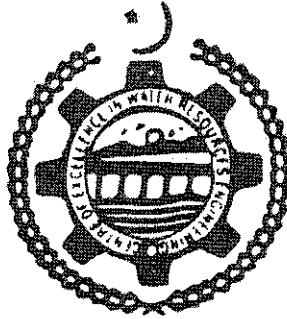


**THESIS**

**PHYSICALLY BASED SEDIMENT AND RUNOFF  
MODELLING OF RAWAL WATERSHED**



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## ABSTRACT

Water is vital, so water resources are important part of our life. Dams are built to preserve water in order to ensure continuous supply of water. In Pakistan one of the major problems faced by dam is of sedimentation which is decreasing reservoir life day by day at rapid rate. The sedimentation problem can be controlled if there is an idea regarding amount of sediment being carried by the river flow from the catchment area by implementing effective watershed management strategies. In Pothowar region there are a lot of small dams mainly constructed for agricultural and drinking purpose. Rawal dam located in Pothowar region is one of the oldest dam of Pakistan. It is located near Islamabad and is the main source of drinking water for Rawalpindi and Cantonment area. The feasibility and detailed engineering design studies of Rawal dam were done by using rainfall record of Murree and Rawalpindi from 1927 up to 1958 as there was no flow data available at the site. At the time of dam construction there was no systematic compilation of flow and sediment data. There was no sedimentation study conducted for dam. Now days the flow data is available only on monthly bases while still there is no record of sediment data. The sediment data is available only in the form of Hydrographic surveys. So far 7 hydrographic surveys have been conducted and the most recent was conducted in 2000. This study was thus undertaken to analyze sediment yield from the Rawal Watershed. Simulation of flow and sediment yield from the watershed was conducted using SHETRAN model. The model was calibrated and verified for the local condition to determine the rate of erosion and sediment yield in the watershed. The available monthly flow data was used for model calibration. The simulated flow yielded good calibration results with coefficient of efficiency (COE) of 0.98 and Percent Bias (PBIAS) coefficient of -2. The sediment data was generated from

a relationship between discharge and sediment load. The calculated sediment data was used for the calibration and validation of model. The sediment load calibration was done for year 2001 with the coefficient of efficiency (COE) of 0.94 and Percent Bias (PBIAS) coefficient of -5.8 showing satisfactory model performances. The results obtained were quite accurate because of the fact that the sediment data was generated. The results can be made more meaningful if there is availability of detailed (daily or hourly) flow and sediment data. The land use of a catchment was altered to analyze the impact of land use (vegetation) on the sediment yield. Based on the results, the SHETRAN model was confirmed to be a reliable tool for catchment sediment yield modelling including simulation of different land uses.

It is recommended that for more reliable runoff and sediment yield modelling of Rawal watershed, availability of detailed data (hourly or daily flow and sediment data) should be made possible. Concrete efforts should be done to increase the forest area in the catchment so that sediment yield can be decreased.