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Report No: ICR00006510

IMPLEMENTATION COMPLETION AND RESULTS REPORT

IBRD-86280

ON A

LOAN

IN THE AMOUNT OF US\$ 200 MILLION

TO THE

City of Buenos Aires

FOR THE

AR Flood Risk Management Support Project for the City of Buenos Aires  
March 5, 2024

Water Global Practice  
Latin America And Caribbean Region

## CURRENCY EQUIVALENTS

(Exchange Rate Effective Jan 15, 2024)

Currency Unit = Argentine peso (ARS)

817.65 ARS = US\$1

## FISCAL YEAR

July 1 - June 30

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## ABBREVIATIONS AND ACRONYMS

CABA	Autonomous City of Buenos Aires ( <i>Ciudad Autónoma de Buenos Aires</i> )
CPF	Country Partnership Framework
ICR	Implementation Completion and Results Report
HMP	Hydraulic Master Plan
IBRD	International Bank for Reconstruction and Development
IRI	Intermediate Results Indicator
IRR	Internal Rate of Return
ISR	Implementation Status and Results Report
MPA	Multiphase Programmatic Approach
M&E	monitoring and evaluation
NBS	nature-based solution
NGO	nongovernmental organization
O&M	operation and maintenance
PAD	Project Appraisal Document
PCU	Project Coordination Unit
PDO	Project Development Objective
PLR	Performance and Learning Review
SIHVIGILA	Hydrometeorological Observation, Surveillance, and Alert System ( <i>Sistema Hidrometeorológico de Observación, Monitoreo y Alerta</i> )
TOC	theory of change

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**DATA SHEET**

**BASIC INFORMATION**

**Product Information**

Project ID	Project Name
P145686	AR Flood Risk Management Support Project for the City of Buenos Aires
Country	Financing Instrument
Argentina	Investment Project Financing
Original EA Category	Revised EA Category
Full Assessment (A)	Full Assessment (A)

**Organizations**

Borrower	Implementing Agency
Buenos Aires City	Chief of Cabinet of Ministries

**Project Development Objective (PDO)**

Original PDO

Strengthen the Autonomous City of Buenos Aires to efficiently manage flood risk and improve the drainage systems in the Cildanez Basin, Maldonado Basin, and Vega Basin.

**FINANCING**

	Original Amount (US\$)	Revised Amount (US\$)	Actual Disbursed (US\$)
<b>World Bank Financing</b>			
IBRD-86280	200,000,000	193,300,000	191,768,791
<b>Total</b>	<b>200,000,000</b>	<b>193,300,000</b>	<b>191,768,791</b>
<b>Non-World Bank Financing</b>			
Borrower/Recipient	126,000,000	84,330,000	84,329,723
<b>Total</b>	<b>126,000,000</b>	<b>84,330,000</b>	<b>84,329,723</b>
<b>Total Project Cost</b>	<b>326,000,000</b>	<b>277,630,000</b>	<b>276,098,514</b>

**KEY DATES**

Approval	Effectiveness	MTR Review	Original Closing	Actual Closing
22-Jun-2016	07-Dec-2016	20-Apr-2020	01-Mar-2022	01-Sep-2023

**RESTRUCTURING AND/OR ADDITIONAL FINANCING**

Date(s)	Amount Disbursed (US\$M)	Key Revisions
30-Apr-2019	138.27	Change in Implementing Agency Change in Results Framework Change in Components and Cost Change in Disbursements Arrangements Change in Institutional Arrangements Change in Procurement
15-Nov-2021	157.27	Change in Implementing Agency Change in Results Framework Change in Loan Closing Date(s) Change in Institutional Arrangements Change in Procurement

**KEY RATINGS**

Outcome	Bank Performance	M&E Quality
Satisfactory	Satisfactory	Modest



**RATINGS OF PROJECT PERFORMANCE IN ISRs**

No.	Date ISR Archived	DO Rating	IP Rating	Actual Disbursements (US\$M)
01	04-Oct-2016	Satisfactory	Satisfactory	0
02	20-Apr-2017	Satisfactory	Satisfactory	50.51
03	22-Jul-2017	Satisfactory	Satisfactory	50.51
04	15-Jan-2018	Satisfactory	Satisfactory	104.51
05	18-Jun-2018	Satisfactory	Satisfactory	123.81
06	19-Dec-2018	Satisfactory	Satisfactory	138.27
07	06-Mar-2019	Satisfactory	Satisfactory	138.27
08	09-Sep-2019	Satisfactory	Satisfactory	138.27
09	04-Dec-2019	Satisfactory	Moderately Satisfactory	138.27
10	28-May-2020	Moderately Satisfactory	Satisfactory	138.27
11	14-Nov-2020	Moderately Satisfactory	Satisfactory	144.27
12	10-May-2021	Moderately Satisfactory	Satisfactory	144.27
13	11-Aug-2021	Moderately Unsatisfactory	Satisfactory	148.27
14	17-Feb-2022	Moderately Satisfactory	Satisfactory	162.27
15	01-Sep-2022	Moderately Satisfactory	Satisfactory	169.27
16	06-Mar-2023	Moderately Satisfactory	Moderately Satisfactory	178.27
17	07-Aug-2023	Moderately Satisfactory	Moderately Satisfactory	178.27

**SECTORS AND THEMES**

**Sectors**

Major Sector/Sector	(%)
<b>Public Administration</b>	<b>14</b>
Other Public Administration	14



<b>Transportation</b>	<b>14</b>
Other Transportation	14
<b>Water, Sanitation and Waste Management</b>	<b>72</b>
Public Administration - Water, Sanitation and Waste Management	7
Other Water Supply, Sanitation and Waste Management	65
<b>Themes</b>	
Major Theme/ Theme (Level 2)/ Theme (Level 3)	(%)
<b>Finance</b>	<b>13</b>
Finance for Development	13
Disaster Risk Finance	13
<b>Urban and Rural Development</b>	<b>39</b>
Disaster Risk Management	39
Disaster Response and Recovery	13
Disaster Risk Reduction	13
Disaster Preparedness	13
<b>Environment and Natural Resource Management</b>	<b>50</b>
Water Resource Management	50
Water Institutions, Policies and Reform	50

**ADM STAFF**

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## I. PROJECT CONTEXT AND DEVELOPMENT OBJECTIVES

### A. CONTEXT AT APPRAISAL

1. **At the time of project preparation, Argentina was facing significant macroeconomic challenges.** Policy uncertainty before the presidential elections, a deteriorated business environment, and worsening external conditions resulted in GDP growing by only 2.7 percent, with growth fueled primarily by public consumption. The national fiscal deficit sat at 3.8 percent of GDP, reflecting a significant increase in public spending before elections. The trade balance further deteriorated due to an overvalued exchange rate and worsening external conditions (i.e., economic contraction in Brazil, slowdown in China, and lower commodity prices). In the context of lack of access to international capital markets, the growing fiscal deficit was financed primarily with monetary emission, with inflation rising to 27 percent, according to private sector estimates. After taking office in December 2015, a new administration embarked on swift reforms to correct macroeconomic imbalances, including the reductions of export taxes on the country's main exports, the unification of the exchange rate, and the removal of foreign exchange restrictions; it also settled the dispute with the debt holdouts. On the domestic front, longstanding energy and transport subsidies were reduced for the non-poor. As a result of these reforms, in combination with the unfavorable external conditions, economic growth exhibited a contraction in 2016 (2.1 percent) before accelerating in 2017 (2.8 percent) and contracting once again in 2018 (2.6 percent), in the context of a severe drought.

2. **Extreme weather events—particularly floods—impose a significant economic burden on Argentina.** As one of the 10 emerging economies with the highest flood hazard exposure Argentina suffers annual losses estimated at US\$3 billion a year, accounting for an estimated 0.7 percent of GDP in 2012.<sup>1</sup> One of the core areas of floods is the Autonomous City of Buenos Aires (CABA).<sup>2</sup> CABA represents about 24 percent of Argentina's economy and 8 percent of the national population, with three million people residing in a city that almost doubles in size daily with two million commuters who rely on the city to work, study, and for health services. Despite being the wealthiest district in the country, about 7 percent of CABA residents have unmet basic needs,<sup>3</sup> with a notable disparity in income distribution across the city. Flooding impacts lives and livelihoods, disproportionately affecting lower-income households with vulnerability linked to poverty, particularly in urban settings, where recovery is hindered even with social assistance. Climate variability, unsustainable urban planning, and increased migration of people to flood-prone areas are worsening the impacts of floods. Annual rainfall and stormwater runoff have dramatically increased in recent decades, rendering the existing urban drainage system insufficient. In April 2013, CABA experienced one of the heaviest storms recorded in nearly 50 years, leaving key transportation routes submerged and mass-transit systems shut down, affecting 350,000 people directly, with damages and losses amounting to US\$300 million. Moreover, severe weather events pose important fiscal impacts (subsidies and tax exemptions) on CABA, with an estimated US\$49 million budget impact for the events recorded in April 2012 and 2013. In addition, the legal and regulatory framework at appraisal provides evidence of the importance of flooding in CABA, e.g., Decree 695, Law 1.575, and Law 4.237. Decree 695 from 2009 endorses CABA's Emergency Plan and catalogs various threats to the city, listing 21 threats including heavy rain and windstorms which, along with flooding, are identified as the top concerns (followed by fires, transportation

<sup>1</sup> According to the world's second-largest reinsurer, Swiss-Re.

<sup>2</sup> *Ciudad Autónoma de Buenos Aires (CABA)*.

<sup>3</sup> *Necesidades Básicas Insatisfechas (NBI)*, a method used to identify critical needs in a population and characterize poverty.



accidents, gas leaks, and more); Law 4.237, passed in 2012, incorporates considerations for flood risk management into the building codes, influencing urban planning and construction standards, among other aspects, and; Law 1.575, established in 2004, creates and administers an emergency subsidy fund for flooding alone, without similar mechanisms for other risks or threats.

**3. At appraisal, CABA had made strides in flood protection with major structural investments in the Maldonado basin; however, little had been done on nonstructural measures, creating the need to shift towards a proactive, more efficient flood risk management approach combining nonstructural measures with infrastructure.** With the support of the World Bank, CABA's Government prepared a Hydraulic Master Plan (HMP), approved in 2006. The HMP was developed under the 1997–2006 Flood Protection Project (P006052) and began its implementation in 2005–2012 through the Urban Flood Prevention and Drainage Project (P088220), the predecessor to this project (P145686). The HMP lays out a comprehensive plan for reducing flood risks and related economic and social losses by 2050. Despite the comprehensive nature of the HMP in highlighting the importance of integrating structural and non-structural measures, the focus of P088220 was predominantly on mitigating flood impacts in the city through the construction of critical drainage infrastructure within the Maldonado basin. The project's Implementation Completion and Results Report (ICR)<sup>4</sup> acknowledged that while the project did a good job implementing the structural measures, it faced several challenges in implementing the non-structural measures. The design of this project (P145686) incorporated key lessons from P088220, emphasizing the importance of a comprehensive flood risk management approach that focuses not only on mitigation using infrastructure investments, but on finding increased efficiencies through improved prevention (including a wide set of nonstructural measures), and better emergency response. Focus was given to capacity building and interagency coordination, e.g., the Emergency Master Plan of 2009 enacted an emergency committee, which, while effective in coordinating emergency responses, lacked regular interagency coordination and efficient risk management. Thus, this project included a better coordination mechanism to support the emergency committee. In summary, the project supported a more efficient flood risk management approach through improved prevention, increase mitigation and better response with a targeted approach focused on addressing the disproportional impacts of floods on the most vulnerable.

#### Theory of Change (Results Chain)

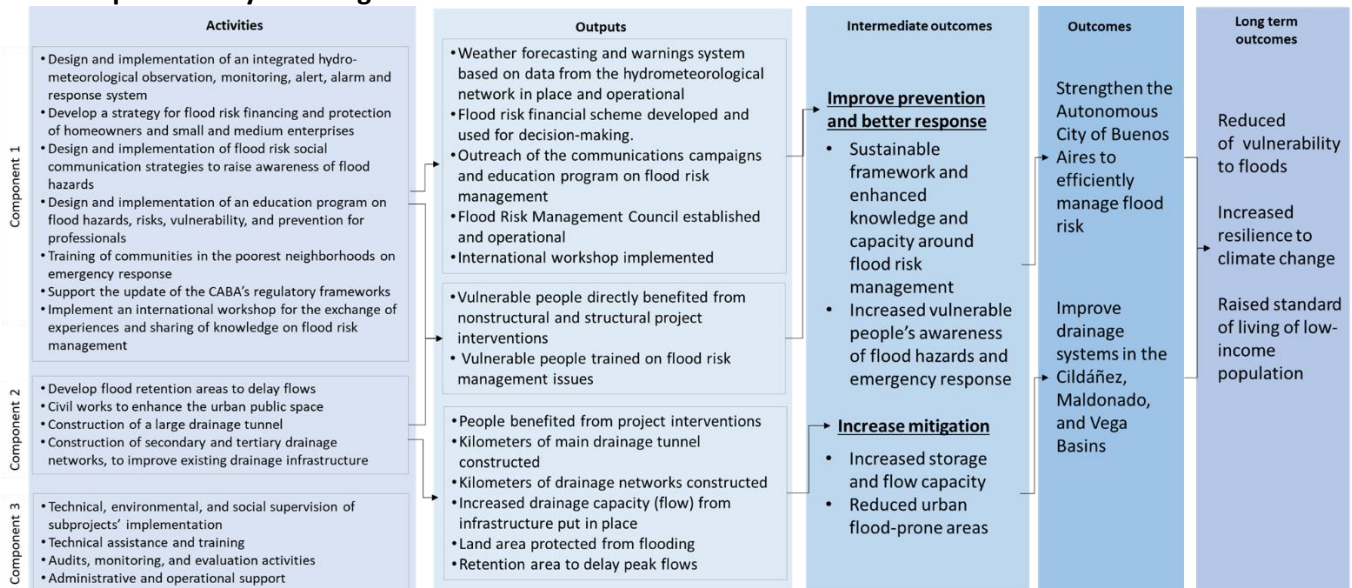
**4. The project aims to support CABA in improving the drainage systems in key basins and implementing a more efficient flood risk management approach through improvements in prevention, mitigation, and response.** Specifically: (a) improved prevention through the setup of the flood risk management council, increased information for decision-making from a hydrometeorological observation, surveillance, and alert system, and communications and education campaigns to promote changes in citizen behavior and stronger flood risk management capacities in officials and practitioners; (b) increase mitigation through infrastructure investments to increase drainage and retention capacity in the three targeted basins, support legal and regulatory frameworks updates, and develop risk models for an innovative financing protection scheme, and (c) better response through institutional capacity building. An ex-post reconstructed theory of change (TOC) is shown in figure 1 based on the information provided in the Project Appraisal Document (PAD).<sup>5</sup>

<sup>4</sup> First APL for the Urban Flood Prevention and Drainage Project <https://documentsinternal.worldbank.org/Search/18417509>

<sup>5</sup> TOC were not required at the time of the project preparation.



