REPUBLIQUE DU SENEGAL

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AGENCE DE DÉVELOPPEMENT MUNICIPAL

PROGEP: A SUSTAINABLE SOLUTION FOR URBAN FLOOD MANAGEMENT

WORLD BANK GROUP

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FLOODING, A LIMITING FACTOR FOR SUSTAINABLE URBAN DEVELOPMENT

Recurrent floods have been among the biggest natural disasters in Senegal in recent decades, particularly in the peri-urban areas (Pikine and Guédiawaye) of its capital Dakar. According to estimates by the Global Facility for Disaster Risk Reduction (GFDRR) , from 1980 to 2008, floods affected between 400,000 and 600,000 people per year and caused significant damage to infrastructure, public facilities and private property, as well as considerable economic losses. Thus, these phenomena, which are the combination of causes related to climate change and anthropogenic sources, are limiting factors in the implementation of Government and territorial authorities' policies to promote sustainable development in these urban areas. A sustainable response to flooding in the peri-urban area of Dakar.

A SUSTAINABLE RESPONSE TO FLOODING IN THE PERI-URBAN DAKAR REGION

From 2012, with the goal of eradicating the recurrent floods that were hitting the peri-urban Dakar region and protecting the population from their serious consequences, the Government of the Republic of Senegal, with the support of the World Bank, the Nordic Development Fund (NDP) and the Global Environment Facility (GEF), has set up an urban development project called "Stormwater Management and Climate Change Adaptation Project (PROGEP)". This project, led by the Municipal Development Agency (ADM), is one of the components of the Ten-Year Flood Control Plan (PDLI). Carried out in the period from 2012 to 2019, the PROGEP was designed and implemented using an approach combining (i) infrastructural measures focused on the construction of hydraulic facilities and the development of floodplains and (ii) non-infrastructural measures including strategic studies on the institutional framework, spatial planning and management documents, social support, etc.

The drainage facilities built by ADM, as part of PROGEP, have positively changed the landscape of the municipalities of the area of intervention and the living conditions of its inhabitants.

COMBINATION OF INFRASTRUCTURAL AND NON-INFRASTRUCTURAL MEASURES TO REDUCE FLOODING IN THE DAKAR PERI-URBAN AREA

Before PROGEP's intervention, the solutions promoted in Senegal for flood control were limited to the urgent construction of stormwater drainage facilities. But these structures were very expensive, as they required heavy pumping equipment, and insufficiently efficient, given the scale and complexity of the floods.

PROGEP has brought a new vision to flood control. It has addressed the problem in a holistic way by combining the construction of infrastructure dedicated to stormwater collection and drainage with a large volume of non-infrastructural activities. The project intervened by activating several levers in a coordinated and complementary way. It has worked on (i) climate risk prevention, by supporting better knowledge of the territories and the production of strategic urban planning and management documents; (ii) the protection of residents and the environment, by building appropriate, less costly and more efficient drainage and stormwater storage facilities; and (iii) the sustainability of achievements, through the implementation of a system to maintain the facilities and community mobilization to manage climate risk.

Preventing flooding through controlled urban planning

1 Drainage Master Plan (PDD) for stormwater in the peri-urban area of Dakar

3 Urban planning documents developed
- Urban Master Plan (PDU) for the Greater Saint-Louis area
- Detailed Urban Plan (PUD) of Pikine and Guédiawaye
- Detailed Urban Plan (PUD) of Diamniadio Urban Pole

2 Geographic Information Systems developed
- Cities of Pikine and Guédiawaye
- Greater Saint-Louis area

3 strategic studies
- National strategy for integrated urban planning and management
- Diagnostic study "Sustainable City" for the Diamniadio Urban Pole
- Diagnostic and strategic study on "Sustainable City" for the Greater Saint-Louis area

Senegal is lagging behind in urban planning and management. Currently, only 7% of communes have urban planning plans. Without adequate knowledge of the territory and effective and operational framework documents, coherent and resilient urban planning will not be possible. To remedy this situation, PROGEP has contributed, in part, to the production of knowledge and the development of decision-making tools mainly related to the hydrological situation, the institutional and financial diagnosis of the stormwater sanitation sector, the master plan for stormwater drainage, the mapping of flood risks, etc. In addition, it supported the development and dissemination of inclusive urban planning documents that integrate climate risks.

