



Flood Damage Assessment Using Remote Sensing and Geospatial Technology

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ABSTRACT

The 2014 devastating floods caused a heavy loss of property and lives of people in floodplains of Jhelum downstream of Srinagar. This research presents a comprehensive GIS-based flood damage assessment modelling approach in the area. The data for the present study was collected by using different field measurement techniques like GPS, measuring tapes and interviews with different stake holders. The investigator used GPS to the information regarding location, elevation and the depth was measured by using a measuring tape. From the flood depth point measurement collected in the map, flood depth map of the areas was generated using the Inverse Distance Weighted (IDW) interpolation algorithm. The flood depth map thus generated showed the minimum and maximum depth of the flood level. It was observed that the maximum area in the study area was inundated. The land use and land cover (LULC) map of the study area was also generated using supervised classification of the Landsat-8 satellite data. It was observed that the agricultural class was the dominant LULC in the area. In this research, we used the algorithm formulated by Srikantha and Dutta, 2000 is used for the estimation of the flood damage to agriculture and built up areas using the input parameters. Different input layers for the damage assessment algorithm were generated as per the requirements of the model and a few data were used from the literature. The results thus obtained provided the damage assessment for paddy on the basis of flood duration and flood extent area. It was observed that the flood loss to paddy was maximum when the flood inundation duration was 10 days and it was minimum when the duration was 7 days. The total agriculture area under flood was 23243 hectares. The flood damage in case of 10 days flood duration was estimated Rs. 26, 83, 970 and the flood damage to agriculture under 7 days flood inundation was observed as Rs. 18, 78, 779. Thus, the total loss to agriculture in the areas was ~45.50 lakhs. Further for built-up damage assessment, two categories of maps were generated viz structure damage to building infrastructure and content damage within the buildings. A major portion of built-up in the area was effected making a huge number of people homeless and causing damage to the household contents that were kept in the ground floor. In case of built up, the total floor area affected by the floods was estimated as 6,23,60,223 sq. m. The total damage caused to building structure/infrastructure was estimated as Rs. 965, 18,03,514 and the damage to the household contents was valued Rs. 76, 89, 87,384. Therefore the total damage due to the 2014 floods to the agriculture and infrastructure in the area is estimated 1042.5 crores.

Keywords: Flood inundation, Flood extent, GIS, Remote Sensing, Geospatial modelling