Figure 1. Ex-post Theory of Change



Source: Based on the PAD.

### Project Development Objectives (PDOs)

5. "The objective of the project is to strengthen the Autonomous City of Buenos Aires to efficiently manage flood risk and improve the drainage systems in the Cildáñez Basin, Maldonado Basin and Vega Basin." The PDO in the legal agreement is the same as the one included in the PAD.

### Key Expected Outcomes and Outcome Indicators

6. The PDO can be unpacked in 2 outcomes:

**PDO 1: Strengthen the Autonomous City of Buenos Aires to efficiently manage flood risk.** The achievement of this outcome was originally envisioned to be measured by the following indicators: (i) Weather forecasting warnings based on data from the hydrometeorological network (yes/no); and (ii) CABA's Flood Risk Management Council complies with its functions as foreseen in its creational decree (yes/no). As discussed later in this ICR, these PDO indicators fell short in measuring the real impact of the project's activities, and do not capture the efficiency part of the PDO.

**PDO 2: Improve the drainage systems in the Cildáñez Basin, Maldonado Basin, and Vega Basin.** The achievement of this outcome was originally envisioned to be measured by: (i) Direct project beneficiaries (gender disaggregated) (Number); (ii) Extreme poor residents protected from flooding (gender disaggregated) (Number); (iii) Increase drainage capacity in the targeted areas from infrastructure put in place (m<sup>3</sup>/s).

7. **Project Beneficiaries:** Beneficiaries were estimated considering that approximately 1.3 million people live in the three target basins and about 1.7 million people commute daily through the target basins to work, school, for household chores, and visiting health care facilities. With project interventions, commuters and residents would be protected from flooding after a rainstorm that statistically (baseline 2015) occurs once every 10 years also indicated as a return period Tr=10.



## Components

8. The project had the following three components:

**Component 1: Institutional Development for Flood Risk Management** (US\$31.2 million total, US\$9.6 million IBRD). This component supported the creation of a modern, sustainable framework for flood risk management within CABA by implementing four subcomponents: (a) a Hydrometeorological Observation, Surveillance, and Alert System (SIHVIOLA)<sup>6</sup>, which encompass the design and implementation of the system, increasing CABA's weather forecasting capacity and thereby improving flood preparedness and emergency management; (b) a Flood Risk Financing and Protection Scheme, including the development of a probabilistic flood risk model, the construction of flood exposure databases, the design of an advanced claims management system, and an innovative financial mechanism for risk retention and transfer to the international capital markets; (c) Flood Risk Social Communication and Education, which comprises delivering flood risk social communication and education activities to raise awareness about flood risk and help shift behavior to a proactive response; and (d) Capacity Building for Flood Risk Management, which encompass capacity-building activities for CABA's agencies in charge of flood risk management, including infrastructure planning and execution, emergency response, and operation and maintenance (O&M) of the drainage infrastructure.

**Component 2: Flood Mitigation Infrastructure** (US\$290 million total, US\$185.6 million IBRD). This component financed priority flood mitigation infrastructure in the most flood-prone watersheds, where the most urgent investment was needed. The selection of the large-scale drainage works was based on the HMP's consideration of the economic benefits of the alternatives. This component included interventions in each of the three basins: *Cildáñez*: (i) Works to develop flood retention areas in the basin to delay flows to the Riachuelo River; (ii) construction of networks to improve the water distribution and wastewater collection in low-income neighborhoods and informal settlements located in the basin; (iii) construction of drainage channels to improve the existing storm drainage infrastructure in the basin by increasing its storage and flow capacity; and (iv) civil works to enhance the urban public space in the basin. *Maldonado*: construction of about 31 kilometers of secondary and tertiary drainage networks in the basin. *Vega*: (i) the construction of a large main drainage tunnel of 8.4 kilometers; and (ii) the construction of about 9.8 kilometers of secondary and tertiary drainage networks in the basin.

**Component 3: Project Management** (US\$4.3 million total, US\$4.3 million IBRD). This component included: (i) the provision of support for the management of the project, including the financing of audits, the monitoring and evaluation (M&E) of the project, the provision of technical assistance, training, and operating costs; and (ii) the development and implementation of a comprehensive baseline data collection and post project data collection and analysis to allow the M&E of the project results and impacts.

## B. SIGNIFICANT CHANGES DURING IMPLEMENTATION (IF APPLICABLE)

### Revised PDOs and Outcome Targets

9. The PDO remained the same across the lifespan of the project, but the results framework was adapted twice: first during the restructuring in 2019 as a response to the changes in project activities, and second in 2021, when only the targets of PDO indicators were adjusted.

<sup>6</sup> Sistema Hidrometeorológico de Observación, Monitoreo y Alerta (SIHVIOLA).



### Revised PDO Indicators

**10. 2019 Restructuring:** Responding to CABA’s request and terminology used to measure poverty, the PDO indicator “Extreme poor residents protected from flooding” was changed to “Vulnerable population protected from flooding” without changing the definition. The definition is understood as being those unable to purchase the basic alimental products to satisfy their primary needs, so no changes were introduced to the target of 20,000 residents. The original target considered only those living in informal settlements in the flood-prone and other underdeveloped areas of the Cildáñez basin; in the 2021 restructuring, the target was adjusted to reflect vulnerable beneficiaries in the project area beyond those in informal settlements, covering a total of 47,000 people. This change does not imply any modifications in the project’s scope.

**11.** During the 2019 restructuring, the intermediate results indicator (IRI) “Land area protected from flooding after rainstorm events with an intensity of up to the equivalent of Tr=10 years”, was moved to PDO indicator due to its relevance in indicating a PDO achievement. The original target of 3.5 km<sup>2</sup> was adjusted to 8 km<sup>2</sup> to reflect the actual surface protected from flooding.<sup>7</sup> During the 2021 restructuring, the total land area protected from flooding was adjusted to 18 km<sup>2</sup> to reflect the extension of the closing date and the progress in the construction of the secondary drainage networks.

**12. 2021 Restructuring:** During the 2021 restructuring, adjustments were made to the PDO indicator’s targets to reflect the extension of the closing date and the progress in the construction of the secondary drainage networks. The original and revised PDO indicators and targets are shown in table 1. During implementation, the design of the secondary drainage networks in the Maldonado and Vega basins needed to be adapted to reflect changes in topographic conditions caused by railway construction carried out by the National Government on the San Martin, Mitre, and Sarmiento lines.<sup>8</sup> An extension of the loan closing date was also done through this restructuring to allow CABA to revise the construction plans and achieve the PDO. The Project Coordination Unit (PCU) designed an action plan to prioritize critical drainage networks with the highest impact on the achievement of PDO targets (number of beneficiaries and protected area of flooding) and to complete most of the works before the project closing date.

Table 1. Revised PDO Indicators

Original Indicator	2019 Restructuring 69% disbursed (US\$ 138.77 M)	2021 Restructuring 79% disbursed (US\$ 157.77 M)
<b>PDO indicator</b> Extreme poor residents protected from flooding <i>Target 20,000</i>	<b>Revised PDO indicator</b> Vulnerable population protected from flooding <i>Target 20,000</i>	<b>Revised target</b> Vulnerable population protected from flooding <i>Target 47,000</i>
<b>IRI indicator</b> Land area protected from flooding after rainstorm events with an intensity of up to the equivalent of Tr=10 years <i>Target 3.5 km<sup>2</sup></i>	<b>New PDO indicator</b> Land area protected from flooding after rainstorm events with an intensity of up to the equivalent of Tr=10 years <i>Target 8 km<sup>2</sup></i>	<b>Revised target</b> Land area protected from flooding after rainstorm events with an intensity of up to the equivalent of Tr=10 years <i>Target 18 km<sup>2</sup></i>

<sup>7</sup> Land protected from flooding was recalculated based on flood prediction models that consider the magnitude of the rain, the existing drainage infrastructure, and the topography and spatial characteristics of the flooded area.

<sup>8</sup> More information in paragraph 63.



### Revised Components

**13. No new components were included or removed but component descriptions were finetuned as some activities were changed as a request of the Government of CABA.** During the 2019 restructuring, subcomponents 1.3 (Communication and Education) and 1.4 (Capacity building) were modified. The modification of subcomponent 1.3 was the result of the revised communications strategy where grants to nongovernmental organizations (NGOs) to raise awareness of flood hazards was not considered a priority as the activity was done through the Ministry. Additionally, the original audience of the education program on flood risk management, professionals and on emergency response for communities in the poorest neighborhoods, was extended to schools, professionals, and citizens in general. The restructuring also incorporated a modification of one activity under subcomponent 1.4 linked to development of participatory contingency plans. As CABA had an Emergency Master Plan, it was not deemed necessary to develop additional contingency plans. While the PCU decided to remove this activity, they requested to add the dissemination of emergency plans and safety recommendations to the communication strategy. Changes to project descriptions were effective during the 2021 restructuring process with CABA signing an amendment to the Loan Agreement on February 21, 2022.

**14. During the restructuring in 2021, CABA requested to cancel subcomponent 1.2., the Flood Risk Financing and Protection Scheme.** CABA concluded that a financial instrument, such as insurance, to address residual risk was impractical for such a relatively small geographic area, especially since the city already had an emergency fund that, despite its limitations, provided some level of resilience against residual risk. Even though some of the information needed as input for the tool was already available (for example, hazard maps and exposure database), CABA decided not to continue with this activity. The changes included in the 2021 restructuring did not affect the achievement of the PDO, but as a result, two IRIs were dropped.

### Other Changes

**15. Additional changes to the results framework were introduced in the 2019 restructuring (RES35718, 30-Apr-2019) and the 2021 restructuring (RES43051, 15-Nov-2021).** Table 2 presents the changes in IRIs, together with the addition of citizen engagement indicators, and the revised targets.

Table 2. Revised IRIs

Original Indicator	2019 Restructuring 69% disbursed (US\$ 138.77 M)	2021 Restructuring 79% disbursed (US\$ 157.77 M)
CABA’s probabilistic flood risk model calibrated and used as a basis for decision making (Yes/No) <i>Target Yes</i>	CABA’s probabilistic flood risk model calibrated and used as a basis for decision making (Yes/No) <i>Target Yes</i>	<b>Dropped</b>
Risk-financing mechanism developed (Yes/No) <i>Target Yes</i>	Risk-financing mechanism developed (Yes/No) <i>Target Yes</i>	<b>Dropped</b>
NGO’s involved in the communications campaigns <i>Target 8</i>	<b>Dropped</b>	
Land area protected from flooding after rainstorm events with an	<b>Moved to PDO indicator</b>	



intensity of up to the equivalent of Tr=10 years		
People reached by communications campaigns on flood risk management carried out by NGOs <i>Target 3,000</i>	<b>Revised indicator</b> People reached by communications campaigns on flood risk management carried out by the city of Buenos Aires <i>Target 3,000</i>	<b>Revised target</b> People reached by communications campaigns on flood risk management carried out by the city of Buenos Aires <i>Target 10,000</i>
Low-income population trained on flood risk management issues <i>Target 670</i>	<b>Revised indicator</b> Vulnerable population trained on flood risk management issues (Number) <i>Target 670</i>	<b>Revised target</b> Vulnerable population trained on flood risk management issues (Number) <i>Target 800</i>
Number of participatory contingency plans developed supported by the project <i>Target 12</i>	<b>Dropped<sup>9</sup></b>	
Grievances responded and/or resolved within the stipulated service standards for response times <i>Target 80%</i>	<b>Revised indicator</b> Neighbors' requests responded <i>Target 80%</i>	
	<b>New indicator</b> Participants of participatory workshops related to flood risk management <i>Target 150</i>	<b>Revised target</b> Participants of participatory workshops related to flood risk management <i>Target 600</i>
	<b>New indicator</b> Beneficiaries of educational programs on flood risk management in schools <i>Target 400</i>	<b>Revised target</b> Beneficiaries of educational programs on flood risk management in schools <i>Target 3,200</i>
	<b>New indicator</b> Beneficiaries' satisfaction with complete water works (1 to 5) <i>Target 4</i>	<b>Revised target<sup>10</sup></b> Beneficiaries' satisfaction with complete water works (1 to 5) <i>Target 3.2</i>
	<b>New indicator</b> Flood resilience (1 to 5) <i>Target 3.42</i>	

**16. Other changes included in both restructurings are as follows:**

- Change in implementing agency and institutional arrangements:** These changes reflect the modification of the Government of CABA organization due to administration changes. The PCU, originally created within the Unit for Multilateral Financing of the Ministry of Finance, was responsible for overall project coordination and served as a permanent link between the World Bank and CABA, while the Ministry of Urban Development and Transport provided technical support to the PCU. In April 2018, as part of a larger organizational changes within the Government of CABA, the PCU was remapped under the Ministry of

<sup>9</sup> IRI dropped as a result of the revised communication strategy under subcomponent 1.3, as the contingency plans were developed by Civil Defense and support was requested for dissemination, which was done through the *Centro Vivencial* funded by the project.

<sup>10</sup> Adjusted to set a more realistic goal.



Urban Development and Transport, retaining the project's coordination functions, while the Ministry of Finance (which is now the Ministry of Economy and Finance) remained responsible for the project's financial management.

- **Change in loan closing date:** In the 2021 restructuring, an 18-month extension was granted to allow for the completion of key activities to achieve the PDO, including the construction of the secondary drainage networks.<sup>11</sup>
- **Change in disbursements arrangements:** The percentages of the disbursement category corresponding to the structural measures were modified to allow greater flexibility in the financing of the secondary network infrastructure.
- **Change in procurement:** The procurement arrangements were revised to reflect the new policy framework.

### Rationale for Changes and Their Implication on the Original Theory of Change

17. The rationale for the changes to the project description, indicators, and extension of the closing date has been explained in the section above. The main effect of these changes on the TOC was the extension of the timeline to achieve the outcomes of the project but, at the same time, allowing for the achievement of more ambitious intermediate outcomes.

## II. OUTCOME

### A. RELEVANCE OF PDOs

Relevance of the PDO: High.

