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LETTER TO THE EDITOR

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# Using social media feeds for mapping and assessing areas affected by flooding due to tropical cyclones

From February to March 2023, Tropical Cyclone Freddy caused widespread flooding and mudslides in Madagascar, Mozambique, and most parts of Zimbabwe and southern Malawi. In Malawi, it was reported that more than 511 people lost their lives, 533 remain missing, and 563,602 people displaced (reliefweb, 2023). According to the Sendai Framework for Disaster Reduction, communities affected by disasters can build back better if past disasters are used as a basis for strengthening disaster risk reduction programs (United Nations, 2015). Therefore, this can be practical if real-world experiences are well documented and made available for disaster management programs. Ostensibly, with Cyclone Freddy, we observed that in Malawi, information about damages related to disasters and response measures taken has been widely shared through social media platforms, especially WhatsApp, Twitter, and Facebook. Thus, social media platforms present the significant potential of data sources to operationalize the provisions of the Sendai Framework (especially priority action 4).

It was observed that information about the hazard and later the damage was mostly shared as screenshots indicating the path of the Cyclone as it progressed towards mainland Africa. At this point, most of the information that was observed in circulation originated from weather forecasting website services. After the Cyclone reached Mozambique, photographs and videos showing damaged locations were shared, and the same happened for Malawi. From the analysis, most of the posts were not radiating from a central point, be it an individual or an institution. Rather random individuals with a social media account shared vast quantities of graphics about damages associated with Cyclone Freddy. This not only nourished the public with near-real-time data about a hazard but also captured information in areas and contexts that are not usually targeted by mainstream sources (i.e., traditional media). Although social media data is known for lacking structure, it is equally seen as one of the big data sources that create opportunities for the development of disruptive innovations and advancements in data-driven science (Kitchin, 2014). So far, in the context of flooding, social media data has been previously used for flood water mapping (Fohringer et al., 2015; Rosser et al., 2017), inundation modeling (Guan et al., 2023; Ouyang et al., 2022; Re et al., 2022), providing valuable information for the development of mitigation measures. However, in the context of the previous tropical cyclones that affected South-East Africa, this data has been rarely gathered and organized to direct efforts to mitigate future similar events.

Considering the current situation, we propose the development of a structured platform that can gather social media data. This platform can use keywords to retrieve and harvest data about hazards, especially how hazards interact with human populations and infrastructure developments s. This data can be stored on a centralized platform where the graphics can be verified by a human observer and deliberate effort can be taken to find the location where the event happened. Malawi recently opened a national data center and this could be used for this purpose (Swinhoe, 2022). The platform can be integrated with existing humanitarian mapping tools such as OpenStreetMap (Haklay & Weber, 2008), and cutting-edge technologies such as Artificial Intelligence to automate the identification of physical location where the picture or video was captured. Equally, such information can be fused with data on response, recovery, and mitigation actions. We believe that this approach can add value to ongoing data-sharing practices by promoting coordination and transparency between relevant government authorities, humanitarian organizations, and the public. However, it must be noted that the use of social media data for mapping and assess flooding can be hindered by the limited presence of active social media users, and the availability of devices with internet access considering that only 20.2% of Malawi's population has access to internet (Kemp, 2022) and acceptability of humanitarian actors toward using social media feeds in disaster management. In addition to the issues mentioned, the developed platform might need to have metrics to indicate data quality. One aspect that is likely to suffer from data quality is assigning a social media graphic to a location especially when a written or oral description of the location

where the picture or video was taken is not available. This can, however, be mitigated by employing multiple verifications or through a score assigned by a human verifier.

In conclusion, developing a structured platform and yet relevant platform for capturing social media data and generating meaningful information may potentially bring significant transformation. This cannot be only useful in Malawi but in many countries where flooding is common and monitoring systems are lacking.

## DATA AVAILABILITY STATEMENT

Data sharing not applicable—no new data generated.

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