Report Number: ICRR0022435

1. Project Data

Project ID	Project Name
P122841	SN-Stormwater Mgt & Climate Change
Country	**Practice Area(Lead)**
Senegal	Urban, Resilience and Land

L/C/TF Number(s)	Closing Date (Original)	Total Project Cost (USD)
IDA-50960,IDA-56630,TF-A4329	31-Dec-2017	92,401,827.88
Bank Approval Date	**Closing Date (Actual)**	
10-May-2012	31-May-2020	

	IBRD/IDA (USD)	Grants (USD)
Original Commitment	55,600,000.00	5,504,587.00
Revised Commitment	96,101,318.98	5,019,779.29
Actual	92,765,122.43	5,019,779.29

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

a. Objectives

The original project development objective (PDO) was to “improve stormwater drainage and flood prevention in peri-urban areas of Dakar for the benefit of local residents.”

The revised PDO was to “reduce flood risks in peri-urban areas of Dakar and improve capacity to plan and implement sustainable city management practices, including climate resilience, in selected urban areas”. It was revised under the first additional financing (AF1) in 2015 and included (a) a project outcome on

improving planning capacities, (b) piloting of a climate resilient and sustainable cities approach, and (c) broadening of the geographic scope to areas outside of Dakar.

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
05-May-2015

c. Will a split evaluation be undertaken?
Yes

d. Components
The original project included four components.

Component A: Flood Risk Mainstreaming in the Urban Sector (Estimated: IDA US$3.6 million/Actual: IDA US$2.2 million). Provided support to flood risk management in urban development through three subcomponents including (a) urban planning and management, (b) institutional strengthening and capacity building of government actors and municipalities, and (c) formulation of an Integrated Stormwater Management and Climate Change Adaptation Program for peri-urban Dakar.

Component B: Drainage Investment and Management (Estimated: IDA US$78.2 million/Actual: IDA US$82.3 million). Supported the establishment and maintenance of an effective drainage system in two Dakar peri-urban districts identified as most vulnerable to recurrent floods (Pikine and Guédiawaye). It had two subcomponents: (a) drainage investments: to build the drainage infrastructure and rehabilitate roads (involved feasibility and technical studies and resettlement) and (b) operation and maintenance (O&M): to create an institutional and financial mechanism for the O&M of the stormwater drainage system, develop a maintenance plan, and clean drainage channels annually.

Component C: Community Engagement in Urban Flood-Risk Reduction and Adaptation to Climate Change (Estimated: IDA US$4.6 million/Actual: IDA US$2.4 million). Supported empowering municipalities, residents, and community groups to engage in (a) flood resilience awareness, communication, and community capacity building and (b) urban flood risk management and adaptation to climate change through pilot community rehabilitation and maintenance of the retention basins and/or urban wetlands allowing for natural runoff, and (c) an awareness raising and communication campaign.

Component D: Project Coordination, Management, Monitoring, and Evaluation (Estimated: IDA US$4.2 million/Actual: IDA US$3.6 million). Management support for the implementation of the project, including the development and operationalization of a monitoring and evaluation (M&E) system.

Changes in components during AF1 and AF2 restructuring:

1. Under AF1, in May 2015, the project underwent a level 1 restructuring, in particular:

(i) Component A was renamed and amended, its scope was increased as a result of the amendments: it was renamed from 'Flood Risk Mainstreaming in the Urban Sector' to 'Integration of Climate Risks in Urban Planning and Management' and amended to include: (a) introduction of a climate change-resilient and sustainable cities approach (urban planning and management) and (b) piloting of climate resilience interventions in two urban selected sites, Diamniadio and Saint-Louis, thus both adding climate resilient interventions and expanding project activities beyond Dakar's peri-urban areas.

(ii) The scope of Component B was revised down following a cost overrun related to the stormwater drainage infrastructure, downsizing one of the four originally selected sites. In the original design, four sites were selected: Dalifort, Thiourour, Yeumbeul, and Mbeubeuss. The latter comprised four sub-sites. Under AF1, the prioritization of investments was made in the Mbeubeuss site, financing was only provided for sub-catchment 3.1. According to the data in the PAD (p. 82-83), the area dropped from the Component B activities amounted to 288 ha. The original area was 661 ha, and remaining area constituted 373 ha.

In relation to the Component B cost overrun, the ICR notes that the project was prepared to respond to an emergency and used the government's Dakar Drainage Master Plan (DMP) for the costing of the drainage investment, as there was no time to do own calculations. One year after the start of project implementation, it turned out that the cost in the DMP was significantly underestimated, and AF1 was requested. Because available funding only covered the estimated financing gap partially, the targets for drainage investment component were reduced.

IEG was informed by the Bank team (2/23/21) that the project responded to an emergency situation (severe flooding) but was not designed as an emergency project because this was the first such project in West Africa. With climate change and much more frequent flooding emergencies, such projects were later recognized as emergency projects by the Bank. Due to the emergency, the team needed to prepare the project fast and therefore did not have time to make own estimates for the area of the drainage works and the related cost, but had to use the Government data from the Dakar Drainage Master Plan (DMP). The DMP included only primary infrastructure (major drainage canals), while the project needed to finance works on secondary canals as well. When the implementation started, the project involved engineering modeling to estimate the capacity of drainage required and the related parameters, including the area to be covered (PDO2) and the related cost. These estimates were finalized by 2014. The draining demand turned out to be higher than in the DMP, leading to higher costs, a financing gap, and a request for AF1 (which was approved in May 2015). The approved additional financing was not sufficient to cover the financing gap, and the team had to reduce the target for the area covered, from the original 660 ha to 400 ha. Note that both numbers are related to the primary infrastructure (primary canals) only and do not include the secondary canals.

