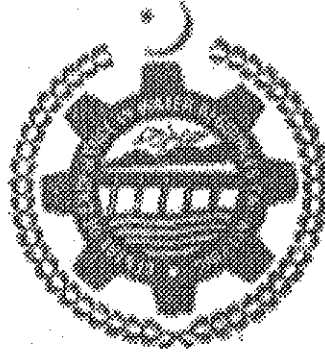


THESIS

**FLOOD ZONE MAPPING USING GIS AND  
HYDRAULIC MODEL**



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## ABSTRACT

Floods in Chenab River generally result from heavy precipitation in 12,600 square miles of Himalayas catchments with limited valley storage. 30 percent of the catchments of Chenab Rive, upstream Marala, lie above permanent snow line. Snowmelts generally reach their maximum in July with an average discharge of about 40,000 cusecs, which is about 40 percent of total flow during July. Snowmelt contribution, however, is not the significant factor of the discharges during high floods of August and September when rainfall contribution is dominant component.

Flood peaks in Chenab River were first recorded in 1892 after the construction of Khanki Headworks. In 1957, a flood of 1,100,000 cusecs was recorded at Marala. High floods were also recorded during 1959, 1973 and 1976. Major flood peaks above 400,000 cusecs occurring during the past years at Marala Barrage and Alexandra Bridge. Flood losses mainly comprise direct damages from river spills to standing crops, irrigation facilities, roads, railway lines, villages, towns, and cities. Exceptionally high floods breached the marginal bunds of Marala Barrage in 1957.

GIS are defined as computer systems capable of assembling, storing, manipulating, and displaying geographically referenced information (USGS, 1998). Originally developed as a tool for cartographers, GIS has recently gained widespread use in engineering design and analysis, especially in the fields of water quality, hydrology, and hydraulics. GIS provides a setting in which to overlay data layers and perform spatial queries, and thus create new spatial data.

Geographic Information System (GIS) applications to floodplain mapping and terrain modeling have been relatively limited. Much of the initial work dealt with the analysis of Digital Elevation Models (DEMs), square grids of regularly spaced elevation data, for hydrologic applications.

In this study 40 km reach from Marala to Alexandra Bridge was selected for flood analysis. Flood discharge of 900000 cfs and 1100000 cfs were used for the analysis of flood plain mapping. The results shows that about 200 and 382 villages with total area of 19586, 313224 acres are flooded with the flow discharge of 900000 and 1100000 cfs respectively. The computed water depths were compared with a physical model study (IRI, 2000) at different locations. The comparison of water depths shows that the results are within the permissible limits.