

Governance and natural disasters: addressing flooding in Saint Louis, Senegal

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ABSTRACT This paper describes an initiative to develop responses to flooding in the city of Saint Louis that focused both on reducing risks and on better preparedness in a city with very limited investment capacity. The initiative was developed by ENDA-Tiers Monde, an international NGO whose headquarters are in Senegal. It focused on building responses that drew on local knowledge and on supporting the engagement of all stakeholders in identifying causes and local solutions both to reduce risks and to reduce people's vulnerability to them.

KEYWORDS disasters / disaster preparedness / flooding / participatory planning

I. INTRODUCTION

The city of Saint Louis was founded in 1659 and owes its existence to a colonial past. In 1885, it served as the capital of Senegal and French West Africa and was one of the largest and most active cities in Africa; the capital was moved to Dakar in 1958. According to the census, the population of Saint Louis was 115,000 in 1998 and estimates suggest that it had risen to 200,000 by 2002. The city borders the Atlantic Ocean to the west and the Republic of Mauritania and the Senegal River to the north.

Saint Louis has a fragmented layout with four main areas of concentration encompassing the Langue de Barbarie spit, Ndar Island and the Sor district along the east-west axis. The city covers 3,700 hectares and is divided into about 20 districts.

The city's many difficulties include the inadequate provision for managing wastewater, excreta and household waste and also rainwater and river water. This has been exacerbated by rapid urban growth, which has led people to cluster in areas at risk of flooding. When population growth is faster than the rate at which the municipal authorities or the private sector can provide housing and basic infrastructure, risks can build up quickly. Settlement of watersheds and valley bottoms has greatly altered drainage patterns and destabilized slopes, increasing the risks of flooding and landslides. This applies to certain districts of Saint Louis that are inhabited by minority groups or lower-income groups, who face both higher risks and inadequate access to resources. The urban poor often have to make difficult choices with regard to risk.



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These kinds of problems are evident in most cities in sub-Saharan Africa – for example, the fact that populations have grown much more rapidly than provision for infrastructure, the absence of effective measures to reduce risks, and the low incomes of much of the population (and thus their limited capacity to reduce risks). This explains why such a large proportion of the region's urban population live in unplanned informal settlements.

There are also many challenges for any local government or other organization committed to addressing these problems. For instance, the information base on the city is deficient, especially for the informal or spontaneous settlement areas, and there is often little coordination between the different public agencies within the city. And there is usually a lack of commitment to the kinds of research that can help fill the data gaps and identify risk reduction policies.

After describing the risks faced by the population of Saint Louis, this paper will describe work undertaken by the international NGO ENDA-Tiers Monde,⁽¹⁾ which has sought to address these risks, focusing on supporting dialogue between all the stakeholders and building a consensus and an information base that provide the basis for action. This was undertaken as part of an Africa-wide initiative to make international agencies, governments and civil society more aware of the risks from disasters in urban areas and gain a better understanding of the actions that are required to reduce these risks (Box 1). This is both to encourage the integration of disaster risk reduction into conventional urban development planning and urban governance and to support organizations that normally respond to disaster to expand their role in disaster risk reduction, especially in reducing the vulnerability of the human settlements most at risk from disasters.

1. For more details of the work of ENDA-Tiers Monde, see www.enda.sn/, which presents information in both French and English. Three papers have been published in *Environment & Urbanization* on some of ENDA-TM's initiatives: Gaye, Malick (1992), "The self-help production of housing and the living environment in Dakar, Senegal", *Environment & Urbanization* Vol 4, No 2, October, pages 101–108; also Gaye, Malick and Fodé Diallo (1997), "Community participation in the management of the urban environment in Rufisque (Senegal)", *Environment & Urbanization* Vol 9, No 1, April, pages 9–29; and Gaye, Malick, Loly Diouf and Nicola Keller (2001), "Moving towards Local Agenda 21 in Rufisque", *Environment & Urbanization* Vol 13, No 2, October, pages 201–214. All these can be accessed at no charge from <http://eau.sagepub.com/>.

