



1. Project Data

Project ID P108654	Project Name Brazil Pernambuco Sustainable Water	
Country Brazil	Practice Area(Lead) Water	
L/C/TF Number(s) IBRD-77780	Closing Date (Original) 30-Nov-2015	Total Project Cost (USD) 190,000,000.00
Bank Approval Date 14-Jan-2010	Closing Date (Actual) 30-Mar-2020	
	IBRD/IDA (USD)	Grants (USD)
Original Commitment	190,000,000.00	0.00
Revised Commitment	190,000,000.00	0.00
Actual	190,000,000.00	0.00

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2. Project Objectives and Components

a. Objectives

The Project Development Objective, as stated in the Financing Agreement dated March 18, 2010 (page 6), was to improve sustainable water supply and sanitation services for the population residing in the Capibaribe River Basin and the MRR. (The MRR is the Metropolitan Region of Recife.)

The Project Development Objective as stated in the PAD (page 7) was identical to that in the Financing Agreement.



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

17-Sep-2015

c. Will a split evaluation be undertaken?

Yes

d. Components

The project is comprised of four components (PAD pages 7 to 10):

Component 1. Water Sector Management and Institutional Development (cost at appraisal: US\$29 million, actual cost: US\$41.51 million). This component aimed to contribute to the Government of Pernambuco's goal of long-term water security by strengthening the sector's institutional and regulatory frameworks as well as the state's capacity for integrated sector planning, policy and management. The component comprised the following three sub-components:

(A) **Integrated water resources management (WRM)**. This subcomponent aimed at strengthening the Borrower's water sector institutional and regulatory frameworks as well as its capacity for integrated water sector planning, policy and management through eight activities. These included (a) establishing the State Water and Climate Agency (APAC); (b) establishing new river basin committees, strengthening existing ones, and establishing water users associations and councils; (c) preparing and disseminating water resource plans; (d) carrying out studies aimed at improving the efficiency and sustainability of groundwater use; (e) carrying out studies to improve water use regulations; (f) modernizing and expanding the hydro-meteorological and water quality monitoring network; (g) carrying out environmental rehabilitation activities; and (h) carrying out other relevant activities.

(B) **Water Services and Infrastructure**. This subcomponent aimed at strengthening the Borrower's policy, regulatory framework, and institutional models for improving management and efficiency operation of water supply, sewerage and irrigated agriculture's infrastructure and services through four activities, including (a) developing a water supply and sewerage services strategy for rural and small towns; (b) implementing pilot projects to test the models developed; (c) improving the Borrower's water supply and sewerage regulation; and (d) carrying out of engineering, technical, social, environmental, finance, economic and legal studies and developing related instruments to allow for private sector participation in the construction, operation, and maintenance of the Sertão Pernambucano canal and its irrigated perimeter. In addition, this subcomponent aimed at developing rural water supply and sewerage strategies for the Agreste and Sertão regions as well as operational plans for pilot implementation in selected areas.

(C) **Project Management**. This subcomponent aimed at strengthening the Borrower's capacity for overall project implementation and monitoring including support to the implementation of the Environmental



Management Plan, project information and communication activities, support to build capacity of the State Secretariat of Water Resource for internal control of projects implemented, among others.

Revised Component 1. All actions related to the Sertão Pernambucano Canal were removed because the federal government was financing several studies to expand irrigation in the São Francisco River basin, and the state government of Pernambuco and the federal government agreed that these studies will be undertaken and financed by federal government. Two new activities, aimed at studying the potential of water use of Pernambuco's semi-arid region water reservoirs, including irrigation, were added. These were (a) carrying out of technical studies to evaluate the potential of multiple use of water in water infrastructure in the State Borrower's territory, and (b) staff training and dissemination activities and carrying out of selected studies. Subcomponent 1C was changed to reflect the replacement of the implementing agency, the Secretary of Water Resources, by the State Secretariat for Economic Development (SDEC), and to include strengthening of COMPESA and SDEC in overall project implementation and monitoring, including support on implementation of the environmental management plan, project information and communication activities, and support for strengthening capacity for internal project control. The remaining staff training and dissemination activities were transferred to subcomponent 1B.

Component 2. Improving Efficiency in the Provision of Water Supply and Sanitation Services (cost at appraisal: US\$52 million, actual cost: US\$87.29 million). This component aimed at increasing COMPESA's operational and economic performance and improving its corporate governance and management. The two main subcomponents were:

- a. **Non-revenue Water (NRW) Activities.** This subcomponent was designed to support the reduction of technical and commercial water losses and improve COMPESA's services, sales, and operational efficiency in selected areas of the MRR.
- b. **Corporate Development.** This subcomponent aimed at providing technical assistance to support the implementation of selected activities of COMPESA's strategic plan, with a focus on activities that could improve the utility's financial equilibrium and overall customer satisfaction, among others.

Revised Component 2. Subcomponent 2B was revised to provide technical assistance to COMPESA to improve its management and operational activities and to carry out studies.

