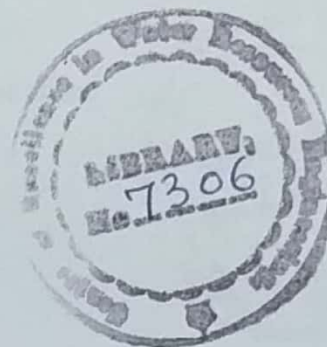


M.Sc. Thesis

HYDROLOGICAL AND HYDRAULIC ANALYSIS OF MITHAWAN
HILL TORRENT FOR WATER RESOURCES DEVELOPMENT



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ABSTRACT

Water plays pivotal role in almost every industry especially in the field of Agriculture. Population is increasing day by day, whereas the water resources are the same. These resources are depleted because of inefficient and poor management especially in this part of sub-continent (Pakistan). One of the major sources of water is the Hill Torrents which emerges from the mountains and diverted towards Agriculture fields for irrigation. Due to steep gradient, flood flows with high velocity which results in damaging to standing crops, irrigation system, houses, roads and sometime human lives also. The flood of hill torrents having a lot of potential for agriculture to meet the shortage of food if manage wisely. There are three major zones of Hill Torrents in Punjab province of Pakistan i.e Pothowar zone, Dera Ghazi Khan (D.G. Khan) zone and Rachna & Chaj zone. Mithawan is one of the biggest hill torrents of D.G. Khan Zone.

A hydrological model using HEC Geo-HMS and HEC-HMS was created for Mithawan watershed in Punjab province of Pakistan. A watershed model delineated using DEM's and HEC-Geo HMS was exported into the HEC-HMS model for estimation of run-off. Rain fall run-off model of Mithawan catchment developed using HEC-HMS model at different return periods by using frequency analysis. HEC Geo-RAS model was used for pre and post-processing of GIS data and HEC-RAS results for flood inundation mapping. Different reaches have been digitized and cross sections have been inserted using HEC Geo-RAS. Water levels at different return periods at different boundary conditions read using HEC-RAS.

Construction of Kachhi Canal (passes through Mithawan Hill Torrent) is a project of national interest to meet the food requirement and for up lift the living standard of the people of Baluchistan province of Pakistan. The 170 Cumecs¹ (6,000 cusecs) discharge of

¹ It's a unit of flow i.e. Cubic meter per second

Kachhi Canal (passes through catchment of Mithawan) is beneficial for the agriculture of Baluchistan province only if exact estimation is ensured by using different techniques. Different options have been studied during research that how the barren land will convert into lush green fields to meet the food requirements of the country. The study is based on detail analysis and investigations of four options for Mithawan Hill Torrent management. Result of the study revealed that peak discharge of Mithawan at Darraha was 79045, 93707, 108068 Cusecs at 25, 50 and 100 years return period respectively. Two storage reservoir having dam height of 196 ft and 209 ft with a storage capacity of 0.018 MAF² and 0.026 MAF respectively have been finalized as a result of this study. In addition, cross drainage structures of different capacities have been finalized at different location of Kachhi canal. It is concluded that flow of Mithawan can be managed by a combination of reservoir and utilization in Pachad³ area (Option-4). Further added, It is also concluded that this study will be helpful in developing the Agro based community in the Hill torrents affected areas and for the design and construction of cross drainage structures & storage reservoir at different locations.

² Million Acre Feet

³ Area Irrigated with hill torrent water.