BOX 1 The African Urban Risk Analysis Network (AURAN)*

Disasters occur on a regular basis in the urban areas of Africa and affect millions of people each year. Because of this, there is an increasing need to understand the processes through which the risks from potential disasters develop in urban contexts and then to identify how locally owned processes can address these. In order to do this, six African institutions formed the African Urban Risk Analysis Network (AURAN), with support from UNDP and ProVention. Work programmes were undertaken in Accra, Algiers, Cape Town, Dar es Salaam, Nairobi and Saint Louis (Senegal) in order to identify:

- the main disaster risks and who is most vulnerable to them;
- the processes that lead to the accumulation of these risks and how these are related to environmental hazards; and
- what local changes can reduce these risks, particularly through actions that might be taken by local governments, community organizations, development- and disaster-oriented NGOs and other relevant agencies.

For each of the partner institutions, this work involved both research and trying to engage local government and other key institutions in identifying risk (and what creates or magnifies it) and acting to reduce it.

* For more details, see <http://www.auranfrica.org/>

II. GOVERNANCE ISSUES RAISED BY FLOODING IN SAINT LOUIS

a. Natural constraints

Saint Louis is located at the mouth of the Senegal River in a wetland area that extends for 10 kilometres westwards along the seafront to N'gallèle (Photo 1). It also extends inland into areas liable to periodic flooding from the river, high tides and rainfall. Some areas should not have been settled because the risk of flooding is so great due to river water and/or rainwater combined with impermeable soils and inadequate or no drainage networks.

In addition, the sanitation/drainage systems that do exist are often inappropriate to the hydro-geological context. Saltwater frequently rises through capillary action, especially at the base of walls, and infiltrates the masonry, causing serious problems. According to the Municipal Development Agency in its review of the urban audit carried out in 1998, there are 162 hectares of poorly drained land.

b. Human constraints

Alongside the natural constraints, there are other, human, constraints. These include:

- the complex tenure situation of many private properties whose status is not in accordance with the law, for example, houses without ownership title, or difficulties caused by joint ownership;
- the low incomes of many households, which constrains their capacity to build and maintain buildings to the required standard;



PHOTO 1
Aerial view of Saint Louis
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- the state's lack of resources, including those needed for many public buildings;
- the policy regarding hotels and the development of tourism. The Hydrobase area, which provides the only opportunity for expansion on the Langue de Barbarie strip, cannot be developed because of the uncontrolled building of hotels. These structures block the roads and traditional access routes to the mouth of the river and in the long run, this is likely to cause tensions and serious problems with the local people.

Flood-prone areas pose enormous problems both for the residents and the authorities responsible for urban management, given that much of the land in the municipality is unsuitable for building. Every rainy season, the affected districts face difficulties in terms of access, movement and hygiene. The 1998 and 2000 floods were genuine disasters, with detrimental consequences in both socioeconomic and health terms. These floods were the result of a combination of factors, namely:

- flooding by the Senegal River;
- constraints on the flow of floodwaters (Langue de Barbarie National Park);
- rising floodwaters due to tidal backflow during high tides;
- blockages, made worse by the formation of sand bars and the silting up of river beds and the Langue de Barbarie; and
- lack of drainage, with rainwater runoff being impeded by the flat surfaces, limited infiltration capacity, lack of a working drainage network and spontaneous and unplanned urbanization.

The floods marked the return of the rains following a long period of drought (10 years). The lack of rain in these years encouraged local populations to settle in naturally occurring but long-dried out river beds. The increasing density of buildings in these areas, together with masonry construction works, erratic settlement and the rising water table means that pools of water remain, especially during the winter months. In most districts, effective rainwater drainage systems and the means for evacuating sewage are either absent or obsolete. To this should be added the fact that some areas such as the bottom of valleys or areas around water sources should not have been settled.

The rains in 1998 and 2000 flooded almost all of the city's districts and much livestock was killed. Many thousands of people were seriously affected. Women and children suffered most from diseases linked to unsanitary conditions, while at the same time there was a slow-down in the economy and in educational activities as floodwaters constrained people's movements.

