

IDENTIFICATION OF PRIORITY AREAS AND CRITICAL DATA FOR FLOOD RISK ASSESSMENT IN THE CÁVADO RIVER BASIN

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Introduction

Floods are among the most impactful climate-related hazards in Portugal, causing recurrent damage to populations, infrastructure and ecosystems, particularly in river basins subject to rapid urbanization. The Cávado River basin, in northern Portugal, has experienced repeated flood events and growing exposure of urban areas and economic activities, motivating new, operational tools to support municipal-scale decision-making.

Objectives

- Develop tools for monitoring and local management of flood risk in the Cávado region.
- Strengthen the articulation between climate adaptation strategies and municipal risk governance.
- Build a georeferenced flood-risk repository to support hazard, vulnerability and risk mapping at the local level.

Study Area

Cávado River basin, focusing on the municipalities of Braga, Amares and Vila Verde, identified as priority areas due to their exposure, historical flood occurrence and territorial vulnerability. Within these municipalities, 52 parishes and 3 BGRU units were selected for detailed analysis (high exposure, recurrent impacts, sensitive land-use dynamics).

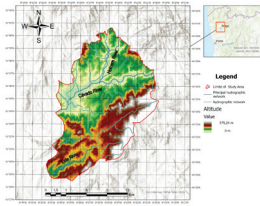
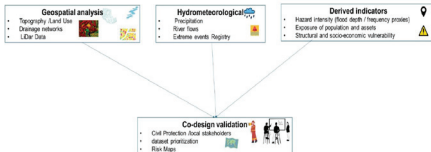


Figure 1: Study Area Map (By Author)

Methodology



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Results

Identification of :

Braga, Amares and Vila Verde as priority municipalities within the Cávado sub-region, based on combined criteria of exposure, historical flood occurrence and vulnerability.

Selection of 52 parishes and 3 BGRU units for detailed assessment, forming the core spatial units for indicator calculation and risk mapping.

Consolidation of a multi-layer GIS database that already enables preliminary hazard exposure and vulnerability screening and supports the design of targeted fieldwork and stakeholder engagement.

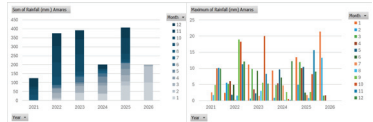


Figure 2: Example Of Amares Characterization of precipitation (CIM Cávado Data)

Higher annual rainfall does not necessarily imply more flash flooding. Flood risk is more strongly controlled by short-duration, high-intensity rainfall events, which can rapidly generate runoff and urban inundation. For this reason, IDF curves and extreme daily rainfall events are more appropriate indicators than annual totals alone."

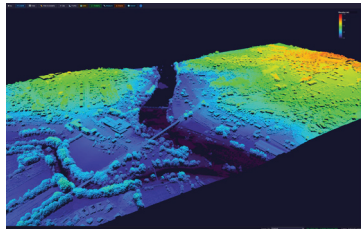


Figure 3: Elevation Map Of Ponte de Bico 3D system in software of flood analysis

The integration of LIDAR-derived terrain data and the HAND method improves flood susceptibility analysis by identifying low-lying areas most likely to be covered by the drainage network during extreme events."

Discussion

The identification of priority areas like Braga, Amares, Vila Verde, aligns with regional flood risk patterns, revealing gaps in current national mapping systems (SNCRH) that lack local resolution. Critical data such as precipitation and topography highlight the need for harmonized geospatial sources, though challenges persist in data availability and integration for real-time and flood forecast applications. These preliminary insights support SMART Cávado initiatives, emphasizing the potential of sensor based and modelled hydrometeorological data, remote sensing, and GIS for enhanced local adaptation and resilience.

Conclusion

This study achieved its primary objective by identifying priority areas and critical data for flood risk assessment in the Cávado River Basin. These initial findings highlight that integrating geospatial analysis, precipitation patterns, historical flood information, and LIDAR-derived terrain metrics provides a robust basis for improving flood susceptibility mapping and computational tools for supporting more effective local decision-making.

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