Component 3. Water Supply and Sanitation Service Expansion (cost at appraisal: US\$320 million, actual cost US\$303.81). This component intended to implement activities aimed at increasing the volume of water supplied to Project areas, expanding sewerage services in the cities located upstream of the main water supply reservoirs in the Capibaribe river basin, and improving the State's capacity to leverage future investments by reviewing and preparing engineering designs for future priority water supply and sewerage systems. The component was divided into the following two subcomponents:

- a. **Pirapama Water Supply System.** This subcomponent aimed at supporting the expansion and integration of the Pirapama Water Supply System through the construction of different elements of the system, such as a pumping station near the Pirapama dam, a bulk water pipeline, water reservoirs, among others.
- b. **Expansion of Services.** This subcomponent aimed at supporting activities to protect and optimize the Tapacurá, Carpina and Jucazinho water reservoirs through the reduction of water pollution and investments in the construction of priority sewerage systems as well as the preparation of master plans and engineering designs for priority water supply and wastewater systems.



Revised Component 3. Activities under subcomponent 3A were changed to include construction and supervision of works of sewerage systems for the cities of Santa Cruz do Capibaribe and Surubim, improvements in the distribution of water in the MRR and River Basin Capibaribe, and works to support the government's emergency response following devastating floods in 2010/2011. Activities under subcomponent 3B were modified due to major delays in contracting the engineering designs for the initially agreed sewerage systems, namely Toritama, Limoeiro, Paudalho and Salgadinho. As such, these project locations were replaced by Santa Cruz do Capibaribe and Surubim that had wastewater treatment plants (WWTPs) engineering designs ready for bidding and implementation. Finally, this subcomponent also included preparation of engineering designs of sewerage systems in the urban areas of the municipalities of Limoeiro, Paudalho, Salgadinho, Vitória de Santo Antão, and others.

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

Project Cost: The original estimated project cost was US\$410.0 million. The actual cost at completion was US\$433.08 million. Counterpart funds increased from US\$220 million to US\$243 million at closing to accommodate the additional costs of completed works, which were higher than estimated at appraisal.

Financing: The project's cost was partly financed through an IBRD loan of US\$190 million equivalent.

Borrower Contribution: The Borrower's contribution at project approval was US\$220 million in local currency financing. The actual contribution of the Borrower at project closing was US\$243.08 million.

Restructuring:

First Restructuring. The project was restructured on September 17, 2015, and its closing date was extended to September 30, 2017 to allow for completion of several major project activities due to unforeseen implementation delays and the need for adjustments to the project scope and activities, as described above. Other changes included: (a) revisions to the project implementation institutions, to take into account changes in the state government structure that had occurred since appraisal and removal of one implementing agency that will no longer participate in the project; (b)[KM1] corresponding reallocation of funds among disbursement categories and components[KM2] ; and (c) revisions to the results framework to align with the new activities and modify indicator target dates to take into account the extension in the closing date.

Second Restructuring. A second restructuring on September 5, 2017 further extended the closing date to March 30, 2019 to allow time to complete works.

Third Restructuring. A third restructuring on February 14, 2019 extended the closing date to March 30, 2020, to allow for the satisfactory completion of important activities essential for achieving the Project Development Objective. Other changes included (a) revisions to the results framework to reflect the extended implementation period and to add an intermediate indicator, "State water regulatory agency (APAC) is fully operational" to the list of PDO indicators; and (b) changes in the implementation schedule.

Dates: The project was approved on January 14, 2010 and became effective on June 15, 2010. The project closed on March 30, 2020, four years and four months after the original closing date of November 30, 2015, as discussed above under restructuring.



Split Rating. Since the target values of the major PDO outcome indicators were modified during project restructuring; efficacy is assessed against both the original targets and the revised targets. Therefore, the review will conduct split rating.

3. Relevance of Objectives

Rationale

Country and Sector Context:

Pernambuco is one of the driest states in Brazil with a per capita freshwater availability of 1,320 m³ per year on average, equivalent to 3.5 percent of the national average per capita availability. The hydrological regime of the State is highly variable with the presence of mostly intermittent rivers in the driest areas of the State (Sertão and Agreste), where droughts associated with El Niño conditions are common. In fact, while these semi-arid areas represent 89 percent of the State's territory, they only count on about 20 percent of the water available for the State, with per capita water availability ranging from 400 cubic meters to 800 cubic meters per year, respectively. The low water availability in the semi-arid regions of the State coupled with the high rate of urbanization and economic activity in the coastal regions placed the State's available water resources under stress.

At appraisal, despite high levels of coverage with about 91 percent of urban households connected to the public water supply network, service was unreliable and intermittent. Of the 170 municipalities that were served by the Pernambuco State Water Supply and Sanitation Company (COMPESA), only 30 received water 24 hours per day. Rationing was commonplace, even in the MRR, where residents on average alternated between 24 hours with water supply and 28 hours without service.