The hydraulic diagram of the Drainage Master Plan (MDP) for stormwater in the peri-urban region of Dakar.

Protecting residents and their property from flooding by building efficient stormwater drainage and storage facilities

1 drainage system
allowing the rapid evacuation, by gravity, of large quantities of stormwater in Pikine and Guédiawaye

36,8
billion FCFA invested

167,000
residents are no longer exposed to flood risks

900 ha
were protected against recurrent flooding

21
rain overflow basins for a total capacity of 648,500 m^3

21 km
of primary collectors in reinforced concrete

4 km
of secondary networks

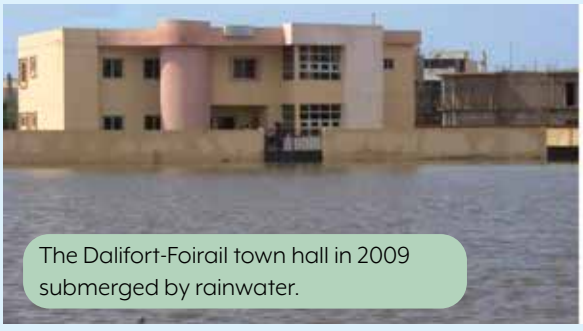
3
discharge facilities at sea

63,000 m^2
of paved roadways

8,100 m^2
of wall-walkways around the ponds

PROGEP has developed a drainage system for the rapid evacuation of large quantities of stormwater based on an innovative Stormwater Drainage Master Plan for Peri-urban Dakar (PDD). The structures were built taking into account the watersheds that polarize them and are guided by a logic based on the restoration of the natural hydrographic network of cascading lakes that were once interconnected by rivers. The design focused on gravity drainage of stormwater to the sea. This choice is less costly to invest, operate and maintain than pump-based sanitation systems. The design of the facilities has helped to reduce the displacement of residents, limit the damage caused to residents and minimize the expenses incurred by the Government in terms of financial compensation.

Thanks to the drainage system implemented, groundwater and stormwater are now discharged throughout the year. The improvements brought about by PROGEP are obvious and tangible and include, for instance: (i) the lowering of the water table from about 1 to more than 2 meters, in some areas, which has made it possible, on the one hand, to virtually eliminate capillary water rise in masonry and drastically reduce, on the other hand, the required frequency for emptying septic tanks, which weighs heavily on household budgets; (ii) the resettlement of houses previously abandoned because they were permanently overrun by rainwater; (iii) a return to normal functioning of basic social infrastructure; (iv) improved sanitary and health conditions with a gradual decline in pathologies linked to standing water; and (v) improved mobility through the construction of interlocking, sanitized and lit paved roads.



The Dalifort-Foirail town hall in 2009 submerged by rainwater.

The Dalifort-Foirail town hall in 2019 after PROGEP drainage construction works.

Ensuring the sustainability of PROGEP's achievements through community engagement and the establishment of a sustainable stormwater management financing mechanism

To set up a permanent maintenance system for the facilities, PROGEP first carried out an exhaustive diagnosis of the stormwater drainage system in Senegal. On the basis of this diagnosis, the project supported (i) a structural reform of the sector, based on clarifying the roles of stakeholders and making the Senegal's National Sanitation Office (ONAS) responsible as the main entity, and (ii) identifying the most appropriate financial mechanism to guarantee the funds needed for maintenance.

