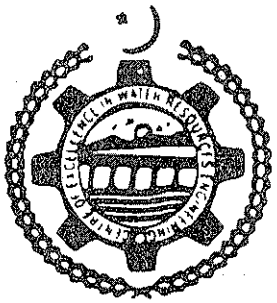
THESIS

DEVELOPMENT OF DECISION SUPPORT SYSTEM FOR OPTIMAL CROPPING PATTERN OF A SELECTED DISTRIBUTARY



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ABSTRACT

Efficiency of irrigation system depends upon providing specific quantity of water from canal through irrigation outlets to the stake holders. The purpose of efficient irrigation system is to provide due share of water to the farmers depending on temporal and spatial scale. The desired objectives can be achieved to a great extent by improving the operation and management of existing system. Efficient planning and careful management is essential to achieve the required efficiency of an irrigation system. The study was conducted on Pervaiz distributary of LCC (East) area in district Faisalabad.

Integrated Water Resources Management (IWRM) approach at the catchment level especially for a water stressed system creates room for conflicts among the upstream and downstream users. Decision Support Systems (DSS) can provide effective tools for water allocation, supply and demand analysis. This research used Water Evaluation and Planning System (WEAP) as a DSS to evaluate the current water management scenario. The main objective was to apply WEAP to the Pervaiz distributary and assess the impact of various proposed water demand change under various scenarios.

The collected information was geo-referenced in GIS software (ArcView) to create spatial database. CROPWAT software was used to access the crop water requirement of the different crops grown in study area for determining the irrigation water requirement of the study area. The FAO Rainfall-runoff method was used to simulate runoff in CROPWAT. In the simulations using WEAP, the study area was divided into 17 sub areas where the supply and demand nodes were spatially located.

Two main scenarios were built from the reference scenario; proposed cropping pattern and climatic change effect scenarios. If the present water situation continues then the water delivery in 2015 will decrease mainly for the months of June, July and August and for the remaining months supply continues almost equally for 2011 and 2015. As the results of CROPWAT model shows that June, July and August are the peak demanding months and if water shortage occur in these months then a huge loss of crop production can be faced. Scenarios were created to reduce the water shortages. Unmet water demand for the Reference Scenario which basis on current situation of water supply in study area was estimated 10.76 Mm^3 while for the Proposed Cropping Pattern estimated unmet water demand was 7.89 Mm^3 and for Climatic Change Effect scenarios unmet water demand was estimated 11.07 Mm^3.