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A Preliminary Tsunami Vulnerability Analysis for Yenikapi Region in Istanbul

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One of the main requirements during post disaster recovery operations is to maintain proper transportation and fluent communication at the disaster areas. Ports and harbors are the main transportation hubs which must work with proper performance at all times especially after the disasters. Resilience of coastal utilities after earthquakes and tsunamis have major importance for efficient and proper rescue and recovery operations soon after the disasters.
Istanbul is a mega city with its various coastal utilities located at the north coast of the Sea of Marmara. At Yenikapi region of Istanbul, there are critical coastal utilities and vulnerable coastal structures and critical activities occur daily. Fishery ports, commercial ports, small craft harbors, passenger terminals of intercity maritime transportation, water front commercial and/or recreational structures are some of the examples of coastal utilization which are vulnerable against marine disasters. Therefore their vulnerability under tsunami or any other marine hazard to Yenikapi region of Istanbul is an important issue.
In this study, a methodology of vulnerability analysis under tsunami attack is proposed with the applications to Yenikapi region. In the study, high resolution (1m) GIS database of Istanbul Metropolitan Municipality (IMM) is used and analyzed by using GIS implementation. The bathymetry and topography database and the vector dataset containing all buildings/structures/infrastructures in the study area are obtained for tsunami numerical modeling for the study area. GIS based tsunami vulnerability assessment is conducted by applying the Multi-criteria Decision Making Analysis (MCDA). The tsunami parameters from deterministically defined worst case scenarios are computed from the simulations using tsunami numerical model NAMI DANCE. The vulnerability parameters in the region due to two different classifications i) vulnerability of buildings/structures and ii) vulnerability of (human) evacuation are defined and scored. The risk level is computed using tsunami intensity (level of flow depth from simulations) and vulnerability (structural and human-based) at each node in Yenikapi. The results are presented at high resolution (1m) and discussed.

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