Inundation Vulnerability Assessment for Flood Prone Area of Bangladesh Using Remote Sensing and Fuzzy Expert System.

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Many small to big rivers with their distributaries and tributaries are flowing across Bangladesh from north to south toward Bay of Bengal. Among them Padma, Meghna, Jamuna, and Brahmaputra are the main. These rivers have a remarkable effect on the life and livelihoods of peoples adjacent to them. Bangladesh is one of the most disaster-prone deltaic country and global hotspot of natural calamities like flood, cyclone, riverbank erosion and saltwater intrusion. According to the published literature, more than ten major flood events took place during monsoon due to excessive rainfall and water flow from upstream which inundated most of the administrative districts including capital. Those floods caused enormous damage to infrastructures like roads, houses, other properties, and agricultural crops. Therefore, the aim of this study was to assess the vulnerable area of inundation by seasonal floods. The study area includes two administrative districts of Bangladesh adjacent to the Jamuna River covering an area of 5488 km^2. They are highly to moderately vulnerable to inundation by flood water. In this study, an inundation vulnerability map was prepared from the multi-criteria analysis applying fuzzy expert system in ArcGIS 10.8.1® environment using satellite remote sensing techniques. The criteria were selected those are directly related to the flood. Among the analyzed area, 42.50% were found high to moderately vulnerable, 41.89% marginally vulnerable and 15.61% are non-vulnerable to flooding. The prepared vulnerability map was compared with the flood inundation map of Bangladesh developed from the 120 hours forecast data set by Bangladesh Water Development Board (BWDB) on 16 August 2017 and found similar.
The prepared inundation vulnerability map can be helpful for the future urban and agricultural planning, as well as overall management plan during and after the flood events in the studied area. This approach can also be helpful for inundation vulnerability assessment in other riverine areas.

Keywords: Flood, vulnerability, fuzzy, remote sensing, Bangladesh.