(iii) The scope of Component C was increased by scaling up original activities to promote further civic engagement for the protection and management of drainage assets. IEG was informed by the Bank team (2/23/21) that Component C was initially designed proportionally to Component B to increase the capacity of the community to support the O&M related to the Component B investment. It was revised down proportionally to Component B at AF1. However, later it was realized that the component had positive results. The community was appreciative of the relevant activities and was requesting more investment. The

outcomes were evaluated as positive in the impact assessment report published in June 2017 (see section Efficacy).

2. Under AF2, in March 2017, the scope of Component A was increased to scale up the project's sustainable cities subcomponent (which was one of the amendments under AF1). AF2 was fully financed by the US$5.5 million from the Global Environment Facility (GEF). The rationale for AF2 was "to include additional needs (integrate capacity building needs in sustainable cities management for targeted stakeholders)". A new intermediate indicator was added to reflect the scale-up: "Key stakeholders (persons) trained in flood risk management, urban climate change resilience, and sustainable cities planning and practices".

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

1. Project Cost:

The original project financing was US$68.8 million, which included (by source) US$55.6 million from IDA and US$13.2 million from the Government of Senegal (GoS).

The composition of original financing by component was:

- Component A: US$1.6 million from IDA;
- Component B: US$48.2 million from IDA and US$7.1 million from the GoS;
- Component C: US$3.6 million from IDA;

Component D: US$2.2 million from IDA and US$6.1 million from the GoS.

The original financing plan was revised twice: under AF1, to add new IDA (US$35 million) and GoS (US$3.0 million) financing, and under AF2, to add a new Global Environment Facility (GEF) grant of US$5.5 million and GoS financing. As a result, the total estimated financing was US$112.3 million and included (by source): US$90.6 million from IDA, US$5.5 million from the GEF, and US$16.2 million from the GoS.

Total actual financing constituted 90.9 percent of the estimated one and equaled US$102.1 million including (by source): US$90.5 million from IDA, US$5.0 million from the GEF, and US$6.6 million from the GoS.

The composition of actual financing by component was:

- Component A: US$2.2 million from IDA and US$5.0 million from the GEF;
- Component B: US$82.3 million from IDA and US$4.5 million from the GoS;
- Component C: US$2.4 million from IDA;

Component D: US$3.6 million from IDA and US$2.1 million from the GoS.

2. Project Dates:

The project was approved on May 10, 2012 and became effective on November 21, 2012. The mid-term review was on June 29, 2015. The original closing date was December 31, 2017, the actual one was May 31, 2020, i.e. the project experienced a 2 years and 5 months extension.

The project went through two restructurings:

a. AF1 (May 5, 2015) was a level 1 restructuring needed to revise the PDO to include the second main outcome of the project on improving planning capacities; to add the piloting of the climate resilient and sustainable cities approach; and to add two urban areas outside of Dakar to the project geographic scope (previously the project was limited to peri-urban areas). A new PDO indicator and new project sub-components were added (as described in sections "Objectives" and "Components").

b. AF2 (March 28, 2017) was a level 2 restructuring needed to scale up the project's sustainable cities subcomponent (which was one of the amendments under AF1) using GEF financing (see details in section "Components").

A split evaluation is done due to the modification of the PDO and a significant change in scope. A new PDO indicator was added to the results framework, a new sub-component added to Component A, two urban areas added to the project scope (only peri-urban areas were included in the original project), and four out of 12 targets (one PDO target and three intermediate targets) were lowered.

3. Relevance of Objectives

Rationale

Senegal is extremely vulnerable to climate change, and flooding is one of the most damaging climate-related hazards. In 2009, intense rainfall led to serious flooding across the country, with the total loss estimated at US$104 million, including US$82 million within Dakar peri-urban areas, according to the Post Disaster Needs Assessment. Dakar's population is increasingly exposed to the recurrent stormwater flooding, which is especially damaging for the informal settlements often built in low-lying flood-prone areas. By 2012, as a result of a rapid urbanization and inadequate urban planning, 90 percent of the peri-urban Dakar population lived in areas classified as slums or spontaneous settlements. The exposure of the population of these settlements to flooding was growing. Drainage was a major issue. In 2012, the year of project approval, the flooding was catastrophic and resulted in loss of life, demolition of infrastructure, and suspension of public services.

