

Research Paper :

Performance evaluation of water delivery system for command area of Som-Kagdar Irrigation Project, Rajasthan

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ABSTRACT

Distributary wise water delivery performance of the Left Main Canal (LMC) and Right Main Canal (RMC) of Som-Kagdar Irrigation Project was examined, using adequacy and relative water supply indicators. These indicators were calculated for ten distributaries of LMC and RMC for five month irrigation period of *Rabi* season, using measured water deliveries and calculated crop water requirements. Daily depth of water at each distributary was recorded to measure the discharge during the season. Crop water requirements were calculated using CROPWAT model. The distributary wise water delivery performance indicators have shown good to fair in head and fair to poor in middle and poor in tail reaches of the LMC and RMC, respectively. Considering the irrigation season and the system as a whole, the calculated indicator's average values were found as poor for adequacy and relative water supply. These results have also shown that there is a systemic water delivery problem in the system. The analysis of results of the spatial and temporal dimensions of these indicators have shown that factors causing this problem are derived partly due to physical state of system and partly due to improper operation and management.

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Water is one of the most important, valuable and sacred inputs in the agriculture today. Ever increasing population of the country coupled with limited availability of cultivable land and water resources are putting tremendous stress on the environment. Limited availability of water resource made it mandatory to use them optimally. It is envisioned that half to two third of increase in agriculture production would come from the irrigated land. Indian agriculture is highly dependent on monsoon which is erratic, inadequate and uncertain. Practicing irrigation is indispensable to increase production, it has reflected in increased irrigation area in the country from 22 mha to 90 mha over the period of time.

Due to increasing cost in developing new water resources, the only option left is to enhance the current level of performance of water deliveries and distribution in irrigation systems. Maintenance of irrigation water delivery and distribution system is essential for sustainability of agricultural production. There is a definite need for performance measures that relate design and management decisions for achievement of measurable objectives. It is necessary to evaluate the separate contributions of these components to the overall

performance of the system.

Adequacy and relative water supply are performance objectives considered when evaluating irrigation water delivery system. Adequacy can be defined as the ability of an irrigation system to meet the required amount of water. Relative water supply is the ratio of total water supplied to the total demand at field level.

Various researchers in the country and overseas have developed optimization model for irrigation planning of Som Kamla Amba irrigation project (Mahla and Gupta, 1997), optimization model for better water allocation integrating soil-water-balance model (Wardlaw, 1999) to produce the linked model (IISMOPT), a new planning model for canal scheduling for rotational irrigation (Santhi and Pundarikanthan, 2000) with multi-objectives *viz.*, equity, adequacy and timeliness which showed better performance as compared to the conventional scheduling procedures. An irrigation scheduling model was developed for irrigation scheduling for single and multiple fields (George *et al.*, 2000). Two models, ISM and CROPWAT, gave similar values of soil moisture but showed variation after second irrigation. Simulated bean yield was slightly higher than measured yield in both single and multiple