THESIS

ASSESSMENT OF FLOOD INUNDATION USING HYDRAULIC SIMULATION MODEL

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2015

ABSTRACT

Floodplain is an area adjacent to the main river channel and becomes inundated frequently when the water in the main river channel reaches to its bankful discharge capacity. Floods are the number-one natural disaster in most of the countries of the world in terms of number of lives lost and property damage. The damages resulting from these disasters are devastating. Floods are serious, common and costly natural disasters.

In the present study, frequency analysis results show the recurrence interval up to 1000 years return period by using the Gumbel and Log- Pearson III Distributions. Gumbel distribution gave best results according to chi-square test. So that, the result of frequency analysis using Gumbel distribution shows that 2014 flood in Nullah Deg has the return period of 200 years. Return periods of 2, 10, 25, 50, 100, 200 and 1000 years having the discharge values 403, 1026, 1344, 1591, 1824, 2056 and 2602 cumecs respectively, were used to delineate the floodplain extents. Also the trends of flood peaks in Nullah Deg from 2010-2014 in Monsoon season were estimated that shows August month in Monsoon season is the most dangerous month for flood peaks in Nullah Deg.

The discharge data from 1982-2014 and channel cross sections data were obtained from respective department. Pre-processing of the data was performed in ArcGIS software for extraction of geometry of the Nullah. Cross sections were extracted from Digital Elevation Model (DEM) by ArcGIS software. DEM cross sections were verified with surveyed cross sections. It was founded that DEM cross sections or geometry need no adjustment for the present scenario. HEC-RAS model

was formulated to simulate flood movements, 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 flood hazards. Post-processing of the HEC-RAS results was performed in ArcGIS to determine the flood inundation extent of different return periods. Almost 50 Villages were under flood in the selected reach. At 2, 10, 25, 50, 100, 200 and 100 years return period maximum Villages were flooded within 0.41-0.96, 0.97-1.56, 0.99-1.47, 1.76-2.46, 1.52-2.35, 3.03-4.08, 4.07-5.32 meter water depth respectively. Ahmed Abad, Adhokee, Pir Muhammad Derh, Bhojoke, Bagh, Kamley Bhagh, Jatoke, Chor, Kingra Moor, Zafarwal, Shehzada and Kamal Pur Chishitan were the main highly affected areas Wadala, Feruzpur, Kotli Sayyedan, Kapor pur, Ahal Ghumman, Dhaul, Sovava were the partially affected areas Many more Villages were also affected in the selected reach but they affected less than others.