Sanitation issues are becoming increasingly urgent in the day-to-day management of the city. In 1999, an integrated waste management programme made a large contribution to stabilizing sedimentation in the minor beds of many watercourses and valleys. Known as PADE St. Louis (Process of Sustainable Improvement of the Environment), it continues to this day. Activities undertaken in the city are consistent with the policy of environmental, economic and social development pursued by the government and local authorities. From this point of view, the programme is responding to the concerns and needs of the communities settled in pockets of poverty.

c. Categories of people affected by flooding

The floods in Saint Louis usually affect those districts occupied by the most disadvantaged populations, the worst affected being Balacos/Diawling, Léona, Pikine, Langue de Barbarie and Ndar Island. Average incomes are very low, nowhere near the guaranteed minimum wage, i.e. less than US\$ 46 per month. Many of the inhabitants are rural migrants and they generally occupy sites not intended for housing. People who live in better quality neighbourhoods, planned low-cost housing and the semi-rural sector have higher incomes (per household and per capita) but generally these are still low and average incomes are relatively low in all parts of Saint Louis.

For those who live in the flood-prone districts, each flood increases their poverty, depleting their incomes and meagre asset bases. Schools generally take in the flood victims and two or three families may find themselves in a single classroom. Because of this, the school year is then reduced to a few months, leading to poorer education for all the children. Moreover, economic activities slow down as workplaces are under water. State social services take some responsibility for the flood victims and there are also some charitable contributions that help provide them with support.

d. Health and environment

The impermeability of the soil and the lack of provision for sewers and storm and surface drains results in pools of water, where larvae develop causing a resurgence of malaria and skin diseases. Floods also mean the



PHOTO 2
Alternative solutions when faced with flooding
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contamination of water sources, which leads to children suffering from diarrhoea on top of chronic malnutrition. High population densities also mean the rapid spread of infections, especially among children.

People in areas at risk of flooding use a range of measures to protect themselves – for example, building flood defence embankments in front of their houses or using sandbags, which are easier to move – and this alters the topography. In this situation, environmental management becomes a priority for strategies to implement development policies. In response to these various problems and to anticipate developments, the municipality is planning to put together a town planning blueprint with the support of the government and its partners.

Financial resources need to be raised quickly to develop the areas identified within the municipality. More than 55 per cent of households in flood-prone areas say that they are in favour of restructuring these areas and sorting out their legal position. Most of these households are concentrated in five of the 20 districts. It is important to find appropriate financial mechanisms to ensure that the operation and maintenance of rainwater management structures is efficient and sustainable, which means raising people’s awareness of the dangers of certain practices.

This was the rationale behind the launch in 2004 of the Governance and Flooding in Saint Louis programme by ENDA-Tiers Monde.⁽²⁾

2. This is supported by the United Nations Development Programme (UNDP) and the Prevention Consortium.

III. THE GOVERNANCE AND FLOODING PROGRAMME

The objective of this programme is not to build infrastructure but to promote good governance around the problem of flooding in Saint Louis. The city’s various stakeholders came together to engage in dialogue and an



PHOTO 3
The official launch of the programme
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PHOTO 4
An awareness-building session in the Diaminar
district of Saint Louis
 © ENDA-RUP

exchange of views in order to find solutions to problems that are beyond the skills or capacities of any one municipal institution. It also required that all local stakeholders be engaged in this, otherwise the process could not be sustained.

Consequently, a participatory plan of action was set up under the management of a steering committee, whose role is to ensure the implementation of the programme activities, i.e. information, education and awareness raising. The tools that have been used have included theatre, exhibitions, media broadcasts, discussions “over a cup of tea”, interviews, photography, intensive awareness-raising campaigns, open-air conferences and public feedback. Collectively, these have helped change the behaviour of the population of Saint Louis.

a. Developing an information base

This began with photographs being taken in the flooded areas over a period of several days, which provided a better understanding of people’s difficulties during the rainy season. Above all, flooding is exacerbated by wastewater from households and other water users and the lack of provision to collect household wastes – as these wastes block natural drains. The fact that the districts at risk of flooding do not have adequate drainage systems makes the situation worse.

