

# EXECUTIVE SUMMARY

## Strengthening community flood resilience in Senegal:

Learning from the 2020 floods in Thiès



Residents carry their belongings as they try make their way through a flooded street after heavy rains in Keur Massar, Senegal. September 8, 2020 © REUTERS/Zohra Bensemra

# THE 2020 FLOODS IN SENEGAL

From September 4 to September 5, 2020, intense rains caused widespread flooding in 11 regions and 25 departments in Senegal. The regions of Dakar and Thiès were hit particularly hard, with approximately 127 mm of rain falling in 24 hours, well above the ‘intense rainfall’ critical threshold of 50 to 75 mm per 24 hours. Informed by Red Cross data, the Ministry of the Interior and Public Security through the Civil Protection Directorate (*Direction de la Protection Civile*) indicated that throughout Senegal, 12,475 households or 77,760 people were affected and 3,285 displaced.<sup>1</sup> The disaster resulted in seven deaths, four of which were reported

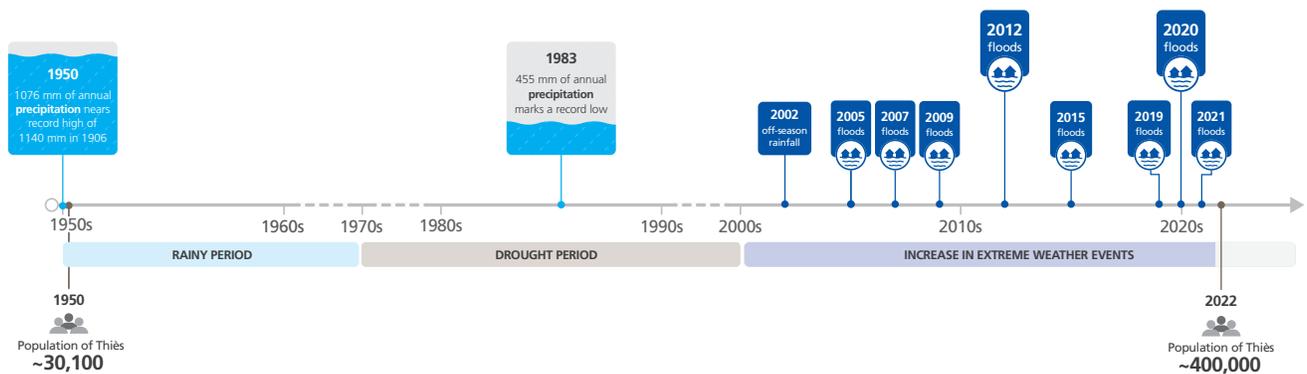
in the regions of Dakar and Thiès. In Thiès, heavy rains caused flooding in 16 neighborhoods, affecting nearly 8,500 people, damaging 85 houses, and injuring eight people.<sup>2</sup>

The floods in Thiès occurred in an area confronting the three-fold challenge of population growth, land-use change, and the socioeconomic impacts of the Covid-19 pandemic. Thiès is located in a wide basin with high plateaus to the west. The ongoing deforestation of those plateaus which exacerbates rainwater runoff, rising water tables, and the consequences of climate change, all contribute to the region’s susceptibility to floods. While for many in

1 Ndiaye, A. L. (2021). “Impacts des inondations de 2020 au niveau des ménages sinistrés - Enquête de base pour l’évaluation des besoins post-catastrophes.” United Nations Development Programme

2 Ibid

**FIGURE 1**  
Timeline of the main extreme weather events in Senegal





Keur Massar, Senegal, flooded by heavy rains. September 16, 2020 © REUTERS/Christophe Van Der Perre

Thiès, flooding of this magnitude and frequency is an emergent concern; the main climatological challenge in Senegal has been the decades long drought that began in the 1970s (see Figure 1).<sup>3</sup> During that period, successive years of drought spurred informal settlement in dried up agricultural areas and marshlands – now particularly vulnerable to floods – in the Thiès and Dakar regions. Though net rainfall increased in the 2000s compared to the previous three decades, annual rainfall totals were lower, on average, than the years that preceded the drought.<sup>4</sup> Nevertheless, since 2005, widespread flooding has become an almost annual event and it is expected that extreme flooding events akin to the floods of 2020 (and potentially even more severe) will be recurrent. The 2021 Intergovernmental Panel on Climate Change (IPCC) report and scenarios developed in Senegal’s Nationally Determined Contribution (NDC) validate this prediction.

