SPATIOTEMPORAL ANALYSIS OF SHORELINE DYNAMICS AND TSUNAMI EXPOSURE ZONES IN PADANG CITY USING REMOTE SENSING AND GIS

BACHELOR'S THESIS

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SPATIOTEMPORAL ANALYSIS OF SHORELINE DYNAMICS AND TSUNAMI HAZARD ZONATION MAP IN PADANG CITY USING REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEM

ABSTRACT

Padang City is one of the coastal regions in Indonesia with a high level of vulnerability to tsunami hazards due to its direct hazard to the Mentawai–Sumatra megathrust subduction zonation. This study aims to analyze shoreline dynamics using multi-temporal satellite imagery and examine their relationship with tsunami hazard zonations based on the area's physical characteristics. The methodology includes digitization of shorelines for the years 2013 and 2025, analysis of shoreline changes rates using the Digital Shoreline Analysis System (DSAS), and overlay of spatial parameters elevation, slope, distance from shoreline, and proximity to rivers to generate a tsunami hazard zonation map. The results reveal spatial variations in shoreline dynamics across Padang City, with significant abrasion observed in Koto Tangah Subdistrict (-1.754 m/year) and Padang Selatan (-1.051 m/year), while notable accretion is recorded in Bungus Teluk Kabung (+1.470 m/year). The overlay analysis indicates that areas characterized by low elevation, gentle slopes, and close proximity to both rivers and the shoreline fall into the category of high tsunami vulnerability. This study demonstrates that the integration of remote sensing data and Geographic Information System (GIS) offers a comprehensive spatial framework to support coastal disaster mitigation efforts and inform risk based spatial planning.

Keywords: geographic information system, remote sensing, satellite imagery, shoreline changes, tsunami hazard.