

Strengthening climate information services and Early Warning Systems in Senegal

Learning from the 2020 floods in Thiès



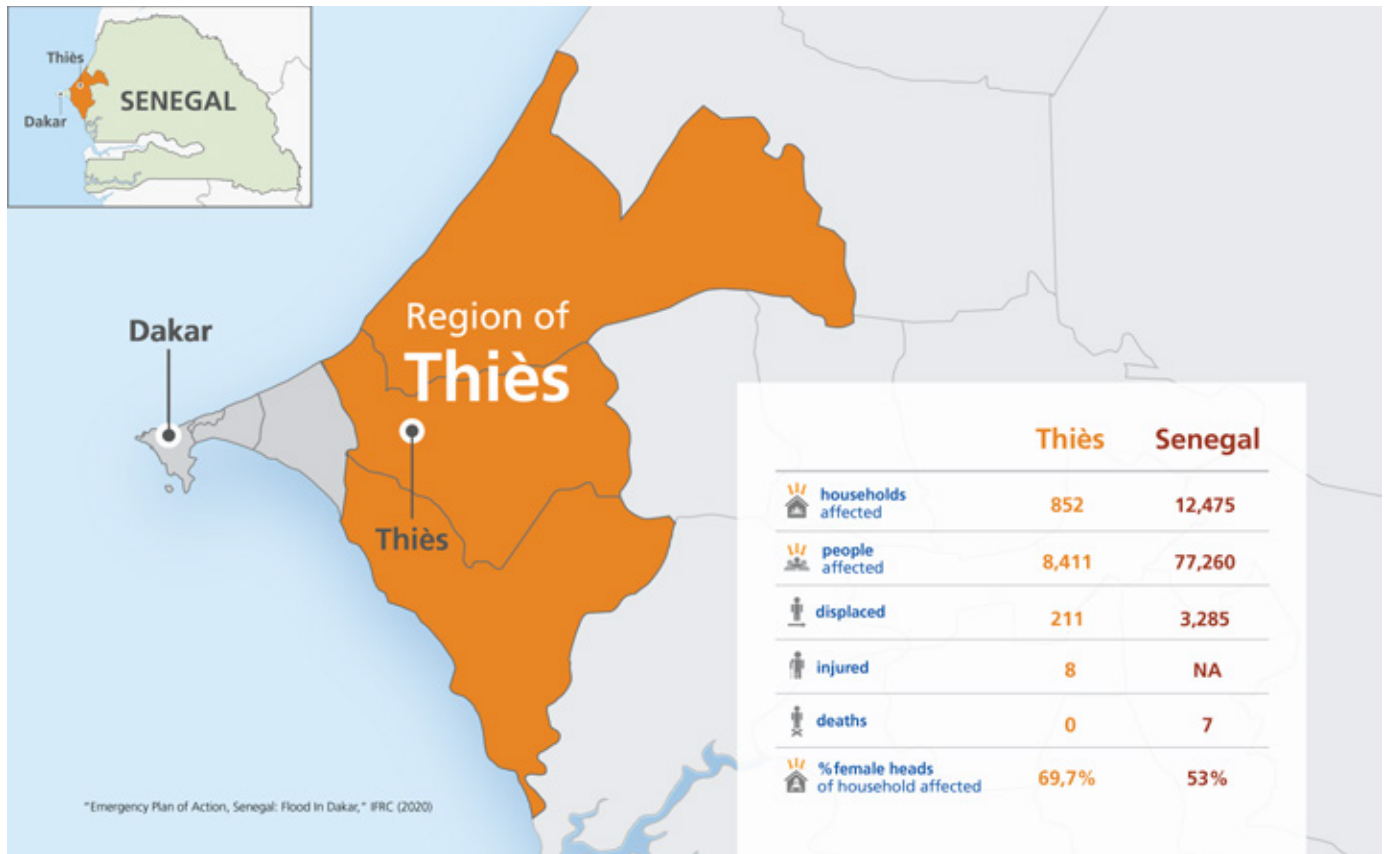
This brief is based on a Zurich Flood Resilience Alliance Post Event Review Capability (PERC) study analyzing the 2020 floods in Thiès, Senegal. It presents a series of resilience lessons from the 2020 floods based on key informant interviews and background research, and highlights opportunities for strengthening early warning and climate information services in Senegal. An electronic copy of this brief and other materials from the study are available at: [floodresilience.net/resources/collection/perc](https://www.floodresilience.net/resources/collection/perc). Additional information about the PERC can be found at www.floodresilience.net/perc and additional information about flood resilience at www.floodresilience.net.

