “below Class III” to “Class III” (Surface water quality in China is classified from V to I with Class I being the best and Class V being the worst. Class III is eligible for irrigation uses, ICR footnote#17). However, the water quality improvement cannot be solely attributed to activities financed under this project since there were other ongoing activities aimed to reduce pollution beyond the scope of this project (ICR, paragraph 41).
- Finally, to improve waste water management, Shinzhu developed a GIS for the monitoring, maintenance, and operation of wastewater pipelines as non-infrastructure measures to complement infrastructure measures, which would also contribute to improving the efficiency of maintenance and operation (ICR, paragraph 40).

Summary of Efficacy Assessment. The project exceeded its PDO outcome target and met or exceeded its intermediate results targets. The evidence provided in the ICR also point to a reduction in pollution of river water that could be partially attributable to the project activities. The evidence provided in the ICR point to an improvement in wastewater infrastructure access rather than wastewater infrastructure services. Despite the misalignment between the PDO and stated activities, the efficacy with which this objective was achieved is rated Substantial.

Rating
Substantial

OBJECTIVE 2 REVISION 1
Revised Objective

To improve wastewater infrastructure services in selected counties of Chongqing Municipality.

Revised Rationale

Theory of Change (ToC). The same ToC applies since the objective was not revised. There was a slight upward revision to the PDO outcome indicator target to 70,280 beneficiaries compared to the original target of 67,200 beneficiaries (about 4.6% increase).

Outcome

The same discussion as mentioned under the original objective.

Revised Rating

Substantial

OVERALL EFFICACY

Rationale

Overall efficacy is rated Modest. While the project exceeded its PDO outcome target for the objective 2, it fell short of meeting its targets for its two outcome indicators for the objective 1.

Overall Efficacy Rating

Modest

Primary Reason

Low achievement

OVERALL EFFICACY REVISION 1

Overall Efficacy Revision 1 Rationale

Overall Efficacy is rated Substantial. The evidence reported in the ICR point to the success of the project in reducing flood risks in selected counties of Chongqing Municipality. The project met or exceeded its PDO indicators and as well was its intermediate results as noted above. Most importantly, the effectiveness of the flood protection measures was tested during the summer 2020 rains. The project also exceeded its outcome target for objective 2, and the evidence reported in the ICR point to a reduction in pollution of river water that could be partially attributable to the project activities.

Overall Efficacy Revision 1 Rating

Substantial

5. Efficiency

Economic and Financial Analysis (EFA)

ex ante

- The overall expected project economic internal rate of return (EIRR) was estimated at 13.05%. The EIRR of the flood control components in the four counties were estimated at 16.4% (Rongchang), 13.0% (Tongnan), 11.6% (Pengshui), and 13.2% (Shizhu), respectively. Cost-benefit analysis was used to evaluate the economic viability of each individual flood control sub-component in the four counties.
- The main economic benefits of the project included avoided flood damages, increases in amenity and land values, and water quality and health improvements owing to improved water environment infrastructure services.
- Sensitivity analysis was conducted for the four flood control components. The results of the sensitivity analysis (under the assumption of a 10% decrease in economic benefit and/or a 10% increase in total costs) showed that the investments for the components were economically robust.

ex post

- The methodology used for the economic analysis followed the same approach used at appraisal. The overall project economic internal rate of return (EIRR) was estimated at 11.50% compared to 13.50% at appraisal. The EIRR of the flood control in the Tongnan County sub-project was 16.79% compared to 13.02% at appraisal), of the flood control in the Rongchang County sub-project was 17.79% compared16.40% at appraisal, of the flood control in the Shizhu County subproject was 6.17% compared to 13.20% at appraisal and the flood control in the Pengshui County subproject was −4.6% compared to 11.63% at appraisal. The project was economically viable as a whole and for two of the sub-projects.
- The lower EIRR at completion in Shizhu and Pengshui was because the intervention area of residential and commercial lands along the rehabilitated riverbanks decreased by 46.9% and 100%, respectively (ICR, paragraph 43).
- Implementation efficiency. The project saved US$12 million because of competitive bidding and the change in the exchange rate. Also, at completion, an additional US$8 million in loan savings were further realized due to competitive bidding. While the closing date was extended by 18-months, this was justified due to factors outside the project's control, including the COVID-19 pandemic and landslides in the project areas (ICR, paragraph 45).