In terms of sanitation, as of 2010, of the 170 municipalities served by COMPESA, only 20 had sewerage networks with an average coverage of about 20 percent, well below national and most regional averages. This affected not only the unserved population, presenting risks to public health, but also indirectly to those connected to the sewerage system, as untreated wastewater contributed to the pollution of water resources. Some of the most important state water sources, located in the Capibaribe river basin and providing water to about 2.6 million people, were receiving increasing biochemical oxygen demand (BOD) pollution loads due to discharge of untreated domestic sewage.

Alignment with Pernambuco State Development Plan. Given the negative impact water scarcity and unreliable water supply and sanitation services have on the economic performance and social development in the state, the government of Pernambuco had selected the water sector as a priority and an important element of its state development plan. It developed a strategy for the sector with the following ambitious objectives: (a) improve state water resources development and management policies and practices in order to allow for the expansion of access to safe and reliable water for human consumption and productive uses, and (b) reach universal access to water supply and sanitation in urban areas by 2014 and 2018, respectively. It estimated that investments of about US\$1.7 billion would be needed during the next three to five years to achieve its established short- to medium-term goals of improvement in service provision.

At appraisal, the project's objectives were consistent with the state government's water sector strategy. It offered more than 25 percent of the required financing to meet the medium-term goals. In addition, the



investments in water supply and sanitation expansion and efficiency would support the government's goals for improvements in economic growth and in social indicators. The project remained aligned with the state water sector strategy at closing.

Alignment with the World Bank Strategy The project fit within the World Bank Group's Country Partnership Strategy 2008–2011 (Report number 42677-BR) discussed by the Bank's Board on May 1, 2008. This highlighted the need for infrastructure development for sustainable growth, shifted Bank support to states, and moved to a more comprehensive approach to the water sector.

The project's objectives were also consistent with the CPS for 2012–2015, which made up part of the Bank's larger strategy of increased engagement with Brazil's northeast, the nation's poorest region. The CPS, which lists water infrastructure and management as top concerns, includes "expanding access to improved basic sanitation" as a priority under Objective 3: Promoting regional economic development. The project also supported other CPS focal areas, including (a) supporting the strengthening of government capacity to perform regulatory and policymaking functions, (b) helping to develop an integrated approach to water resources management and water supply and sanitation and supporting efficiency improvements and promoting the use of innovative technologies and service delivery models (such as results-based contracts).

Finally, the project aligns with Objective 3.2 of the Country Partnership Framework (CPF) for fiscal 2018–2023, which aims at providing sustainable urban services. The Bank is committed to support the Government of Brazil in seeking new models to support investment and improve the quality of urban infrastructure and improve the efficiency of service delivery, which includes continued investments in WSS to foster resilience against the increased variability of water supply. In addition, under the same objective, the CPF highlights the challenges that many cities face in reducing water pollution and the need to improve the quality of the urban environment. Therefore, the CPF aims at continuing the engagement in providing more inclusive and sustainable urban services, as well as continue to support the consolidation of existing efforts through a mix of ongoing and new investments at the municipal level.

Previous World Bank Experience. The World Bank has been engaged in the water sector in Brazil and the state of Pernambuco for many years. In 1993, the Bank financed the Federal Water Supply and Sanitation Sector Modernization Project, which covered Pernambuco. It financed a follow-on project in 1997. Notable achievements of these projects included (a) the establishment of the national water supply and sanitation information system, (b) the dissemination of modern approaches to services operation, and (c) the development of state regulatory frameworks and agencies, including to the establishment of the 2007 Federal Guidelines Law for Basic Sanitation. In 1998, the Bank financed the Federal Water Resources Management Project (Proagua), which supported activities aimed at improving water resources management in all states in the northeast region, including Pernambuco. This project aims to strengthen sector institutions.

Development Problem. The project would improve water resources management and water supply and sanitation service delivery. Also, the project would help the state in laying a foundation for moving towards a performance-based sector wide approach.

Rating

High



4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective

OBJECTIVE 1

Objective 1: “Improve sustainable water supply services for the population residing in the Capibaribe river basin and the MRR.”

Rationale

Theory of Change

A fairly direct causal link can be drawn between the project’s original activities and the expected outcomes. The activities consisted of (a) integrated WRM and the establishment of the State Water Regulatory Agency, APAC (Agência Pernambucana de Água e Clima; and (b) efficiency improvements and institutional strengthening of the Pernambuco State Water Supply and Sanitation Company, COMPESA. The theory of change (ToC) discussion in the ICR appropriately presents the activities, outputs, and intermediate outcomes that would be expected to achieve objective 1.

The key assumptions for achieving this objective were: (a) the construction of a water supply conveyance system, establishment, and isolation of hydraulic areas and metering districts, and the reduction of NRW would lead to increased availability of water and reduction of population subject to rationing; and (b) the establishment of the State Water Regulatory Agency (Agência Pernambucana de Água e Clima, APAC) would improve WRM.

Outputs

Eleven reservoir management councils for three critical river basins were established, matching the target. In addition, two river basin committees were established and three were strengthened.