18. The PDO strongly aligned with both international development priorities and the agreed-upon strategy between the National Government, the Government of CABA, and the World Bank to increase resilience and adapt to the impacts of climate change in Argentina, and as such was highly relevant. In 2006, CABA approved the HMP as the first planning document related to water risk. It highlighted the insufficiency of main and secondary drainage networks and intensified investment alternatives for flood protections for precipitation events with 10-year recurrence as one of the main design criteria. At that time, CABA's drainage infrastructure had the capacity to safely handle a storm with a two-year recurrence. Yet today, CABA has been able to develop a wider strategy and change its relationship with water, linking urban flood risk management with wider sustainable urban development and climate change agendas. CABA has also engaged in the C40 initiative,<sup>12</sup> a global network of almost 100 mayors of the world's leading cities that are united in action to confront the climate crisis. Through this network, the city also received direct support from the city of Copenhagen to further optimize green interventions using the lessons learned in the Danish Capital and other parts of the world. The project is also aligned with the 2018 Resiliency Strategy "*Buenos Aires Resiliente*."<sup>13</sup> During project implementation, it supported the paradigm shift of the city towards a new strategy which incorporates water as the axis of city development and introduces new concepts of comprehensive urban water management, focused on respect for

<sup>11</sup> Progress towards achievement of PDO was revised to Moderately Unsatisfactory (MU) in the August 2021 Implementation Status and Results Report (ISR). This reassessment was due to the recognition that an extension of the project's closing date was necessary to achieve the PDO. The achievement of certain key indicators, such as the number of beneficiaries, was contingent upon the construction of the secondary drainage networks, which had not started within the original timeframe.

<sup>12</sup> <https://www.c40.org/>

<sup>13</sup> [https://recursos-data.buenosaires.gob.ar/ckan2/compromisos/Buenos\\_Aires\\_Resiliente.pdf](https://recursos-data.buenosaires.gob.ar/ckan2/compromisos/Buenos_Aires_Resiliente.pdf)



nature, enjoyment, and resilience. There has been a clear shift in CABA's vision on water: It has adopted aspects related to climate change, resilience, and more efficient combinations of green and grey infrastructure, increasing retention capacity and reducing the need for drainage. In 2021, the PCU with the support of the World Bank, developed a documentary that showcases the community's relationship with water and the new vision of CABA forged during the implementation of the project.<sup>14</sup>

**19. Alignment with the World Bank Group's FY19–FY22 Country Partnership Framework (CPF)<sup>15</sup> and the Performance and Learning Review (PLR)<sup>16</sup> is high.** . The objectives of the project are aligned with supports the CPF's focus area "Supporting Argentina in implementing its Nationally Determined Contributions", by addressing Objective 10 (Building Resilient and Low-Carbon Cities). Considering the PLR, the project supports two focus areas: (i) "supporting inclusive recovery" by improving living conditions, mitigating the impacts of flooding and reducing vulnerability of population; and (ii) "supporting climate measures and long-term sustainable growth" by increasing the resilience of the city to extreme weather events induced by climate change and climate variability, through a combination of nonstructural and structural measures for flood risk management and reducing vulnerability of people. According to the Country Climate and Development Report (2022),<sup>17</sup> Argentina faces up to US\$1.4 billion in annual expected asset losses from floods, which translates into up to US\$4 billion in welfare losses. The project supported the climate change adaptation capacity and institutional strengthening as part of an integrated flood risk management strategy in CABA, mitigating flood impacts to reduce direct damage to assets, the disruption of socio-economic activities, and increase the safety and livelihood of its three million inhabitants and two million daily commuters.

**20. Alignment is high with the Systematic Country Diagnostic<sup>18</sup> which stresses the importance of fostering climate-smart growth, requiring closer integration between the mitigation and adaptation agendas.** Argentina needs to work on its adaptation agenda and invest in adaptation interventions to not only reduce probability of flooding, but also to reduce vulnerability, and increase readiness. The project provided support to CABA and allowed for better flood protection for vulnerable communities. The project adopted innovative concepts to further increase resilience and efficiency, e.g., the implementation of green spaces to help delay peak flow, so that the drainage systems don't become overloaded. Additionally, the project improved information availability, awareness, and early warning systems, which helped the city to increase accessibility of information and provide timely climate-related warnings that helped people to proactively prepare. In addition, the focus of the project allowed the city to transform the way the most vulnerable population respond to climate-related risks.

**21. Alignment with the United Nations' Sustainable Development Goals (SDGs) is high.** The PDO is primarily aligned with SDG 11 (safe, resilient, and sustainable cities and communities) and specifically SDG 11.5 to reduce water-related disaster management. It is also aligned with SDG 13 (climate action) by strengthening resilience and adaptive capacity; SDG 1 by minimizing impacts on livelihoods and exacerbation of inequalities; SDG 9 by avoiding damage to vital

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<sup>14</sup> La Ciudad y el Agua | Documental: <https://www.youtube.com/watch?v=yBED5gfmwas>

<sup>15</sup> World Bank. 2019. Argentina - Country Partnership Framework for the Period FY19-FY22. Washington, DC: World Bank Group. <https://documentsinternal.worldbank.org/search/30967686>

<sup>16</sup> As a result of the PLR, the CPF was extended for two years. World Bank. 2022. Argentina - Performance and Learning Review of the Country Partnership Framework for the Period FY19-FY22. Washington, DC: World Bank Group. <https://documentsinternal.worldbank.org/search/33818219>

<sup>17</sup> World Bank Group. 2022. Argentina Country Climate and Development Report. <https://openknowledge.worldbank.org/entities/publication/0208826f-8ca9-5fa1-8e94-0eadd09ef29c>

<sup>18</sup> World Bank Group. 2018. Argentina: Escaping crises, sustaining growth, sharing prosperity. Washington, DC: World Bank.



infrastructure and the high cost of relief and recovery that undercut development activities; and SDG 8 by reducing the impact of slowing economic growth and limiting long-term investments.<sup>19</sup>

## B. ACHIEVEMENT OF PDOs (EFFICACY)

Efficacy rating: High.

### Assessment of Achievement of Each Objective/Outcome

**22. By focusing on prevention, mitigation, and response, the project bolstered CABA's transformation from a reactive flood protection strategy to a proactive, integrated, and more efficient flood risk management approach that combines nonstructural measures of green and grey infrastructure with a strong focus on climate adaptation and resilience to protect the most vulnerable.** CABA's strengthened capacity to proactively manage flood risk manifest in three strategic areas: (a) improved prevention through increased hydrometeorological information, observation, forecasting and early warning, decision support systems, as well as resilience through communication and education strategies and public awareness to promote changes in citizen behavior; (b) increased mitigation through infrastructure investments to increase drainage and retention capacity, and through updates to the legal and regulatory frameworks; and (c) better response capabilities through enhanced institutional coordination and capacity building by introducing flood prevention criteria in planning and decision-making.

**23. The project achieved its PDO to strengthen the Autonomous City of Buenos Aires to efficiently manage flood risk and improve the drainage systems in the Cildañez Basin, Maldonado Basin, and Vega Basin.** The assessment below is disaggregated by objectives/outcomes, together with the evidence of achievement considering the PDO outcome indicators. PDO 1 focused on the prevention and response aspects briefly described above, while PDO 2 focused on the mitigation through infrastructure investments. No split rating was deemed necessary, considering the PDO remained the same during implementation and no major changes were made to the PDO indicators. Moreover, the project's scope was broadened to not only serve the initially targeted population but also to extend benefits to a larger group of vulnerable people.

#### **PDO 1: Strengthen the Autonomous City of Buenos Aires to efficiently manage flood risk.**

**24. During implementation, CABA developed a more efficient approach to managing flood risks.** Although the efficiency, as part of PDO 1, was not discussed nor explicitly defined or clearly measured at the appraisal stage, it became apparent that efficiency was achieved through the implementation of nonstructural measures aiming at improved prevention, and better emergency response. CABA gained proactive and efficient flood risk management capabilities by reducing the impacts of floods through the activities described as follows.

**25. Leveraging advanced technologies, the project enabled the implementation of a system that provides real-time hydrometeorological information and early short-term weather forecasting alerts with great precision, vastly improving the efficiency of CABA's flood prevention.** The Hydrometeorological Observation, Surveillance, and Alert System (SIHVIGILA) was the first step in developing a coordinated and efficient response to potential flood risks. The system, later known as SAT,<sup>20</sup> began implementation in 2018, with 1 radar and 33 hydrometeorological stations

<sup>19</sup> <https://floodresilience.net/resources/item/reaching-the-sustainable-development-goals-the-need-for-building-resilience/>

<sup>20</sup> Sistema de Alerta de Tormentas. More information: <https://buenosaires.gob.ar/desarrollo-urbano-y-transporte/noticias/el-sistema-de-alerta-de-tormentas-sat-una-herramienta>



installed and operational, distributed throughout the Metropolitan Area of Buenos Aires. In 2022, the system was expanded by integrating other pre-existing monitoring stations, for a total of 69 hydrometeorological stations. The information received from the monitoring stations, radar, and satellite information is processed in the CABA-based Coordination and Control Center, generating forecasting reports and alerts at 36 hours (every 12 hours) and 7 days (every 24 hours). Real-time information and short-term, precise weather forecasting alerts up to 120 minutes in advance are shared with Civil Defense, General Directorate of Rainwater System, Emergency Medical Care System, firefighters, and police, who in turn can articulate the necessary measures, coordinate among institutions, and optimize resources strengthening CABA's emergency response. In addition, the system provides information regarding the status of the water tables and drainage network in CABA, establishing the existing water flow and projecting drainage times, which is of particular interest for planning purposes of the public works areas as well as for the General Directorate of Rainwater System to perform the necessary adjustments (intensification of drain cleaning works) and maintenance before a big storm event improving CABA's prevention capacity. In short, increased hydrometeorological information, observation, forecasting, early warning, and decision support systems have strengthened CABA's efficient flood risk management capacity, benefiting not only the city itself but the broader Metropolitan Area of Buenos Aires.

**26. Through a targeted communication and education campaign strategy, the project gave rise to an informed, proactive population, developing widespread awareness of both the value of water and the importance of mitigating flood-related events and making CABA citizens partners in proactive risk management, substantially enhancing resilience for all.** To build an informed community, CABA focused on educating students as future citizens, while also emphasizing teacher professional development, developing and integrating tailored materials and tools into school curricula, and creating a platform to make all learning materials for students and teachers on flood risk management readily accessible.<sup>21</sup> The inauguration of the "Centro Vivencial" in August 2019 marked a significant step forward in experiential learning and community engagement around water and flood risk management. The center was established with the goals of informing the public about water resources policies, increasing awareness about CABA's hydro-morphological context, disseminating emergency and contingency plans, highlighting the works financed by the project, and enhancing the communication with residents living close to flood risk reduction interventions. In 2020, because of the COVID-19 lockdown, the PCU created a virtual exhibit with seven didactic and learning stations,<sup>22</sup> a participatory workshop,<sup>23</sup> and activities that teachers and students could-use, replicating the in-person experience. In November 2021, the immersive experience was moved to *Ecoparque*,<sup>24</sup> adapting the content to focus on cultural awareness and transformation of the city and its interaction with water. With these efforts, the people have become integral to the process of fostering a culture of resilience and sustainability in CABA's approach to water risk management.

**27. Through the streams and watershed signage program, the project has helped CABA enhance its proactive flood risk management capabilities by raising public awareness.** To advertise the existence of streams below the urban area and to activate a new relationship between people and water, from January 2022 until August 2023, the PCU installed signage of different types in many places to increase visibility and allow for the identification of streams and basins within CABA. In total, more than 450 vertical signs and 180 horizontal signs on pedestrian paths, bicycle paths, and

<sup>21</sup> "Ciudadanía Global" platform: [www.ciudadaniaglobal.bue.edu.ar/resources/public](http://www.ciudadaniaglobal.bue.edu.ar/resources/public)

<sup>22</sup> Access the platform here: <https://ciudadaniaglobal.bue.edu.ar/events/news/55/semana-del-agua-visita-virtual>. Other learning videos can be found here [www.youtube.com/@centrovivencialplanhidraul8828/featured](https://www.youtube.com/@centrovivencialplanhidraul8828/featured)

<sup>23</sup> This video shows how children express their aspirations of how they want to live and their value of water: [www.youtube.com/watch?v=PsXsYqXVVXQ](https://www.youtube.com/watch?v=PsXsYqXVVXQ)

<sup>24</sup> *Ecoparque* is a public park focused on environmental education. <https://buenosaires.gob.ar/vicejefatura/ambiente/ecoparque>



manhole covers, referred to the passage of a stream in the basin. In addition, 360 QR code signs provided easy access to the virtual platform of CABA. Additionally, 20 posters were installed in bus stations.

**28. Strengthening hydrometeorological information systems, education programs, and public awareness boosts resilience, but only insofar as key stakeholders and core institutions are optimally equipped to plan for prevention, mitigation and better response; to that end, the project has helped CABA enhance its proactive flood risk management capabilities through a number of effective soft measures, including the following activities (i-iv):**

**29. (i) Enhanced institutional coordination through the Flood Risk Management Council.** Since its establishment in 2016, the Flood Risk Management Council has been instrumental in bridging the gap in interagency coordination. The Council enhances coordination among various institutions for city-level flood risk management, convening quarterly to advance discussions and integrate flood management into broader government agendas. This inter-ministerial council, created under Decree N°287/2016,<sup>25</sup> has helped with institutional coordination setting the issue of flood management on the agenda of other government agencies and fostering coordination and discussions of project-related activities.

**30. (ii) Introducing prevention criteria in planning and decision-making by updating the CABA's regulatory framework to incorporate essential water risk management concepts, including the delineation of water risk areas.** The PCU, with the support of the World Bank, was able to update the regulatory framework of the city, integrating water risk management concepts in the development of the new urban planning code, including zoning regulations to restrict development in high-risk flood areas, guidance on flood resilient infrastructure, and advise on green infrastructure for retention and infiltration areas. Through these strategic updates to the regulatory framework, the project has significantly strengthened CABA's approach to water risk management, ensuring that urban development is aligned with safety and sustainability.

**31. (iii) Enhancing preparedness and response in communities that are likely to be at higher risk due to their socioeconomic status.** The project supported Civil Defense's "*Primeros Respondedores*" program<sup>26</sup> by organizing training workshops for the capacity building of these first responders in low-income areas and purchasing emergency kits to improve their initial response capabilities until the arrival of emergency services. These first responders are the ones who best know the vulnerable neighborhoods; their involvement encompasses a variety of risk-preventing and mitigation actions (see paragraph 47 for more information).

**32. (iv) Improving institutional capacity via the acquisition of critical technological resources that bolstered CABA's monitoring and management of water systems capacity.** This included the procurement of specialized software, hardware, drones, and equipment to monitor water quality, quantity, groundwater levels, as well as topographic measurements. Other advanced instruments were also supplied to various institutions of CABA, including the General Directorate of Environmental Control of the Environmental Protection Agency.

