

African rivers conference abstract

Theme 1: Hydro-climatic drivers in hydrological river systems

## **Understanding flood risk drivers in semi-arid and arid basins: the case of Turkwel and White Volta basins**

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### **Abstract**

Rising temperatures and increasing rainfall variability are posing high flood risks in semi-arid and arid basins. Communities located in marginalized settings are disproportionately impacted by floods as they are least equipped to manage the flood impacts. This study compared two locations in east and west Africa: The Turkwel river basin in Kenya and the White Volta basin in Ghana. Both locations primarily experience dry conditions, and prolonged droughts are more common. However, in recent years, severe and sudden floods following prolonged droughts are wreaking havoc to vulnerable communities.

Since flood risk is shaped by both physical hazards and social vulnerability, this study sought to understand the changes in rainfall patterns, land surface conditions and water infrastructure management decisions that have implications for floods. The study used remote sensing data analysis and community perspective interviews to obtain a more accurate picture of the physical drivers and that of the community knowledge.

In Turkwel basin, extreme rainfall represented by the 95<sup>th</sup> percentile rainfall showed an increasing trend during 1981-2024, indicating more frequent extreme rainfall events. The wettest years were 2018 and 2019 with April 2018 and October 2019 rainfall leading to flooding. The Lodwar town is the most impacted with communities living close to Turkwel and Kawalasee rivers. Communities indicated that high wind with flooding is the most damaging compound event with wind occurring before heavy rains that requires further understanding.

In the the White Volta basin damage to agricultural fields is impacting smallholder farmers as per this study analysis of rainfall extremes, flood risk, and inundation patterns during

2017-2020. Crops that were wilting because of drought are washed away by floods as the climatic situations changed from drought to floods in a couple of weeks. Communities that live and farm close to the river and those without alternative livelihoods are highly impacted. These climatic conditions are exacerbated by the increase in bare land due to deforestation and land degradation. Moreover, high rainfall when coinciding with water release from upstream dams, the impact is widespread, showing the benefits of analyzing compound events that provide a more accurate picture of what vulnerable communities face.