The revised PDO included two parts. The first part of the PDO replicated the original PDO, with a non-substantive change in the wording (changed it from "improve stormwater drainage and flood prevention in peri-urban areas of Dakar for the benefit of local residents" to "reduce flood risks in peri-urban areas of Dakar", while the objective to "reduce flood risks" was to be achieved through the means of financing stormwater drainage. The second part of the revised PDO: (i) emphasized actions aimed at national, local, and community capacity building that were present in the original project, and (ii) defined the new objective and actions of introducing and piloting climate resilient urban planning and sustainable cities concept. The new objective reflected the adoption of two new national priorities: (i) addressing urban vulnerabilities and urban flooding, which was prioritized in the Economic and Social Policy Document (2011–15) and (ii) the development of sustainable cities approach and the integration of climate resilience

into urban policy, supported by the GoS' participation in the GEF's new Sustainable Cities Program as a pilot country since 2015. Also, by strengthening urban resilience to climate change, the project contributed to the implementation of the National Climate Change Adaptation Program of Action (2006).

The PDO was in line with the GoS's *Ten-year Flood Management Program* (2012-22) (PDGI, cost US$1.4 bln) and the *Dakar Drainage Master Plan* for stormwater (January 2012). The project aimed at drainage improvements in poor informal settlements, in particular, in the districts of Pikine and Guédiawaye with 1.3 million inhabitants or 12 percent of Dakar's total population.

The PDO was also consistent with the World Bank's Country Partnership Framework (CPF) 2020-24, in particular, to Focus Area III *Increase Resilience and Sustainability in the Context of Growing Risks,* sub-pillar 1 *Promote and protect resilient livelihoods, ecosystems, and infrastructures in the face of climate change.* PROGEP is referred to in the CPF as one of the critical interventions supporting this sub-pillar.

Rating
High

4. Achievement of Objectives (Efficacy)

OBJECTIVE 1

Objective
To improve stormwater drainage and flood prevention in peri-urban areas of Dakar for the benefit of local residents.

Rationale
The Theory of Change (ToC) for this objective was as follows: there are two sets of inputs: (i) financing and im construction of the drainage system in peri-urban Dakar areas; and (ii) financing and implementing a flood redu campaign and flood reduction community management activities and community investments. Input (ii) was des increase community knowledge about and support to the project-supported flood risk reduction activities, which significant investment in physical drainage infrastructure (input (i)), would help to ensure protection against flooc indicators, however, only reflected the number of beneficiaries and the area covered, and lacked indicators to m project results, such as reduced flooding.

The ToC is logical, except from lacking a clear formulation of the objective at the outcome level. Physical draina essential to provide protection from flooding, and community awareness and active participation were critical to system and support flood prevention with community-level actions. At the community level, social facilitators su to facilitate community participation in stormwater management, drainage operation and maintenance, and flooc

Outputs

1. Approximately 29.3 km of the primary drainage system in Pikine and Guédiawaye (which were the most vuln rab urban districts of Dakar) was put in place, exceeding the original target of 28.2 km.

2. The Operation and Maintenance (O&M) of the stormwater drainage system in Pikine and Guédiawaye was fu ncti closure but not funded. A study to identify policy reforms needed for effective O&M system for stormwater mana gen the project, was validated by the GoS, and a decree to create the National Sanitation Fund was under examinat on However, the needed transfer of funds for the O&M of stormwater management of Pikine and Guédiawaye expe rier Therefore, this output was not achieved. The Bank team clarified to IEG (2/23/2021) that the financing is still pe din (drafted under the project) was approved by the government but has not been signed by the president. Recently af new Bank project, which would finance this expense, was requested.

3. Drainage channels were cleaned at least once a year in the project area, as reported, before the rainy seaso du Note that this output does not overlap with the O&M of the drainage system (previous output).

4. 68 flood risk reduction participatory community investments (PICs) were completed, exceeding the original ta get

5. Approximately 84,366 people were reached by the information education and communication (IEC) strategy a : lo levels, exceeding the original target of 80,000.

6. Local flood management committees in Pikine and Guédiawaye were engaged in stormwater management a tivi

Outcomes

The project exceeded the original target for PDO indicator 1 but did not achieve the original target for PDO indic ator was some weakness in the methodology of measuring the second indicator.

1. PDO indicator 1: Approximately 167,000 people benefited directly from the project, exceeding the original tar et c by 27 percent. This target was exceeded mainly due to a rapid population growth in the area due to continued u bar annually), residents' return after drainage upgrades, and other demographic factors.

2. PDO indicator 2: The area of 900 ha in peri urban Dakar was protected against recurrent flooding through dra nag some weakness in the methodology of measuring PDO2: the original target included only primary infrastructure wh achievement covered both primary and secondary infrastructure. With this change in the methodology, the targe : ar achievement, as reported in the ICR, are not comparable. In relation to the methodology of estimating the targe IE the Bank team (5/18/21-5/19/21) that while the 900 ha were indeed protected by both the primary and secondar ' ne target of 660 ha protected by the primary network was not achieved (parts of that area were dropped from the p oje

The ICR also reports on other relevant outcomes, which were not reflected in the Results Framework (RF) and her targets in this project:

3. Gains in drainage capacity were achieved, as follows: 700,000 m3 from ponding, 5,000 m3 per hour from pur pir 25,000 ml from sanitized interlocking concrete block paving roads.

4. The drainage system installed by the project supported improved groundwater and stormwater management. Gro main source of flooding in these areas, was reduced from 1 meter to 2 meters, leading to reduced water infiltrat on a sanitation.

