

THESIS

EVALUATION OF FLOODING HAZARDS OF SOAN RIVER
IN RAWALPINDI AREA



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By

JEHANZEB
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ABSTRACT

Pakistan has long history of flooding from the Indus River and its tributaries. Soan River is one of the left bank tributaries of the mighty Indus River. It is mainly a monsoon fed stream with small perennial flow. The present study aims at studying the flood hazards of Soan River in Rawalpindi area for the 8.5 km reach located between Kak bridge (Lahore Islamabad highway) to G.T. Road bridge.

The effective catchment contribution to the study reach was worked out from annual instantaneous peak flood discharges from 21 years data. Frequency analysis was carried out to determine peak flood discharges for selected return periods of 50, 100, and 200 years as 3,943, 4730 and 5580 cumecs. A unit hydrograph was derived by using HEC-HMS model for an insight of the flow pattern. The peaks obtained were converted to flow hydrographs using the synthesized unit hydrograph. HEC-RAS model was used to determine water surface profiles for the various frequency floods. The results were obtained in terms of critical water depths for each frequency flood. The model results provided the extent of flooding over the banks of the reach cross-sections. The area liable to flooding was determined as 1071, 1947 and 3069 hectares for the 50, 100 and 200 years flood respectively.

The 100-year return period flood was selected for designing flood protection measures. Different options for flood protection were considered and out of these options of levee was selected due to its lower costs and ease in construction. The effect of levee placement to protect the area on both banks was studied using the HEC-RAS model and the levee height was determined against resulting water surface levels. The Lacey silt factor was determined through actual sampling and analysis of bed material collected from selected study reach. This information was used in determining the scour depth for levee design. A preliminary sample design of the levee for the largest height was also carried out.