Legislation was drafted, which the ICR states is contributing to integrated WRM, through better planning of water withdrawals, water quality monitoring, and improved planning and allocation during extreme events. These are expected to improve WRM, which in turn would increase the sustainability of access to water supply services. According to the Bank team (e-mail dated August 21, 2021) the legislation has yet to be adopted and the discussions with the relevant agencies are ongoing.

Metering improved through the installation of micro- and macro-meters, which led to an increase in the MRR in macro-metering (from 66.13 percent of district metered areas in 2010 to 95.25 percent in 2019), as well as in micro-metering (from 74.65 percent in 2010 to 86.80 percent in 2019), according to the project team in an e-mail dated August 21, 2021. The primary distribution mains have been restructured, which is bringing an additional 5.13 cubic meters per second of water to the MRR with the Pirapama system. In addition, distribution zones have been established in selected areas of the MRR. These in turn are expected to



improve COMPESA's efficiency in providing water supply services, and therefore reduce the need for rationing.

Most targets for outputs were achieved:

- The target to reduce water losses was almost achieved, reaching 94 percent of the revised target.
- The target for cash flow sufficiency of funds was nearly achieved, reaching 97% of the revised target.
- The target for the number of utilities to be supported was met.
- The target on implementation of bulk water charges was not achieved. However, the tariff studies and proposals have been completed and currently pending approval by the State Assembly.

Outcomes

Compared against the original target

PDO Indicator 1 was partially achieved. Some 49.5 percent of people in the MRR were subject to water rationing at project closure, compared with the target of 10 percent.

In sum, the PDO indicator target was partially achieved. The efficacy of this objective is modest.

Rating:

Modest

Based on the partial achievement of objective 1, efficacy is rated Modest.

Rating

Modest

OBJECTIVE 1 REVISION 1

Revised Objective

Objective 1: "Improve sustainable water supply services for the population residing in the Capibaribe river basin and the MRR."

Revised Rationale

OBJECTIVE 1 REVISION 1

Revised Objective

Improve sustainable water supply services for the population residing in the Capibaribe river basin and the MRR

Revised Rationale



Theory of Change (ToC). The ToC remained unchanged. Outcome targets were revised.

Outputs

The same as those reported under original objective.

Outcomes

Compared against the revised target set at the February 2019 restructuring.

PDO Indicator 1 was partially achieved. Some 49.5 percent of people in the MRR were subject to water rationing at project closure, compared with the revised target of 35 percent (71 percent of the revised target). The inability to reach the target was due primarily to recurrent droughts in the Agreste's subregion during project implementation that reduced the water production capacity of the Agreste's associated water system from 1.10 cubic meters per second to 0.55 cubic meters per second. This affected nearly 350,000 people in the city of Caruaru. A large portion of the project funds earmarked for NRW reduction were used instead to increase the capacity of another transmission system (Prata) from 0.60 cubic meters per second to 0.97 cubic meters per second, making up for some of the shortfall arising from the recurrent droughts in the Jucazinho system.

Although nearly half the households in the MRR are still subject to rationing, water availability has significantly increased, with most neighborhoods having 24-hour water supply at least 3 to 4 days, compared to the before-project situation of six to 12 hours every three to four days, with extreme cases (households at higher altitude) of six hours per week.

PDO Indicator 2 (added during 2019 restructuring) was achieved. At project completion, APAC had been established and was operating, contributing to integrated WRM in the state, including evaluating water resources management policies and instruments; and putting into operation a state-of-the art hydrometeorological monitoring and forecasting system, including a flood early warning system. By the end of the project, APAC was fully carrying out its responsibilities: including (a) implementing state policies on WRM and national policies on dam safety; (b) monitoring hydrometeorological and weather forecast and climate at the state level; and (c) adopting measure to prevent, mitigate, and adapt to extreme climate change related events. APAC was also carrying out its responsibilities related to dam safety.

Gender. Although not noted in the results framework, about 1.2 million women in the project area benefited from reduced time required to fetch water during days of water rationing. In addition, about 30 percent of the members of basin and users' committees are women and their contribution has been perceived as fundamental in conflict resolution and in the management of the committees.

Based on the partial achievement of objective 1, efficacy is rated Modest.

Revised Rating

Modest

OBJECTIVE 2



Objective

OBJECTIVE 2

Objective 2: “Improve sanitation services for the population residing in the Capibaribe river basin and the MRR.”

Rationale

Theory of Change

A direct causal link can be drawn between the project’s original activities and the expected outcomes. The activities consisted of constructing two wastewater treatment plants, constructing sewerage networks, and connecting households to the network. These in turn would be expected to lead to a reduction in the biological oxygen demand discharged, the PDO outcome for this objective. The key assumption leading to this objective was that the construction of wastewater systems for collection and treatment of wastewater in the project area would lead to the reduction of BOD discharged into the environment and protection of water quality.

Outputs

Two wastewater treatment plants were constructed, and sewerage networks laid.

Some 20,600 new connections to the sewerage network were made, bringing the total number of households connected to 28,769, which were benefiting a total of 70,020 additional people. This falls short however of the revised target of 44,411 new connections presented in the 2015 restructuring paper (54 percent) and the original target of 24,891 set at appraisal (83 percent).