5. From 2012 to 2018, the flooding reduced in 18 out of the 21 communes (all densely populated areas) where ater The flooding was reduced from 11.74 km2 in 2009 (2.13 percent of total intervention area) to 1.44 km2 in 2018 0.2

6. Municipalities, residents, and community groups are empowered to engage actively in urban flood risk reduct on resilience to climate change.

To summarize, the project constructed a primary drainage system in two peri-urban districts of Dakar, benefiting 16 in these areas who previously suffered financial and health losses due to frequent and sometimes severe floodi g. there was no working drainage system in these districts. As a result, the flooding was reduced from about 12 km 2 in km2 in 2018. The constructed drainage system supported both stormwater and groundwater management. Gro ndw main source of flooding in these areas, and it was decreased from 1 meter to 2 meters. This had an added bene fit c sanitation leading to reduced water pollution and a lowered risk of waterborne diseases. The methodology used to r related to the area covered was not reliable as the actual achievements related to both primary and secondary i nfra were measured against the target that only included primary infrastructure. Achievement of the original objectiv e is Substantial, with moderate shortcomings.

Rating
Substantial

OBJECTIVE 1 REVISION 1
Revised Objective
To reduce flood risks in peri-urban areas of Dakar.

Revised Rationale
The linkages between inputs, outputs, and outcomes are described in the ToC above, with the objective to reduce flood risks in peri-urban areas of Dakar. The second PDO indicator was adjusted to (a) specify the intervention zone in peri-urban Dakar according to the original design, and (b) review the target value to reflect the investment prioritization made under AF1.

Outputs

1. The primary drainage system of 29.3 km in Pikine and Guédiawaye (which were the most vulnerable to floods peri-urban districts of Dakar) was put in place by project closure, exceeding the revised target of 15.82 km.

2. Sixty-eight flood risk reduction participatory community investments (PICs) were completed, exceeding the revised target of 30 PICs.

3. Approximately 84,366 people were reached by the information education and communication (IEC) strategy at local and national levels, exceeding the revised target of 60,000.

Other outputs are the same as outlined under the assessment of the original Objective 1 (no revision of targets took place).

Outcomes

PDO indicator 1: Approximately 167,000 people benefited directly from the project, exceeding the original target of 132,000 people. This target was not revised under any of the two restructurings. The actual number was 167,000 people, 27 percent above the target. This target was exceeded mainly due to a rapid population growth in the area due to continued urbanization (2.5 percent annually), residents' return after drainage upgrades, and other demographic factors**.**

PDO indicator 2: 900 ha in peri-urban Dakar were protected against recurrent flooding through drainage works, from a baseline of zero ha, exceeding the revised target of 400 ha. IEG's meeting with the Bank team (5/18/21) confirmed that the methodology was changed and the reported outcome at closure included both the primary and secondary infrastructure. The project team confirmed that the revised target of 400 ha for primary infrastructure was exceeded.

In June 2017, an impact evaluation report "Operation Clean Neighborhood" was published. It was prepared by the Dakar Municipal Development Agency, the World Bank Development Impact Evaluation (DIME), and Trinity College, Dublin. The report evaluated Component C intervention, i.e., the activities of local Community Based Organizations (CBOs) who worked with communities to improve and maintain the cleanliness of public spaces and drainage infrastructure (launched in September 2015 and lasted one year). Of the 391 neighborhoods in PROGEP areas, 160 were randomly selected for the evaluation – 80 as the "treatment" neighborhoods and 80 as a control group. After that, a survey was conducted to collect data from 28,010 individuals, 2,400 households, and 160 CBOs. The results show that CBOs in treatment quartiers were more likely to undertake cleaning events compared with CBOs in control quartiers. Moreover, households in treated quartiers were more likely to have heard of the "operation clean neighborhood" approach. Households in the treatment area had a better perception of the cleanliness of their area compared with the control group, suggesting a positive impact on community engagement in the maintenance and cleanliness of public spaces. The increased community engagement resulted in improved functioning of the drainage canals: treated areas were less affected by flooding in the past rainy season and reported reduced levels of illness and income loss due to flooding.

Revised Rating
Substantial

OBJECTIVE 2
Objective
N/A - There was no original objective 2. Objective 2 was added at the restructuring.

Rationale
N/A

Rating
Not Rated/Not Applicable

OBJECTIVE 2 REVISION 1

Revised Objective
To improve capacity to plan and implement sustainable city management practices, including climate resilience, in selected urban areas.

Revised Rationale
The Theory of Change (ToC) for this objective is as follows: There are three sets of inputs: (i) financing and implementing urban planning and management strategy, plans, and training; (ii) financing and implementing institutional capacity building at national and municipal level (in project municipalities); and (iii) financing the sustainable city pilots through climate resilience measures. These inputs were designed to support each other in accomplishing the goal of increased capacity to plan and implement sustainable city management practices in selected urban areas. The main output was expected to be that climate change related risks would be embedded in national and local urban planning, and that management and enforcement tools would ensure sustainable urban practice. The expected intermediate outputs included: (i) development of the National strategy on integrated urban planning that includes flood prevention and climate resilience and related local urban plans; (ii) training in flood risk management, urban resilience and sustainable urban planning for national and local government units; (iii) improved municipal sustainable city practices.

