

PRODUTO TECNOLÓGICO (PT)

**Flood MATTERS: Decision Support System for Flood Decision Modeling
and Analysis Towards Temporal Risk Evaluation in Sustainable Cities**

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ABSTRACT

Urban adaptation implies combating the multifaceted effects of the climate and requires public managers to propose a broad agenda between public and private technical-scientific institutions, in order to take preventive, efficient, and innovative decisions concerning floods. Given this backdrop, presents a novel Decision Support System (DSS) for enhancing flood risk prioritization in urban areas under the multicriteria approach. Therefore, this DSS explores multidimensional models to support the decision-making process, thereby inserting the decision-maker's (DM's) preferences, in terms of expected utility (EU), by using the Multi-Attribute Utility Theory (MAUT), Decision Analysis and other important methodological advances in this field. Comprising environmental, financial, human, mobility, and social issues simultaneously, the models deal with risk assessment by combining the sources of hazard and its consequences with EUs under a stationary perspective, in short- and long- term decisions. On the other hand, a new multicriteria method was structured to introduce time dependence into the EU-based modeling in traditional MAUT. The Non-Stationary MAUT (NSMAUT) method inserts the increasing impatience by the DM when judging, in terms of utilities, his/her preference for receiving outcomes in the future, with the aid of climatic and demographic forecasting techniques. Numerical applications with these models can be performed by Flood MATTERS DSS, from which statistical tools with sensitivity analysis, georeferencing, and graphical visualization provide the DM with a wide range of information so that he/she justifies their strategic decisions under credibility. Consequently, the contributions explored in this DSS have the potential to promote financial, social, and environmental. This sense, our findings share important evidence that supports policymakers in allocating financial resources to fund adaptation measures, promoting environmental preservation, and combating social inequalities and pessimistic climate projections from integrated urban adaptation planning under climate and urbanization effects. Although the models outlined in this DSS have different perspectives regarding the same problem, the models are complementary, they share useful insights and can be used in a practical context based on local needs and limitations, being replicable to any urban space.

Keywords: Flood risk; Climate change; Multi-criteria decision making/aiding; MAUT; NSMAUT; Decision analysis.

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