Summary of Efficiency Assessment. Overall, efficiency is rated Modest. The ex post economic returns were below expectations at appraisal in two project counties, and the overall EIRR for the entire project level at 11.50% was lower than the expectation at appraisal at 13.05%. While the project realized US$20.00 million in savings, it is not clear why the investments in Pengshui County proceeded despite not serving a flood protection purpose.

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	✓	13.50	100.00 ☐ Not Applicable
ICR Estimate	✓	11.50	100.00 ☐ Not Applicable

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

6. Outcome

Assessment against the original outcome targets. Relevance of Objectives was rated Substantial. Overall Efficacy was rated Substantial, but with moderate shortcomings. The project exceeded its PDO outcome target for the objective 2, but fell short of meeting its targets for the two outcome indicators for objective 1. Efficiency was rated Modest. The overall ex post EIRR at 11.50% was lower than the expectation at appraisal at 13.05%.

Based on Substantial Relevance, Substantial Overall Efficacy (Modest achievement of one objective and Substantial achievement of the other), and Modest Efficiency, Outcome is rated Moderately Satisfactory.

Assessment against the revised outcome targets. Relevance of Objectives was rated Substantial. Overall Efficacy was rated Substantial. The project met or exceeded its revised PDO indicators for Objective 1. Most importantly, the effectiveness of the flood protection measures was tested during the summer 2020 rains. The project also exceeded its outcome target for objective 2. Efficiency was rated Modest. The overall ex post EIRR at 11.50% was lower than the expectation at appraisal at 13.05%.

Based on a Substantial rating for both Relevance of Objectives and Overall Efficacy, and a Modest rating for Efficiency, Outcome is rated Moderately Satisfactory.

Split Rating. The Overall Outcome will be assessed based on a split rating as outlined below:

	Original Targets without Restructuring	Revised Targets with Restructuring
Relevance of Objectives	Substantial	Substantial
Efficacy		
Objective 1	Modest	Substantial
Objective 2	Substantial	Substantial
Efficiency	Modest	Modest

Outcome Ratings	Moderately Satisfactory	Moderately Satisfactory
Numerical Value of Ratings	4	4
Disbursement (US$, millions)	US$50.00	US$30.00
Share of disbursement	0.625	0.375
Weighted value of the outcome rating	2.5	1.48
Final outcome rating	Moderately Satisfactory (4)	Moderately Satisfactory (4)

The overall outcome rating is determined by calculating the share of disbursements before and after restructuring. The weighted value of the outcome rating under the original objectives is the outcome rating (4) times its weight (62.5%) = 2.5. The weighted value of the outcome rating under the formally revised objectives is the outcome rating (4) times its weight (37.5%) = 1.48. The weighted average score is the sum of the two: 2.5 + 1.48 = 3.98. Rounding this to the nearest whole number, it amounts to an overall outcome value of 4, or Moderately Satisfactory on the 6-point scale.

a. Outcome Rating

Moderately Satisfactory

7. Risk to Development Outcome

The ICR (paragraph 79) identified the following risks that could potentially impact the development outcome:

1. Technical risk. The project benefited from a technical quality assurance mechanism that was in place throughout preparation and implementation. This mechanism involved the review of sub-project feasibility studies and designs, construction quality control and oversight, project design changes, and planning for O&M of project facilities. By project completion, O&M manuals for the flood infrastructure financed under this project were developed, with staffing identified and financing committed from the government budget for all four project counties. While landslide sites and the geological deformation sites were all stabilized, any future construction activities close to those sites needs close attention particularly in Pengshui (ICR, paragraph 79).

2. Environmental risk. By project completion, there were no pending social or environmental issues or grievances. The resettled communities were consulted and involved throughout the project stages. All the compensation was paid and the necessary livelihood-restoration programs were effective. All disrupted sites were restored, with ecological restoration and water and soil conservation measures implemented (ICR, paragraph 79).

3. Other stakeholder ownership risk. The beneficiary surveys showed that there was strong ownership of the project by the beneficiary communities for both flood protection and wastewater collection.