The ToC is logical. Physical drainage infrastructure was essential to provide protection from flooding, and community awareness and active participation was critical to avoid misuse of the system and to support flood prevention with community level actions. Institutional capacity was another necessary component supporting flood prevention viability and sustainability of the project outcomes, which were clearly formulated at the adequate outcome level.

A third PDO indicator was added to reflect a new outcome: Tools related to urban resilience, including climate change, were to be adopted at the national and subnational levels.

Outputs

1. Climate change related risks are embedded in national and local urban planning, management and enforcement tools to ensure sustainable urban practice:

(a) Key central and local government staff trained through seven sessions stakeholders (persons) in flood risk management, urban climate change resilience, and territorial planning: 591 staff trained, exceeding the target of 400 staff (the target was established at the AF1).

(b) A study defining the governance model of the Diamniadio agglomeration was prepared. Based on the study, an inter-municipal cooperation agreement was prepared and formalized, the Association of Local Governments was formed, and a three-year program was prepared for it. The Association is actively involved in the preparation of the Saint-Louis Urban Resilience Plan.

Outcomes

PDO Indicator 3: Tools related to urban resilience, including climate change, were adopted at the national and subnational levels. They were leveraged to feed into the national urban code, underpin the development of the new city of Diamniadio, and guide the design of new investments such as the ones the Saint-Louis Emergency Recovery and Resilience Project (SERRP) (P166538, approved June 2018) and the forthcoming Senegal Affordable Housing Program (P174759, project concept filed Jan 2021)).

The planned results under AF2 were accomplished, as followed:

Subnational level

Planned: A. Improved planning and management capacities of pilot cities and central government for sustainable cities with the following outputs: city action plan and stakeholder capacity building needs assessment, as well as urban plans for sustainability. B. Identification of investment projects in pilot cities with the output: identification of priority projects for investment.

Actual: (i) Detailed urban plans for Pikine and Guédiawaye, which integrated flood prevention and were pending approval by decree; (ii) flood risk management plan for the Diamniadio agglomeration; (iii) drainage master plan (DMP) and master plan for the Saint-Louis agglomeration; (iv) diagnostic studies and city action plans to promote cities' sustainability for Saint-Louis and Diamniadio; (v) GIS and Territorial Information System tools developed for Pikine-Guédiawaye and Saint-Louis; (vi) modeling of the Saint-Louis Delta; and (vii) knowledge generated from investments undertaken in the solid waste management and green city sectors in Saint-Louis and Diamniadio.

National level

Planned: Strengthening national policy framework for sustainable cities with the following outputs: urban policy gap analysis and urban preparation of policy reform documents.

Actual: National level tools included a study for urban policy gap analysis and action plan for cities' sustainability, including climate resilience; a study for urban policy reforms related to cities' sustainability and climate resilience; a national strategy for integrated urban management and planning (that has been adopted by the National Urban Committee under the Urban Ministry); and a knowledge sharing platform on sustainable cities and urban resilience in Saint-Louis and Dakar.

Revised Rating
Substantial

OVERALL EFFICACY
Rationale
The efficacy under the original PDO is assessed as substantial, albeit with moderate shortcomings. The original outcome target for the primary infrastructure area protected against flooding was not achieved. Overall, there was a significant increase in drainage capacity and improvement in stormwater management. The DIME's impact study conducted after the mid-term review of June 2015 and published in December

2017 showed that the households in the area were less affected by flooding, and the incidents of illness and income loss due to flooding were reduced (the income loss was reduced by 47 percent and illness – by 11 percent).

Overall Efficacy Rating

Substantial

OVERALL EFFICACY REVISION 1

Overall Efficacy Revision 1 Rationale

The efficacy under the revised PDO is substantial. The project achieved the revised PDO targets and all the revised intermediate targets but one.

Overall Efficacy Revision 1 Rating

Substantial

5. Efficiency

Economic analysis. The economic analysis showed that the project was economically viable with an ex-post net present value (NPV) of US$26 million discounted at 12 percent over 30 years, an economic rate of return (ERR) of 28 percent, and a present value of benefit over cost ratio (PVBCR) of 1.4. This is similar to the ex-ante calculations that produced the NPV of US$27 million, the ERR of 26 percent, and the PVBCP of 2.0. Ex-post sensitivity analysis involved alternative 6 percent discount rate calculations, in which case the NPV doubles to US$52 million.

The ex-ante analysis used the project cost of US$72.9 million, which is the original project cost. The ex-post analysis used the project cost of US$106.8 million, which is the estimated actual cost at the time of the analysis, net of the GEF funding of 5.5 million, as this source was not completely disbursed by project closure.

Benefits. The main benefits considered were the foregone flooding days and land appreciation. The cost of the foregone flooding days was calculated by using the GDP per capita of the affected population (167,000 inhabitants) per flooding day (5.6 days per year, the average for the past 25 years). Land price appreciation of 34 percent was used at project appraisal, which was a conservative estimate. Attributing land appreciation to the flood protection achieved by the project is reasonable to some extent, as long as other factors, including continuously increasing demand for land, land speculation, and the construction boom, are also taken into account. The project team subsequently clarified that they were not able to find reliable and updated data on the real estate price increase in the Dakar region. The ex-ante cost-benefit analysis relied on a hedonic pricing

method where the difference in land values was explained by only one out of three variables considered, i.e., flood-proofed areas had a 34 percent increase in land value when compared to flood-prone areas.

