

## Flood inundation mapping of downstream region in the Beas River basin: a case study of July-2023 floods in Himachal Pradesh, India

Floods are devastating natural disasters that have a significant negative impact on the economy, infrastructure, and human life. Given how recent climate change effects have increased the frequency and severity of floods globally, particularly in the Himalayan region, precise inundation mapping is essential to develop efficient flood risk reduction plans to ensure better preparation for these events in future. We present a flood inundation map of the Beas River Basin, created using HEC-RAS 2D, during the 2023 July flooding. The flood inundation analysis was carried out between Pandoh Dam and Pong Dam in the Beas River main channel. The aim of this study was to identify high-risk areas and assess flood-prone zones. We used the Copernicus DEM with 1 arcsecond with 30m resolution. For Land Use and Land Cover map we used the 10-meter resolution Geo TIFF files from Sentinel-2 to calculate Manning's roughness values. Furthermore, the insertion of break lines resulted in a small reduction in simulation time and an improvement in model performance. Using RAS-Mapper, the flood inundation maps were displayed according to the water's surface height, depth, flow rate, and arrival time. Stage data observed from the Victoria bridge were used to evaluate the accuracy of maximum water depth during the floodplain and showed good results. Hourly outflow discharge data from pandoh dam is used to simulate the basin, and it is observed to be maximum of 12.12 m depth in the Victoria bridge during simulation whereas it was 12.01 is observed in the bridge. The result from the research analysis could be used by flood management authorities to mensurate the flood at various locations in the study region.