3 Cissé, O., and Sèye, M. (2015). “Flooding in the suburbs of Dakar: impacts on the assets and adaptation strategies of households or communities.” International Institute for Environment and Development (IIED). *Environment & Urbanization* 28.1. <https://journals.sagepub.com/doi/pdf/10.1177/0956247815613693>

4 Ibid

Flood risk and loss and damage will continue to grow unless risk reduction action is taken. Climate projections point to an increase in extreme weather events with more intense and erratic rainfall and a rainy season marked by more bouts of drought. Uncontrolled urbanization and rapid population growth, poor waste management, and large-scale infrastructure projects are increasingly attributed as key factors compounding Thiès’ geographic and climatic risk to floods.

In addition, the socioeconomic impacts of the ongoing Covid-19 pandemic are deepening people’s vulnerability. When the 2020 floods occurred, the negative ramifications of lockdowns due to the pandemic, coupled with an overall decline in GDP, had already hit hard. Restrictions affected the most vulnerable households who are particularly dependent on small business activities.<sup>5</sup> Many lost jobs and income, and some people lost their homes.

These socio-economic, environmental, and development issues have heightened flood risk and underscore the need to further focus disaster risk reduction (DRR) efforts.

5 Ndiaye, A. L. (2021).

# KEY LESSONS AND RECOMMENDATIONS

In recent years, Senegal has experienced floods that have led the government to make significant investments in weather forecasting and disaster response. PERC interviewees highlighted a number of these initiatives:

- The national emergency response plan (*Organisation des secours en cas de catastrophes, ORSEC*), which was enacted in 1999, has been implemented following severe floods in 2005, 2009, 2012, 2019, 2020, and 2021;
- The Rainwater Management and Climate Change Adaptation Project (*Projet de gestion des eaux pluviales et d'adaptation au changement climatique, PROGEP*) under World Bank funding, which is currently in its second phase;
- The Integrated Flood Management Project in Senegal (*Projet de Gestion Intégrée des Inondations au Sénégal, PGIIS*) is funded through a Green Climate Fund grant with the support of the French Development Agency (*Agence française de développement, AFD*);
- The “Pikine Irrégulier Sud” project, which is in its second phase and implemented by the Agency for the Promotion of Investments and Major Works (*Agence nationale pour la promotion des investissements et grands travaux, APIX*); and,
- The National Flood Management Committee (*Comité National de Gestion des Inondations, CNGI*), whose main mission is to ensure the coordination and steering of the national flood risk management policy.

Despite these ongoing initiatives, which have improved water drainage infrastructure, an Early Warning System (EWS), and the efforts among actors responsible for DRR, challenges remain. Respondents identified different priorities for supporting local authorities and communities to build flood resilience. These are explored in detail below.

- 1 Early Warning and Early Action
- 2 Urban planning
- 3 Resettlement
- 4 Capacity building

# 1 EARLY WARNING AND EARLY ACTION

## Strengthen 'end-to-end' EWS with specific and actionable information.

ANACIM plays an important role in transmitting warning messages and forecasts through their EWS. While ANACIM generates critical climate information and disseminates warning messages through various media channels, PERC interviewees highlighted difficulties related to the lack of precision and specificity of the warning messages. Additionally, more lead time would support the implementation of a rapid intervention plan, allowing communities to mobilize and make their way to safety. However, the fine tuning

of early warning messages presupposes that the EWS has adequate reach in the first place, and coordination among flood actors is established to implement necessary preventive and response measures. Greater communication about the EWS is also needed as one-third of interviewees (working in flood research or civil protection) responded that they were unaware of its existence. Similarly, while there is some collaboration among actors, most institutions still operate in silos.