Introduction

From Friday, September 4th to Saturday, September 5th, 2020, intense rainfall caused widespread flooding in 11 regions and 25 departments in Senegal. These floods resulted in significant economic and material losses, and impacted the living conditions and livelihoods of many. In the Thiès region, 16 neighborhoods were flooded, affecting nearly 8,500 people, damaging 85 houses and injuring eight individuals. Fortunately, no loss of life was reported. Although the rainfall in Thiès (about 126.9 mm in 24 hours) was well above the critical threshold of 75 mm — which corresponds to “intense rainfall” — flooding is not a new risk for the region. Given climate change and its consequences, extreme weather events such as this will likely become the norm.

Recognizing the importance of adapting to these new norms, there is a need to adopt better practices in flood risk reduction.

FIGURE 1. Region of Thiès



This map, "Region of Thiès", is a derivative of [Map of the departments and regions of Senegal](#) - wikipedia map by [Amitchell125](#) shared under a [Creative Commons \(CC BY-SA 4.0\)](#) license

Strengthening Early Warning Systems (EWS) has enormous potential to reduce material and human losses, while generating a significant return on investment. According to a 2019 study, every dollar invested in EWS yields six dollars in return.¹ EWS are endorsed by the United Nations Office for Disaster Risk Reduction (UNDRR) and are considered a priority for 138 countries that are signatories to the United Nations Framework Convention on Climate Change (UNFCCC). Despite a number of achievements in building EWS and the establishment of the National Flood Management Committee (Comité National de Gestion des Inondations, CNGI) in Senegal, challenges persist. Findings from our PERC research suggest

several entry points and opportunities for improving EWS and strengthening the way climate information is communicated and understood, and then translated into actions that reduce damage.

Forecasting and early warning systems in Senegal

The 2020 floods deeply affected vulnerable households, damaged infrastructure, and interrupted services in Thiès. Despite the existence of early warning and response mechanisms, PERC interviews revealed an ongoing need to strengthen forecasting capacity and EWS. In particular, the PERC study identified the following strengths and opportunities for improvement in EWS:

- **Existence of a national early warning system.** At the national level, Senegal's EWS is

1 Bapon S.H.M. Fakhruddin and Lauren Schick, 2019. "Benefits of economic assessment of cyclone early warning systems - A case study on Cyclone Evan in Samoa," *Progress in Disaster Science 2*. Accessed 7 October 2021, <https://doi.org/10.1016/j.pdisas.2019.100034>



A resident makes his way through a flooded street after heavy rains in Keur Massar, Senegal
September 8, 2020. REUTERS/Zohra Bensemra

“

As for the flooding, we knew it was coming. So, we should have put in place plans, forecasts and simulations. We would have mobilized all the means of alert to involve the population, the mayors, the associations, as well as the forces of order and defense, the Senelec [the national electricity company], the journalists... everyone, to prepare to face it.

- Press extract, Civil Protection Department

managed by the National Flood Management Committee (Comité National de Gestion des Inondations, CNGI), which is composed of key flood actors including the Directorate of Flood Prevention and Management, the Directorate of Civil Protection, the National Agency of Civil Aviation and Meteorology (Agence Nationale de l'Aviation Civile et de la Météorologie, ANACIM), and the National Office of Sanitation of Senegal (Office National de l'Assainissement du Sénégal). At the local level, Regional Flood Management Committees (Comités Régionaux de Gestion des Inondations, CRGI) are in charge of flood control. ANACIM plays a central role in this committee. The institution produces climate information and establishes long-term forecasts (seasonal), intra-



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

seasonal forecasts (spanning 10 days to 1 month), medium-term forecasts (weekly, 72-hour and 24-hour) and more specific and precise alerts issued between 6 hours and 1 hour before the event. Subsequently, ANACIM shares alert messages with the authorities through flood control actors, and also with the general public via its website, the national television channel, the media, social networks, mobile applications and text and voice messages in Wolof. However, public awareness of the system and what to do to prepare for and stay safe during a flood is limited and this knowledge gap means that many people may not receive the information they need to take preventive action. In addition, climate information is sometimes transmitted at the last moment, which does not allow for the rapid implementation of a response plan.

- **Flood forecasting.** Although ANACIM is able to issue forecasts concerning the risk of heavy rainfall, there are still some limitations, due in

part to a broken radar. As such, ANACIM adopted an alternative solution and currently relies on automatic stations, which unfortunately provide less accurate information on the intensity of rainfall than the radar. Moreover, because urban floods are complex, rainfall forecasts or a radar are not sufficient for anticipating the degree or impact of the floods. The use of GIS is essential to understand flood risk and to identify flood-prone areas.

