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Flood Hazard Mapping of Lower Indus Basin Using Multi-Criteria Analysis

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Abstract

The Super Flood, which hit Sindh in 2010, has turned out to be a wakeup call and has underlined the overwhelming challenge of natural calamities, as 2010 flood and the preceding flood in 2011 caused a huge loss to life, property and land use. These floods resulted in disruption of power, telecommunication, and water utilities in many districts of Pakistan, including 22 districts of Sindh (Memon, 2012). These floods call for risk assessment and hazard mapping of Lower Indus Basin flowing in the Sindh Province as such areas were also inundated in 2010 flood, which were not flooded in the past in this manner. This primary focus of this paper is the use of Multi-criteria Evaluation (MCE) methods in integration with the Geographical Information System (GIS) for the analysis of areas prone to flood (Papaioannou et. al. 2015). This paper makes use of an open source geographic information system SAGA GIS (System for Automated Geoscientific Analyses) for carrying out MCE (Pickup, 2008). This research demonstrated how SAGA GIS tools can be used to produce map of flood vulnerable areas using MCE techniques. Slope, Aspect, Curvature, Soil, and Distance from Drainage, Land use, Precipitation, Flow Direction, and Flow Accumulation are taken as the causative factors for flooding in Lower Indus Basin. Analytical Hierarchy Process-AHP was used for the calculation of weights of all these factors. Finally, a flood hazard Map of Lower Indus Basin was generated which delineates the flood prone areas in the Sindh province along Indus River Basin that could be inundated by potential flooding in future. It is aimed that flood hazard mapping and risk assessment using open source geographic information system can serve as a handy tool for the development of land-use strategies so as to decrease the impact from flooding.

Academic Discipline and Sub-Disciplines : Flood modeling; Open source

Keywords : Geospatial Modeling; Flood hazard mapping