1 **institutional and financial mechanism** for the maintenance of the drainage system

9 **Local Committees for Stormwater Management and Climate Change Adaptation Initiatives (COLIGEP)** set up by municipalities

73 **Community Investment Projects (PICs)** for a total amount of 1,800,000,000 FCFA

84,000 **educated about climate risks** (53% of whom are women)

8 municipalities and 80 neighborhoods mobilized in Clean Neighborhood Operations (CNOs)

With regard to community involvement, PROGEP has promoted the participation of beneficiaries to facilitate the execution of the work and ensure the sustainability of the drainage facilities. A real social engineering project was carried out by experienced social facilitators in the project's intervention areas. These activities were aimed primarily at two target groups: national and local actors (elected officials, local authorities, intercommunal structures, residents in the project area) so that they could take ownership of the project's objectives and actively participate in their achievement. Through this approach, PROGEP wanted to support the culture of flood control and the strengthening of the capacities and knowledge of stakeholders to cope with climate risks.

4 innovative initiatives were carried out to promote community engagement:

Information and awareness session in a school located near a rain overflow basin to promote compliance with safety measures.

1. The implementation of an information, education and communication (IEC) strategy

It aimed to raise awareness of PROGEP, the Stormwater Drainage Master Plan for Peri-urban Dakar (PDD) and to harmonize the understanding of their objectives by all stakeholders. Particularly before the work, the strategy was to ensure public support for the objectives and guidelines of the PDD. During the construction work, it was to facilitate the appropriation of the facilities by the residents and, after the work, to contribute to the sustainability of the management, maintenance and upkeep of these facilities and amenities.

2. The establishment of Local Committees for Stormwater Management and Climate Change Adaptation Initiatives (COLIGEP)

In each of the 9 communes in its intervention area, PROGEP has facilitated the establishment of these communal bodies, created by municipal decree, which now make it possible to coordinate the mobilization of community actors and local authorities (local elected officials, municipal services and neighborhood community associations) to ensure the sustainability of structures, climate risk management and quality of life in the territory. The tasks carried out by these committees differ according to the specific needs of the communes. They can be responsible, among other things, for: (i) coordinating and guiding the initiatives of communal actors involved in flood control; (ii) acting as an interface between local communities and external stakeholders (as in the case of complaint management during PROGEP); (iii) educating residents on respect for non-construction zones; (iv) providing guidance during urban development; (v) supporting the implementation of upkeep and maintenance plans.

Information sharing meeting between ADM and members of the COLIGEP of Djidah Thiaroye-Kaw around a stormwater rain overflow basin in the municipality.

A Community Investment Project (PIC) in the commune of Yembeul Nord: recreational area.

3. The implementation of Community Investment Projects (PICs)

The PICs are participatory micro-projects (between 6 and 35 million FCFA) submitted first to a process of identification, for social confirmation, then technical, and finally financial validation. They take the form of initiatives to develop recreational spaces, leisure activities and sanitation facilities for the management of domestic wastewater (grey water from laundry and cooking). They have been a tool to encourage the participation, involvement and ownership of the population, in order to create the conditions necessary for: (i) the integration of the drainage system into the social and urban fabric; and (ii) the proper use, maintenance and preservation of the facilities built.

4. The animation of Clean Neighborhood Operations (CNOs)

NOs are voluntary and committed initiatives undertaken by local communities to promote efficient waste management and keep neighborhoods clean. These operations have made it possible to establish, with a minimum of resources and a strong commitment, a respectful behavior of residents and to stimulate a sustainable dynamic of health and improvement of the living environment. Within the framework of PROGEP, this dynamic is valuable. In the absence of sanitation operations, waste accumulates in drainage structures or in natural stormwater channels. This is both a major risk of obstructing the regular flow of rainwater and a factor in the persistence of flooding with all the consequences associated with this phenomenon.

The youth of Djida Thiaroye Kaw engaged in the maintenance of the areas adjacent to the stormwater drainage pond.

Providing tools to stakeholders in the sector to ensure climate risk management in urban areas

The shortcomings observed in the effective management of climate risks in urban areas depend mainly on the insufficient financial, logistical and human resources of the central and local structures in charge of intervening in this sector. To address these challenges, PROGEP has therefore engaged in a vast initiative to strengthen the role and skills of local and national actors (national directorates, communes, decentralized technical services, non-governmental organizations (NGOs), community-based organizations (CBOs), COLIGEP members, ONAS agents, etc.), in flood management, climate change adaptation, urban governance, land use regulations, and drainage system maintenance. Senegal can now count on a critical mass of actors sensitive to the issue of climate risks and able to mobilize at the local and national level to address them.