8. Assessment of Bank Performance

a. Quality-at-Entry

- Strategic relevance and approach. The project was strategically relevant to the Government of China and Chongqing Municipality. The PDO was in line with the Government priorities and the Bank strategies (see section 3 for more details). Closing gaps in the provision of infrastructure services in the four poor counties and ensuring basic service provision for low-income populations was considered a high priority for project support. However, there was a misalignment between the second objective (to improve wastewater infrastructure services) and the supporting activities, which were geared towards improving access to infrastructure rather than services.
- Technical, financial, and economic aspects (for investment lending projects). The project featured a comprehensive approach to reduce flood risk that included structural and non-structural activities as well as awareness-raising activities. The project design was informed by integrated flood risk management approaches applied in several projects in China including the Jiangxi Wuxikou Integrated Flood Management Project and the Qinghai Xining Flood Control and Watershed Improvement. However, the project preparation could have benefited from a better quality review of technical designs and flood risk mapping. The financial and economic aspects could have benefited from a more accurate baseline of the project with regards to assessing the flood protection area and impacted population.
- Poverty, gender, and social development aspects. The project targeted poverty-affected counties with project outcomes directly contributing to local poverty alleviation. Gender disaggregated indicators were included in the Results Framework to assess the extent to which women equally benefitted from flood-prevention activities and received adequate compensation and resettlement measures to meet their needs.
- Environmental aspects. The project was expected to have significant benefits in terms of reducing flood risks and improving water management infrastructure and services. Environmental aspect were adequately addressed in the PAD.
- Fiduciary aspects. The Chongqing Project Management Office (CPMO), was established under the Chongqing Municipal Development and Reform Commission (CDRC), had extensive experience with four Bank-financed projects and would be responsible for overall project management, including fiduciary aspects.
- Implementation arrangements. The project had four PIU established in each of the four project areas. Except for the Pengshui PIU,
the other three PIUs have had experience with Bank operations from previous Bank projects. Overall, implementation arrangements were at a good level.
- Risk assessment. Six main risks were identified at the appraisal stage relating to three main areas: stakeholders, implementing agency and project risks. The PAD also included relevant mitigation measures. The overall risk was rated substantial.
- M&E arrangements. Overall, M&E design was simple, clear, but had some shortcomings related to indicator targets, inaccurate baseline data, and lack of indicators to track some activities (see section 9 a for more details).

Summary of Quality at Entry (QAE) Assessment. The project was strategically relevant, with a comprehensive design. Fiduciary and environmental aspects were adequate. Risk assessment was thorough and included relevant mitigation measures. However, there were several shortcomings related

to: PDO formulation, technical designs and flood risk mapping, and M&E design weaknesses. Overall, QAE had moderate shortcomings and therefore rated Moderately Satisfactory.

Quality-at-Entry Rating
Moderately Satisfactory

b. Quality of supervision

The Bank conducted 15 supervision missions over the duration of the project. Implementation support missions were conducted at least twice a year and included high-level discussions with senior government officials, technical discussions, and field visits (ICR, paragraph 77). The ICR also noted that additional missions were conducted to address issues during implementation. The project implementation benefited from the stability at the task team leadership with a single change of the TTL during the project. Adequate transition arrangements ensured that the TTL change did not affect implementation support. The Bank worked proactively with the Borrower to restructure the project and ensure that implementation was progressing towards the achievement of the PDO.

However, the Bank could have used the restructuring to revise the PDO to reflect better alignment with project activities and address M&E design shortcomings. Also, the project could have benefited from better informal communication between the Bank task team and counterpart project team. For example, with regards to the landslides in the project areas, cracks were observed on the crowns of landslides along all the earth slopes as early as August 2019 and December 2019, however, this was not communicated to the Bank except after the occurrence of the landslides in July 2020 (ICR, paragraph 77). Finally, it is not clear why the investments in Pengshui County proceeded despite not serving a flood protection purpose.

Summary of the Quality of Supervision Assessment. Overall, the Bank provided effective supervision of the implementation process and guided the project towards achieving its PDO. The ICR (paragraph 78) noted that the Bank not only provided technical expertise, but also shared managerial experience with the project management entities, including local governments, the PMO, and the PIUs. There were some shortcomings related to not using the restructuring to revise the PDO and the lack of informal communication between the Bank task team and counterpart project team. Overall, Bank Supervision is rated Moderately Satisfactory.

Overall, Bank Performance is rated Moderately Satisfactory due to moderate shortcomings at QAE.