Administrative/Operational Efficiency. The project efficiency should be assessed in the context of the Component B cost overrun and the resulting AF1 when the target for Component B was reduced while the cost increased. Considering that Component B constituted 80 percent of the total project financing at approval and 85 percent at closure, the cost overrun under Component B is an efficiency issue for the entire project, before and after restructuring.

In relation to the Component B cost overrun, the ICR notes that at approval, the Dakar Drainage Master Plan (DMP) was used for the costing of the drainage investment. During implementation, it became clear that the cost in the DMP was underestimated, and AF1 was requested. Because available funding only covered the estimated financing gap partially, the targets for the drainage investment component were reduced. This constitutes an administrative inefficiency due to inadequate planning, however, considering the situation of emergency and the lack of adequate cost data at appraisal, this shortcoming is assessed as moderate.

In addition to the above, project's efficiency was also negatively affected by the delays with co-financing from the government, as government co-financing was not always mobilized on time.

Considering the situation of emergency and the lack of data, the above shortcomings are considered moderate, and the overall efficiency is rated substantial.

Efficiency Rating

Substantial

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	✓	26.00	71.00 ☐ Not Applicable
ICR Estimate	✓	28.00	100.00 ☐ Not Applicable

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

6. Outcome

Original objective:

Relevance of objectives: High
Efficacy: Substantial, with moderate shortcomings

Efficiency: Substantial
Outcome: Moderately Satisfactory (a value of 4).

Revised objectives:
Relevance of objectives: High
Efficacy: Substantial
Efficiency: Substantial
Outcome: Satisfactory (a value of 5).

Based on a share of the disbursements of US$29.95 million or 29 percent before restructuring on May 5, 2015, the overall project outcome rating is Satisfactory (0.29*4+0.71*5=4.71).

a. Outcome Rating
Satisfactory

7. Risk to Development Outcome

To ensure the sustainability of its outcomes, the project supported the development of relevant policy and institutional capacity at national and local level and educating and training communities in flood prevention and climate resilience through social facilitators (non-governmental firms). In particular, at the policy level, the project supported the integration of floor risk management into local and national urban planning. At the institutional level, module-based training programs on flood risk management and urban climate change adaptation were implemented within relevant national government departments and in the two municipalities where the project activities took place. At the community level, social facilitators continue to operate after project closure to ensure community participation in stormwater management, drainage operation and maintenance, and flood prevention.

However, there are some risks to the sustainability of the outcomes:

Financial risk: The project was intended to ensure continued government financing of the O&M for the drainage infrastructure constructed by the project. A study to identify which policy reforms would support such system was conducted by the project and validated by the GoS during project life. However, by project closure, this system, while being functional, was not yet funded. This puts the drainage network financed by the project at a risk of not being maintained. The Bank team informed IEG (2/23/2021) that the financing is still pending: the decree (drafted under the project) was approved by the government but has not been signed by the president. Recently, after the last flood, a new Bank project, which would finance this expense, was requested. However, a long-term solution needs to be found to ensure project outcome sustainability.

Environmental risk: Exposure to natural disasters and climate change poses a risk, as it means that the rain patterns are changing, with heavier and less predictable rainfall. This might require more climate resilient infrastructure including drainage systems with higher capacity to accommodate stormwater.

Ownership risk: Considering the unfulfilled government obligation to finance the O&M for drainage infrastructure, there is a risk to the sustainability of the outcomes. The Bank team informed IEG (5/5/21) that the lack of sustainable O&M solution is the result of complex existing institutional arrangements and fiscal

space constraints. The Government has demonstrated ownership of the project and requested a follow up operation, which has been submitted for Board approval. To address long-term sustainability for the maintenance of the drainage system, under the new operation, the World Bank will provide support to the Government to prepare and implement a roadmap for the financing and management mechanisms of the urban drainage systems at national level, with sustainable financing mechanisms established.

8. Assessment of Bank Performance

a. Quality-at-Entry

The project was designed in response to natural disasters that lead to severe flooding**,** loss of lives, and economic damage, and the project design was innovative. In particular, it incorporated a watershed approach into drainage design, thus combining the natural pathways for stormwater with gravity drainage infrastructure. This approach was less expensive than the usual pump-based sanitation and represented a new flood risk management concept for Senegal. The project was strategically relevant and technically adequate and innovative. The project had a clear focus on development impact, as it was implemented in the poor areas of Dakar and focused on the population which is disadvantaged in terms of their level of income, housing conditions, and vulnerability to the increasing (with climate change) flooding.

The project design relied on the estimates for the area of the drainage works and the related primary infrastructure costs. At the same time, to achieve the objective of reduced flooding, the project needed to invest in both primary and secondary infrastructure. This led to a significant cost-overrun under Component B, which constituted 80 percent of the overall cost at approval and 85 percent at closure. Due to this shortcoming in the design, the project had to be restructured. The restructuring involved significant additional financing combined with a decrease in the target for the primary infrastructure area protected from flooding (PDO2). Considering the situation of emergency and the lack of adequate cost data at appraisal, this shortcoming is assessed as moderate.