### Recommendations

- At the local level, there is a need for more detailed, contextually relevant, and localized information on what actions to take in the event of flooding and severe rain.
- EWS need to be made more accessible and broad reaching so that people are aware and prepared.
- Local, regional, and national actors need pre-established cross-sectoral coordination mechanisms for quick and coordinated action in the event of a flood.



Woman and child in area affected by flooding in Thiès Senegal, 2021 © Lydia Darby

# 1 EARLY WARNING AND EARLY ACTION

## Invest in additional flood forecasting technologies and dissemination.

In particular, to maximize use by communities, the timeliness and accuracy of weather forecasts need to be strengthened and coupled with information on the likely impacts of that weather. To forecast heavy rainfall, ANACIM relies mainly on meteorological data from its national network of observation stations but also on forecast data from numerical weather models. However, station-based forecasts are limited in their ability to predict the amount and intensity of

rainfall. This is particularly true in urban areas where the complexity of urban flooding makes it difficult to foresee the magnitude of impacts from a rainfall event. Though the supercomputer ANACIM recently acquired should improve the accuracy of the local numerical Weather Research and Forecasting (WRF) model, ANACIM should also have an operational meteorological radar that can provide precise information, notably on the quantity of rainfall.

### Recommendations

- Radar and weather station data should be combined with climate scenario-based approaches to improve weather forecasting.
- Improved weather forecasts should be further complemented by GIS and extensive risk mapping to improve impact forecasting.
- Balance spending on technological improvements for forecasting and early warning dissemination, and the understanding and use of early warning information by communities.



Residents wade through a flooded street after heavy rains in Keur Massar, Senegal. September 8, 2020 © REUTERS/Zohra Bensemra

## 2 URBAN PLANNING

### Improve the use of urban management tools to support DRR and flood risk management.

---

While there are a number of tools and laws – including construction and maintenance standards, land use plans, and timely infrastructure maintenance – intended to regulate the settlement of communities in flood-prone areas, gaps remain in how they are applied and enforced. When applied consistently and systematically, enforced, and coupled with timely maintenance of flood protection and drainage infrastructure, they can help to mitigate flood risk.

In addition, rapid and uncontrolled urban growth, including some large-scale infrastructure projects, have displaced flood risk to new areas. This maladaptation further exacerbates the flood problem and infrastructure dilemma, in neighborhoods that lack or do not have flood risk management measures in place.

#### Recommendations

- Urban planning would strongly benefit from an urban flood model that could be used to identify, before construction begins, how potential plans will shift flood risk so that mitigation projects, such as greenways, drainage corridors, etc., can be built in along with the new construction, saving time and money.
- Land use plans should be updated regularly and respected.
- Construction standards should be complied with, monitored, and enforced.
- Flood mapping should be used to inform new construction, create dedicated green spaces and rainwater infiltration zones, and ensure adequate drainage space.
- Drainage infrastructure should be regularly maintained and tested, particularly prior to the rainy season, and plans should be in place for post-flood clearing of the system.
- Waste management and household waste disposal practices should be improved to reduce the risk of waste clogging drainage systems.

## 2 URBAN PLANNING

### Explore the use of green/grey infrastructure for flood risk management.

Nature-based solutions (NbS) targeting the Thiès plateau could help restore degraded environments and improve soil absorption and water retention. Re-greening the plateau and protected forests which are considered a priority area for the Great Green Wall initiative, would also contribute to shared efforts towards sustainable development goals and adaptation to climate change across the region.<sup>5</sup> NbS that increase drainage and improve infiltration can often be designed to provide co-benefits in the form of community

building and income generating activities, as pilot projects in Dakar have achieved.<sup>6</sup>

5 For more information on the Great Green Wall initiative: <https://www.greatgreenwall.org/about-great-green-wall>

6 For example, “Vivre avec l’eau” is a project that creates community-driven multi-use green spaces for water absorption and retention in suburban areas. Among others, community gardens integrated in the design, provide income generating activities and promote ownership and maintenance of the green spaces. <https://www.cres-sn.org/projet-vivre-avec-leau-quand-leau-de-pluie-devient-un-atout/>

#### Recommendations

- Urban development policy should combine the implementation of grey infrastructure with NbS.
- Tools and approaches to increase the adoption of contextually appropriate NbS in urban planning and land use should be identified with community input.