Twenty-two engineering designs for municipal water supply and for wastewater systems were prepared. This exceeds the target set at appraisal of 14 and the revised target of 21 set in the 2015 restructuring paper.

An additional 5.13 cubic meters per second have been supplied to the MRR from the Pirapama Water Supply System, matching the original target.

Outcomes

Compared against the original target

PDO Indicator 2 was partially achieved. About 1,164 metric tons of BOD were being removed by the WWTPs financed under the project, compared with the target of 3,160.

Based on the partial achievement of objective 2, efficacy is rated Modest.

Rating

Modest



OBJECTIVE 2 REVISION 1

Revised Objective

Objective 2: "Improve sanitation services for the population residing in the Capibaribe river basin and the MRR."

Revised Rationale

Compared against the revised target set at February 2019 restructuring

PDO Indicator 3 (formerly 2) was partially achieved. At project completion, the Surubim and Santa Cruz do Capibaribe sewerage networks and WWTPs had been completed and were fully operational, however collecting and treating a lower amount of wastewater from those municipalities than initially planned. Due to the project, discharges of untreated sewage into the environment fell by 1,164 metric tons BOD per year. This is below the revised target of 2,939 tons of BOD per year presented in the 2019 restructuring paper, and below the target of 3,160 tons of BOD per year set at appraisal. The lower than envisaged outcome is due to lower household connections than anticipated, and thus lower flows of sewage to the wastewater treatment plants.

The ICR notes that the treatment plants are operating at high levels of efficiency in terms of BOD removal, with 98.0 percent in Santa Cruz do Capibaribe and 95.2 percent in Surubim, largely surpassing the Federal Government's requirements. At project closing, COMPESA had developed a household connection plan that is intended to increase connections to 34,750, which would result in a reduction of BOD of 2,215 tons per year 2022. It should be noted that reducing discharges of BOD contributes to the sustainability of water resources, considering that they were discharged into water bodies that serve as the source of drinking water for municipalities within the MRR.

Based on the partial achievement of objective 2, efficacy is rated Modest.

Revised Rating

Modest

OVERALL EFFICACY

Rationale

The objective of improving sustainable water supply services for the population residing in the Capibaribe river basin and the MRR was partially achieved and is rated modest, while that of improving sanitation services for the population residing in the Capibaribe river basin and the MRR was partially achieved and is rated modest. Overall efficacy is rated modest.

Overall Efficacy Rating

Modest

Primary Reason

Low achievement



5. Efficiency

Economic and Financial Efficiency

An economic analysis of the project was conducted at appraisal, comparing the costs and benefits of two types of investments. The first relates to investments to reduce NRW, which would allow for expansion of services and therefore increases in water sales, and for reduction in operating and maintenance costs of delivering a unit of water, and reduction in costs incurred by households to cope with water rationing, such as purchase of storage tanks or buying water from private vendors. This generated an economic rate of return (ERR) of 39 percent (using a discount rate of 10 percent), and a net present value (NPV) of US\$743 million.

The second involves investments in sewage collection and treatment, which would allow for increases in revenues and reductions in the costs of households' use of onsite sanitation solutions, such as septic tanks. This generated an ERR of 19 percent, and an NPV of US\$23 million. The overall ERR for the two types of investments was 37 percent and the NPV was US\$766.

At completion, the ERR was 9.4 percent (using a discount rate of 6 percent), substantially lower than the appraisal estimate.

For the investments in NRW, the ERR at project closing, as estimated in the ICR, was 10 percent and the NPV was US\$211. The Bank team clarified in an e-mail dated August 21, 2021 that the lower-than-expected reductions in NRW "was due to pressure management and sectorization efforts falling below expectations. These shortcomings would have been difficult to "revert" due to the recurrent droughts which obligated the gains made in reducing NRW in certain areas to be transferred to areas suffering from water shortages." For the investments in the sewage system, the ERR at project closing was 7 percent, and the NPV was US\$6 million. The Bank team clarified in the above-mentioned e-mail that the lower-than-expected ERR and NPV for the investments in the sewage system was due to lower revenues from lower than expected new connections. The team also noted that delays in finalizing the wastewater collection and treatment infrastructure also reduced the benefits associated with providing a cheaper sanitation solution (network connection with a tariff versus an individual solution requiring sludge emptying) to the population. The ERR for the two components was 9 percent and the NPV was US\$217. The ERR declined to 8 percent over two sensitivity-analysis scenarios.

The ERR for the two components was 9 percent and the NPV was US\$217. The ERR declined to 8 percent, over two sensitivity-analysis scenarios.

The ICRR assessed the project as a whole to be marginally financially viable with a financial (FIRR) of 6.4 percent. Water supply investments are assessed to be marginally financially viable with an FIRR of 6.5 percent, while sewerage investments are not financially viable at closing with a 2.6 percent FIRR.