The second AF (March 2017) was fully financed by the GEF to better support the restructured project through complex studies.

The risk assessment at entry was not fully adequate: while it included a conclusion about the risk of poor financing for operations and maintenance of the drainage system by the government, it did not provide a mitigation mechanism. As a result, the O&M for the constructed drainage is still not available from the government at the time of the ICRR preparation. A follow-up operation, however, has been submitted to the Board for approval and will support the preparation of a roadmap for the financing and management mechanisms of the urban drainage systems at national level, with sustainable financing mechanisms.

Quality-at-Entry Rating

Satisfactory

b. Quality of supervision

The project was closely supervised, as reported in the ICR. The task team leader and most of the team members were located in the country and provided day-to-day support to project implementation. This involved 16 implementation missions, one mission every six months. The ICR notes that Aide Memoires were of high quality and candid, comprehensively covering implementation challenges and providing programmatic recommendations on how to address challenges. Project performance indicators were realistically rated.

The team mobilized trust fund resources to provide additional technical value and specialized expertise in DRM to support the GoS throughout the design and development of complex studies implemented under the project.

The team followed through on the compliance with environmental and social safeguards, procurement and financial management, specifically with resettlement procedures, flagging potential issues and proposing plans to mitigate them. There was a fatality at a drainage work site in the neighborhood of Keur Massar (Mbeubeuss catchment) in 2018. It was confirmed that proactive measures were taken by the project team before the accident to ensure adherence to the occupational health and safety (OH&S) measures, including a detailed action plan developed with the implementation agency, the contractor, and the supervision firm.

Quality of Supervision Rating
Satisfactory

Overall Bank Performance Rating
Satisfactory

9. M&E Design, Implementation, & Utilization

a. M&E Design
Overall, the Results Framework was clear, but did lack some relevant outcome indicators. The original PDO was at an intermediate outcome level. This was addressed at the restructuring where the PDO for Objective 1 was reformulated and was pitched at an adequate outcome level. The two original PDO indicators only covered number of beneficiaries and area covered. These were World Bank core indicators, and although they are relevant, they are not sufficient (without additional relevant indicators at the outcome level) to measure the results (at the outcome level) of the project. Most of the indicators had quantitative targets. All indicators included baseline and target data. Non-quantitative indicators were, for the most part, detailed and clear. After restructuring a third PDO indicator was added: “Tools related to urban resilience, including climate change, adopted”. This indicator was vague in that it did not specify to what kind of “tools” it was referring.

The ICR notes that the RF, while being adequate, would have further benefitted from the targets informed by technical studies and a design that would have included a survey to generate data on beneficiary satisfaction or living conditions in the intervention zones before and after the project.

M&E was the responsibility of the ADM.

b. M&E Implementation

The ICR reports (para 49-50) that the project M&E team collected, measured, recorded, analyzed, verified, and stored data on all the activities in progress and the results achieved. Regular site visits were essential for collecting data for the M&E framework.

The project included an impact assessment that complemented the project M&E system. A DIME in relation to Component C was conducted in 2015. This helped inform the implementation of the subsequent stages of the project and provided useful information for the development of the community engagement strategy.

c. M&E Utilization

The M&E framework informed project-related decisions, especially those related to the drainage infrastructure works. The implementation experience was used to further improve the M&E system. The M&E outcomes supported nine online project knowledge notes produced to disseminate lessons learned.

M&E Quality Rating

Substantial

10. Other Issues

a. Safeguards

The project was classified as category A under the World Bank safeguards policies. Five safeguard policies were triggered at appraisal: Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BP 4.04), Pest Management (OP 4.09), Physical Cultural Resources (OP/BP 4.11), and Involuntary Resettlement (OP/BP 4.12). After AF1, Natural Habitats and Pest Management policies were no longer triggered. During the early years of implementation, compliance with safeguards was considered to be satisfactory. The three Resettlement Action Plans (RAPs) were fully executed, with almost 99 percent of the Project-affected Persons (PAPs) compensated and the remaining PAPS to be compensated by December 10, 2020. However, later in project implementation (after the Level 1 restructuring), some delays were experienced in the compensation, related to (a) a decree that took a year to be signed, (b) lack of availability of counterpart funding in 2018 and 2019 during the election period. Aside from the delays, there were other issues during the RAPs implementation including difficulties with updating the PAPs' numbers in informal densely populated areas and insufficient data on the socioeconomic profiles of the PAPs in these areas. Remedial actions were identified in the RAPs' audit, and recommendations were made to improve forthcoming operations. A grievance redress mechanism with functioning committees at the district, municipal, and neighborhood levels was put in place as part of the approved abbreviated RAP and was later reinforced.

As reported by the ICR, there was a non-compliance to occupational health and safety measures at a drainage work site resulting in a fatality of a 10-year-old boy on June 10, 2018. Proactive measures are reported to have been taken by the task team before the fatality, including a detailed action plan developed with the implementation agency, the contractor, and the supervision firm.

