B. SUMMARY

Title: Identifying optimum agrowell dimension for sustainable irrigation in Anuradhapura district.

Research Institute: The Open University of Sri Lanka

Chief Scientific Investigator: Dr C.Shanthi De Silva
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Period of Contract: From January 15, 1997 to June 30, 2000.

Scientific background and objectives

Due to serious water shortage during the yala season in the dry zone, the irrigated rice field area reduces sharply. Consequently, the ratio of the other field crops to rice increases relatively during yala season year by year with the increase of privately owned agrowells. Because of this, agrowells are being constructed without proper scientific investigations and leading to over exploitation of the groundwater resource due to high density of wells. Therefore the objective of this study is to identify the optimum well dimensions based on aquifer properties and recharge characteristics.

Experimental method

A case study was conducted in the Meegassagama lower command area of the Trippane Tank Cascade System in Anuradhapura District. Study area was fully equipped with twenty observation boreholes covering seven agrowells, raingauge, parshall flumes and evaporation pan. Daily monitoring was done on the groundwater levels at twenty observation brothels and seven agrowells before and after pumping, rainfall, evaporation, tank water level, tank water issue and outflows at the drainage. In addition crop information such as type of crop, cultivation extent, time of planting, 20% cover, time and harvesting etc was recorded periodically. Soil infiltration rate, permanent wilting point and field capacity were also measured during the study period. Several pumping tests were conducted during the study period in all seven wells during early and late dry seasons. Analysis was mainly based on the radial flow model (RFM) developed by the principal investigator in her Ph.D study. Pumping tests were analysed by RFM to identify the horizontal hydraulic conductivity and specific yield. And the same model was used to study the long term behaviour of the agrowell and to develop the nomograph. Soil moisture balance based computer model was used to estimate the annual average recharge to the aquifer.

Results and Conclusion

Average horizontal hydraulic conductivity and the specific yield of the study area were 5m/day and 0.025 respectively. The average annual recharge to the aquifer was 170 mm. Groundwater balance was developed with components such as

recharge, change in groundwater storage, tank water issue, and seepage losses from the tank, abstraction, outflow and big tree evaporation. It is extremely difficult to perform a perfect balance due to the errors in the several of the components. Nevertheless, groundwater balance indicates valuable information such as the groundwater flow under the tank bed even during the dry season, which connects the tanks in the system. Nomograph was developed using the RFM and the results obtained on the aquifer parameters, recharge and groundwater balance to identify the optimum well dimension such as optimum well radius, well depth and spacing in a new agrowell system and/or the sustainable volume of water available for irrigation in the existing agrowell system of the study area.

C. If the contractor publishes the results of the research

Not yet published.

D. A Thesis for a postgraduate degree

Nil

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