Design and implementation efficiency

Design and implementation efficiency was modest. The project's closing date was extended by five years from that set at approval. Delays in implementation arose for several reasons. First, technical challenges for handling the integration of north-south into one single water supply system seem to have been underestimated at appraisal. Second, the detailed engineering designs for implementation of the wastewater systems in four municipalities had not been completed when implementation started, causing significant implementation delays and eventual change of location of the sewerage system. Time overruns detract from efficiency, given the opportunity cost of capital and the service fee that borrowers continue to pay on Bank loans.



Most activities were completed, and the loan was fully disbursed.

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	✓	37.10	0 <input checked="" type="checkbox"/> Not Applicable
ICR Estimate	✓	9.40	0 <input checked="" type="checkbox"/> Not Applicable

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

6. Outcome

The project's objectives were highly relevant to the World Bank Group's Country Partnership Framework for fiscal 2018–23. Overall efficacy was Modest for the project's original targets, and Modest for its revised targets, with 88 percent of the project's funds having been disbursed prior to the 2019 restructuring and 12 percent post-restructuring. Efficiency was found to be Modest. Overall outcome is based on a split evaluation, whereby outcome pre-restructuring is rated Moderately Unsatisfactory (rated 3 on a six-point scale, where 1 is Highly Unsatisfactory and 6 is Highly Satisfactory) and post-restructuring, is rated Moderately Unsatisfactory (3, on the same six-point scale). The overall outcome rating is the average of the weighted value of outcome ratings, that is, $(US\$167.75 \text{ million} \times 0.88) + (US\$22.25 \text{ million} \times 0.12) = 2.65 + 0.36 = 3.01$, which translates to Moderately Unsatisfactory.

a. Outcome Rating

Moderately Unsatisfactory

7. Risk to Development Outcome

Institutional risk. Sustainability of water supply service delivery is at risk due to the incomplete implementation of dam safety measures in the Pirapama system's dam and reservoirs. The COMPESA has agreed to complete the remaining six activities. A post-closing safeguards action plan has been agreed with the Borrower. The Bank team will continue to monitor its implementation. In addition, APAC will also continue to closely follow and enforce the implementation of this action plan.

The non-achievement of NRW targets may lead to an increase in the proportion of the population subject to water rationing. To mitigate this risk, the smart urban water trust-funded program, an activity funded by the



United Kingdom Prosperity Fund is being implemented in the MRR, and includes innovative approaches, such as research on water and sanitation customer behavior focus on operational efficiency. This program will be implemented from 2020 to 2022 and is expected to result in an increase in COMPESA's capacity to further reduce NRW.

Government ownership/commitment risk. Delays in approval of the bulk tariff charges for abstraction of raw water in the water basin threaten financial sustainability. The tariff study has been completed and was ready for submission for the State Assembly's approval, but the onset of the Covid-19 pandemic halted meetings of the State Assembly. Although APAC and the basin committees receive funds from the state government, apart from supporting the control of water abstraction and use, the additional funds would further support the activities implemented by APAC and, most importantly, the users and basins committees that have been established.

Economic risk. The limited increase in cashflow indicator due to droughts and the economic disruption due to the Covid-19 pandemic reduced COMPESA's cash flow by 20.3 percent, and its operating and net profit by 37 percent. COMPESA is expected to fully recover from these Covid-19-related impacts by the end of 2021.

8. Assessment of Bank Performance

a. Quality-at-Entry

The Bank team supported the delivery of a substantially relevant and technically sound project, which closely aligned with the Government of Pernambuco policies and strategies, and with the CPF. The Bank ensured that a team of specialists was mobilized to address all relevant project aspects, including technical aspects, social and environmental safeguards, and monitoring and evaluation (M&E). Moreover, the Bank team considered the lessons learned from previous projects in designing the project. For example, it included measures to help poor households connect to the water supply and sewerage networks, such as participatory approaches, subsidies and social tariffs targeting the poor, financing connections, and introducing bulk water charges with low charges for a specified level of use. These mechanisms allowed the project to simultaneously target the needs of the poor and to reach watershed management objectives. In addition, the project supported a more comprehensive and participatory process of watershed planning, a new institutional arrangement, and a broader range of planning tools, incorporating land use and water resources together with other aspects of spatial planning, aimed at ensuring that activities upstream did not negatively affect downstream users. The project also supported the state government in implementing a much-improved M&E system to provide the scientific and economic knowledge for adequate watershed management.

The Bank team prepared all safeguards and fiduciary documents prior to project approval. It ensured that for the Pirapama water system, a social analysis, a Resettlement Policy Framework (RPF), and a Resettlement Action Plan (RAP) were prepared. Recognizing that COMPESA and the other implementing agencies had no experience with Bank procedures, the Bank team conducted trainings for the implementing agencies to ensure they had had adequate knowledge and resources to successfully implement the project.



The Bank team, however, could have supported the client in selecting systems that didn't require preparation of detailed engineering designs, which significantly delayed implementation. In addition, the Bank team could have included this risk and the hydrological risk, among the project risks and recommended mitigation measures. Finally, there were weaknesses in the design of the results framework as noted in the section on M&E below.