The establishment of a Geographical Information System (GIS) has provided a stronger information base on settlements and has helped to plan ahead and protect sensitive areas. However, several issues have arisen concerning the actual capacity of this modern system to find

solutions to the problems of flooding. The GIS offers various functions. It allows the building up and management of data on all households and neighbourhoods and provides analyses that allow a flood vulnerability map to be created that identifies those sectors that experience problems in cases of flooding. This includes generating a range of maps, tables, graphs and figures. It also supports decision making for planning relief and managing land use and the environment's natural resources. However, people do not always gain awareness of the key flooding issues through this process but, rather, on a day-to-day basis through weather forecasts, especially at times when the waters of the Senegal River are rising. However, appropriate information presented in appropriate ways can have a catalytic role in risk prevention.

b. Logistics

Leaflets and posters showing the main objectives and activities of the plan of action have been prepared. The programme has produced a CD-ROM on the initial activities and a meeting is planned to show it to members of the steering committee so that they can validate the tools.

c. Interviews

Interviews are used to collect the views of all the different stakeholders concerned with or affected by flooding issues. Interviews during, before and after the rains have been held with residents of the affected districts who have given their views on the health and hygiene problems caused by flooding as well as reporting their constant fear of such disasters. Some solutions were offered.

The public authorities that were interviewed were deeply concerned about the unplanned or erratic settlement by local communities in the lowland areas through which water flows naturally. They also highlighted the disposal of household waste into the sewerage system and even into the riverbeds, which further contributes to the flooding issues experienced during the winter. The communities themselves are increasingly aware of the issues surrounding the high-risk areas they settle in but there is a lack of alternative places available in which to re-house them.

d. Special events

In parallel with these activities, special events have been held in other districts such as Diamaguène, Bango and Léona, with a view to changing the behaviour of people suffering from flooding and unhygienic conditions. One of the key behaviour changes needed is to stop the disposal of household waste in the streets, which blocks drainage channels and prevents rainwater from draining away. During these various information and awareness-raising sessions, it emerged that household waste is the main material used to build flood defences and this has resulted in outbreaks of various waterborne diseases. Preventing waterborne and other water-related diseases such as malaria must be seen as a primary public health objective in the medium and long term.

ENDA–Tiers Monde and the programme's steering committee organized an open-air conference in the presence of the deputy mayor and the head of the Regional Health Division of Saint Louis. Three topics were debated: tools to evaluate vulnerability; overall data and network perspectives; and riverbed management. It discussed work planned for the future and provided an opportunity to clarify the programme's preliminary objectives for its "soft" activities.

The National Sanitation Bureau of Senegal (ONAS) and the Hydraulics Department are working closely together with respect to the riverbed. During the rainy season the riverbanks usually burst, causing flooding. Depending on the scale of the flooding, priority emergency projects may be set up such as the infrastructure put in place in Diamagune and Léona. ONAS also has five pumping stations in strategic places to combat flooding. The infrastructure is serviced and maintained regularly; for example, the pipes are cleaned out as each rainy season approaches.

Some useful contributions were made during the open-air conference. Some participants criticized the pumping of water from the river as a negative action that could only prolong the flooding. They also reported on practices such as taking sand from the Diaminar district to Diamaguene, exacerbating the problem in Diaminar.

The most vulnerable district is Pikine, which would have to be restructured before any infrastructure could be put in place because of its geo-morphological and topographical features. Faced with the various hazards, the residents have set up a "flood prevention and control committee", which all participants wanted to join, and an application has been made to the city's steering committee. It was also made clear how Saint Louis needed a public education campaign to stop people dumping household waste in facilities intended for rainwater.

e. The steering committee

The steering committee is a small discussion group and decision-making body that was formed to ensure the implementation of the programme's action plan. As far as possible, members must observe the time scales that have been set and the programme's broad aims. The steering committee is a multidisciplinary structure made up of one representative from each of:

- the authorities (collectively represented by the deputy mayor, who has responsibility for the environment);
- technical bodies such as the water authority, health and hygiene and ONAS (the Senegal National Sanitation Office), which currently chairs the steering committee;
- the local district councils;
- economic interest groups;
- community-based organizations and districts associations; and
- the press.

