

# CF Challenge Fund

## Institut de Recherche pour le Développement

Real-time urban flood risk data via cellphone network analysis



### CONTEXT

In drought-prone regions like the Sahel, a sun-drenched region of Northern Africa that runs from the Atlantic Ocean to the Red Sea, the lack of water is a harsh and inescapable reality for millions. Increasingly dangerous, however, is the sudden deluge of the very same precious resource. Extreme weather events are increasing in frequency and intensity with climate change, with floods now impacting typically drought-prone regions like the Sahel. Fast population growth, unplanned urbanization, and the lack of adequate wastewater and drainage networks worsen flood risks for millions.

The ability to monitor rainfall with sufficient precision is vital to anticipate these risks, as well as to provide information and tools for the authorities to take timely, potentially life-saving decisions. In high income countries, rainfall and urban/rural flood monitoring is provided by weather and water agencies with well-developed observation systems like radar. However, this expensive and high-maintenance equipment is often out of reach for low-income countries.

To provide an alternative, innovative, and affordable solution, a team at the Institut de Recherche pour le Développement tested an urban flood protection system in Burkina Faso that measures rainfall via the loss of cellular network signals.

### HIGHLIGHTS



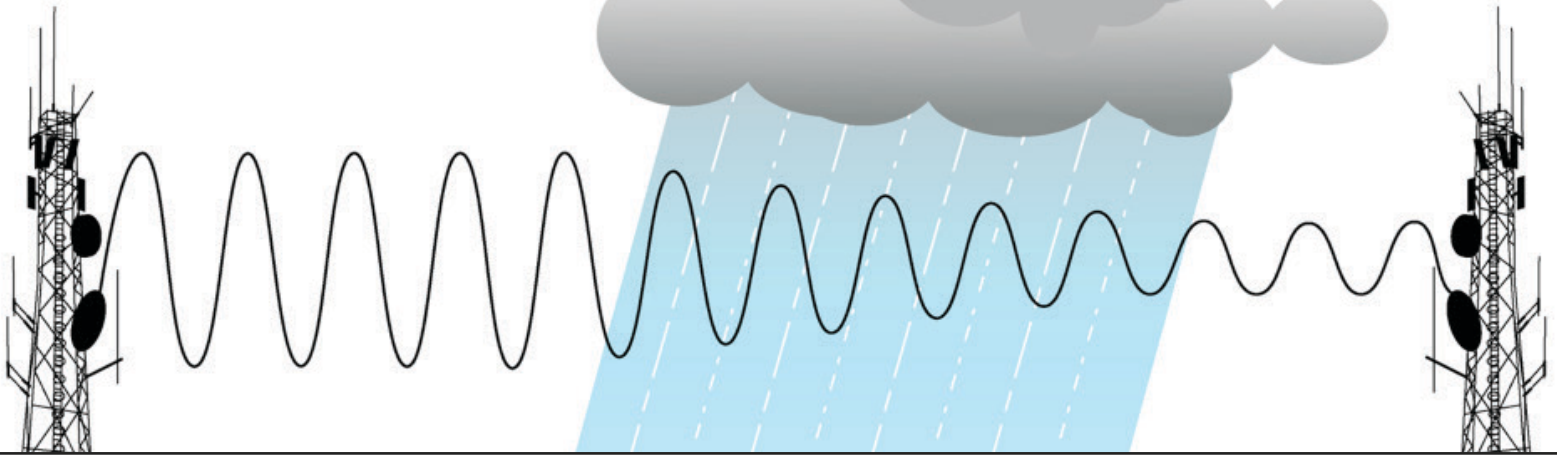
Created awareness of the potential use of mobile phone networks to identify and quantify urban flood risk.



Validated this cost effective and innovative solution for monitoring rainfall in the city of Ouagadougou.



Brought together cellular providers to help bring the method to scale in the Sahel and other regions.



The Institut de Recherche pour le Développement team and other international collaborators worked to create a cost-effective alternative to weather radar using mobile telecommunication networks. This method exploits radio waves attenuation caused by rain. Based on the loss of signal on the cellular network, rainfall can be accurately monitored throughout the network. In Africa, where the mobile phone network is dense and growing, this method offers an unprecedented potential for accurate and real-time rainfall monitoring, especially in urban areas where the network is extremely dense.

## APPROACH

With this new technique, a hydrological model was developed for Ouagadougou city to provide a Flood Early Warning System for decision makers. In collaboration with local weather services and a cellular operators, the team demonstrated and quantified the interest and practical advantages of the new monitoring method. Two mobile operators (one in Burkina Faso, and one in Niger) agreed to provide free data to the project in two major African cities.

In phase I, the project has provided a proof of concept that in African countries where the cellular phone network is developing rapidly, rainfall measurement based on cellular networks can provide a cost-effective, reliable and sustainable solution to improve weather/climate monitoring for risk assessment. The project was first piloted in Ouagadougou, Burkina Faso.

In the second phase, the team will carry out a vulnerability assessment in Ouagadougou to seek understand how the public can be better act on the early warning information derived from the Real-time urban flood risk data via cellphone network analysis tool. The methodology will also be replicated in Niamey, Niger.

**“Flooding has become a major problem in Burkina Faso. As director of Civil Protection Services, taking timely decisions to ensure the safety of the population is a serious responsibility.”**

*– Colonel Lazare Yago, General Director of Civil Protection Services in Ouagadougou*

## NEXT STEPS

In the near future, the team will finalize the operationalization of the tools and, together with local authorities, will quantify their practical impact on population through better and more timely decision making. The team will also continue investigating and developing potential collaborations to help scale the concept to other cities in the Sahel and beyond.

Another upcoming challenge is to ensure acceptance of the warnings by the population in order to maximize the effective impact of flood early warnings for improved resilience. Further analysis and interaction with population is among the objectives for the project’s next phase.