- **Early warning and preventive measures.** The success of early warning systems depends largely on community members correctly interpreting climate information and knowing what actions to take to reduce flood impacts. Without a clear understanding of the content of the messages, people lose confidence in the reliability of the warnings and do not take the actions necessary to protect themselves. The PERC interviews revealed two major problems in the delivery of warning messages. The first is the lack of accuracy



One of the limitations in flood prevention is the lack of communication with the affected communities. It would be beneficial to carry out trainings with the communities on climate information and other capacity building programs like for prevention and safety. There is still a communication gap between flood management actors and target communities. Contact is mainly made after the disaster has occurred to assess the damage and implement response operations.

- PERC interviewee

and specificity of the warning messages; the information is not detailed at local scale. The second is that early warning messages do not include instructions regarding what actions to take to reduce risks. Furthermore, as flood impact numbers from Thiès show in Figure 1, women, in particular, fail to receive early warnings. Much of the EWS information is shared at local flood management committees, and women are under-represented on those committees.

Recommendations

These strengths and limitations highlight several opportunities for improving early warning systems

in Thiès that can be replicated in other locations in Senegal.

- **Train communities to better interpret climate information.** For early warning messages to be effective, individuals and communities need to understand the risks they face and the steps they can take to protect themselves. This includes capacity building programmes for communities to understand weather information and raise awareness about flood risks. Training programmes should also focus on good practices in flood risk reduction. To have a successful EWS, it must be people-centred, not technology-centred. It must be built with communities, who must then have confidence in it and act to make it work. This

COMMUNITY-BASED EWS PILOT PROJECT

The Pikine Irrégulier Nord-Guédiawaye - Integrated Flood Risk Management of Dakar's Suburbs (Pikine Irrégulier Nord-Guédiawaye - Gestion intégrée des risques d'inondations dans la banlieue de Dakar, PING-GIRI) project is setting up an experimental early warning system for 500 people in Dakar, in partnership with ANACIM and Jokalante, a communications agency focused on messaging for development projects to maximize community engagement. Jokalante's focus is in ensuring that the dissemination of weather information to communities includes instructions on the best actions to take to cope with extreme events, especially in the agricultural context. The pilot project aims to improve the dissemination of EWS through the use of audio messages by phone, and community radio, generally, that include specific instructions. Studies have shown that over 70% of users prefer receiving audio messages for the transmission of early warnings. Alongside audio messages, images and graphics to show the potential impacts of floods can help to take preventive measures.

can be done, for example, by training community representatives to share climate information and good practices in risk reduction at the neighborhood level.

- **Tailor early warning messages to target communities and include clear instructions.** Warning messages for communities should be adapted to the local context and delivered using relevant platforms. Interviewees highlighted the need to couple warning messages with additional information on the potential impacts of heavy rains and specific actions to be taken to mitigate these impacts. Communities should be involved in the design of these warning messages from the beginning, to ensure that they are appropriate and adapted to the local context. Some initiatives are already being implemented to improve the transmission of climate information to communities through appropriate platforms and in accessible formats.
- **Strengthen flood forecasting.** In order to have more accurate and reliable information, ANACIM requires a functioning radar that provides more accurate forecasts of rainfall intensity compared to the automatic stations ANACIM now relies on. Additionally, more time is needed to transmit warnings. This will provide people with more time to take early action and respond. Fortunately, interviewees emphasized that the Integrated Flood Management Program in Senegal (Programme de Gestion Intégrée des Inondations au Sénégal, PGIIS) plans to equip ANACIM with a rain radar that will allow for much more accurate flood

risk forecasts and thus improve preparation for extreme events.

- **Strengthen the capacity of Local Flood Management Committees (Comités Locaux de Gestion des Inondations, CLGIs) in risk prevention.** PERC interviewees stressed the fact that coordination between actors is stronger during the disaster response phase than during the preparedness or risk reduction phase. This calls for strengthening local committees' ability to interpret and disseminate climate information among stakeholders and ensure effective coordination. Subsequently, the committees should define an inclusive and gender-sensitive flood preparedness² and response plan for Thiès. This plan should be based on climate information, knowledge of at-risk areas, and awareness of the most vulnerable groups. Capacity building programs should include communities so that they can be better prepared for floods. It is also important to plan specific sets of actions to be carried out by different stakeholders and according to different levels of alerts. This should be supported by defining responsibilities and securing the necessary resources for their implementation.

2 For an example, see Brown et al., (2019) [Gender Transformative Early Warning Systems: Experiences from Nepal and Peru, Rugby](#), UK: Practical Action

The Zurich Flood Resilience Alliance PERC provides research and independent reviews of large flood events. It seeks to answer questions related to aspects of flood resilience, flood risk management and catastrophe intervention. It looks at what has worked well (identifying best practice) and opportunities for further improvements. Prepared by Practical Action and ISET-International, as part of the Zurich Flood Resilience Alliance, this publication is intended solely for informational purposes. All information has been compiled from reliable and credible sources; however, the opinions expressed are those of the Practical Action and ISET-International.