The compliance with overall social and environmental safeguards is deemed to be moderately satisfactory, as reported by the ICR (para 54).

b. Fiduciary Compliance

Financial management: The Agency for Municipal Development (ADM) complied with the World Bank's financial management policies with some shortcomings. All financial management and audit reports submitted were unqualified and in accordance with all World Bank requirements. ADM had adequate financial management capacity with a qualified full-time financial and administrative director. The budgeting and accounting arrangements were assessed as adequate. The project was in compliance with the financial reporting arrangements, with the quarterly interim financial reports and annual audit reports being submitted to the World Bank mostly within the stipulated timelines. The project disbursed 99.93 percent of IDA and 91.61 percent of the GEF resources at project closure. However, government and project contributions were often not mobilized on time and weaknesses were noted in internal audit arrangements and advance payments. Internal and external audit recommendations were not fully implemented. Despite these weaknesses, the project's financial management system provided the necessary assurance that the World Bank proceeds were being used for the intended purposes and that reports could be relied upon to monitor the project. Financial management during implementation was mostly rated Satisfactory.

Procurement: Procurement shortcomings identified include, among others, the following: (a) insufficient staff in the Procurement Unit, (b) the absence of core team members in charge of project implementation in the implementing agency's procurement commission, (c) unavailability of a detailed procurement and contract management manual, (d) unavailability of a database with companies/suppliers/providers for restricted consultations, and (e) delays in updating activities in the online platform Systematic Tracking of Exchanges in Procurement (STEP). The World Bank team intensively monitored compliance with the project's procurement procedures. By the end of the project, progress was made with regard to entering all the transactions in STEP. Despite these shortcomings, the contracts were generally awarded in accordance with the stipulations of the competition documents and after confirmation of the qualification of the successful candidate. Furthermore, no cases of fraud or corruption were observed in this context. Procurement was rated satisfactory and moderately satisfactory during the project implementation period.

c. Unintended impacts (Positive or Negative)

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d. Other

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11. Ratings

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

12. Lessons

The following lessons are derived from the ICR with some modification of the language:

1. Cross-sectoral approaches can lead to a win-win situation for both sectors when environmental considerations underpin technical disaster risk management solutions. This can also support higher sustainability of project outcomes and may be financially beneficial as compared to single sector approaches. The project was based on an integrated approach to stormwater drainage, which combined a watershed analysis with engineering drainage solutions. This approach supported a restoration of the natural pathways for evacuating the stormwater using gravity drainage infrastructure all the way to the ocean through a natural slope in the ground. This was a cheaper approach as compared with a standard one to invest in a pump-based sanitation. It was also innovative for Senegal and represented a new vision on flood management, where sustainable land management objectives are mainstreamed into (DRM) infrastructure sector.

2. Community engagement in cleaning and waste management can be critical for the sustainability of outcomes of urban drainage infrastructure projects, especially in densely populated informal settlements. Activities aimed at community engagement can lead to behavior change, foster ownership of drainage infrastructure by communities, and limit the risk of conflicts. The project dedicated a full-fledged component on community engagement targeting both national and local actors. The project engaged Community Based Organizations (CBOs) to work with local communities to improve and maintain the cleanliness of public spaces and drainage infrastructure. An impact assessment published in June 2017 concluded that this led to behavioral change. Increased community engagement resulted in improved functioning of the drainage infrastructure. As a result, the neighborhoods with such community engagement were less affected by flooding and reported reduced levels of both illness and income loss due to flooding, as compared with neighborhoods where community engagement did not take place.

3. Supporting institutional action and provision of continued financing (for example, the establishment of a sanitation fund and sustainable financing for O&M in this project) may

facilitate the sustainability of project outcomes. A long-term engagement with the main stakeholders in the country (critically, the government) might be a necessary condition.

13. Assessment Recommended?

Yes

Please Explain

This project involved technical innovations and innovative cross-sectoral approaches; had flexible implementation to adjust to lessons learned mid-term; and, importantly, included a community engagement approach, which was critical for outcome sustainability. At the same time, it had two issues that are typical for DRM projects in low income countries: lack of financial sustainability of outcomes and insufficient data at entry. It would be informative to evaluate post-completion outcomes, including beneficiary value-added; evaluate project longer-term sustainability; and distill lessons for future Bank DRM projects in low income countries regarding financial sustainability solutions and data reliability.

14. Comments on Quality of ICR

The ICR is well written and generally of a high quality. It provides a good and succinct background information and a detailed yet condensed analysis of efficacy and efficiency. The quality of evidence is generally good, and the quality of analysis is good with concise summarizing of salient points. The ICR is internally consistent.

However, there are shortcomings. First, there are notable unclarities in relation to the achievement of most critical project's targets: PDO indicator 2 (area covered by the construction of the drainage infrastructure) and a related intermediate indicator (length of the constructed drainage canals). Second, in efficiency, apart from the cost-benefit analysis, the ICR does not satisfactorily discuss other measures of cost effectiveness under the project and analyze administrative/operational inefficiencies. Lastly, the ICR contains no annex summarizing the impact evaluation. This information had to be subsequently sought from the project team. The team was very responsive to the requests from IEG for additional information: the ICR author was instrumental in providing the documents, and the project task team leader clearly and efficiently replied to all the questions.

a. Quality of ICR Rating

Substantial