

**PROJECT INFORMATION DOCUMENT (PID)  
CONCEPT STAGE**

Report No.: AB5983

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| <b>Project Name</b>                              | Flood Prevention and Drainage Project   |
| <b>Region</b>                                    | AFRICA  |
| <b>Sector</b>                                    | Flood protection (60%); General water, sanitation and flood protection sector (40%)   |
| <b>Project ID</b>                                | P122841   |
| <b>Borrower(s)</b>                               | MINISTRY OF ECONOMY AND FINANCE   |
| <b>Implementing Agency</b>                       |   |
| <b>Environment Category</b>                      | <input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> FI <input type="checkbox"/> TBD (to be determined) |
| <b>Date PID Prepared</b>                         | November 12, 2010   |
| <b>Estimated Date of Appraisal Authorization</b> | September 6, 2011   |
| <b>Estimated Date of Board Approval</b>          | December 22, 2011   |

1. Key development issues and rationale for Bank involvement

Flooding is the most serious natural hazards Senegal has been facing over the last three decades. Over the past 30 years (1980 to 2009), existing databases indicate that it has affected over 900,000 people - although there are likely to be many others, since many people are living in depressed and flood prone areas - and caused the death of 45 people and important damage to infrastructure along with economic losses. Although there are several regions regularly flooded, Dakar is one of the most affected and vulnerable regions of the country due to the concentration of economic activities and population density combined with continuing demographic pressures.

Flooding has become a recurrent reality in suburban Dakar since the devastating floods in 2005, directly affecting the poor and increasing water borne diseases, malaria and the risk of cholera. At the end of August 2009, heavy rainfall caused again serious flooding in Senegal. The peri-urban areas in Dakar were hit the hardest, with major damage to housing, schools, health centers, roads, markets, water supply and sanitation networks, and other public services. The cost of damages and losses is estimated at a total of US\$ 103 million . Around 360,000 people were affected, mainly in the districts of Pikine and Guediawaye, and among them some of the most vulnerable people of Senegal. The impact on the livelihood and living conditions of the affected people is high. The floods resulted in a 14% loss of annual average income of affected people and aggravated the food insecurity in peri-urban areas. Permanent stagnating waters over many months allowed for water born disease and solid waste dumping. Given the recurrence of floods, the cumulative effect on the economy as well as poverty would gradually increase if not addressed.

The underlying causes of recurrent flooding are complex. The absence of investments in drainage systems during the last three decades in the suburbs of Dakar, the lack of governance in

<sup>1</sup> Post Disaster Need Assessment, Urban floods in Dakar, 2009, Government of Senegal, WB, UNDP and EU

the urban sector, uncontrolled urban growth, uncertain land tenure and occupation of low lying areas which have obstructed the natural channels for storm water drainage have been critical in the current vulnerability. Other causes include the volume and intensity of rainfall, inadequacy of sanitation networks, and rising groundwater table of the Thiaroye aquifer.

Urbanization of the peri-urban areas has been unplanned without appropriate control by the competent authorities for decades, and without proper access to infrastructure, networks and basic services. The Dakar Metropolitan Area has a population of 2,167,893 and includes the Districts of Dakar, Guédiawaye, Pikine, and Rufisque. Out of the 1 million people living in the District of and Pikine and Guédiawaye, 600,000 people live in squatter settlements, which are the largest concentration in Senegal (Diagne, 2002). The city's infrastructure, built to accommodate 300,000 people, is over-stretched. The city is growing at a rate of 150,000 to 200,000 people per year. 80 % of economic activities are concentrated in the greater Dakar area. Paradoxically, the drought in recent decades is partly responsible for the flooding, because during this period most of the flood prone areas were urbanized. Reduced pumping of groundwater from the Thiaroye aquifer and infiltration of storm water and domestic waste water resulted in the groundwater table rises, making Pikine and Guédiawaye more vulnerable to flooding.