Pierre COLY
Director of Institutional Support at the Municipal Development Agency (ADM)

"The strengthening of the means of action of key actors involved in climate risk management was also an important component of the project with the signing of some fifteen memoranda of understanding[1]. Through these protocols, the logistical and institutional resources of these actors have been strengthened to enable them to better assume their roles and responsibilities in climate risk management. In addition to these memorandums of understanding, there are the Pikine and Guédiawaye city contracts, as well as the letters of commitment and other documents by which the communes and communities have pledged to preserve and maintain the PICs that have been implemented. The use of contracts has thus been an important lever to strengthen the commitment of the various stakeholders and mobilize them towards the achievement of the

1 (i) in Dakar with the National Civil Aviation and Meteorological Agency (ANACIM), the National Fire Brigade (BNSP), the Dakar Urban Community-Rufisque Urban community (CADAK-CAR), the Directorate of Sanitation (DA), the Directorate for Prevention and Management of Flood Risks (DGPI), the Directorate General for Urban Planning and Architecture (DGUA), the Directorate for the Environment and Classified Facilities (DEEC) and the Directorate for the Surveillance and Monitoring of Land Use (DSCOS);
(ii) in Saint-Louis with: the Commune of Saint-Louis, the Regional Division of Urban Planning and Housing (DRUH), the Regional Division of the Environment and Classified Facilities (DREEC), the Regional Development Agency (ARD), the University Gaston Berger (UGB)

ENSURING THE PROPER FUNCTIONING OF DRAINAGE FACILITIES AND CONTINUING SUPPORT TO COLLECTIVES AND COMMUNITIES TO ADDRESS CLIMATE RISKS

In order to continue to ensure the protection of urban populations against flood risks, it is important to consolidate, strengthen and sustain PROGEP's infrastructural and non-infrastructural achievements.

The drainage system installed is exposed to a significant number of risks that could compromise its longevity. It is therefore essential to finalize the institutional and financial reforms initiated as part of the project, to **ensure the maintenance of the facilities and guarantee their proper functioning over time.**

In the neighborhoods concerned by PROGEP, there are now human resources trained in flood control and climate risk management, and consultation frameworks to prevent the facilities built from suffering excessive deterioration. It is necessary to capitalize on the social investments made, to continue technical and financial support to COLIGEPs and to continue to **support preventive maintenance of the facilities and the resilience of the communities**.

Clean Neighborhood Operations (CNO) have provided an important dynamic in PROGEP's intervention area, promoting community involvement in household waste management. However, citizen mobilization alone is not enough to ensure effective waste management. The services in charge of these issues must develop the strategies and provide the necessary resources to support this mobilization and **ensure quality of life in the neighborhoods and health around and in the drainage systems**.

The availability of participatory planning documents integrating climate risks allows, where they exist, for more efficient land use and the preservation of non-construction zones from unplanned occupation. It is essential to **implement the action plans designed** within the framework of PROGEP to preserve the liberated rights-of-way, and to **replicate the initiative throughout Senegal**, to make up for the delays in urban planning and to **build territories that are more resilient to climate shocks**.

The Municipal Development Agency (ADM)

ADM, the agency responsible for coordinating the implementation of the Stormwater Management and Climate Change Adaptation Project (PROGEP), was established in 1997 thanks to combined efforts of the Government and the Mayors Association of Senegal, AMS. The agency was established in the context of 1996 reforms, referred to as the "regionalization" reforms, aimed at reinforcing decentralization and local development in Senegal. As a key partner to local authorities, and in accordance with its Strategic Plan, ADM works to make local regions more attractive and competitive and to strengthen their governance. To this end, the agency contributes to building strategic, financial, administrative and technical capacities of local authorities. ADM helps authorities manage territorial information, facilitates cooperation between local authorities, and promotes inter-communality.

This publication is part of a series of briefs that capitalize the achievements of and lessons learned from the implementation of the PROGEP project. This capitalization brief can be accessed at: www.adm.sn/progep

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