

TOWARDS A DECISION THEORY-BASED EXPOSURE INDEX FOR TSUNAMIS

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More than 250,000 deaths and 50,000 injured as well as billions of dollars in property losses worldwide has been the output of 26 tsunamis that have occurred worldwide since 1990. Despite the fact that none of these tsunamis have struck the Puerto Rican coastline, the fact that Puerto Rico is an island and it is also located within a seismically active plate boundary makes Puerto Rico extremely vulnerable to the onslaught of tsunamis. It is, thus, essential to have metrics that facilitate the tasks of strategic planners and emergency responders and that allow to efficiently highlight the potential losses linked to this threat; whether these losses are human lives, economic assets, or infrastructure.

This work proposes a tsunami exposure index based on a decision theory-based approach known as the *Analytic Network Process* (ANP). The conceptual framework for this exposure index can easily be extended to address a wide variety of other natural hazards such as storm surge, hurricanes, as well as other types of flood. This exposure index considers high-dimensional qualitative information from subject-matter experts and 48 quantitative attributes from a variety of sources that allow to decompose tsunami exposure and sensitivity into four factors: *population, land use, facilities, and economy*. All variables were calculated for the tsunami evacuation zone (TEZ) using GIS dasymetric mapping analysis. This method facilitate data transferring from one layer (e.g. population) to another layer with zones of relative homogeneity. An overall exposure and sensitivity assessment will be provided for all 46 Puerto Rican communities. The final map will provide an approximate tsunami exposure metric in the form of a hierarchical weighted average.