

**FORMULATION OF A GIS-BASED DECISION SUPPORT SYSTEM FOR THE
APPROPRIATE ADOPTION OF CROPS AND IRRIGATION TECHNIQUES**

by

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(2017-MS-WRE-3)**

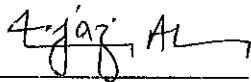
A THESIS

presented to the university of engineering and technology, Lahore
in partial fulfillment of the requirements for the degree of
Master of Science

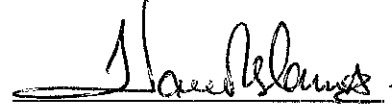
in

WATER RESOURCES ENGINEERING

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Approval Date:

19/1/2022

CENTRE OF EXCELLENCE IN WATER RESOURCES ENGINEERING
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ABSTRACT

Water resources in Pakistan are dwindling but water demand is increasing tremendously due to escalated population and urbanization. Almost 90% of the agricultural production comes from irrigated land. The irrigation water paucity and misuse of land resources have become an alarming issue and threatening the food security in Pakistan. Meticulous suitability analysis for different irrigation methods and crops is the basic prerequisite for sustainable use of land and water resources. Therefore, the present study aims to evaluate the acceptability of different irrigation techniques and crops by using a multi-criteria Analytical Hierarchy Process (AHP) leading to a decision support system to recommend feasible irrigation techniques for selected crops in three civil divisions (i.e., D.G. Khan, Multan & Bahawalpur) of Southern Punjab. Multi-criteria Analytical Hierarchy Process (AHP) is applied to assign the weights to criteria and sub-criteria for parametric evaluation and pairwise comparison.

The study revealed that high suitable areas are 63%, 28%, and 9% under drip, sprinkler and surface irrigation while the highly suitable area for sorghum, maize, rice, wheat and tomato falls to the tune of 99.50%, 99.29%, 99.98%, and 93.34% and 99.62%, respectively. The analysis of the combination of characteristics manifests that vegetable crops lie in the highly suitable category under surface irrigation while cereal crops under sprinkler irrigation are moderately suitable and vegetable crops lie in a highly suitable class under sprinkler irrigation, i.e., 92% to 94%. The fruit crops under sprinkler irrigation lie in suitable to moderately suitable sort, i.e., from 42% to 64%. This distinct suitability of different crops & irrigation techniques may pave the way for policymakers in decision-making and water management. An awareness campaign for the cultivation and rotation of crops with higher potential suitability may be launched. The suitability maps may lead toward crop zoning begetting optimum yield with minimal resources through the study area.