GIS-Based Assessment of Flood Vulnerability in Addalachenai: A Pathway to Sustainable Coastal Resilience

[1]MAF. Reesha, [2]MF. Minha & [3]MAF. Amal
Department of Geography, Faculty of Arts & Culture, South Eastern University of Sri Lanka

Correspondence: reeshakram@gmail.com

Abstract

Addalachenai, a coastal town in Sri Lanka, is increasingly vulnerable to seasonal flooding due to intense monsoonal rainfall, low-lying terrain, inadequate drainage, and unregulated land use changes. This study aims to assess spatial flood vulnerability and its environmental and socio-economic implications, with the broader objective of recommending sustainable resilience strategies. The main objective is to map high-risk flood zones using Geographic Information Systems (GIS), while sub-objectives include evaluating flood-induced impacts on agriculture, infrastructure, and local livelihoods. The research integrates both primary data (field surveys, stakeholder interviews) and secondary data (rainfall records, satellite imagery, digital elevation models, and land use/land cover maps). GIS-based hydrological modeling and floodplain mapping techniques are employed to analyze flood patterns and vulnerability hotspots. Findings reveal that flood-prone zones are predominantly situated in low-elevation areas with poor drainage, leading to significant environmental degradation, including soil erosion, reduced agricultural productivity, and infrastructure damage. The study proposes a suite of GIS-informed strategies, including wetland restoration, improved drainage planning, community-based early warning systems, and the adoption of climate-resilient land use practices. These measures aim to reduce flood risk, strengthen disaster preparedness, and support sustainable development efforts within vulnerable coastal regions.

Keywords: flooding, Addalachenai, GIS, hydrological modeling, spatial analysis, primary and secondary data, coastal resilience, sustainable mitigation