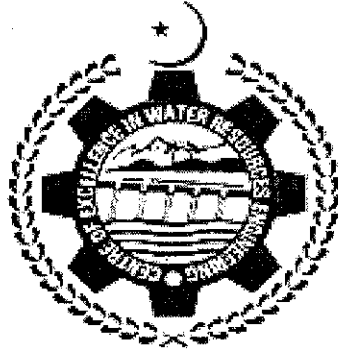


THESIS

**SENSITIVITY ANALYSIS OF DIFFERENT LANDUSE AND
TOPOGRAPHIC PARAMETERS FOR SOIL EROSION**



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ABSTRACT

Climatically major part of Pakistan falls in arid to semi arid zone, where the rains are seasonal and sporadic. Almost all hilly nullahs /hill torrents originating from the mountains of these areas receive non-perennial flows and pass through large tracts of fairly leveled and fertile land before they join the Indus Basin System. These hill torrents bring in flashy floods of shorter duration and higher magnitudes. Due to steep gradients, flood flows move with high velocity, which result in damages to standing crops, irrigation system, houses, roads etc, and some time human lives also. In fact, these hill torrents have lot of potential for agriculture produce to meet up the shortage of food and raw materials for agro based industries, if managed wisely.

Pothowar hill torrent one of the major hill torrent of Punjab province. Pothowar area is one of the regions of Pakistan where the topography is classified as plateau along with intermittent gullies and ravines; and as such no large canal system can be developed. The physical features of the area dictate the provision of local irrigation system for isolated small tract of land having topographic uniformity. Nevertheless the hill torrents flood flows are mostly wasted except those where storage arrangements have been provided. The plateau comprising the districts of Rawalpindi, Attock, Jhelum and Chakwal, forms about 40% of Punjab barani area.

Soil erosion is one of the most important land degradation issues in the rain fed areas. A study was conducted in the Dharabi watershed of Pakistan to estimate the extent of soil erosion under different land use practices linked with rainfall-runoff phenomenon. Different plots with varying slope from 1% to 20% are selected for measurement of runoff and sediment yield. The rainfall data collected from 2004 to 2008 at the Soil and Water Conservation Research Institute (SAWCRI) Chakwal show

an average annual rainfall of 632 mm. However, 52% of it occurred from June to September. All runoff events occurred in summer especially during monsoon season whereas the rainfall events were less intense during winter. The rainfall intensity of the major summer rainstorms ranged from 50 to 100 mm/hr, indicating high erosion possibilities in summer. Sediment yield of small gully catchments ranged from 4.7-8.3 ton/ha/year. Soil erosion assessment is a capital-intensive and time-consuming exercise. A number of parametric models have been developed to predict soil erosion at drainage basins, Soil erosion model used in this study is based on the methods explained by Morgan (Morgan, 1986; Morgan and Finney, 1984).

Different plots of different slope treated with different vegetation cover and management practices are used. The WEPP model is used for simulation of different hillslopes and watershed for the calculation of sediment yield. The model was calibrated and validated for data of rainfall events, runoff and sediment yield recorded at SAWCRI sub catchment. The model provided a good agreement between the measured and the computed rainfall and runoff. The distributed input parameters include rainfall amounts and intensity, soil textural qualities, plant growth parameters, residue decomposition parameters, effects of tillage implements on soil properties and residue amounts, slope shape, steepness, and orientation, and soil erodibility parameters. Each class was analyzed individually in terms of soil type, average slope, land use / land cover and different climatic factors for the estimation of sediment yield to find out the dominant factor leads to higher erosion. It provides us help to analyze main cause of soil erosion and take conservation measures to reduce it.