THESIS

APPROXIMATION OF FLOODING EXTENT OF INDUS RIVER AT JAMPUR USING HYDRAULIC MODELLING

Submitted by

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ABSTRACT

Floods occur mainly due to intense storms which cause more runoff than the capacity of the stream within its normal channel section. Flooding could also be emphasized due to poor operation of dams and barrages across the river. Effective flood management requires structural as well as non-structural measures. In 2010, Tehsil Jampur of Pakistan faced severe flood due to heavy rainfall in the catchment of Indus river. Present study area of Tehsil Jampur could not be evacuated during flood and high level damages faced by the property and crop.

The study was conducted along 126 km reach of Indus river, from D/S of Taunsa Barrage to Jampur. Frequency analysis was done by using flood frequency analysis software's i.e. Hydrologic Frequency Analysis (HYFA) and HEC-SSP for the peak flow discharge data of 53 years from 1958 to 2010. Results of frequency analysis showed that the recurrence intervals of up to 500 years by using Log Pearson Type III distribution. Results of frequency analysis showed that the flood of 2010 has return period of about 200 years by using HYFA and HEC-SSP software for the peak flow discharge data.

The discharge and channel cross section data were obtained from respective departments. Pre-processing of data was performed in ARC-GIS software for extraction of geometry of the river. Cross sections were extracted from SRTM DEM by ARCGIS software. DEM cross sections were verified with surveyed cross section. It was found that DEM cross sections or geometry need no adjustment for the present scenario. HEC-RAS hydrodynamic model was formulated to simulate flood movement, flood water level and inundation area under various flood conditions.

HEC-RAS water surface levels were compared with the actual water levels for determining the flooding hazards.

Post-processing of HEC-RAS performed in ARCGIS resulted to determine the flood inundation extent of different return periods. Total inundated area of 50, 100, 200 and 500 years return period was found to be 13365, 14580, 15765 and 17360 hectares respectively.