Extreme weather events and urbanization are exacerbating flood risk; even at the end of the rainy season, streets are often flooded in Thiès. 2019 © Wikimedia Commons

## 3 RESETTLEMENT

### Explore the “if, when, and how” of resettlement for communities living in at-risk areas.

---

Recurrent floods are increasing debate about whether, how, when, and where to resettle communities living in at-risk areas. In the specific case of Thiès, this includes communities living in areas where the water table is very high, making them particularly vulnerable

to floods. While there are examples of relocation of communities in Dakar, resettlement raises the issue of identifying sites where people can continue their livelihoods and maintain their social ties, and who bears the cost of relocation.

#### Recommendations

- Key variables that should be incorporated into resettlement plans include relying on local knowledge and experience; using risk maps and localized climate information to determine the location of key infrastructure and services; intentionally considering how to retain social capital and cultural ties; and supporting people to maintain and improve their livelihoods.
- Authorities and communities must decide on the trade-offs between adaptation, mitigation, and relocation. If relocation is the chosen option, the households in question must be active and willing participants.
- If communities are relocated, supportive measures should be put in place to avoid further strain on already disadvantaged populations, including through the provision of basic infrastructure and services such as schools and markets, and an enabling environment for business opportunities, and sustainable building models.

## 4 CAPACITY BUILDING

### Improve coordination between civil protection actors at the local level and strengthen their knowledge and capacity, particularly in preparedness and DRR.

The establishment of Regional Flood Management Committees (CRGI) has strengthened organizational capacity, but coordination remains a challenge. Communities voiced frustration with response efforts that left people and critical infrastructure cut off for

days, especially those in some of the hardest hit areas. Preparedness and DRR efforts are often limited to what households can manage themselves, including using sandbags and moving possessions to higher levels.

#### Recommendations

- A specific flood contingency plan should be developed and funds secured for its implementation.
- Dissemination of early warning messages to hard-to-reach and particularly vulnerable demographics such as women and the elderly needs to be strengthened.
- Flood shelters and escape routes need to be collaboratively identified and communicated by communities.
- Contingency planning for critical services such as hospitals should actively engage and coordinate actors across departments and sectors, including reaching out to and involving communities and local leaders.

### Invest in community awareness, preparedness, and capacity building to take appropriate actions.

PERC interviews highlighted that communities lack knowledge and capacity to translate forecast and hazard information into specific actions to prepare for and stay safe during disaster events. Households