**33. The two PDO indicators linked to this objective were achieved, and the IRIs, overachieved** (table 3). The overachievement of beneficiaries of the education communication programs can be attributed to a strategic combination of digital and physical outreach initiatives. The establishment of the online platform offers a rich array of materials, tools, and other interactive applications that facilitate learning and engagement. This digital effort was

<sup>25</sup> <https://boletinoficial.buenosaires.gob.ar/normativaba/norma/313081>

<sup>26</sup> More information about the program: <https://buenosaires.gob.ar/seguridad/defensa-civil/formacion-de-primeros-respondedores-barriales>



effectively complemented by experiences through field trips and tours in the retention area in *Parque Indoamericano* and the exhibit in *Ecoparque*, both of which are accessible public spaces in CABA (see next section). This integrated approach not only created a synergistic effect but also significantly broadened the program’s impact. Furthermore, the strategic reallocation of funds due to the cancelation of certain activities under component 1 enabled CABA to enhance its investment in the communication and education program, as one of the main priorities for CABA during implementation.

Table 3. **PDO 1 Indicators Achievements**

<b>PDO Indicators</b>	<b>Target</b>	<b>Achievement at ICR</b>
Weather forecasting warnings based on data from the hydrometeorological network	Yes	Yes
CABA’s Flood Risk Management Council complies with its functions as foreseen in its creational decree	Yes	Yes
<b>IRIs</b>	<b>Target</b>	<b>Achievement at ICR</b>
Implementation progress of the SIHVIGILA	33 stations gathering data and used for analysis	69 stations gathering data and used for analysis (overachieved)
People reached by communications campaigns on flood risk management	10,000	45,000 (450% - overachieved)
Vulnerable population trained on flood risk management issues	800	861 (107% - overachieved)
Participants of participatory workshops related to flood risk management	600	705 (117% - overachieved)
Beneficiaries of educational programs on flood risk management in schools	3,200	30,000 (937% - overachieved)



**PDO 2: Improve the drainage systems in the Cildañez Basin, Maldonado Basin, and Vega Basin.**

**34. The project’s construction of drainage infrastructure, significantly enhanced CABA’s ability to manage and mitigate flood risk.** The integration of innovative interventions, including nature-based solutions (NBS) and green infrastructure, allows CABA to adapt gradually to the impacts of climate change by increasing the water retention capacity within the city limits.

**35. In Cildañez basin, the project financed the construction of drainage infrastructure and a retention area that increased the water storage capacity, alleviating the burden on the exiting drainage system in the basin and playing an important role in safeguarding the most vulnerable communities.** In 2020, the retention area in *Parque Indoamericano* became the first large-scale NBS in CABA with its 20,500m<sup>2</sup>. The NBS has been strategically integrated into the park's landscape, maximizing the social and environmental value of the area,<sup>27</sup> and is today so successful as to have inspired CABA to explore additional NBS pilot interventions within the city.

**36. Recognized in the HMP as a key strategic component of the city's hydraulic infrastructure, financing the construction of the second emissary of the Vega stream in the Vega basin is a clear demonstration of the project's commitment to enhancing the city's resilience to flooding.** At 8.4 kilometers long and over 5.3 meters in diameter, the tunnel benefits more than 13 densely populated neighborhoods in the city.

**37. The project financed the construction of secondary drainage network in the Vega and Maldonado basins, enhancing the area's drainage capacity alongside the main infrastructure.** As mentioned previously, updates to the technical designs were required during implementation due to changes in CABA’s topography, leading to more efficient systems and increasing the benefits (protected land area and more beneficiaries with reduced impacts). The system encompasses 17.5 km of secondary drainage network.<sup>28</sup> At the time of ICR writing, contract physical progress is at 70 percent, reaching the project beneficiary targets.<sup>29</sup> Completion of the works contracts is expected in March 2025, at which point new areas will be protected and new direct beneficiaries reached.<sup>30</sup> Having remaining works outside the project's timeline do not affect the achievement of the PDO, as the work contracts are ongoing, and CABA has a budget allocation for these drainage works.

**38. At project closure, the lives and livelihoods of over three million people have been substantially improved, including as a result of the reduced risk of traffic disruption caused by flooding.** At appraisal, an estimated 1.7 million people commuted daily through the target basins, and 1.3 million<sup>31</sup> lived in the project area. At project closure, updated information allowed for a new balancing of beneficiaries. Using 2022 national census data,<sup>32</sup> the estimated number of total beneficiaries living in the targeted basins is approximately 1.5 million people (21 percent in the Cildañez and Vega basins and 59 percent in the Maldonado basin) due to densification in parts of the city where approximately 54 percent of the population is female. Updated beneficiaries defined as those that commute daily through the target basins, are estimated at more than 1.5 million people.<sup>33</sup> Beneficiary estimates were calculated in the same way as in appraisal, using updated sources of information. It is important to acknowledge that such figures are subject to the inherent uncertainties of demographic and statistical analysis.

**39. The achievement of the PDO indicators linked to this objective, as well as the IRIs, are shown in table 4.**

Table 4. PDO 2 Indicators Achievements

PDO Indicators	Target	Achievement at ICR
Direct project beneficiaries	3,000,000	3,001,287 (100%)*
Female beneficiaries	50 percent	54 percent (108%)



Vulnerable population protected from flooding	47,000	47,000 (100%)
Increased drainage capacity in the targeted areas from infrastructure out in place	60 m <sup>3</sup> /s	60 m <sup>3</sup> /s (100%)
Land area protected from flooding after rainstorm events with an intensity of up to the equivalent of Tr=10 years	18 km <sup>2</sup>	18 km <sup>2</sup> (100%)
<b>IRIs</b>	<b>Target</b>	<b>Achievement at ICR</b>
Vega drainage tunnel constructed	8.4 km	8.4 km (100%)
Secondary and tertiary drainage conduits constructed	41 km	42.30 km (103%)**

Note: \*More population will benefit with mitigation from larger storms impacts due to the remaining secondary and tertiary drainage networks being built through CABA’s own funds. Nevertheless, as beneficiaries for all the basin target basins have been considered, as well as commuters through the target basin, the increase in beneficiaries is not considered significant. \*\*The reported target considers around 10 km of secondary and tertiary drainage conduits being constructed and financed with CABA’s own funds.

### Justification of Overall Efficacy Rating

**40. The overall efficacy rating is rated High.** By focusing on prevention, mitigation, and response, the project strengthened and accelerated CABA’s transformation from a reactive flood protection strategy to a proactive, integrated, efficient flood risk management approach with a strong focus on climate adaptation that twins nonstructural measures with green and grey infrastructure to improve resilience.

## C. EFFICIENCY

**Efficiency rating: Substantial.**

### Assessment of Efficiency and Rating

**41. At appraisal a detailed economic analysis found the project to be economically feasible.** The results showed that the project would generate an internal rate of return of 21 percent. To assess the efficiency, an ex-post economic analysis following the approach adopted at appraisal was done. The analysis comprised two distinct methodologies: (i) cost-benefit analysis for the drainage works in the Cildáñez, Maldonado, and Vega basins (component 2), and (ii) benchmarking analysis of the institutional development for the flood risk management activities (component 1). The cost-benefit analysis calculated benefits based on the avoided costs from infrastructure damage and traffic disruptions due to flooding. The costs considered both the initial project investments and O&M.

<sup>27</sup> <https://www.youtube.com/watch?v=67WSmqpE40A>

<sup>28</sup> This network was subdivided into 2 contracts or lots: (i) Lot 1 encompasses 7 branches (3 in the Vega basin and 4 in the Maldonado basin; (ii) Lot 2 includes 9 branches, all in the Maldonado basin.

<sup>29</sup> The main reasons are due to changes in protected areas (given the changes in topography) as well as improvements in the designs.

<sup>30</sup> As of February 2024, progress is around 60 percent completion for Lot 1 and 80 percent completion for Lot 2 of the secondary drainage network. The Government of CABA has committed to complete the works, with their funding after the closing date, with the current contract arrangements, that include an ESMP that meets environmental and social safeguard policies.

<sup>31</sup> Estimates based on mobility surveys, local and national census statistics, among others.

<sup>32</sup> Source: [https://censo.gob.ar/index.php/datos\\_definitivos\\_caba/](https://censo.gob.ar/index.php/datos_definitivos_caba/)

<sup>33</sup> Non-residential beneficiaries (people living outside the targeted basins) were considered here. Mobility statistics were used to estimate this number: (i) people using public transport (bus, train, metro) and (ii) people using personal vehicles. The surveys consider transportation transactions from (to) the Great Buenos Aires to (from) CABA and within CABA’s transportation from (to) other areas outside the targeted basins. Around 1.148.368 people use public transport and 355.410 use private transport. Sources:

<https://www.estadisticaciudad.gob.ar/eyc/?p=29183> and [https://buenosaires.gob.ar/sites/default/files/2023-04/Viajes\\_Transporte\\_P%C3%BAblico\\_202202%20con%20dise%C3%B1o%20actualizado.pdf](https://buenosaires.gob.ar/sites/default/files/2023-04/Viajes_Transporte_P%C3%BAblico_202202%20con%20dise%C3%B1o%20actualizado.pdf)



**42. The ex-post cost-benefit analysis of the infrastructure works in the basins indicates positive outcomes in a conservative scenario.** Without considering the benefits (but the investment cost) originated in the interventions in the Cildañez basin (since the infrastructure financed under the project differed from that assessed at appraisal), the internal rate of return (IRR) of component 2, is 17.4 percent, and the present value of net benefits at US\$224 million (table 5). The IRR is marginally below the appraisal estimate since the results were achieved over a longer period of time. Nevertheless, this performance aligns with similar flood management projects, for example, the Metro Colombo Urban Development Project (P122735) with an ex-post IRR of 16 percent for a 9.5-year long project or the predecessor Urban Flood Prevention and Drainage Project (P088220) with an ex-post IRR of 14 percent and a 6-year long implementation period.

**43. To assess the efficiency of component 1 (mainly non-structural interventions) the same benchmarking technique used at appraisal was implemented, showing highly satisfactory results.** The IRR obtained by this method is 44 percent, and the benefits exceed the costs by 3.25 times.

Table 5. Results of the Economic Assessment

Metric	At appraisal (2016)	At closing* (2023)
Costs (million US\$, using 2013 prices)	330	257
Benefits (million US\$, using 2013 prices)	664	481
Net benefits (million US\$, using 2013 prices)	334	224
IRR (%)	21	17

Note: \*Does not include benefits of the Cildañez works.

**44. Implementation efficiency:** The project's implementation kicked off rapidly but encountered a slowdown due to many factors, among them, the strong appreciation of the US\$ compared to the AR\$ peso, and delays in the procurement of the second drainage networks due to the changes in CABA's topography. Despite these challenges, the project was able to be implemented with limited delays, and within the original allocated budget. Its efficiency is similar to other comparable flood management projects, as mentioned above. The economic repercussions, such as the impact of currency fluctuation and devaluation, are reflected in the lower net present values of the project's costs and benefits. Nevertheless, these economic factors did not undermine the project's level of efficiency (nor the efficacy as previously analyzed).

**45. Efficiency is rated Substantial.** The project delivered significant positive measurable benefits. With net benefits exceeding US\$481 million, an economic IRR of 17 percent compared to the 21 percent expected at appraisal, and an extension of 18 months, the project's efficiency remains robust, meriting a Substantial rating.

#### D. JUSTIFICATION OF OVERALL OUTCOME RATING

**46. Based on the above, the overall outcome rating is Satisfactory.** The project was and remained relevant to CABA, has achieved its stated objective, and transformed the way floods are managed. The IRR is below the initial projections, but the project has achieved the PDO in a slightly longer implementation period and within the original budget.



## E. OTHER OUTCOMES AND IMPACTS (IF ANY)

### Gender

**47. Clear proof of the need to address gender issues in managing flood risks.** During project implementation, a gender disaggregated social baseline study<sup>34</sup> was performed by the PCU with the support of the World Bank team, demonstrating in more detail the devastating impact of floods on the poor people, particularly women, in the Cildáñez and Vega basins. The main findings showed that in low-income communities in CABA, most first responders to floods are women, who also take leadership roles in high-risk situations. These first responders are the ones who better know the vulnerable neighborhoods and their involvement encompasses a variety of risk-preventing and mitigation actions, from knowing what number to call in case of an emergency and what information to provide, to basic notions of first aid and CPR or the use of fire extinguishers, electrical risk, among others. The study showed that, during and in the aftermath of a flood event, a higher percentage of women are in charge of health care, childcare, care of the elderly, and house care activities, such as cleaning, shopping and running errands, leaving them less time than men to focus on study and work. This causes the existing gap in education and economic opportunities between women and men to widen even more, which further increases their vulnerability. The study recommends the integration of a strong and clear gender perspective as part of investments in water infrastructure as well as in water risk management. To address gender issues, several workshops were held with women leaders in vulnerable neighborhoods (in Slum N°6 in the Cildáñez basin) to identify the challenges. Workshops were suspended during the COVID-19 lockdown and resumed by the end of 2021. For the first workshop, the objective was to identify the challenges with women leaders from vulnerable neighborhoods. For this second workshop, the aim was to find possible solutions between those women and CABA. In 2023, four workshops were held with an estimate of 15 women per workshop.

### Institutional Strengthening

**48. A robust pipeline portfolio preparation was created during implementation.** During implementation, the project financed several consultancies for the development of technical, environmental, and social studies, allowing CABA to have a more robust pipeline portfolio for future investments that are part of its plans and strategies, supporting its planning capabilities.

### Poverty Reduction and Shared Prosperity

**49. The project has contributed to the World Bank's corporate commitments to reducing extreme poverty and sustainably increasing shared prosperity.** The PDO aimed to protect vulnerable communities, defined as those unable to purchase the basic alimetal products to satisfy their primary needs, by reducing their susceptibility to the poverty trap. Even though CABA is the richest district in the country, there is strong spatial heterogeneity within the city in terms of income. The Vega and Cildáñez basins are in different areas of CABA, consequently impacting different socio-economic sectors of the city. In the Cildáñez basin residents belong to low-income sectors, covering part of the poorer *comunas*,<sup>35</sup> with the largest number of informal settlements (around 45 informal settlements).<sup>36</sup> Most of the

<sup>34</sup> More about the methodology and findings: <https://documentos.bancomundial.org/es/publication/documents-reports/documentdetail/200321597652355366/argentina-a-data-driven-framework-to-address-gender-issues-in-managing-flood-risks>

<sup>35</sup> Administrative division within CABA. The Cildáñez basin covers the *comunas* 7, 8, 9 and 10.

