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IMPROVING THE ACCURACY OF FLOOD RISK MAPS BY FUSING SAR, OPTICAL IMAGERY, DIGITAL ELEVATION MODEL AND OPEN GEOSPATIAL DATA: A CASE STUDY OF DOUALA ESTUARY IN CAMEROON

Abstract

Data fusion offers numerous advantages when applied to environmental mapping and modelling. In flood risk mapping, it is often required to combine information from a variety of remote sensing and geospatial data sources. This integration exploits the complementary characteristics of various sensors to generate an optimal, multi-perspective view and comprehensive assessment of the flood risk in the target area. It is also an adaptable methodology for deployment in low-income countries (LICs) where fine resolution spatial data and technical expertise could be lacking. Available facts indicate that Douala is highly prone to flood risk especially in the coastal and nearshore areas. In this study therefore, we aim to demonstrate the immense benefits of multi-source and multi-sensor data integration in undertaking flood risk mapping of Douala, Cameroon. This was achieved by fusing several open-access datasets including Sentinel-1 synthetic aperture radar and Sentinel-2 multispectral imagery, a bare-earth digital elevation model (30m FABDEM), and land use and ancillary spatial datasets. The flood extent was delineated through processing of Sentinel-1 and Sentinel-2 imageries in Google Earth Engine, and transferred to the ArcGIS environment for overlay analysis with the DEM and land use data. Preliminary results and analysis showed settlements at risk, at different levels of inundation. To further improve understanding, the flood risk was categorized into four levels of risk ranging from low to very high. These preliminary findings justify the need for fusion of multi-source and multi-sensor data for flood modelling. It also amplifies the importance of building resilient and smart cities for the current and the next generation in LICs.