Quality of Supervision Rating
Moderately Satisfactory

Overall Bank Performance Rating
Moderately Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design

- The PAD did not include a Theory of Change (ToC) since it was not required by the Bank at the time of appraisal. Nonetheless, the ICR included a ToC (Figure 1) that was derived from the project description in the PAD. Overall, the ToC provided a clear connection between the project activities and expected outcomes in a plausible causal chain. However, there was a misalignment between the second objective (to improve wastewater infrastructure services) as the supporting activities were geared towards improving access to infrastructure rather than services.
- The PDO was to be assessed through three PDO level results indicators: 1. The total urban area vulnerable to design floods protected; 2. People benefited from flood risk reduction (male/female); and 3. People provided with access to improved sanitation facilities under the project (male/female). These indicators were directly connected with PDO and measurable. However, the targets for the PDO indicators 1 and 2 were overestimated and had to be revised down during implementation.
- The Results Framework (RF) included seven intermediate results indicators (IRIs). These indicators tracked the project activities and the implementation progress. However, the IRIs were focused mainly on flood risk reduction, and several intermediate indicators had percentage targets, which according to the ICR (paragraph 59) "did not establish a clear link with the investments under the project."
- The RF also lacked indicators to monitor and track several activities supported by the project including: infrastructure investments to improve wastewater management capacity, flood management platforms and enhanced institutional capacity of project counties in preparing annual updates of flood emergency preparedness and responsiveness plans, and capacity improvements (ICR, paragraph 59).
- While the M&E design was simple and clear, the RF was not comprehensive enough to track and measure all the activities supported by the project.

b. M&E Implementation

- The Chongqing Project Management Office (CPMO) was responsible for implementing the project progress and monitoring activities. Semiannual project progress reports and annual reports monitoring reports were submitted to the Bank. According to the ICR (paragraph 60) "M&E data were collected and verified in a methodologically sound manner."
- A baseline report was completed within the first 12 months of effectiveness.
- Overall, implementation arrangements were adequate, and data was collected systematically and efficiently (ICR, paragraph 60).

c. M&E Utilization

- According to the ICR (paragraph 61) the M&E data "were used effectively to inform project implementation and support project management decisions." M&E data enabled the Bank and the PMO to monitor progress, identify bottlenecks, and facilitate decision-making or proactive actions, such as increasing supervision frequency and making changes to project implementation. For example, improved population and topographic data informed the adjustment of PDO targets in the first restructuring.

- Overall, the evidence provided in the ICR confirmed that M&E data were used to effectively inform project implementation and support project management decisions.

Summary of M&E Quality Assessment. While M&E design was simple and clear, several project activities were not tracked/measured due to the lack of relevant indicators. Implementation arrangements were adequate and data was systematically collected. M&E utilization was evident as data were used to inform project implementation and support project management decisions. Overall, the Quality of M&E is rated Substantial, but with notable design shortcomings. That said, the design shortcomings did not hinder the assessment of the PDO.

M&E Quality Rating
Substantial

10. Other Issues

a. Safeguards

- The project was assigned an environmental Category A (full assessment), mainly because the location of some proposed components could be environmentally sensitive (for example, flood control and embankment in the Pengshui County's Wujiang River section and the Shizhu County's Longhe River section), though some impacts might be site-specific and few would be irreversible (PAD, paragraph 73). It triggered five safeguard polices: Environmental Assessment (OP 4.01); Natural Habitats (OP 4.04); Physical Cultural Resources (OP 4.11); Safety of Dams (OP 4.37); and Involuntary Resettlement (OP/BP 4.12).
- The project involved land acquisition and resettlement for the construction of project-financed infrastructure. An Environmental Impact Assessment (EIA) was carried out for the project components, and an environmental management plan (EMP) and a consolidated Resettlement Action Plan (RAP) were prepared.
- **Compliance with Environmental Safeguards.** According to the ICR (paragraph 63) "the project complied with environmental safeguards policies." The environmental management system was well established in the CPMO and county PMOs, and the mitigation measures in the EMP were also well implemented (ICR paragraph 64). The project did not directly finance the construction and rehabilitation of any dams, and no significant natural habitats and no endangered species were affected by the project. A physical cultural resources management plan was integrated as part of the EMP that according to the ICR (paragraph 66) "included appropriate mitigation measures."
- **Compliance with Social Safeguards.** According to the ICR (paragraph 68) "the project complied with social safeguards policies." The project permanently acquired 89.56 ha of land in four counties, which economically affected 1,701 households (with 6,859 persons) and relocated 274 persons in 77 households. A total of 16,693 m2 of residential houses were demolished. The ICR reported that "the RAP was consistently implemented under the CPMO's strong coordination and in full consultation with displaced persons." The Government paid the compensation for relocation, land attachments, standing crops and other assets directly to the displaced persons.
- **Landslides and the Project's response.** In July 2020, two landslides occurred at Tianchi and Guihuabang sites, damaging nearby houses. 39 families (169 people) from Tianchi and Guihuabang were evacuated and relocated them to nearby temporary housing. The Pengshui PMO developed

and implemented a Safeguards Corrective Action Plan (SCAP), Landslide Remedial Plans, and an Environmental and Social Management Plan for the remedial works of the landslide bodies which included an Emergency Response Plan and was disclosed locally and on the World Bank's website on November 16, 2021. The remediation work was completed by project closure (ICR, paragraph 70).