<sup>36</sup> *Villas* and informal settlements with a minimum of 8 grouped families, where more than half of their inhabitants do not have land title, nor formal access to at least 2 of the basic services (water, electricity and/or sewer network).



interventions financed under the project were in Villa Soldati, part of *comuna* 8 in the Cildáñez basin, one of the most vulnerable of CABA, with 13,3 percent of the population with unmet basic needs (NBI)<sup>37</sup> (higher than the 7 percent at CABA's level and 12.7 percent at the national level).<sup>38</sup> In addition, this is one of the *comunas* in the city that registered population densification.<sup>39</sup> Moreover, around half of the beneficiaries are those who commute daily from the surrounding municipalities in the Province of Buenos Aires to work, to school, to fulfill household chores, and to visit healthcare facilities. The vulnerability of the inhabitants in these municipalities is high, with around 60 percent being low-income sector or lower.<sup>40</sup>

**50. As recognized in the Water Security Assessments in Argentina,<sup>41</sup> floods are a poverty trap for lower-income people, especially in urban areas, as they find it hard to fully recover even after social transfers.** People with lower incomes (bottom 20 percent) experience a loss in well-being 3.3 times higher than people with higher incomes (top 20 percent). Despite not having been the main basin where most of the investments were made, the project was designed with a strong focus on the most vulnerable and this was achieved mostly with the soft activities. As mentioned above, not only structural measures were implemented in the Cildáñez basin, but also a big portion of the non-structural measures was carried out with the most vulnerable population, mainly participatory workshops to raise awareness and improve flood preparedness. In addition, the first large-scale NBS is located in this area, providing a space for learning, leisure, and recreation.

#### Other Unintended Outcomes and Impacts

**51. Collaboration between CABA and Copenhagen to enhance climate resilience, particularly in flood management, and to foster a culture that appreciates water's role in urban development.** Between 2020 and 2023, several meetings were held between representatives of CABA, the Danish Embassy and officials from the city of Copenhagen to learn from each other and find opportunities to improve the implementation of the HMP, which is the equivalent of the Climate Change Adaptation Plan of Copenhagen. The main objectives of this collaboration are, among others to promote mechanisms to increase the resilience of the two cities against the impact of climate change in terms of flood management, and to promote a culture that embraces and enjoys water and its added value to urban development. In May 2023, the Water Adaptation Conference took place in CABA, bringing together water management leaders and experts to share knowledge about water-related issues. This also provided an opportunity for the Bank to share experiences.

**52. CABA has incorporated NBS in several citywide strategies.** During project implementation, the task team promoted the use of NBS and supported the above-mentioned mindset change through knowledge exchanges. CABA showed great interest in the implementation of these solutions, and their inclusion in several citywide plans and strategies (including the city's climate change strategy). The reservoir in *Parque Indoamericano* is an example of a

<sup>37</sup> *Necesidades Básicas Insatisfechas* (NBI), a method used to identify critical needs in a population and characterize poverty.

<sup>38</sup> According to the national census (2010). *Comuna* 9 had 8.8 percent of the population with unmet basic needs.

<sup>39</sup> According to the latest national census (2022), that shows 9.1 percent population growth between 2010 and 2022, compared to the 8 percent of population growth in CABA.

<sup>40</sup> According to 2010 census data.

<sup>41</sup> Argentina: Valuing Water. 2021. Washington, DC: World Bank. Available at:

<http://documents.worldbank.org/curated/en/492451629179850822/Argentina-Valuing-Water>

Argentina Water Security: Valuing Water - Brief for Policy Makers. 2021. Washington, DC: World

Bank. <http://documents.worldbank.org/curated/en/945671624438916229/W21006-Argentina-WSD-Policy-Brief-Accessible>



successful green intervention that increases the retention capacity while optimizing the recreational and environmental value. This urban wetland has been presented in many national and international meetings and is also used to inform other lending operations, for example, the project financing interventions for flood risk reduction in the northern provinces of the country.<sup>42</sup>

**53. A methodology for evaluating costs and benefits of NBS was prepared for CABA.** In 2021, the World Bank obtained financial support from the QII Trust Fund and based on national and international experiences, developed a methodology for estimating the costs and benefits of NBS. The World Bank formally delivered the report to the PCU for internal appropriation of the methodology. The report also provided some conclusions based on the application of the methodology to one of the case studies in CABA, and a set of recommendations that the PCU appreciated and allowed them to take into consideration when implementing these pilot NBS cases moving forward.

**54. The inclusion of flood risk management in education programs provides a greater impact on future resilience.** Although the project was expected to include an education program, it was aimed at professionals and practitioners, nevertheless, as a result of the education and communication strategy, one of the main achievements of the project was to influence and include flood risk management topics as part of the mandatory elementary and secondary education program in the city. It is expected this will have a major impact on the future of CABA's citizens.

### III. KEY FACTORS THAT AFFECTED IMPLEMENTATION AND OUTCOME

#### A. KEY FACTORS DURING PREPARATION

**55. Project readiness was well advanced at approval which allowed for swift launching of bidding processes and solid disbursement rates in the first years of implementation.** During project preparation, detailed engineering designs for the bulk infrastructure were prepared, and bidding processes were well advanced under the previous operation.<sup>43</sup> The project had an outstanding implementation rate in the first years with impressive disbursement rates, with the signing of the contract for the primary tunnel in the Vega basin in the first year of implementation. The fact that the project is also part of the action plan of the HMP facilitated the implementation with clear objectives and prioritized interventions.

**56. The design of a non-complex and adequate results framework was key to effectively supervising and reporting on progress during implementation.** This is one of the main lessons learned from the predecessor Urban Flood Prevention and Drainage Project (P088220).<sup>44</sup> During preparation, special attention was given to avoid unnecessarily complex indicators and, instead, include simple indicators and targets that adequately reflect a project's outcomes.

#### B. KEY FACTORS DURING IMPLEMENTATION

**57. Despite an initially impressive implementation rate in the first few years, the project encountered a significant setback when the designs of the secondary drainage networks had to be adjusted due to changes in the city's**

<sup>42</sup> Climate Resilient Infrastructure for Urban Flood Risk Management (P178534).

<sup>43</sup> AR Urban Flood Prevention and Drainage Project (P088220).

<sup>44</sup> As stated in the ICR of project P088220 <https://documentsinternal.worldbank.org/Search/18417509>



**topography.** As mentioned above, the project had an outstanding implementation rate in the first years with impressive disbursement rates, however, disbursements hit a hard stop when the designs of secondary drainage networks had to be reviewed and updated, because of the changes in the city's topography. These changes were a direct consequence of the decisions and investments made by the National Government in the railroad infrastructure on the San Martin, Mitre, and Sarmiento lines. These interventions were beyond the control of the PCU and led to a delay of 18-months in the construction of the secondary drainage networks.

**58. The PCU possessed the necessary technical experience to construct, manage and operate the drainage infrastructure financed under the project.** In addition, safeguards staff had little rotation during implementation, which contributed to consistent compliance with safeguards requirements and helped prevent implementation delays. However, the PCU did encounter challenges in keeping administrative capacity in procurement processes and contract management issues towards the end of the implementation period with several of its key members retiring or moving to other jobs. The new team members lacked the experience, this was flagged in the last Implementation Status and Results Report (ISR), in which procurement rating was downgraded as the final procurement processes for small contracts demanded intensive guidance from the World Bank's team to avoid delays and non-compliance.

**59. Inflation and exchange rate fluctuations posed challenges for certain procurement processes, which were exacerbated by macroeconomic uncertainties.** Due to limitations in foreign currency payment and import restrictions, the purchase of imported equipment, such as tunnel boring machines, was delayed. Additionally, the depreciation of the Argentinian peso (AR\$) relative to the loan currency (US\$) since 2014 resulted in an increase in available funds, as many contracts were denominated in AR\$. Consequently, this led to a limited cancelation of the loan at the project's closure.

**60. The COVID-19 pandemic caused delays in ongoing works, and the implementation of new health and safety protocols for pandemic management further slowed the resumption of activities.** The public health emergency was declared in March 2020 in Argentina and some ongoing works suffered delays. Despite these challenges, the PCU demonstrated agility in adapting to the circumstances for the implementation of nonstructural activities. They swiftly revamped their communication strategy by establishing a virtual platform, enabling them to engage with a remarkably large audience, mostly teacher and students, and expanded their reach beyond CABA.

**61. Fostering a supportive social environment is essential for the successful implementation of innovative interventions.** Engaging in meaningful and continued dialog with stakeholders and community organizations is critical to support project activities, especially for "innovative" interventions such as NBS. Such engagement not only generates support but also helps prevent delays in implementation due to social opposition.

**62. Participation in the C40 network and the partnership with Copenhagen played an important role during the project's implementation.** By joining the C40 Cities Climate Leadership Group and signing a cooperation agreement with the city of Copenhagen, CABA not only aligned with global climate leadership initiatives but also embraced and refined innovative water management strategies. These two facts strengthened the integration of innovative concepts in water management in the city, helping the project introduce ideas to be embraced and optimized.



## IV. BANK PERFORMANCE, COMPLIANCE ISSUES, AND RISK TO DEVELOPMENT OUTCOME

### A. QUALITY OF MONITORING AND EVALUATION (M&E)

#### M&E Design

**63. The indicators were simple and relevant, but the first objective was not fully captured by the PDO indicators.** Although no TOC was prepared at appraisal, the development outcome and component descriptions were clear and allowed for a strong M&E and reconstruction of the underlying TOC. The objectives of the project were specified, and the results framework designed at appraisal was aligned with the development outcomes. The indicators were simple, well-defined, relevant, and achievable. The indicators also allowed to capture most the activities described under each component, while capturing the contribution to the development outcomes. However, the results framework had some shortcomings in measuring the results of capacity strengthen and efficiently management of flood risk. These indicators targeted more the progress on the outputs, than capturing the first part of the PDO.

#### M&E Implementation

**64. M&E arrangements were implemented satisfactorily,** as rated in the 17 ISRs. Responsibility for monitoring the achievement of outcomes and results rested on the PCU, receiving consistent close support and supervision from the task team. The project provided support on institutional strengthening and M&E staffing at the PCU. Biannual reports were submitted by the PCU and at least 2 supervision missions or technical meetings were held each year. This schedule enabled close monitoring of the project's progress and the prompt identification and response to potential issues during implementation. Although the wording and targets for some project indicators were revised during the two restructurings, leading to enhancements in the results framework, these modifications were relatively minor.

#### M&E Utilization

**65. Implementation progress and updates were conducted with information provided by the PCU.** Results progress was documented in the ISRs to inform project implementation and management. The design of the results framework allowed the PCU to monitor progress during implementation. Nevertheless, the absence of new census data and precise mobility information posed challenges in updating the number of beneficiaries accurately. Moreover, incorporating completed interventions into the models and generating new flood hazard maps was a time-intensive process, which constrained the PCU's ability to report promptly on the number of beneficiaries.

#### Justification of Overall Rating of Quality of M&E

**66. The overall quality of M&E is rated Modest.** While the M&E system was proficient in assessing the achievement of the development objectives of the project, the results framework had some shortcomings in not providing sufficient evidence of progress or achievement and failed to adequately capture the first part of the PDO.

### B. ENVIRONMENTAL, SOCIAL, AND FIDUCIARY COMPLIANCE

**67. Environmental and social safeguard was rated Satisfactory throughout most of the implementation period and at closing.** At appraisal, the safeguards triggered was OP/BP 7.50 - Projects on International Waterways. The Cildáñez, Maldonado, and Vega basins are part of the larger Rio de la Plata basin, which is an international waterway shared by



Argentina and Uruguay. In addition, as the works under component 2 entail large excavations and movements of soil, OP/BP 4.11 was triggered as a precautionary measure. The OP/BP 4.12 - Involuntary Resettlement, was triggered as a precautionary measure, as the works in the Cildáñez basin could affect a small number of houses in an informal settlement adjacent to the Soldati Lake.

**68. The project was classified as Category A according to OP/BP 4.01, based on the flood mitigation works to be developed under Component 2,<sup>45</sup> with some potentially significant adverse socio-environmental impacts although they were not considered irreversible or non-mitigable.** Environmental and Social Impact Assessment (ESIA), including an Environmental and Social Management Plan (ESMP), were developed for each of the interventions related to the Cildáñez, Vega and Maldonado subcomponents. All safeguard-related policies were complied with, and safeguard-related ratings were rated Satisfactory throughout most of the implementation period. The CABA's staff responsible for the socioenvironmental management is well experienced and gained extensive knowledge during implementation, in particular in regard to community involvement and citizen engagement activities. One year before project closure, the Overall Safeguards Rating was downgraded to Moderate Satisfactory because of some claims received connected to the potential financing of pilot NBS interventions in CABA, sparking citizens concern regarding the efficacy of the interventions as a flood mitigation strategy, as well as, environmental and social impacts, and community engagement and participation, among others. In response, the PCU reinforced its stakeholder engagement and communication processes. However, these interventions could not be financed before completion because of the associated delay. The complaints were addressed and closed satisfactorily, upgrading the safeguards rating to Satisfactory in the last ISR.

**69. Financial management was Satisfactory throughout most of the implementation period and at closing.** Financial reports and audits were received, reviewed, and found acceptable. No accountability issues were flagged during implementation. One ISR rated financial management as Moderately Unsatisfactory due to the overdue of CY2019 audit report.

**70. Procurement performance was Satisfactory throughout most of the implementation period, with a slight downgrade to Moderately Satisfactory at closing.** Procurement processes were slowed down primarily due to staff turnover, which resulted in inadequate transfer of project knowledge and procedural know-how. In addition, the depreciation of the Argentinian peso contributed to the slowdown. Despite these challenges, all bidding processes adhered to World Bank standards, and no misprocurement was declared throughout the project's implementation.

## C. BANK PERFORMANCE

### Quality at Entry

**71. The project responded to and was aligned with CABA's priorities.** The task team, consisting of technical, fiduciary, and safeguard specialists, was deemed appropriate for facilitating the preparation of the project. At appraisal, the risk was deemed high, and various measures addressing environmental and social management issues were proposed

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<sup>45</sup> Specifically, the large drainage tunnel and its complementary works in the Vega Basin (subcomponent 2.3), whereas the interventions in the Cildáñez Basin (subcomponent 2.1) and Maldonado Basin (subcomponent 2.2) were expected to have less potentially significant adverse effects, are site-specific and reversible, and can be readily prevented or mitigated.



to mitigate the risks. Overall, the project scope was appropriate, and the results framework was clearly defined reflecting project-related outcomes.

