

ABSTRACT

Flooding is a broad, widespread and most disastrous characteristic in the world. In Pakistan, floods are one of the most devastating and recurring natural hazards. River Chenab is the main western river of Indus River System in Pakistan which undergoes intensive flooding almost every year. Flood frequency analysis is the most common technique used for the at-site estimation of flood recurrence interval. Normal, Gumbel and Log-Pearson Type III (LP3) probability distributions were employed for simulating the future flood discharge scenarios using annual peak flow data (1971–2020) from four gauging stations names Marala, Khanki, Qadirabad and Trimmu headworks of the River Chenab. The results shows increasing trend in discharge which reveal that the capacity of headworks should increase for better flood management in future. Analysis shows the probable discharge values for Marala headworks will be 515043, 809389, 931276, 1052264 and 1172810 cusecs for 5, 25, 50, 100 and 200years flood. D-index is used for the selection of a suitable distribution for estimation of maximum flood discharge. However, as revealed by the goodness-of-fit test (D-index Test), Gumbel distribution was found to be the better fitted probability distribution for Chenab basin. The D-index value for Gumbel, LP3 and Normal distribution is 2.77, 3.08 and 3.06 respectively for Marala station.

After statistical analysis, the data were exported in HEC-RAS to geo-visualize the vertical profile and spatial extent of flood for different scenarios. Vertical Profile of probable floods of 5, 25, 50, 100 and 200 years is visualized which shows the maximum depth of 18.3m. Our analysis generated floodplain and inundation maps and the result that different areas would be under water in different return periods. Thus, finding of the study may help in planning and management of flood plain area of Chenab basin to mitigate future probable disaster through technical approach.