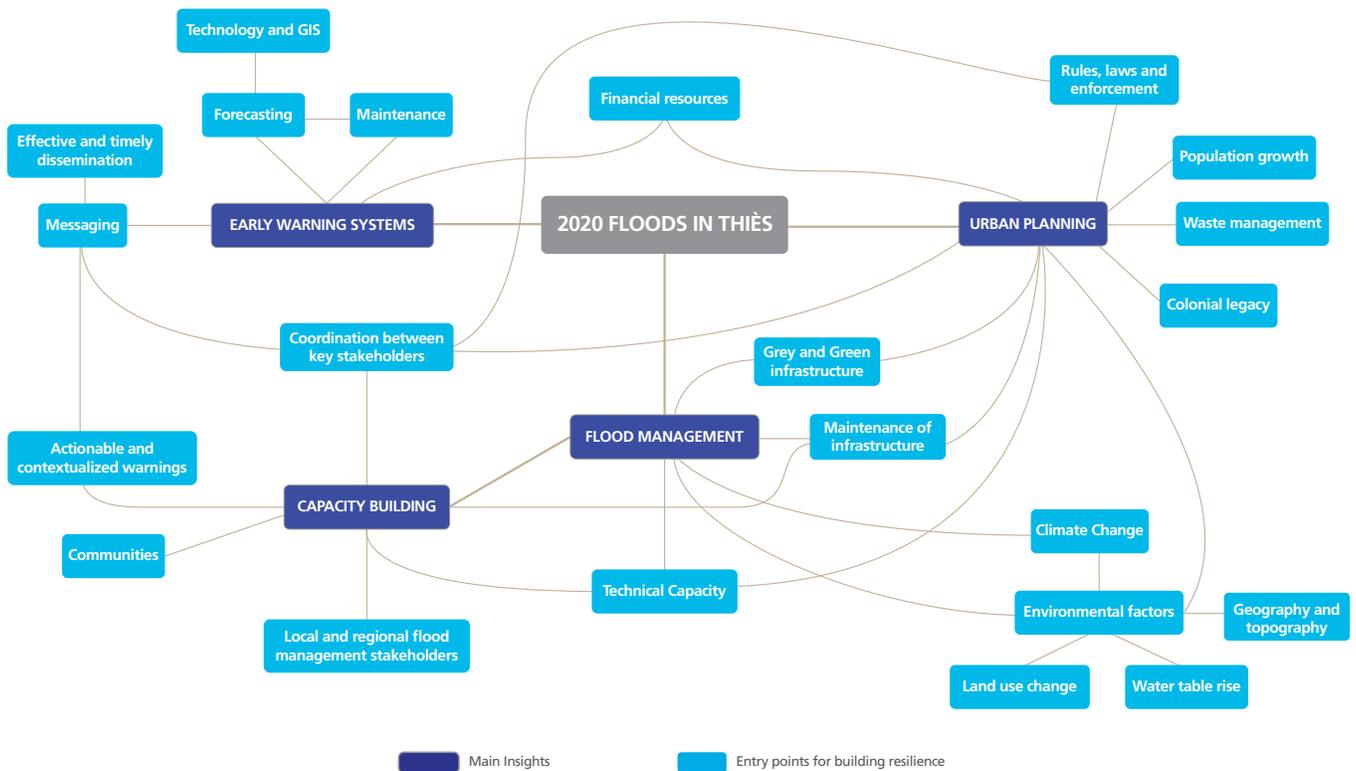
should know how to prepare for floods, what to do when it floods, and how to manage after a flood. Raising awareness could also empower communities to advocate for more adaptation measures, and encourage action beyond response and recovery.

#### Recommendations

- Knowledge and capacity should be built at the community level on understanding and knowing how to use weather and flood forecasts, local level risk mapping, land-use regulations and building requirements, and community preparedness and response plans.
- Community training programs should include basic skills training, including first aid, asset protection, and safe evacuation, to reduce the impacts of floods.
- The establishment of a community task force could both build social capital and bridge communities with local government for disaster preparedness and response efforts, and to implement capacity building programs.

**FIGURE 2**

Mind map of key learnings



# PLANNING FOR THE FUTURE

The observations and lessons learned from this study highlight opportunities and avenues to consider to reduce the impacts of flooding in Thiès and the Dakar region of Senegal. DRR and flood resilience building approaches must consider a changing climate, as well as compounding development pressures including urbanization and population growth.

As the key lessons and recommendations show, building community resilience to flooding requires an integrated approach that spans a range of sectors and scales of governance, while taking into account local needs and priorities. Building resilience is not about preventing hazard events, but preventing disasters. Resilience is about learning to live with and adapt to uncertainty without losing the development gains already made. The recommendations sourced from stakeholder interviews, key informants, and secondary sources highlight the need for a shift in approach from a response-based model aimed at short-term recovery, to one that is focused on prevention and adaptation, to achieve long-term resilience.



This summary is based on a Zurich Flood Resilience Alliance [Post Event Review Capability](#) (PERC) study analyzing the impacts of the 2020 floods in Thiès, Senegal. The study, developed by Practical Action and the Institute for Social and Environmental Transition – International (ISET), focuses on why the extreme rainfall events and ensuing floods resulted in a disaster in Thiès. It draws on 15 interviews with stakeholders from government agencies, NGOs, community based organizations, and academics, and a review of secondary sources to highlight key opportunities for building resilience.