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Ex-ante recognition of the basic minimum urban system to improve the ex-post recovery process

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The occurrence of a disaster can significantly affect the functionality of an urban system, by causing a series of direct and indirect impacts on different sectors and infrastructures. UNDRR, in its definition of 'resilience', stresses the significance of preserving and restoring the basic structures and functions of a system through risk management, to support it in recovering from the effects of a hazard in a timely and efficient manner. Indeed, after the occurrence of a disaster, a minimum set of structures and functions have to be in place to guarantee the system's adequate operation and allow the urban system to begin the recovery process.

This research develops and applies the concept of the 'basic minimum urban system' (BMUS), as the subset of physical assets of the urban system to be preserved in order to ensure continuing recovery efforts after a disaster. The BMUS must be determined in accordance with some defined criteria that indicate the relative socio-economic worth of the various assets and the significance of their contribution to the urban system's performance. When the urban system is exposed to multiple and potentially interacting (such as cascading, consecutive, compound, etc.) risks, the assets' contribution to the system's ability to deal with these complex multi-risk conditions needs to be considered and integrated into the BMUS determination.

In light of this, the goal of this work is to establish a methodological framework that combines participatory planning techniques (such as Delphi, fuzzy cognitive mapping, etc.) with quantitative data (like GDP, demography, etc.) analysis to model the urban system and ultimately identify its most crucial components and their interdependencies as the BMUS.

Since an urban area's characteristics and identity have a significant impact on the determination of its important physical assets, the relevance of a certain physical asset to be included in the BMUS may differ from one urban system to another. As a result, the final suggested approach must be able to provide a broad framework that takes into account the unique characteristics and requirements of the urban system and its inhabitants. In this study, incorporating local knowledge for recognizing and representing distinctive characteristics of the urban area in the analysis is accomplished through stakeholders' involvement through a participatory method.

As a result, several indicators are developed to assess the significance of urban system components in a multi-risk environment exposed to earthquakes and floods, with a focus on improving the urban system's ability to recover from disasters. These indicators are designed to

evaluate the relative socio-economic importance of various buildings and urban forms. Indicators are generated in two complementary approaches: 1) participatory with involving stakeholders to illustrate the various interdependencies (physical, functional, etc.) among urban system functions and 2) analysis of quantitative physical and socio-economic data that characterize the urban system and its constituent parts at three different spatial scales (e.g., macro, meso, micro).

The developed indicators are tentatively tested for the Sanremo municipality of the Liguria region (Italy). With the aim of increasing ex-post recoverability, decision-makers could use these indicators as a basis to optimize their ex-ante investment.