Once the steering committee was formed, ENDA–Tiers Monde supported capacity building for its members. This was designed mainly to share knowledge about factors that aggravated flooding in Saint Louis, to discuss problems that were frequently encountered and to suggest solutions (Table 1).

TABLE 1
Identifying problems and solutions

Problems identified	Suggested solutions
Salinization of the river	Construction of dams and dykes
Capillary water rise in the walls of buildings	Watertight trenches
Faecal pollution	Improve sewers and drains
Contamination of water by pathogenic agents	Water treatment
Population displacement	Re-housing
Dermatitis/skin diseases	Respecting the rules of hygiene
Malaria	Sleeping under impregnated mosquito nets
Diarrhoea	Better quality water and sanitation; respecting the rules of hygiene

The members of the steering committee organized a visit to the various technical services involved in the programme. The main objective was to find the most effective way of ensuring the rational dissemination of information while stimulating and strengthening cooperation with potential partners.

The steering committee meets periodically to assess activities and discuss what remains to be done. For example, it has called for training sessions for stakeholders to help them come up with strong messages to change the behaviour of people affected by flooding and household waste. Teachers of the Koran denounced the unwholesome conduct of people who often emptied their septic tanks during the rainy season and engaged in other unhealthy practices. They stressed the good habits of our ancestors in terms of education and respect for the environment.

f. The action plan

The action plan contains a series of planned activities to be carried out over the duration of the programme (Table 2). These were identified taking into account proposals that were discussed and then adopted by groups of all the stakeholders. The steering committee monitors the implementation of the activities.

IV. CONCLUSION

Saint Louis is a region that is at high risk from flooding – and these risks are likely to be further exacerbated by climate change, both from sea-level rise and from increased water flows in the river. But the city's vulnerability to floods is a result of human practices. If no action is taken, then the long-term viability of the city is in doubt. However, for some time now, under the direction of the government, certain regional services have taken action to alleviate the effects of flooding. Alongside this, some NGOs have an important role in the areas of research–action. Thus, apart from behavioural change and training initiatives, ENDA's RUP programme (with its focus on participatory development), in association with the

TABLE 2
Actions

Activities	Districts	Means	Stakeholders	Themes
Different district/ social mobilization	Eaux Claires, Diaminar, Leona	Radio (SUD FM, RTS, etc.), posters exhibitions	ENDA, ONAS, Hydraulics Dept., district councils, firefighters, Northern Reporters Association	Embankments with waste that cause conflict and disease; preventive measures to be implemented
Capacity building	ISRA	Training posters, documentation on water resources in the zone	Trainers, ENDA, Hydraulics Dept., ONAS, SAED, DREEC	Better knowledge of health and hygiene problems associated with flooding
Training visits/ exchanges	Bango	Maps, layouts, photos, GPS	Hydraulics Dept., SONES, ONAS, ENDA steering committee	Programme themes
Different districts (monitoring, evaluation)	Darou	Radio, notices, leaflets	District council	Settling in at-risk areas makes the population more vulnerable
Media dissemination (leaflets, posters, etc.)	ENDA office	Flipchart	ENDA	Getting acquainted with the media

university, is mapping both existing and potential flood zones. These tools evaluate precisely the level of risk for each area and so provide the authorities with useful information for disaster risk reduction.

Raising awareness and building capacity among all the stakeholders as well as setting up a Geographical Information System (GIS) are all vital tools for use not only by the stakeholders but most especially by the decision makers. It is hoped that this has generated the knowledge and capacity to implement needed safeguards. The Governance and Flooding in Saint Louis programme lasted two years. This does not mean that awareness-raising campaigns designed to change behaviour will now cease. But it is important that all stakeholders continue to be involved if the process is to succeed.

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