COASTAL TERRITORIAL VULNERABILITY INDEX: THE IMPORTANCE OF A LOCAL APPROACH IN ANTICIPATING THE IMPACTS OF COASTAL FLOODING

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ABSTRACT

The coastal zone of continental Portugal presents a great diversity of morpho-sedimentary systems such as estuaries, lagoons, barrier islands, beaches, dunes, and cliffs. The high population density and range of land uses, occupation and activities make it an area of great national strategic value. It is also an area subjected to multiple risks. In this study, a multidimensional methodology to analyze, evaluate and interpret local vulnerability (Coastal Territorial Vulnerability Index - CTVI) has been developed and applied in three study areas.

Keywords: Coastal zone, Flood; Overtopping; Vulnerabilities; Multidimensional methodology

1. INTRODUCTION

According to Tavares *et al*. (2021), during the period 1980-2018, 650 overtopping and coastal flooding occurrences were identified in mainland Portugal. Moreover 1708 associated impacts were also detected. This study is motivated by the need to enhance the assessment of coastal vulnerability to flooding on a local scale using multilayer variables. In this approach, coastal vulnerability is calculated based on a composite index that aggregates the different dimensions of vulnerability within a given territory. The scale of analysis and the variety of variables differentiate this methodological approach, that was applied in three study areas located on the western coast of continental Portugal (Figure 1).

2. METHODOLOGICAL APPROACH

The CTVI is a multidimensional approach that results from the analysis and evaluation of four components - morphology, land value, buildings and public areas -, represented by 33 variables (*e.g* artificial protection infrastructures, land use and occupation). After analyzing and evaluating each vulnerability component, the CTVI is calculated by adding the four components scores (Figure 1). Each component of vulnerability and the CTVI are classified from very low to very high.

3. MAIN ACHIEVEMENTS

The results show that in the different studied areas the CTVI is predominantly very low to moderate (86.2%), essentially corresponding to natural areas (Figure 1). There is a marked contrast between these areas and the artificial ones, which generally have high to very high CTVI. With regard to natural and transition areas, the CTVI obtained is fundamentally influenced by the morphological and land value component of the vulnerability. Whereas artificial areas are fundamentally influenced by the land, public areas and buildings components. The comparison of the results and the distribution of

the flooding and overtopping occurrences observed between 1980 and 2018, shows that 83.3% of the occurrences are in areas classified as moderate, high and very high CTVI.

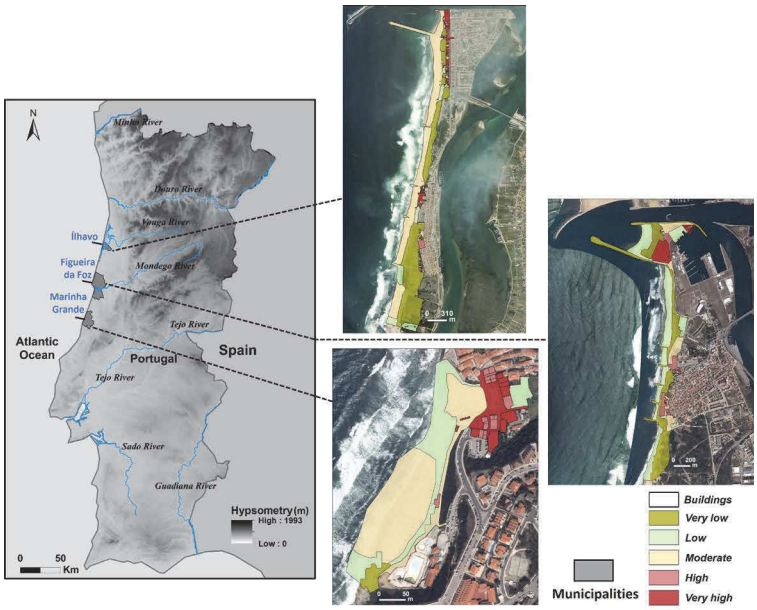

Figure 1. The Coastal Territorial Vulnerability Index in the study areas

4. CONCLUSIONS

The increasing complexity that characterizes coastal areas makes it necessary to provide user-friendly tools for the different stakeholders and coastal managers. In this sense, the CTVI methodology is a comprehensive and functional tool that integrates the different dimensions of vulnerability. The CTVI methodology can contribute towards obtaining a unique framework for evaluating and measuring coastal flood vulnerability with a high level of detail (local scale).

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