

ABSTRACT

In this study, a two pronged attempt has been made to undertake systematic evaluation of the soil conservation measures adopted in Wagarwadi watershed and comparative allocation of land to different crops considering watershed-tank-command area continuum under varying resources availability and management practices of Aundha minor irrigation project located in Parbhani district of Maharashtra state. Also the economics of existing and recommended allocations were evaluated for the project.

A collaborative integrated watershed development study was taken up along with the State Soil Conservation Department. Intensity-duration-return period relationship was developed for Wagarwadi watershed and daily, monthly and annual erosion index values were computed. Benchmark information on socio-economic status of the people, physico-chemical properties of the soil, productivity, land use and cropping pattern were used to evaluate the impact of soil conservation measures on the development of watershed. Measurements of runoff and sediment loss were carried out and data on crop productivity were collected after the execution of different soil conservation structures and adoption of other conservation practices.

The recharge was estimated with the help of water balance model using daily rainfall and evaporation data. Steady state condition for the aquifer system has been simulated assuming an equilibrium condition during May, 1992. The monthly recharge estimates of the recharge model and other inputs were fed to the finite difference aquifer model in the transient condition and after several trials final model was developed.

The watershed development programme helped to conserve the large percentage of runoff water and soil in situ, raised the watertable, increased the crop productivity and enhanced socio-economic status of the people.

Considering various resources availability and constraints of Aundha minor irrigation project command area, single and multi-objective mathematical programming models were formulated. Different parameters such as requirement and availability of water, labour and fertilizer; crop economics, food, nutrient and animal feed requirements and their availability from recommended cropping pattern were estimated.

Single objective plan viz. maximisation of net benefit and production; minimisation of investment, maximisation as well as minimisation of labour were considered using different levels of fertilizer and irrigation efficiencies. Finally a best compromise plan was worked out with the help of a multi-objective allocation model using Fuzzy technique.

Runoff value obtained for Aundha minor irrigation watershed by applying curve-number technique was very close to the value obtained from Wagarwadi watershed by using water balance model. Therefore, this result will be applicable to similar ungauged watersheds for determination of runoff.