Although the rains that caused the floods during the last decade were not exceptionally heavy, climate change may probably make flood risks much worse through more frequent and severe extreme-weather events, sea level rise and stronger storm surges.

Institutional arrangements for urban drainage and flood management, and more broadly Disaster Risk Management, seem to be complex and inefficient. Many stakeholders are involved but there is no lead agency responsible for overall consistency. The main stakeholders are the National Sanitation Office (ONAS), the Road Works Agency (Ageroute), the JAXAAY plan, the National Agency for the Promotion of Investment in Major Works (APIX), the Ministry in charge of urban development, the Civil Protection Directorate and the National Unit of Firefighters, and the municipalities. The roles and responsibilities regarding the construction and maintenance of urban drainage systems have not been clearly defined. The Civil Protection Directorate (DPC) current structure has shortcomings that prevent it from effectively performing its duties of coordination, mobilization and facilitation of interventions of sector stakeholders involved in disaster risk management. The ORSEC Plan is still of very limited usefulness because water pumping alone is not a sustainable or appropriate solution unless it is supported by measures to reduce flood risks in the short, medium and long term.

There are numerous initiatives involving storm water drainage and flood protection, but none of them deal with the issue of flood risk reduction in a comprehensive and consistent manner. Actions are taken without environmental and social impact assessments and detailed hydrological studies, and the technical and economic justification for certain initiatives has not been demonstrated. The drainage component of the sanitation master plan has barely been implemented and is currently being revised. In addition, flood risks have not yet been effectively integrated into urban plans as highlighted in a study on Natural Hazards and Climate Change Risks (World Bank, Geoville Group, African Institute in Urban Management, June 2009)

Floods and Disaster Risk Management are currently stated priority of the Government. The second generation of PRSP (Poverty Reduction Strategy Paper) covering the 2006-2010 period,

referred to “Disaster and Risk Prevention and Management” as a priority pillar, and promotes its systematic integration in sectoral plans and programs linked to Social protection. It recognizes that disasters are a constraining factor for the country’s development. Disaster risk management was thus included as a major element of the third PRSP pillar “social Protection, disaster and risk prevention and Management” and a major component of the National Strategy for Social Protection. The PRSP also calls for the development of a National Program for prevention and management of major risks aiming among others at promoting strategies and mechanisms to prevent and manage risks from disasters.

Following the 2009 floods, the Government of Senegal conducted a Post-Disaster Needs Assessment (PDNA) financed by the Global Facility of Disaster Reduction and Recovery (GFDRR) with support of the World Bank, the UNDP, the European Union and other development partners. The PDNA concluded that it was critical to attack the underlying causes of the floods and outlined a medium and long-term strategy for flood risk reduction, based on a combination of structural and non structural measures. Investing in primary drainage is particularly important and urgent from an economic, social and political stand point, since floods are becoming annual, recurrent and increasingly damaging. At the same time, institutional and policy reforms related to urban governance and Disaster Risk Management are also needed to address fully the problem of urban floods.

## 2. Proposed objective(s)

The project will contribute to reducing the risk of flooding in the peri-urban areas of Dakar and preserving household and business assets of those living in flood prone areas.

This will be achieved through the a combination of infrastructure and non infrastructure measures which will address the underlying causes of the floods, including: i) the construction of priority primary drainage infrastructure which will allow rainwater evacuation out of the water basin to the sea, ii) the pumping of groundwater aquifer of Thiaroye to reduce rate of increase in the groundwater table; iii) providing more responsibilities to municipalities and local population in urban flood risk management, iv) flood prevention and mitigation through appropriate urban planning, strengthening of the disaster risk management system, and improved awareness-raising and education efforts of affected communities to promote behavioral change and resilience to flood risks.

