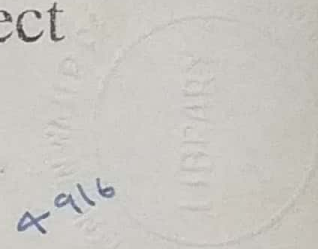


Prediction of Drainable Surplus of
Fourth Tile Drainage Project
Faisalabad



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For the Degree of Master of
Philosophy in Water Resources
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June, 1993.

ABSTRACT

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The main objective of this study was prediction of drainable surplus of Fourth Drainage Project (FDP), Faisalabad also known as Lower Rechna Remaining Project (LRRP). Before achieving this objective the water balance aspects of six subsurface drainage projects in Pakistan were reviewed to gain insight in the drainable surplus calculation so that the methodology can be refined to calculate the drainage coefficients of the subsurface drainage projects. In this study the drainable surplus of the project was predicted for ten monsoon (wet) and non-monsoon (dry) seasons on the basis of nodal division of the project made for the groundwater study of the area by SGMP (Standard Groundwater Modeling Package). Water balance in the unsaturated zone was made by using the spreadsheet program LOTUS 123. The calculated maximum net recharge is 1.46 mm/d for monsoon 1986 based on actual rainfall of 1985-89. The monsoon rainfall of 1986 was actual rainfall with a return period of 3 years. Simulation of the five years return period gave an average net recharge of 1.53 mm/d for an area of 6576 ha. The model is made flexible for the input parameters of the water balance to find the sensitivity of the net recharges towards the input parameters.

In the sensitivity runs actual rainfall with a little part of direct surface runoff was taken for a particular season. Direct runoff from rainfall is very little for the cultivated areas but from the barren areas it is comparatively more. By changing the percentage of rainfall as surface runoff or the rainfall data of a different station (Faisalabad), instead of Chak 77/GB, or 5 years return period rainfall, large differences were observed. It means that rainfall is very sensitive for determination of the net recharges. The next most sensitive parameter was crop ET. Evaporation from barren/fallow lands was found less sensitive.

Water used by crops was estimated by Pan evaporation and the Jensen-Haise methods to calculate reference crop ET. Results obtained by the both methods were used to see the effect on net recharges. It was observed that the crop ET was more sensitive

to net recharges as compared to bare soil evaporation. Results by Pan method were 5 % lower than the Jensen-Haise which affected the net recharges more than 50 %, so care is needed in using the method for this particular study. Jensen-Haise was used because it is widely used in Pakistan and was calibrated for Pakistani conditions.

For the basic model run the average recharges for the whole area for the whole duration (1985-90) were comparable with the SGMP results. But on the nodal basis or seasonal basis the results were not much comparable. The calculated net recharges (1.53 mm/d, 5-years return period) were in between the results obtained by SGMP (0.66 mm/d, max. value for monsoon 86) and the previous studies as USBR, 1989 (2.44 mm/d, designed value).