Quality-at-Entry Rating

Moderately Satisfactory

b. Quality of supervision

The World Bank team conducted regular implementation support missions and provided timely technical guidance to the local and the central implementing agencies. The Bank team regularly visited all project sites. Recognizing the limited capacity of the implementing agencies, the World Bank team supported the client with procurement, fiduciary, and safeguards implementation through continued trainings and hands-on capacity building support. In addition, the project had only two task team leaders from preparation to closing.

The Bank team carried out three project restructurings that aimed not only to extend the project closing date, but also at adjusting the results framework. However, given the severity of the drought in the MRR, the Bank team could have restructured the project to take account of the climate challenges and hydrological risks that the region was facing and revise the project outcomes and targets to reflect these challenges. In addition, with the major delays in the construction of the wastewater treatment plants and the limited ability to increase the number of sewerage connections, the team could have reduced the target for BOD to be removed to reflect the lower-than-expected flows through the plants. Project restructurings thus had limited scope, apart from time extensions.

The safeguards team closely supported the Borrower and COMPESA, particularly on the dam safety issues that were identified at initial stages of project implementation. The team regularly visited project sites and spent considerable time ensuring that safeguards issues were addressed.

However, at the time of the project's closing, there were unresolved environmental, resettlement, and dam safety issues, meaning that the project was not in compliance with the Bank's policies at closing. Therefore, the Bank team agreed with the government on a detailed action plan for implementation by the Borrower and COMPESA after closing.

Quality of Supervision Rating

Moderately Unsatisfactory

Overall Bank Performance Rating

Moderately Unsatisfactory



9. M&E Design, Implementation, & Utilization

a. M&E Design

The M&E system was aligned to project objectives and the results chain, which contained indicators to track the project's achievements and impact. However, additional indicators could have been included to assess the sustainability of water supply services, improvement in WRM, and progress with construction of the wastewater treatment plants. The data collection methods, and responsibilities were clearly defined.

However, given that the project included dimensions of sustainability and integrated WRM, associated outcome and intermediate indicators could have been included, such as volume of wastewater collected, quality of effluent from WWTP compared to the standards, and number of people benefiting from investments under the project in water supply. On WRM, indicators such as the number of meteorological stations installed and functioning, flood and drought alert system installed and operational, and number or percentage of people trained and capable of communicating with the population when there is a flood and drought alert, could have been used. Moreover, the results framework lacked the Bank's core indicator of "Direct project beneficiaries (number), of which female (percentage)," or the Bank's core indicator at the time for the water sector, "People provided with access to "Improved Water Sources" under the project (number)."

b. M&E Implementation

Implementation of the M&E system was adequate. The semi-annual progress reports that COMPESA submitted to the Bank prior to each supervision mission contained data on the reduction of water rationing and on progress made on the number of connections to the sewerage system. These were verified by the Bank team during site visits.

As noted above, during the restructuring approved in February 2017 and the restructuring of February 2019, targets were revised to more reflect what was likely to be achieved during the extended implementation period.

c. M&E Utilization

A reliable flow of M&E information during the project implementation enabled the Bank team to assess the performance of project components and their potential sustainability. The information also led to decisions to restructure the project, aimed at ensuring the project achieved its objectives.

M&E Quality Rating

Modest

10. Other Issues

a. Safeguards



The project was assigned Environmental category “A” and six safeguard policies were triggered: Environmental Assessment (OP/BP 4.01); Natural Habitats (OP/BP 4.04); Forests (OP/BP 4.36); Physical Cultural Resources (OP/BP 4.11); Involuntary Resettlement (OP/BP 4.12); and Safety of Dams (OP/BP 4.37).

Environmental Assessment (OP/BP 4.01) and Safety of Dams (OP/BP 4.37). The ICR reports (para 95 and 96) that at project closing, no significant environmental impact had occurred in consequence of project activities. Environmental safeguards performance ratings varied between Satisfactory and Moderately Satisfactory throughout implementation, but was downgraded to Unsatisfactory at project closing due to: (a) the pending implementation of six of the eight recommendations from the Dam Safety Panel for the Pirapama Dam; and (b) unresolved issues related to the highly eroded slopes of the hills above the five water reservoirs constructed in Olinda, which represent significant risk to reservoir stability in the medium to long-term.

A post-closing, a Safeguards Action Plan was agreed upon with the Borrower to resolve all pending issues. The hiring of a Dam Safety Panel to provide advice both for Pirapama and the four flood contention dams is part of the Action Plan. The Bank is closely monitoring the implementation of the agreed actions through monthly meetings with the client. The Bank team clarified through an e-mail dated August 21, 2021 that “of the eight actions presented in the ICR (Annex 6) on the Action Plan, one is completed (erosion prevention in Jordão Reservoir) and the rest are all either under contract, ongoing or about to be completed. Some actions remain to be completed more in the long term (such as those related to the corrective works for Pirapama dam and the flood contention dams), and will continue to be monitored by the Bank in the monthly meetings.”

