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Why Community-Led Flood Risk Mapping: The African Context

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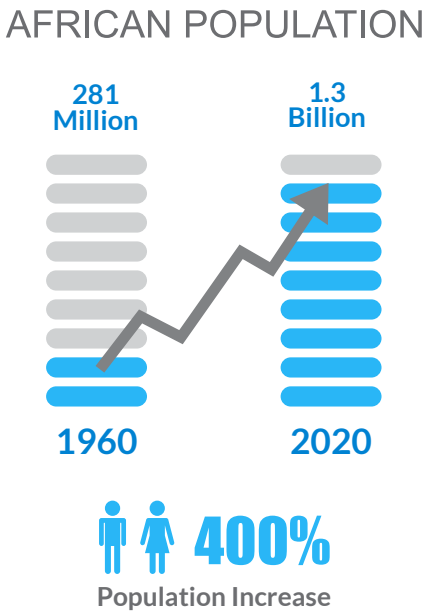
Context

The African continent has a very diverse climatic profile ranging from equatorial to desert with variable levels of rainfall and water flow. In the last 50 years, this variability has been increasingly exacerbated by effects of climate change[1]. Indeed, flood-related impacts and associated economic losses have been on the rise in Africa[2], and with earth continuing to warm, these losses are likely to rise without effective and context specific mitigation measures being put in place.

That being said, directly attributing the rise in flood risk and associated losses to climate variability is identifying one half of the problem. A strong case can be made for intensive and unplanned human settlements in flood-prone areas being the second half contributing to the flood risk profile of the continent[3].

The total population of Africa stands at just over 1.3 Billion people, having risen by over 400% since 1960 (~281 Million)[4]. This rise has brought with it wide spread urbanization and settlements along flood plains for economic development. These largely unplanned urbanization and rise in numbers of people living in floodplains has led to the blockage of water ways resulting in an increase in impacts associated with flooding[5] .



Flood Risk Management

Since 2015, global frameworks have been designed to ensure sustainable development is at the center of addressing socio-economic challenges. For example, the Sendai Framework for Disaster Risk Reduction, the Sustainable Development Goals and the Paris Agreement on Climate Change are mutually reinforcing and integrate disaster risk reduction with climate change adaptation. This has been done to ensure that sustainable development and humanitarian assistance addresses long term challenges in a consistent and coherent fashion.[6]

This is easily observed in the text of SGD Goal 11 which state:

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BY 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations.

BY 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels.

[1] Flood risk management in Africa – Darren Lambuso 2020
[2] Flood fatalities in Africa: from diagnosis to mitigation - Giuliano Di Baldassarre et al
[3] Flood fatalities in Africa: from diagnosis to mitigation - Giuliano Di Baldassarre et al
[4] Worldometer Africa population data
[5] Flood fatalities in Africa: from diagnosis to mitigation - Giuliano Di Baldassarre et al
[6] Implementing the Sendai Framework in Africa: Progress Against the Targets (2015–2018) - Dewald van Niekerk, Christo Coetzee & Livhuwani Nemakonde

Consequently, humanitarian and development organisations are adopting anticipatory DRM approaches such as Early Warning Early Action (EWEA), Forecast-based Action (FbA) and Forecast-based Financing (FbF). These approaches recognize that the impacts of weather related disasters can be avoided or reduced if weather and climate forecasts, together with in depth knowledge of risk, are systematically used for anticipatory early action. For example, the Kenya Red Cross Society has developed flood Early Action Protocols that defines early actions such as encouraging use of building back safer techniques for dwellings in floodplains, and other effective and socially sustainable actions like dissemination of early warning information and placement of flood markers, that will improve local system's capacity to deal and cope with floods.

Flood Risk Mapping

Critical to delivery of these anticipatory approaches, knowledge is a crucial first step which involves the development of flood risk maps useful in understanding areas at risk, population and infrastructure in these areas. These maps are a representation of layered datasets such as settlements, flood return periods and local infrastructure which are then easily visualized, interpreted and used by disaster risk managers. For example, in the event that there is an imminent hazard, the maps are used to prioritize areas and vulnerable population to be targeted by the early actions.[7] [8] [9] [10]

However, flood risk mapping in Africa has not been universally adopted. A 2016 study identified only South Africa as having produced flood hazard maps for the areas of highest risk for at least the past two decades, and Mozambique where a concerted effort to carry out flood mapping for the major river basins has been done.[11] This needs to change, and efforts to embrace and invest in community based approaches including mapping of flood risk/prone areas should to be encouraged.

