Flood hazard, vulnerability and risk assessment using geospatial tools: A case study of River Khialy, District Charsadda

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Abstract

This research work is focused on flood hazard, vulnerability and risk assessment in the floodplain of river Khialy, District Charsadda using GIS and remote sensing. Due to gentle slope the study area is mostly affected by the recurrent floods. The present study is based on 2010 flood to develop hazard, vulnerability and risk assessment maps. The developed flood hazard map is divided into three different zones of high, medium and low hazard areas. NDVI (Normalized Difference Vegetation Index) tool was applied on the pre and post images of 2010 flood to evaluate the vegetation change in the study area. Return period for flood was calculated through the analysis of discharge data of the Swat River at Munda headworks. Flood frequency analysis was also done on highest peak discharge data of River Swat at Munda Headworks from 1929 to 2010. The data had been calculated for infrastructure vulnerability through different parameters like building age, building material, building damage and building stories for which the data was collected through field survey. A standard questionnaire was designed for all parameters. The parameters were combined through overlay tool to find the vulnerability map and then applied IDW on the overlaid output. A generalized vulnerability map was developed by dividing the study area into different zones on the basis of observation. After developing vulnerability map it was combined with hazard map and by the combination of these a final risk map was developed. The study should assist to develop and implement flood mitigation strategies.