Natural Habitats OP/BP 4.04. The ICR does not report on compliance with this safeguard.

Forests (OP/BP 4.36). The ICR does not report on compliance with this safeguard.

Physical Cultural Resources OP/BP 4.11. The ICR does not report on compliance with this safeguard.

IEG asked the Bank team to clarify compliance with these Safeguards. The Bank team explained in an e-mail dated August 21, 2021 that “the Project was compliant with Natural Habitats (OP/BP 4.04), Physical Cultural Resources (OP/BP 4.11), and Forests (OP/BP 4.36), and there were no incidents or deviations to report.”

Involuntary Resettlement OP/BP 4.12. The ICR reports (para 97) that social safeguards ratings remained in the satisfactory range for most of the project’s implementation period, but were downgraded at project closing to Moderately Unsatisfactory due to pending issues related to the documentation of the payment of easement fees for 20 landholders affected by the works of the Pirangi-Camevô water main and the Surubim sanitation system.

b. Fiduciary Compliance

Financial Management. The project’s implementing agencies generally complied with the Bank’s fiduciary policies. Financial management was rated Satisfactory and Moderately Satisfactory throughout project life. The internal control arrangements identified in the Financial Management Assessment were strengthened



as its associated action plan suggested, including the assignment of a dedicated financial management Specialist in the implementing agency. The control risk at closing was rated as Moderate, the same rating as at appraisal, and E-FISCO, Pernambuco’s Financial Management Information System, proved to be appropriate to account for project execution. All audit reports expressed unqualified/unmodified audit opinions. All Interim Financial Reports received during the life of the project were considered acceptable by the World Bank and were received on a relatively timely basis. No cases of ineligible expenditures were identified or alleged cases of fraud and corruption during project implementation were recorded.

Procurement. Procurement compliance was considered to be Moderately Satisfactory overall. Procurement systems and the implementing agencies’ arrangements functioned reasonably well during implementation. During implementation, the government agencies had a well-functioning procurement team, with the relevant experience in procuring goods and services using Brazil law and rules on procurement, however with limited experience with Bank guidelines and no prior experience with processes to hire consulting services.

Despite initial challenges in applying the Bank’s policy, procurement had no major issues throughout the project and the Bank’s procurement rules were fully complied with. The application of the Bank’s guidelines in the selection of consultants and firms seems to have had a positive impact on the quality of the service providers. Overall, the policy advice and technical assistance provided by the World Bank team helped to strengthen institutional capacity.

c. Unintended impacts (Positive or Negative)

d. Other

11. Ratings

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

12. Lessons

IEG derives the following lessons drawn from the ICR:

Project implementation should focus on ensuring that sewerage household connections are installed in parallel to the construction of the wastewater treatment plants. The installation of



wastewater household connections was designed to start after the construction of the wastewater treatment plants was complete. Connections should take place during the construction of the sewerage network to ensure that treatment plants receive sufficient wastewater flows.

Innovative approaches to design and build WSS systems efficiently should be incentivized to accelerate project implementation, ensuring that set outcomes are met. The Bank and COMPESA found innovative solutions for the construction of water supply and wastewater systems which were time and cost effective, including through design-build-operate contracts and performance-based contracts. The design-build-operate contracting approach was tested with the Santa Cruz do Capibaribe sewerage system. This allowed COMPESA to complete the project in a timely manner, with fewer contract amendments than through the traditional approach of bidding for works with basic engineering designs. COMPESA plans are to adopt the design-build-operate approach for a number of upcoming water supply and sewerage works packages. Similarly, the performance-based contracting approach used for the first time with the Olinda NRW reduction program is now being replicated and expanded to other municipalities under COMPESA's management.

Vulnerabilities to climate change and other non-climatic stresses and shocks should be incorporated into project design and implementation support plans for water and sanitation investments. The identification of the vulnerability of water systems to climate and other non-climatic uncertainties during project design should be accompanied by appropriate planning and project management mechanisms to enhance preparedness and response, but also to set realistic targets for project objectives, particularly in areas known to suffer from natural disasters such as droughts and floods. Techniques for assessing the vulnerability of water systems to climate change and other non-climatic uncertainties should be integrated into implementation support tools to inform in a timely manner the need for restructuring and for adjusting targets as well as infrastructure component designs. In addition, taking into account the hydrological risk associated with recurrent droughts into the design of infrastructure could for example lead to more flexible, robust, progressive and resilient approaches to planning and building water and wastewater systems, thus minimizing the impacts of reduced water or wastewater flows on their operation and on the costs (both capital and operating expenses) associated with these assets.

13. Assessment Recommended?

No

14. Comments on Quality of ICR

The ICR is clearly written and consistent with guidelines. It provides adequate details of the project's activities, including detailed annex summarizing the efficiency analysis. Its analysis is broadly evidence-based. The ICR, however, could have provided information on compliance with safeguards, covenants, and the condition of disbursement.



a. Quality of ICR Rating
Substantial