## 3. Preliminary description

The proposed project will have 4 components:

### **Component A: Institutional strengthening and capacity building in flood risk management and urban planning**

Institutional strengthening and capacity building is needed in order to address the problem of urban floods, mainstream flood risks into urban planning, strongly reinforce the role of municipalities and local population in flood management and improve urban governance and land use regulation. Since these reforms and the construction of drainage networks will take

time, a particular emphasis should also be given to flood preparedness and response. This component, which cost is estimated to amount US\$ 10 million, will include the following activities:

- a) Preparation of general studies including a stocktaking assessment on urban planning and flood risks, an institutional and financial sustainability study, an urban drainage master plan for the Districts of Pikine and Guediawaye, detailed engineering design and bidding documents for priority investments, environmental and social impact assessment, capacity building needs assessment for flood preparedness and response, design of awareness raising campaigns. The overall design of the investment component of the project (Component B), the Environmental and Social Impact Assessment, Environmental Management Plan and Resettlement Action Plan are being prepared under PPA financing.
- b) Mainstreaming of flood risks into urban management and planning. The subcomponent will support institutional reforms and capacity building for improved urban governance and effective integration of flood risks into urban planning and development. It will include the development of a Geographic Information System for flood risk mapping covering the District of Pikine and Guediawaye; the declaration of flood prone areas as uninhabitable zones to be incorporated in the Urban Development Plan; the enforcement of uninhabitable status of flood zones and wetlands (*'The Niayes'*) by physical means (e.g. planting of trees, vegetal fences...) and implementation of land use regulation through various means (restrictive regulations, economic incentives, knowledge enhancement, public investments...); and community risk management at municipal level. A particular attention will also be given to the establishment of a sustainable institutional and financial scheme and building strong operational capacity for the maintenance of the drainage system and pumping stations.
- c) Strengthening of the disaster flood/risk management system in Senegal, including the establishment of an early warning system, capacity building of the national meteorological agency and the hydrology department; the improvement of flood preparedness and response systems; the establishment of an emergency funding mechanism, the reform and strengthening of the civil protection department; and awareness raising / communication for behavioral changes.

### **Component B: Development of priority primary drainage infrastructure**

- a) The construction of priority primary drainage infrastructure which will allow the evacuation of rainwater to the sea. Transferring the flood waters to the sea appears to be the most relevant approach, rather than channeling it within the basin given the risk of raising the level of groundwater. The construction of a drainage network is already planned as a part of the urban restructuring of Pikine Irregulier Sud (APIX s.a., Dakar Diamniadio Toll Highway Project). The project will finance the construction of primary drainage infrastructure, mainly in the North of the Cap Vert Peninsula, which will allow the evacuation of stormwater of the district of Pikine and Guediawaye. A decision should

be taken on the acceptable level of risk: drainage systems are often designed for a 10 or 20 year return period depending on the cost of climate proofing and socio-economic importance of protected areas. This sub-component would be subject to a rigorous technical study and an environmental and social assessment during project preparation. A drainage master scheme and a priority investment plan will be prepared and closely coordinated with the ongoing revision of the sanitation master plan already underway and funded by the European Investment Bank. The drainage investments will take into account the existing settlements and be designed / selected in order to minimize the resettlement of households, mainly those living where the drainage channel will be built. Maintenance costs have to be covered by municipalities, but a financial sustainability study is needed to explore various options. The cost is estimated to amount approximately US\$ 60 million.

- b) The pumping of the groundwater of Thiaroye to avoid further increase of the groundwater table and saturation of the soil surface in inhabited areas. Several studies concluded that the pumping of 16 000 m<sup>3</sup>/day would result in a 0.5 to 1.5 meter decrease of the level of the groundwater table, without causing further sea water intrusion. The water would be transferred to the Niayes zone where it would be used for horticultural irrigation in substitution to potable water which is currently provided to smallholders by the water company of Senegal (SONES/SDE) and heavily subsidized (US\$ 4 million/year). The expected positive impacts are a more sustainable and cost effective management of water resources. This activity will require the rehabilitation of the Thiaroye boreholes and the creation of a duct that will allow the transfer of water to the Beer Thialane irrigation perimeter in the Niayes zone currently upgraded by the PDMAS/Canada. The estimated cost is US\$ 20 million. US\$ 7 million are already financed by Canada for the rehabilitation of Beer Thialane perimeter and US\$ 13 million are sought. The irrigation system will be operated by a Public Private Partnership to be established. It will be decided during project preparation whether this activity will be included in this project, or addressed through existing agricultural programs, such as the PDMAS a currently planned.