### Quality of Supervision

**72. The task team provided good supervision throughout project implementation by regularly providing guidance and technical assistance while supporting the innovative and transformational nature of the project.** The project had one task team leader during the entire supervision period, which helped to keep continuity during implementation. In addition, the main task team underwent very little staff rotation and was present in the country office, enabling them to closely monitor the progress of project implementation. The supervisions included formal in-person and virtual supervision missions including site visits, and frequent technical meetings, together with constant exchanges and guidance. The task team provided detailed reporting through the ISRs. The close supervision and regular engagement between the task team and the PCU allowed the proactive management of project implementation and proactive identification of opportunities through its two restructurings. During project implementation, the PCU expressed their gratitude for the task team's support and guidance, especially around nonstructural activities. The team has used a number of opportunities to support the project through technical assistance allowing to bring in and supervise the integration of innovative concept like the implementation of green infrastructure.

### Justification of Overall Rating of Bank Performance

**73. Based on the above, the ICR rates the World Bank's overall performance as Satisfactory.**

## D. RISK TO DEVELOPMENT OUTCOME

**74. Risk to development outcome is rated Modest.** The project has successfully achieved its objectives, and there is no immediate risk that could undermine the transformative progress achieved by the project in flood risk management or the O&M of the project-financed interventions. Sound arrangements for O&M are in place, and CABA counts with budget allocations and experience with similar drainage works. Completed drainage works have been transferred to the well-equipped team under the Ministry of Public Space and Urban Hygiene (drainage directorship), with its corresponding manual provided by the PCU. This Directorship oversees the drainage works O&M, including the infrastructure financed under the previous World Bank project. This collaborative arrangement ensures the long-term sustainability of the drainage network.

**75. Non-structural measures have substantial ownership from all groups implementing them, including the education and communication programs, the resilience strategy, and several international commitments to ensure these initiatives continue being relevant for the city.** Some risks have been identified, in particular with the O&M of SAT due to its high cost. Despite the establishment of budget allocations and the transfer of the system, the current economic situation, characterized by reduced public expenditure, poses a threat of budget cuts for these systems. In addition, CABA has made a firm commitment to complete ongoing contracts for the secondary drainage network, allowing them to reach out to additional direct beneficiaries and make proper and complete use of the primary drainage infrastructure constructed under the project. The contracts are signed, backed by a dedicated and strong supervisory



team, and earmarked budget allocations to guarantee their successful completion. CABA has committed to completing this activity, as part of the HMP, and as stated in the last supervision mission Aide Memoire.<sup>46</sup>

## V. LESSONS AND RECOMMENDATIONS

**76. The World Bank's long-term engagement in flood risk management was critical to ensuring a change in Government approach to flood management, integrating structural and non-structural measures.** The World Bank contributes as a long-term partner, ensuring continuous engagement across multiple administrations, and facilitating inter-jurisdictional and intersectoral articulation. The project is among the largest flood risk management projects of the World Bank in Latin America and the Caribbean and institutional coordination at different levels and with different sectors were key. The proper balance of structural and non-structural measures is important to ensure the sustainability of the works and create an integrated approach to flood risk management. The project showcased the importance of early warning systems and the implementation of intensive communication and education programs. When compared to structural interventions, financial resources needed for nonstructural measures are often minor but their impact on project implementation and sustainability are crucial. However, non-structural activities are more difficult to carry out during the financing of infrastructure projects and seldom lead to quick disbursement. The high overhead that is often required for their implementation adds to this challenge. Risks can be reduced with engineering, but residual risk mitigation and resilience can only be reached through intensive participation of the communities at risk.

**77. Community education is crucial: the successful implementation of large-scale, proactive, flood risk management projects require the active participation of informed and enabled community members working in tandem with other key stakeholders to develop a climate adaption and risk mitigation strategy.** Meaningful, open, thorough, and continued communication and engagement with stakeholders and community organizations is required to facilitate innovative project interventions. Communities should have easy access to the right information. During project implementation, many of the communication and education resources were created and shared in the global virtual platform of CABA, which allowed them to reach an exponential number of people. Virtual content provides more flexibility and accessibility, improves engagement, collaboration, and participation, and allows continued update and expansion of materials and topics. Honest, proper, and timely responses explaining the impacts, costs, and benefits, especially of project interventions, are crucial to create a relationship of mutual trust. It is also important to be aware of the different social and political force fields that can influence implementation feasibility and other risks that could lead to delays in project acceptance and implementation.

**78. Before draining water, flood management projects need to consider opportunities to retain and store water, optimizing the balance between green and grey interventions and taking a river basin wide approach, to optimize efficiency of interventions.** Many flood risk management projects focus on improving drainage and increasing flow capacity, which is indeed one means of reducing risk in flood-prone areas. However, there are several benefits in considering retaining water in the location of the precipitation and increasing local storage capacity to regulate runoff and reduce peak flows, increase water availability, and gradually implement interventions that help to adapt to ongoing climate change. Green interventions, if adequately designed, implemented, and maintained, provide multiple economic, social, and environmental benefits, and add value to urban development.

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<sup>46</sup> CABA ensure that these activities continue to comply with the Bank's safeguards until their conclusion.



**79. Core components of viable flood risk management project design are a broad and flexible description of its components that allows for adaptability during implementation, and the integration of innovative solutions that may not have been anticipated at appraisal.** For example, the concept of green infrastructure was introduced during project implementation, but the application of the concept was hindered by the fact that it had not been included in the project design and negotiation and did not form part of the formally agreed project interventions that could be financed through the loan; this caused delays in the preparation of interventions, eventually leading to the cancellation of a pilot project. In addition, the design of a non-complex and adequate results framework for effective supervision and reporting on progress during implementation was key. The availability of a Multiphase Programmatic Approach (MPA) allows for addressing issues with long-term engagement and flexibility, and the gradual strengthening of flood risk management over time.<sup>47</sup> The scalable and modular framework approach of MPAs allowed adequate time for preparation during the first phase and for optimizing efficiency of investments and sustainability in next phases. The project's early success and effective implementation of activities within the expected timeframe can be significantly influenced by its level of preparedness at appraisal. The project experienced a successful start, which can be credited to its state of advanced readiness at the time of approval. As a result, the project showed impressive disbursement rates and efficient implementation in the first years of implementation, indicating that the project was not only well-planned but also well-executed. Lastly, the strategic transformation process, underpinned by the project, has been cited as a good example in the region and can be replicated in future initiatives within the country (for example, in the Climate Resilient Infrastructure for Urban Flood Risk Management Project [P178534]) and worldwide; its implementation has been shared as a model of good practice, providing recommendations on the design and exploring options for future lending operations for large and complex flood risk management projects.

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<sup>47</sup>Climate Resilient Infrastructure for Urban Flood Risk Management (P178534) Project's PAD.



**ANNEX 1. RESULTS FRAMEWORK AND KEY OUTPUTS**

**A. RESULTS INDICATORS**

**A.1 PDO Indicators**

**Objective/Outcome:** Strengthen the CABA to efficiently manage flood risk

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
CABA's Flood Risk Management Interministerial Council complies with its functions as foreseen in its creational decree	Yes/No	No 04-Feb-2016	Yes 01-Mar-2022		Yes 01-Sep-2023

**Comments (achievements against targets):**

Target achieved. The Flood Risk Management Council was created in 2016 under the Decree N°287/2016. Since its creation, the council has served to put the issue of flood management on the agenda of other government agencies and to facilitate inter-ministerial coordination and discussions related to the project activities.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
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Weather forecasting warnings based on data from the hydrometeorological network	Yes/No	No 04-May-2015	Yes 01-Mar-2022	Yes 01-Sep-2023
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**Comments (achievements against targets):**

Target achieved. The Hydrometeorological Observation, Surveillance, and Alert System started implementation in 2018. The information received from the monitoring stations, the radar, and satellite information is processed in the Coordination and Control Center located in CABA, generating real-time forecasting reports and alerts at 36 hours (every 12 hours) and 7 days (every 24 hours). This information is shared with Civil Defense, General Directorate of Rainwater System, Emergency Medical Care System, firefighters, and police, to articulate the necessary measures, optimize resources, and allow the CABA to offer a quick and effective response to possible emergency situations.

**Objective/Outcome:** Improve drainage systems in the Cildanez, Maldonado and Vega Basins

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Direct project beneficiaries	Number	200,000.00 04-May-2015	3,000,000.00 01-Mar-2022		3,001,287.00 01-Sep-2023
Female beneficiaries	Percentage	50.00	50.00		54.00

**Comments (achievements against targets):**



Target achieved. The 2022 national census data was used to update the number of total beneficiaries living in the targeted basins to around 1.5 million people (21 percent in the Cildáñez and Vega basins and 59 percent in the Maldonado basin), of which around 54 percent are female. Regarding the beneficiaries defined as those that commute daily through the target basins, these are estimated at more than 1.5 million people.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Vulnerable population protected from flooding	Number	0.00	20,000.00	47,000.00	47,000.00
		04-May-2015	01-Mar-2022	15-Nov-2021	01-Sep-2023

**Comments (achievements against targets):**

Target achieved. During the 2019 restructuring, this indicator was revised and changed to “Vulnerable population protected from flooding” to reflect the definition used by CABA regarding vulnerable population, being vulnerability a wider concept than extreme poverty. At this stage, the end target of 20,000 residents only considered those living in informal settlements in the flood-prone and other underdeveloped areas of the Cildáñez basin. In the 2021 restructuring, the target was revised to reflect the extension of the closing date and the construction of the secondary drainage networks, in the Cildáñez, Maldonado, and Vega basins.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Increased drainage capacity in the targeted areas from infrastructure out in place (flow m3/sec)	Number	0.00	60.00		60.00
		04-May-2015	01-Mar-2022		01-Sep-2023



**Comments (achievements against targets):**

Target achieved.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Land area protected from flooding after rainstorm events with an intensity of up to the equivalent of Tr=10 years	Square kilometer(km2)	0.00	8.00	18.00	18.00
		04-May-2015	01-Mar-2022	15-Nov-2021	01-Sep-2023

**Comments (achievements against targets):**

Target achieved. Land protected from flooding was calculated based on flood prediction models that consider the magnitude of the rain, the existing drainage infrastructure, and the topography and spatial characteristics of the flooded area.

**A.2 Intermediate Results Indicators**

**Component:** Institutional Development for Flood Risk Management

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Implementation progress of the SIHVIGILA	Text	NO	33 stations gathering data and used for analysis	33 stations gathering data and used for analysis	69 stations gathering data and used for analysis



		04-Feb-2016	01-Mar-2022	01-Sep-2023	01-Sep-2023
<p><b>Comments (achievements against targets):</b>            Target achieved and exceeded. The Hydrometeorological Observation, Surveillance, and Alert System started implementation in 2018, with 1 radar and 33 hydrometeorological stations installed and operational, distributed throughout the City and Greater Buenos Aires. In 2022, other pre-existing monitoring stations were integrated into the system, adding to a total of 69. The information received from the monitoring stations, the radar, and satellite information is processed in the Coordination and Control Center located in CABA, generating real-time forecasting reports and alerts at 36 hours (every 12 hours) and 7 days (every 24 hours).</p>					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
People reached by communications campaigns on flood risk management carried out by the city of Buenos Aires	Number	0.00 04-May-2015	3,000.00 01-Mar-2022	10,000.00 15-Nov-2021	45,000.00 01-Sep-2023
<p><b>Comments (achievements against targets):</b>            Target achieved and exceeded. This indicator refers to direct communication with city neighbors.</p>					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Vulnerable population	Number	160.00	670.00	800.00	861.00



trained on flood risk management issues		04-May-2015	01-Mar-2022	15-Nov-2021	01-Sep-2023
<b>Comments (achievements against targets):</b> Target achieved.					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Participants of participatory workshops related to flood risk management	Number	0.00 04-May-2015	150.00 01-Mar-2022	600.00 15-Nov-2021	705.00 01-Sep-2023
<b>Comments (achievements against targets):</b> Target achieved and exceeded. .					

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Beneficiaries of educational programs on flood risk management in schools	Number	0.00 04-May-2015	400.00 01-Mar-2022	3,200.00 15-Nov-2021	30,000.00 01-Sep-2023
<b>Comments (achievements against targets):</b>					



Target achieved and exceeded. The combination of the online platform, where materials, tools, and other interactive applications are available, added to the excursions and tours included in the retention area in *Parque Indoamericano* and the exhibit in *Ecoparque*, both public areas in CABA, had an exponential effect in the outreached people by the communication and education program.

**Component: Flood Mitigation Infrastructure**

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Secondary and tertiary drainage conduits constructed	Kilometers	11.00 04-May-2015	41.00 01-Mar-2022		42.30 01-Sep-2023

**Comments (achievements against targets):**

Target achieved. The construction of the secondary drainage network in the three target basins started in November 2021. At the time of project closure, 60 percent of progress has been made, estimating the finalization of the works in March 2025. The reported end target considers around 10 km of secondary and tertiary drainage conduits constructed and financed with matching grants.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Length of Vega drainage tunnel constructed	Kilometers	0.00 04-May-2015	8.40 01-Mar-2022		8.40 30-Jun-2023

**Comments (achievements against targets):**



Target achieved. The works for the main tunnel of 8.4 kilometers in the Vega basin started in October 2016 and finalized in November 2019.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Beneficiaries' satisfaction with complete water works (1 to 5)	Text	0.00	4.00	3.20	3.88
		01-Jan-2018	01-Mar-2022	15-Nov-2021	01-Sep-2023

**Comments (achievements against targets):**

This indicator measures the level of beneficiaries' satisfaction with complete water works built under the project. The results correspond to the final evaluation conducted during 2023.

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Flood resilience (1 to 5)	Text	2.85	3.42		3.37
		19-Nov-2018	01-Mar-2022		01-Sep-2023

**Comments (achievements against targets):**

This indicator measures beneficiaries' perception towards flood events. Results of the end evaluation conducted during 2023.



**Component: Project Management**

Indicator Name	Unit of Measure	Baseline	Original Target	Formally Revised Target	Actual Achieved at Completion
Neighbors' requests responded	Percentage	0.00	80.00		100.00
		04-Feb-2016	01-Mar-2022		01-Sep-2023
<b>Comments (achievements against targets):</b> Target achieved and exceeded.					



