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Application of frequency ratio modelling technique for predictive flooded area susceptibility mapping using remote sensing and GIS

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Coastal areas are directly vulnerable to natural disasters like floods, which causes massive damages to natural resources and human resources. Dam induces floods can be devastating for surrounding low lying areas. Bharuch is a district with substantial industrial growth, and intended human activities were causing an imbalance in natural resources for planning and fulfilling other demands. Floods can be devastating concerning the Bharuch district's social, economic, and environmental perspectives. The proper analysis becomes very important to reduce the impact and find mitigation measuring techniques. I did flood susceptibility mapping using the frequency ratio model for the six sub-districts of the area. The susceptibility of a flood was analysed using the frequency ratio model by considering nine different independent variables (land use/land cover, elevation, slope, topographic wetness index, surface runoff, lithology, distance from the main river, soil texture, river network) through weighted-based bivariate probability values. In total, 151 historical floods were reported. I took locations for this study, from which I used 72 locations for susceptibility mapping. I combined the independent variables and historic flood locations to prepare a frequency ratio database for flood susceptibility mapping. The developed frequency ratio was varied from 0 to 13.2 and reclassified into five flood vulnerability zones, namely, very low (less than 0.99), low (0.99-2.04), moderate (2.04-5.58), high (5.58-13.2) and very high susceptibility (more than 13.2). The flood susceptibility analysis will be a valuable and efficient tool for local government administrators, researchers, and planners to devise flood mitigation plans.

Keywords: Flood Susceptibility · Flood · Frequency Ratio · Vulnerability · Bharuch