Community Flood Risk Mapping

As listed in the prior section, one of the primary datasets needed for accurate flood risk mapping is information on people at risk. Given the earlier described changes in population rise and urbanization, obtaining this data is a crucial in identifying people living in or expanding settlements into flood basins.

In Africa, the primary source for this information is carried out usually every ten years. However, data from these exercise is usually availed in a coarse resolution, typically aggregated to administrative levels.[12] For example, in Kenya, the data is disaggregated and

Engaging with local community in identifying Flood Impact Hotspot in Suswa, Narok County.

[7] Why are maps important?

[8] Flood risk mapping at the local scale: Concepts and Challenges - B. Merz, A.H. Thieken & M. Gocht2

[9] A multicriteria approach for flood risk mapping exemplified at the Mulde river, Germany - Volker Meyer, Sebastian Scheuer & Dagmar Haase

[10] Using flood maps for community flood risk communication

[11] Flood risk management in Africa – Darren Lambuso 2020

[12] Where to draw the line: Data problems and other difficulties estimating urbanisation in Africa - Jacqueline Borel-Saladin

aggregated at the smallest administrative level which is the ward. This makes identification of individuals living in flood prone areas less explicit. Additionally, data on vulnerabilities of persons living in flood prone areas is equally lacking in specificity. As a long term solution, engagement with custodians of this information especially at community level is needed to avail the necessary datasets for future use.

This is a significant challenge in the humanitarian context especially in the development of anticipatory approaches given the rapid onset nature of flood hazards which are on the rise due to climate change and variability. This means ground work on data collection is necessary to fully understand flood risk in Africa. To expedite the process, acquire high resolution information and to ensure community ownership, there is need to embrace local knowledge where community members provide insight into the effects of flooding and vulnerability in their locality that may easily escape the assessments from afar.

This ensures the communities are informed and empowered to be effective participants in decision making, and that communities view flooding as a serious threat to their livelihoods that needs addressing. The modalities of involving the community is diverse, to include simple mapping exercises like sketches of flood areas relative to where they live, or going round the community and visually pointing and collecting coordinates of flood zones.

Results from these exercises should be merged with technical cartographic techniques such as Height Above Nearest Drainage (HAND) to produce succinctly accurate flood risk maps of communities[13].

Flood Impact Hotspot identification in Loita, Narok County.

[13] Height Above the Nearest Drainage – a hydrologically relevant new terrain model - D.Nobreab, L.A.Cuartas, M.Hodnettc, C.D.Rennób, G.Rodrigues, A.Silveirab & WaterloocS.Saleska

Kenya's Case

These community approaches are very effective in localized settings as experienced by Kenya Red Cross Society in supporting Counties develop flood risk maps. This has been done through the World Bank and the European Union support (ECHO) in Narok, Siaya, Makueni and Kwale counties in 2019; and Tana River, Garissa and Kilifi counties in 2020-21. The support provided centered on ensuring sustainability, consequently, Kenya Red Cross Society embarked on a number of capacity building activities to ensure knowledge transfer to county stakeholders in conducting flood risk mapping. As an example, in Narok county, which is largely rural with heavily populated urban centers, at the behest of the County Government, Kenya Red Cross Society together with the County Disaster Management's GIS office embarked on a weeklong exercise to map out new flooding hotspots that were anecdotally known but not properly georeferenced.

With assistance from community members, the team took GPS coordinates of these locations which were then mapped out and layered with rain gauge location data obtained from Kenya Meteorological Department for use in the development of an Early Warning Communications Strategy. This resulted in the mapping out of over 70 locations within the county that experience flood hazard. For areas that had urbanized settlements, the team with the help of volunteers conducted a Mapathon to identify infrastructure and settlements which were then used in development of a Height Above Nearest Drainage analysis to pinpoint dwellings and structures at risk of flooding. This would not have been possible without the involvement of the community in identifying hazard locations given the vast nature of Narok county.

Given that the population of Africa is estimated to rise by 30 % to 1.7 Billion in 2030, there is need to leverage on successes like this, to champion for additional investments in terms of human resource, technical capacity and financial resources required for scaling and ensuring sustainability of such community lead flood risk mapping exercises. These investments will ensure the community is at the center of flood risk management on the continent, there by scaling down potential future losses of lives and livelihoods.

Flood Impact Hotspot identification in Emurua Dikirr, Narok County.

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