ABSTRACT

This study develops an approach for command area planning for a minor irrigation project incorporating factors which affect micro level planning. Mehgawan Minor Irrigation Project of the Narmada basin has been selected for the study. A linear programming allocation model was formulated by considering the four objectives viz., i) the maximisation of net benefit, ii) the maximisation of total production, iii) the maximisation of labour employment and iv) the minimisation of investment subject to the constraints dealing with the crops, soil, land, individual crop area, food and nutrients requirement, fertilizer and labour availability and water requirement. Four factors, fertilizer availability, irrigation water release policy, area restriction on individual crops and health of the conveyance and the distribution systems were considered to be liable to undergo changes in the course of the running of the project. To present a plan for each situation, 108 combinations involving six levels of fertilizer availability, three water release policies, two options of infrastructural facility development and three irrigation system efficiencies were used to develop the alternate plans. Based on these results obtained from the single objective based planning, the goal programming model was formulated for solving the multiobjective allocation problem for the eight environments to take care of different stages of the fertilizer availability, the monsoon forecast and the infrastructural development. The weekly reservoir

operation schedule was prepared for all the identified crop plans. The study revealed that improvement of 10 per cent in irrigation system efficiency will yield an annual net benefit of about Rs. 36,000/-, but the improvement should be taken up if and only if fertilizer become unconstrained. The fertilizer availability needs to be atleast doubled as soon as the project is completed to utilise the significant portion of the irrigation potential with further increase to unrestricted level. If the monsoon forecast indicates normal rainfall, unrestricted water release policy should be adopted, but in case of the subnormal rainfall forecast, the water release policy should be 50 per cent supply during kharif season and corresponding plan should be adopted. This will lead to only just 2.9 per cent drop in the total net benefit and 6.77 per cent drop in the labour employment potential for 18.46 per cent drop in water supply. In multiobjective command area planning for a minor irrigation project, the production maximisation and the labour employment maximisation should not be allotted priority higher than that of the net benefit maximisation objective. The employment generation which is of paramount importance in an industrially backward district will be better served by the infrastructural facility development instead of according higher priority to the former in the planning process.

Key words: Alternate plans, Fertilizer availability, Infrastructral facilities, Irrigation water release policy, Multiobjective linear goal programming, Project environment, Irrigation system efficiency.