b. Fiduciary Compliance

Financial Management (FM). The project had an adequate FM system that provided accurate and timely information and complied with World Bank FM policies (ICR, paragraph 72). The ICR reported that no significant FM issues were noted throughout the project implementation, and all project audit reports had unqualified audit opinions (paragraph 72). Finally, loan proceeds were disbursed to the project in a timely manner.

Procurement. According to the ICR (paragraph 73) "procurement was carried out in accordance with the World Bank procurement policies, procedures, and requirements." While the project was complex, all the PMOs were able to carry out procurement and contract implementation efficiently (ICR, paragraph 73). There were no mis-procurement cases under the project (ICR, paragraph 73).

c. Unintended impacts (Positive or Negative)

None.

d. Other

None.

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 included four lessons. The following three are emphasized with some adaptation of language:

1. Integrated flood risk management is more effective with deeper and more comprehensive structural and nonstructural measures, leveraging both gray and green infrastructure. Flood management needs to adopt a risk-based approach, which requires proper flood risk mapping and careful verification after the infrastructure systems are selected and designed during project preparation to inform the use of risk reduction measures (that is, dike construction, emergency plan, flood awareness raising, and so on). For future project preparation, flood risk maps need to be developed by the clients based on modern technologies, including satellite images, and improved social, economic, and topographic data during project preparation to inform project interventions as well as to identify appropriate project outcome targets. In addition to gray infrastructure, a wide range of green infrastructure, including wetlands and ecological embankment, can also be utilized to complement and maximize a series of social economic and ecological co-benefits beyond flood risk management.

2. Developing an accurate baseline assessment is critical to ensure smooth project implementation and completion. A more detailed baseline assessment for geological conditions that included the identification of landslide risks is needed to inform to inform construction site selection; and minimize landslide risks during implementation. Also, assessing the flood protection area and population based on flood risk mapping and high-resolution population data is needed to prioritize project interventions and help avoid unnecessary restructuring processes. In addition, an accurate baseline will help in avoiding overestimation of population growth in small- and medium-size cities and towns as well as cost overestimation.

3. Developing a multihazard risk management system, especially in mountainous regions, requires establishing an effective life-cycle system from planning, supervision, and response to remediation. An effective disaster risk management system is critical for managing multihazard risks especially in mountainous regions, such as mountain torrents, earthquakes, and landslides. Preparation of projects in mountainous regions requires putting in place a comprehensive and effective system for managing those risks from a life-cycle perspective, from improved risk identification during project preparation, adopting of design changes to mitigate those risks, to close implementation supervision and communication, emergency preparedness and response, and appropriate remediation measures adopting the concept of ‘Building Back Better’. Local governments and project implementing agencies need to be involved in the entire process to enhance their project ownership and take responsibilities in disaster response and remediation.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

Quality of Evidence. The ICR benefited from the data collected by the M&E system, which enabled tracking the progress of activities and assessing the achievement of the PDO. However, some activities were not tracked due to the absence of relevant indicators.

Quality of Analysis. The ICR provided clear linking between evidence and findings and used the evidence base to serve the arguments under the different sections, in particular the discussion on outcomes.

Lessons. Lessons reflected the project experience and were based on evidence and analysis.

Results Orientation. The ICR included a comprehensive discussion on the achievement of the PDO. The outcome discussion was well balanced between what the project actually achieved on the ground and the achievement of outcome indicators.

Consistency with guidelines. The ICR used the available data to justify most of the assigned ratings.

Conciseness. The ICR provided comprehensive coverage of project activities, and candidly reported on shortcomings. Reporting on safeguard compliance was thorough. However, the outputs in Annex 1 lacked targets.

Summary of the Quality of ICR Assessment. The ICR was well written and benefited from the evidence base generated through the project's M&E system. It included a clear discussion on the achievement of outcomes and reflected relevant lessons. Reporting on safeguard compliance was thorough and the ICR provided a comprehensive assessment on M&E. Overall, the Quality of the ICR is rated Substantial.

a. Quality of ICR Rating
Substantial