## B. KEY OUTPUTS BY COMPONENT

Objective/Outcome 1	
Outcome Indicators	<ol style="list-style-type: none"><li>1. Weather forecasting warnings based on data from the hydrometeorological network</li><li>2. CABA's Flood Risk Management Council complies with its functions as foreseen in its creational decree</li></ol>
Intermediate Results Indicators	<ol style="list-style-type: none"><li>1. Implementation progress of the SIHVIGILA</li><li>2. People reached by communications campaigns on flood risk management</li><li>3. Vulnerable population trained on flood risk management issues</li><li>4. Participants of participatory workshops related to flood risk management</li><li>5. Beneficiaries of educational programs on flood risk management in schools</li></ol>
Key Outputs by Component (linked to the achievement of the Objective/Outcome 1)	<p><b>Component 1</b></p> <ol style="list-style-type: none"><li>1. 69 hydrometeorological monitoring stations gathering data, used for weather forecasting and warnings system in place and operational</li><li>2. 45,000 people reached by the communications campaigns on flood risk management</li><li>3. Flood risk management council established through decree N°287/2016 that includes its roles and obligations</li><li>4. 861 vulnerable people trained on flood risk management issues</li><li>5. 705 participants in participatory workshops related to flood risk management</li><li>6. 30,000 students reached by the education program on flood risk management</li></ol>



Objective/Outcome 2	
Outcome Indicators	<ol style="list-style-type: none"><li>1. Direct project beneficiaries</li><li>2. Vulnerable population protected from flooding</li><li>3. Increased drainage capacity in the targeted areas from infrastructure out in place</li><li>4. Land area protected from flooding after rainstorm events with an intensity of up to the equivalent of Tr=10 years</li></ol>
Intermediate Results Indicators	<ol style="list-style-type: none"><li>1. Vega drainage tunnel constructed</li><li>2. Secondary and tertiary drainage conduits constructed</li></ol>
Key Outputs by Component (linked to the achievement of the Objective/Outcome 2)	<p><b>Component 2</b></p> <ol style="list-style-type: none"><li>1. 3,001,287 people who benefited from project interventions</li><li>2. 47,000 vulnerable people who directly benefit from project interventions</li><li>2. 8.4 km of main drainage tunnel constructed</li><li>3. 42.3 km of drainage networks constructed</li><li>3. 60 m<sup>3</sup>/s increased drainage capacity from infrastructure put in place</li><li>4. 18 km<sup>2</sup> land area protected from flooding</li><li>5. Temporary retention area in Parque Indoamericano</li></ol>



**ANNEX 2. BANK LENDING AND IMPLEMENTATION SUPPORT/SUPERVISION**

**A. TASK TEAM MEMBERS**

<b>Name</b>	<b>Role</b>
<b>Preparation</b>	
Christophe Prevost, Maria Catalina Ramirez	Task Team Leader(s)
Ana Maria Grofsmacht	Procurement Specialist(s)
Alejandro Roger Solanot	Financial Management Specialist
Martin Ariel Sabbatella	Team Member
Robert Hale Montgomery	Social Specialist
Maria Pia Cravero	Counsel
Elba Lydia Gaggero	Social Specialist
Carlos Alberto Molina Prieto	Social Specialist
Diana Marcela Rubiano Vargas	Team Member
Patricia Lopez Martinez	Team Member
Fabiola Altimari Montiel	Counsel
Santiago Scialabba	Social Specialist
Claudia Nin	Team Member
Rosanna Nitti	Team Member
Victor Manuel Ordonez Conde	Team Member
Eugene Nikolay Gurenko	Team Member
Luz Maria Gonzalez	Team Member
<b>Supervision/ICR</b>	
Maria Catalina Ramirez, Nicolaas Johannes Placidus Mar de Groot	Task Team Leader(s)



Gustavo Adrian Canu, Alvaro Larrea, Francisco Rodriguez	Procurement Specialist(s)
Alvaro Gilberto Fernandez Trigoso	Financial Management Specialist
Guadalupe Rojo	Social Specialist
Claudio Alvaro Mentasti	Procurement Team
Antonella Celeste Perila	Procurement Team
Patricia Rut Jaime	Team Member
Ayelen Nadia Becker	Team Member
Maria Del Carmen Alvarez Enciso	Team Member
Maria Gracia Lanata Briones	Social Specialist
Eleonora Beatriz Camalli	Social Specialist
Elba Lydia Gaggero	Environmental Specialist
Maria Emilia Sparks	Social Specialist
Santiago Scialabba	Social Specialist
Claudia Nin	Team Member
Rahmoune Essalhi	Team Member
Carolina J. Cuba Hammond	Environmental Specialist

**B. STAFF TIME AND COST**

Stage of Project Cycle	Staff Time and Cost	
	No. of staff weeks	US\$ (including travel and consultant costs)
<b>Preparation</b>		
FY13	4.475	77,866.35
FY14	19.672	167,903.65
FY15	12.992	69,814.66
FY16	24.240	124,249.12
FY17	2.514	15,647.93
<b>Total</b>	<b>63.89</b>	<b>455,481.71</b>



<b>Supervision/ICR</b>		
FY17	11.705	63,431.13
FY18	17.269	77,744.42
FY19	10.135	43,034.43
FY20	12.950	57,454.89
FY21	14.300	52,604.35
FY22	17.287	94,179.95
FY23	19.350	125,237.75
FY24	7.607	23,914.44
<b>Total</b>	<b>110.60</b>	<b>537,601.36</b>

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**ANNEX 3. PROJECT COST BY COMPONENT**

<b>Components</b>	<b>Amount at Approval IBRD Financing (US\$M)</b>	<b>Amount at Amendment to Loan Agreement 2022 IBRD Financing (US\$M)</b>	<b>Actual at Project Closing (US\$M)</b>	<b>Percentage of Approval (US\$M)</b>
Institutional Development for Flood Risk Management + Project Management	9.6 4.3	13.5	12.00	88.9
Flood Mitigation Infrastructure	185.6	186.0	180.80	97.2
Front-end Fees	0.50	0.50	0.50	
<b>Total</b>	<b>200.00</b>	<b>200.00</b>	<b>193.30</b>	<b>96.65</b>



**ANNEX 4. EFFICIENCY ANALYSIS (Ex-post economic evaluation)**

- Ex-ante economic analysis was carried out using two methodologies:** (a) cost-benefit analysis for the works to be implemented in each of the three basins (Cildáñez, Maldonado, and Vega – component 2) as part of the drainage interventions; and (b) Benchmarking analysis for the institutional development for the flood risk management (component 1) by using the benchmarking technique.
- Ex-post economic analysis follows the same methodology as the ex-ante analysis.** Component 2 is analyzed by the cost-benefit method, which includes the investments, the operation and maintenance (O&M) of the infrastructure, and the benefits derived from flood mitigation. The analysis of component 1 is also carried out using the same methodology as ex-ante.
- Ex-ante evaluation had two instances,** the first was reflected in the PAD, and the second corresponds to a review in April 2015,<sup>48</sup> with a difference in the amount of the program. In the PAD US\$326 million were estimated, and in the April review, this value increased to US\$348 million, in both cases at 2013 prices.
- Disbursements totaled US\$313 million at current prices, expressed in 2013 values equivalent to US\$278 million.** The disbursement period covers 2017 to 2023. Estimated at 2013 prices, investments are reduced by 11 percent compared to values at current prices (table A1). The estimate at 2013 prices is made to express the values in the same currency as benefits and O&M costs, as was done in the ex-ante analysis.

Table A1 - Investments Made - Millions of US\$

Ref.	Year	Disbursements at current prices			Disbursements at 2013 Prices
		IBRD	Local	Total	
(*)	2017	69.7	9.9	79.6	75.6
(**)	2018	57.3	11.2	68.5	63.6
(**)	2019	5.7	43.3	49.0	44.6
(**)	2020	5.6	14.8	20.5	18.4
(**)	2021	17.9	4.1	22.0	18.9
(**)	2022	13.6	2.4	16.0	12.8
(***)	2023	22.0	36.1	58.1	44.5
		191.8	121.9	313.6	278.4

Source: Values are restated at 2013 prices using the Consumer Price Index for All Urban Consumers, US city average (CPI-U); (\*) Irregular period 06/30/16 to 12/31/17; (\*\*) Source: Grant Thornton Argentina Audit Reports, confirmed by CABA; (\*\*\*) Source: CABA and IBRD. For the year 2023, the average index for the months of January / October was considered to deflate.

**Evaluation of Drainage Works (Component 2)**

- The economic analysis of drainage works is carried out using the cost-benefit method.** The same methodology is maintained as the one carried out ex-ante. The investments considered were those corresponding to the disbursements for all program components (table A1).
- The ex-post analysis considered the risk reduction benefits originated in the interventions carried out in the three basins Maldonado, Vega, and Cildáñez** (This version does not include the benefits in the Cildáñez basin). The benefits originate from: a) the reduction of traffic interruptions and inconvenience caused by flooding and b) the reduction of asset losses. The first stream of benefits is estimated by the time value method, while the second by the cost of avoided damages.

<sup>48</sup> Only the model used for the analysis was available and all its details correspond to the 2015 review.



7. **The investments in the Cildáñez basin were partially modified and, therefore, the benefits originated in the project are different.** At appraisal, works focused on the cleanup of Lake Soldati, nevertheless, these investments were carried out by CABA outside the program. Instead, flood mitigation interventions were identified and increased in the basin. The impact on the benefits has not yet been estimated and, therefore, this evaluation does not include the benefits, nor the O&M costs corresponding to the basin but does include all the investments corresponding to the program.

8. **The objectives planned for the Maldonado and Vega basins were achieved and are estimated to be exceeded starting in 2025.** Ex-ante planned to complete the project in year 3 and the benefits were recorded from the fourth year onwards. The progress of the works determined that 70 percent of the benefits planned for the Vega basin will be achieved in year 4 (2020) and 100 percent of the benefits, for both basins, will be achieved in year 8 (2024). It is estimated that the impact achieved with the project covers a 10 percent larger area; a sensitivity analysis is carried out that includes this greater impact on benefits starting in 2025.

9. **The amount invested, the investment period and the exclusion of the benefits and costs of O&M in Cildáñez constitute the main differences between the ex-ante and ex-post analysis.** Ex-ante was considered an investment period of 3 years (initial year 2016). The disbursements covered a period of 7 years, although significant progress was achieved in the first three years as indicated in the previous paragraph.

10. The O&M costs are all those required for the investments carried out in both basins and the values considered in the ex-ante analysis are maintained. **31 years are considered for the projection horizon.** This determines a relatively conservative result for the ex-post analysis, to the extent that the flow of benefits is partially reduced in 4 years.

11. **Ex-post, the same annual discount rate (10 percent) was used as in the ex-ante analysis,** although it should be noted that the discount rate recently used in other Bank programs, for Argentina and the same sector, has been 4 percent annually and, alternatively, 6 percent annually.

12. **Ex-post results are satisfactory, the internal economic rate of return is 17.4 percent annually.** Although the investment period was longer and the most socially profitable part of the project (Cildáñez) is not accounted for in this version, the investments at constant prices were lower and the goals were achieved. Considering a discount rate of 10 percent annually, the present value of the net benefits is US\$224 million (Table A2), and the benefit/cost ratio is 1.87.

13. **Extending the projection horizon does not produce substantial changes in the results.** A sensitivity analysis was carried out regarding the horizon of the projections, it was extended by 4 years (Until 2051) so that the flow of total benefits ex-post covers the same number of years (28) as ex-ante, with this change the TIRE increases to 17.6 percent.

14. **The present value of costs, total and net benefits is lower than the ex-ante estimate due, mainly, to a longer investment period.** As the investment period is longer, not only investments but also O&M costs and benefits are deferred over time, reducing their present value.

Table A2 – Economic Analysis Indicators (Component 2)

	Basin	Present Value (US\$ million) (*)			IRRE	Horizon
		Costs	Benefits	Net Benefit		
Ex ante	Vega and Maldonado	284	598	315	20%	2016/46
	Cildáñez	47	66	19	36%	
	PAD	330	664	334	21%	



<b>Ex-post (**)</b>	<b>257</b>	<b>481</b>	<b>224</b>	<b>17%</b>	<b>2017/47</b>
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Note: The values are expressed in 2013 prices. (\*) Discount rate 10 percent. (\*\*) Does not include the benefits of interventions in the Cildáñez basin. For the ex-post evaluation, the ex-ante projections corresponding to a review of the economic analysis of April 2015 were used, which has minor differences with the values included in the PAD.

15. **The IRRE rises to 18.3 percent by increasing benefits by 10 percent, starting in 2025.** It is estimated that the project has achieved flood mitigation coverage 10 percent greater than initially planned. Transferring the same percentage to the benefits, starting in 2025, the profitability of the project improves, and the present value of the net benefits rises to US\$262 million.

**Evaluation of Institutional Development for Flood Risk Management (Component 1)**

16. **The purpose of this component was to provide the CABA with a modern and sustainable framework for flood risk management.** The component included a) a hydrometeorological observation, monitoring and warning system; b) technical assistance to support the development of a flood risk financing strategy and protection plan; c) social communication and education on flood risk, and d) institutional strengthening for flood risk management in CABA. The ex-ante analysis of component 1 was carried out by two methods, a) including the investment costs of the component in the evaluation of component 2 and b) by using the benchmarking analysis technique. The first analysis was detailed above, the second is developed below.

17. **These objectives were achieved in 2019, ex-post benefits are counted from 2020, inclusive.** The same annual values of benefits and O&M costs used ex-ante are considered. The same period is also considered for benefits (11 years). The methodology used to calculate the benefits was the benchmarking analysis technique based on GDP.

18. **The investments were for an amount of US\$34.4 million at 2013 prices.** This value is a consequence of investments for US\$23.1, at current prices, increased by 60 percent due to the appropriation of investment costs corresponding to other components (total US\$37 million). To deflate them at 2013 prices, the same methodology as indicated in table A1 was used.

19. **The results are slightly higher than the ex-ante estimates, a consequence of a lower investment cost at 2013 prices.** For the “likely” estimate, the benefits are 3.25 times the costs and the IRR is 44 percent. Ex-ante results were determined for a similar investment in a European country, this estimation is repeated with the ex-post data (table A3).

Table A3 – Economic Analysis Indicators (Component 1)

	(000 USD)	Estimation actual benefits		Benefits for a European-like country	
		Low estimate	Likely	Low estimate	Likely Estimate
<b>Ex-ante</b>	Costs	44,4	44,4	44,4	44,4
	Benefits	16,9	129,2	33,8	258,5
	Net Benefit	(27,4)	84,9	(10,5)	214,1
	IRRE	-6%	36%	5%	61%
	B/C	0,38	2,91	0,76	4,82



	(000 USD)	Estimation actual benefits		Benefits for a European-like country	
		Low estimate	Likely	Low estimate	Likely Estimate
<b>Ex-post</b>	Costs	39,8	39,8	39,8	39,8
	Benefits	16,9	129,2	33,8	258,5
	Net Benefit	(22,9)	89,5	(5,9)	218,7
	IRRE	-3%	44%	9%	73%
	B/C	0,43	3,25	0,85	5,50

20. **Profits are calculated based on GDP for CABA, but GDP has fallen considerably.** Ex-ante, the 2012 GDP was used as a reference, which remained at similar values until 2017, decreasing considerably in 2018 and even more during the pandemic. The 2021 GDP in US\$ (latest data available for CABA) was 34 percent lower than in 2012. Although it is debatable to carry out the ex-post evaluation considering the behavior of exogenous variables, to the extent that impacts outside the control of project execution would be incorporated, given the magnitude of the fall in GDP, this impact was evaluated. Considering a reduction in GDP of 34 percent, in the “likely” scenario the rate of return would be 31 percent.<sup>49</sup>

<sup>49</sup> The GDP of CABA is assumed to be the GGP corresponding to CABA reported by DGESYC of CABA.