### **Component C: Participatory urban flood risk management**

- a) Community participation in urban flood risk management will be strongly supported in selected neighborhoods. This component will support innovative approaches and the participation of local population and NGOs in solving the problems related to flooding, based on similar successful initiatives in Burkina Faso (*Urban environment project*), Kenya (*Voices of Kibera*) and Indonesia (*Kampung Improvement Program*). Lessons learned from other flood management projects demonstrated that the construction of primary drainage networks had to be coordinated with municipalities and local population in order to facilitate their acceptance, while local participation can facilitate long-term maintenance. The subcomponent will finance pilot investments programs for the rehabilitation and maintenance of secondary and tertiary rainwater drainage network, urban roads network, and solid waste collection. A particular attention will be given to capacity building in flood preparedness and response, awareness raising and behavioral

changes for resilience. The project will also reinforce the role of municipalities in flood management, and promote the integration of flood risk management strategies and action plan in their local development plans (*plan d'urbanisme locaux*). The cost is estimated to amount to approximately US\$ 10 million. This activity will be closely tied up with the institutional and policy development under Component A. It will also ease the implementation of future urban requalification programs which were built on insalubrious grounds liable to flooding and lacking significant infrastructure, paved roads and other networks, such as the forthcoming restructuring of Pikine Irregulier Sud over 860 hectares (APIX s.a., Dakar Diamniadio Toll Highway Project).

**Component D: Project coordination and management.** This component will provide financing for the efficient implementation of the Project, including staff, operating costs, monitoring and evaluation, and cost of audits. The cost is estimated to amount US\$5 million.

#### 4. Safeguard policies that might apply

The proposed project is designed to have beneficial impacts on the population in terms of reduced vulnerability to flooding and improved livelihoods conditions. The project is categorized A because of the potential adverse environmental and social impacts of the civil works related to the construction of the drainage infrastructure with the option to change it to a Category B depending on the findings and recommendations of the technical feasibility study and environmental and social impact assessment carried out during project preparation. Regarding social aspects, the drainage investments will take into account the existing settlements and be designed / selected in order to minimize the resettlement of households, mainly those living where the drainage channel will be built. In addition, a reformed urban planning process through a stronger involvement of municipalities and proper zoning will prevent flooded prone areas and wetlands from being inhabited.

Consequently, two major safeguard policies are triggered, namely, the Environmental Assessment (OP/BP 4.01) and Involuntary Resettlement (OB/BP 4.12) safeguard policies. The Natural Habitats (OP/BP 4.04) policies might need to be triggered depending on the impact of drainage on the wetlands (*Niaye*).

The Environmental and Social Management Framework (ESMF) and Resettlement Policy Framework (RPF) of the Local Authority Development Project (urban project) will be updated for the overall project and used for implementation purposes.

Regarding drainage investments (component B), an Environmental and Social Impact Assessment (ESIA) will be prepared. The study will include an Environmental Management Plan (EMP) as well as a Resettlement Action Plans (RAP) which will be prepared in accordance to the Bank's Safeguard Policy on Involuntary Resettlement OP 4.12. This will be done as a part of the preliminary design stage so that recommendations can be included into the project design. The ESMF and RPF will fully apply for the pilot investments under component C. Since the project includes land use planning aspects, due consideration will be also given to the Interim Land Use Guidance note.

The executing agency will be responsible for the preparation of the ESIA, EMP and RAP, as well as update of ESMF and RAF and their submission to the Bank for approval.

5. Tentative financing

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| Source:                                     | (\$m.) |
| BORROWER/RECIPIENT                          | 10     |
| International Development Association (IDA) | 50     |
| Other partners                              | 30     |
| Total                                       | 90     |

6. Contact point

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