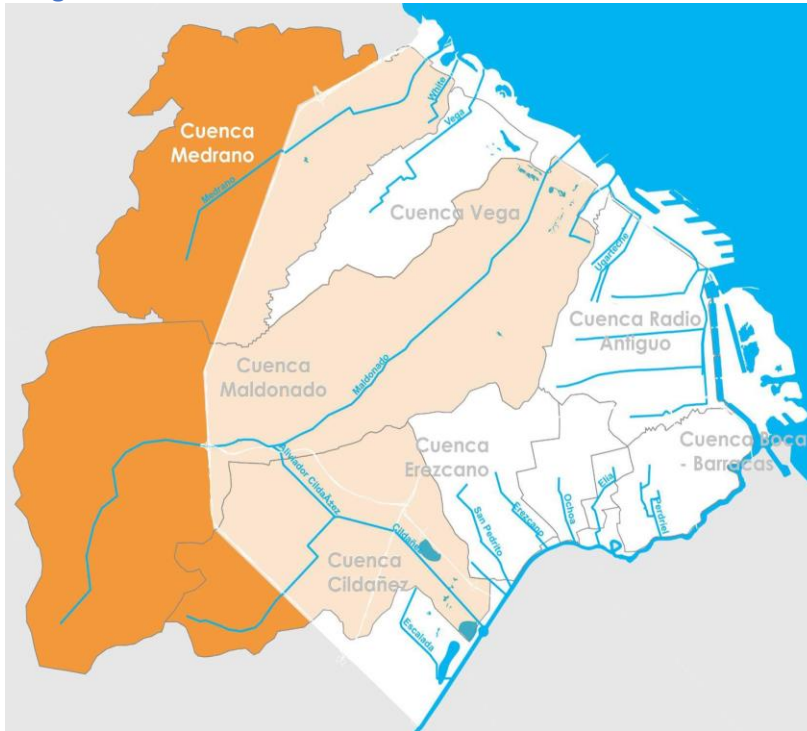
**ANNEX 5. BORROWER, CO-FINANCIER AND OTHER PARTNER/STAKEHOLDER COMMENTS**

On February 19, 2024, CABA informed the World Bank, via email, that they reviewed the ICR and did not have any comments or objections. CABA also confirms being in complete agreement with the rating of the project, which has been implemented and completed satisfactorily.



**ANNEX 6. SUPPORTING DOCUMENTATION (IF ANY)**

**Annex 6.1 Map of the targeted basins in CABA**



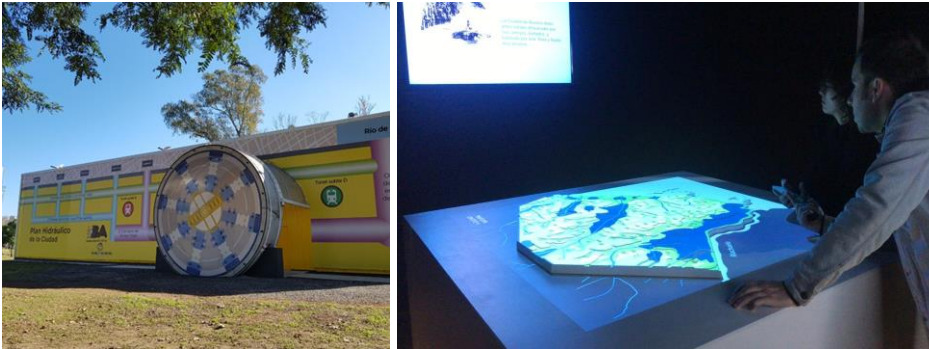
Source: PIU.

**Annex 6.2 Photographic record of the different activities under components 1 and 2**

**COMPONENT 1**



"Primeros Respondedores" program: kits and training workshops in low-income areas.



Learning center “*Centro Vivencial*”



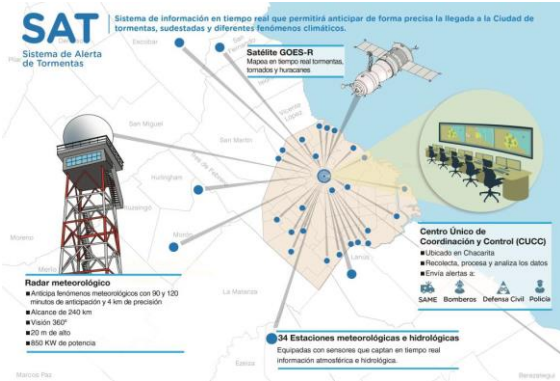
Immersive experience in *Ecoparque*.



Education program on flood risk management in schools and the virtual platform with learning materials for students and teachers regarding flood risk management.



Streams and watershed signage program.

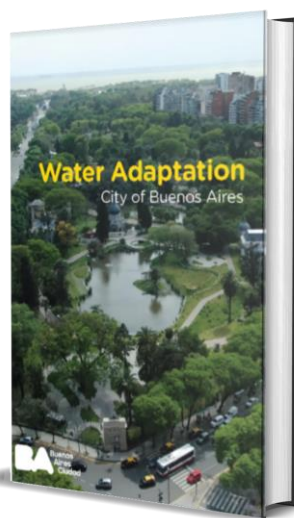


The Hydrometeorological Observation, Surveillance, and Alert System (SIHVIGILA), later known as SAT.

**Water Adaptation Conference BA 2023**

Urban solutions for the relation with water

Martes 30 de mayo | 14 h - Salón Auditorio Casa de Gobierno Uspallata 3160



Collaboration between CABA and Copenhagen.



Participatory workshops related to flood risk management.

**COMPONENT 2**



Water retention area in *Parque Indoamericano*, the first large-scale NBS in CABA.





Vega drainage tunnel, with its 8.4 kilometers long and more than 5,3 meters in diameter. Source: <https://buenosaires.gov.ar/compromisos/23000-metros-de-obras-hidraulicas-y-sistema-de-alerta-de-tormentas>



The secondary drainage network in the three targeted basins.

**Annex 6.3. Contracts signed during project implementation by component**

COMPONENTE 1	TOTAL (US\$)
CONSULTORÍA TÉCNICA PARA LA ORGANIZACIÓN DEL 2º CONGRESO INTERNACIONAL DE URBANISMO Y MOVILIDAD DE LA CIUDAD AUTÓNOMA DE BUENOS AIRES EN EL MARCO DEL CONVENIO DE PRÉSTAMO BIRF-8628AR	6461.09



SERVICIO DE CONSULTORÍA PARA LA ELABORACIÓN DEL SOPORTE GRÁFICO Y DIGITAL DE LOS CONTENIDOS EDUCATIVOS PARA LA GESTIÓN DEL RIESGO DE INUNDACIONES	107605.15
IMPLEMENTACIÓN DE LA ESTRATEGIA DE COMUNICACIÓN SOCIAL – ETAPA 1	161446.77
SERVICIO DE IMPLEMENTACIÓN DE LA ESTRATEGIA DE COMUNICACIÓN SOCIAL - ETAPA 2	379476.23
ADQUISICIÓN DE AMBULANCIAS PARA SAME (COVID19)	637180.97
SERVICIO DE CONSULTORÍA PARA LA ELABORACIÓN DE INFORME DE IMPACTO AMBIENTAL Y SOCIAL DEL COLECTOR BAJA COSTANERA	377779.25
SERVICIO DE CONSULTORÍA PARA LA ELABORACIÓN DE INFORME DE IMPACTO AMBIENTAL Y SOCIAL DE SOLUCIONES BASADAS EN LA NATURALEZA PARA LA GESTIÓN DEL RIESGO Y DISFRUTE HÍDRICO CUENCA MEDRANO - REGENERACIÓN DEL ARROYO MEDRANO EN PARQUE SAAVEDRA	28037.13
ACCESIBILIDAD PARA EL USO PÚBLICO DEL RESERVORIO DEL PARQUE INDOAMERICANO	444100.02
SERVICIO DE DESARROLLO DE SEÑALÉTICA PARA LA VISIBILIZACIÓN DE ARROYOS EN LA CIUDAD DE BUENOS AIRES	125428.01
SERVICIO DE MANTENIMIENTO E INTEGRACIÓN DEL SISTEMA DE ALERTA TEMPRANA HIDROMETEOROLÓGICA DE LA CIUDAD AUTÓNOMA DE BUENOS AIRES (SATHCABA)	1103725.94
ADQUISICIÓN DE EQUIPOS PARA EL MONITOREO DE LA CALIDAD DE AGUA DE LOS ARROYOS DE LA CABA	39028.32
DESARROLLO DE PLATAFORMAS AUDIOVISUALES	64337.04
EXPERIENCIA ARROYOS BUENOS AIRES ECOPARQUE	731577.07
SERVICIO DE NO CONSULTORÍA PARA LA IMPLEMENTACIÓN DEL RECORRIDO EDUCATIVO Y DE CONCIENTIZACIÓN EN RESERVORIO DEL ARROYO CILDAÑEZ ETAPA 1	90560.53
AMPLIACIÓN TALLERES DE GÉNERO - FGR - RIESGO HÍDRICO	160591.56
SERVICIO DE CONSULTORÍA ELABORACIÓN DEL INFORME DE IMPACTO AMBIENTAL Y SOCIAL “RAMAL LARRALDE – CIUDAD DE LA PAZ”	20673.27
SERVICIO DE CONSULTORÍA PARA LA ELABORACIÓN DE INFORME DE IMPACTO AMBIENTAL Y SOCIAL DE LA MEJORA DE LA EFICIENCIA HIDRÁULICA Y CONTROL DE LA DESEMBOCADURA DEL ARROYO MEDRANO	32708.25
SERVICIO DE CONSULTORÍA PARA LA ELABORACIÓN DE SECUENCIAS DIDÁCTICAS, SOPORTE GRÁFICO Y DIGITAL DE LOS CONTENIDOS EDUCATIVOS PARA LA GESTIÓN DEL RIESGO DE INUNDACIONES – ETAPA 3	79363.56
<b>COMPONENTE 2</b>	
SEGUNDO EMISARIO DEL ARROYO VEGA	109351798.7
SERVICIO DE CONSULTORÍA INSPECCIÓN TÉCNICA DE LA OBRA CONSTRUCCIÓN DEL SEGUNDO EMISARIO DEL ARROYO VEGA	5858407.56
GESTIÓN INTEGRAL DE AGUAS URBANAS EN ÁREAS MARGINALES CUENCA CILDÁÑEZ - ETAPA I Y II:	30053615.45
AMPLIACIÓN DE LA RED SECUNDARIA DE RAMALES PARA LAS CUENCAS DE LOS ARROYOS MALDONADO, VEGA Y CILDÁÑEZ	34109363.60
<b>COMPONENTE 3</b>	
REVISIÓN DE LOS PROYECTOS EJECUTIVOS DE LOS RAMALES SECUNDARIOS DE LA CUENCA DEL ARROYO MALDONADO GRUPOS D Y E Y LA ELABORACIÓN DE LOS PROYECTOS EJECUTIVOS DE LOS RAMALES SECUNDARIOS DE LA CUENCA DEL ARROYO VEGA	1233503.53
EJECUCIÓN DE LOS ESTUDIOS COMPLEMENTARIOS SOBRE EL IMPACTO DE LA DESCARGA DEL ARROYO VEGA SOBRE LA TOMA DE AGUA DE AYSA TT3	404452.35
ELABORACIÓN DE LA INGENIERÍA DEL COLECTOR BAJA COSTANERA: ANTEPROYECTO DE LA TRAZA DESDE BORGES (VTE LOPEZ, BUENOS AIRES) HASTA DOCK SUD Y EL PROYECTO EJECUTIVO DEL TRAMO COSTA SALGUERO – DOCK SUD	1486937.32
SERVICIO DE RELEVAMIENTO DE DATOS PARA ESTUDIOS DE SUELO Y AGUA SUBTERRÁNEA - PARÁMETROS AMBIENTALES E HIDROGEOLÓGICOS - PARQUE SAAVEDRA - PARQUE SARMIENTO - CUENCA MEDRANO DEL PROYECTO DE ASISTENCIA A LA GESTIÓN DEL RIESGO DE INUNDACIONES PARA LA CIUDAD DE BUENOS AIRES	56313.02
PROYECTO EJECUTIVO DEL TÚNEL ALIVIADOR DEL ARROYO MEDRANO, TRAMOS I Y II Y OBRAS COMPLEMENTARIAS	361617.58
ADQUISICIÓN DE SOFTWARE DE MODELACIÓN	81202.65
CONTRATACIÓN SERVICIO DE DIGITALIZACIÓN DE IMÁGENES SOBRE UN VUELO FOTOGRAMÉTRICO DEL TERRENO DE LA CUENCA DEL ARROYO MALDONADO	118120.77



PLAN DE ORDENAMIENTO HIDRÁULICO DE LAS CUENCAS ALTAS DE LOS ARROYOS MALDONADO Y CILDÁÑEZ	136222.01
RELEVAMIENTO ESTRUCTURAL E HIDRÁULICO DEL ARROYO CILDÁÑEZ	1263616.05
SERVICIOS DE NO CONSULTORÍA PARA LA EJECUCIÓN DE ESTUDIOS BASE Y DOCUMENTACIÓN LICITATORIA PARA EL PROYECTO DE RELLENO COSTERO Y PLAYA PÚBLICA	61773.65
SERVICIO DE RELEVAMIENTO Y LEVANTAMIENTO DE DATOS PARA EL ESTUDIO DE EVALUACIÓN FINAL DE RESULTADOS E IMPACTOS SOCIALES DEL PROYECTO DE ASISTENCIA A LA GESTIÓN DEL RIESGO DE INUNDACIONES PARA LA CIUDAD DE BUENOS AIRES	234641.37
ADQUISICIÓN EQUIPOS TOPOGRÁFICOS	10735.82
EQUIPOS DE MODELACIÓN MATEMÁTICA	113802.88