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GROUNDWATER MODELLING FOR MANAGEMENT – a CASE STUDY in BANGLADESH

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Abstract

Most of the human activities including agriculture need ample quantities of water. Increasing demands of food by ever increasing population has resulted in the utilization of water resources to the limit. In Bangladesh groundwater is the source of municipal and irrigation supplies, it suffered the considerably from the growing demands. In many areas groundwater quality has deteriorated by saline water intrusion, arsenic contamination, pollution from the surface sources and pesticides.

Bangladesh is located in the low lying delta of one of the largest river systems in the world and is subject to alternating periods of excess and deficit in available water in the form of rainfall, recurring floods and cyclonic storms. At present, about 40% of the cultivable land has access to some form of irrigation out of which about 63% of the area (1994-95) is irrigated using groundwater. It was estimated during surveys, carried out in 2002, that there are more than 40,000 deep tubewells (DTW), 300,000 shallow tubewells (STW) and over 900,000 manual irrigation pumps in operation in the country. About 95% of drinking water is derived from groundwater sources. Due to over-exploitation of groundwater for irrigation, hundreds of hand tube wells are dry for a period of the dry season. On the other hand, the dry season (Nov-May) water demand will increase from the presently estimated 19,800 Mcm to 34,000 Mcm in 2025 due to expected increase in dry season agriculture. A major portion of the dry season demand will be met from groundwater sources.

The study area is located in the north-western part of Bangladesh and covers app. 475300 ha with a cultivated area of app. 307300 ha. The main problem of the study area is that the current irrigation setup fails to bring all the cultivable lands under irrigation. During dry season most of the tubewells (DTW and STW) are dry due to excessive withdrawals of groundwater, resulting in a tremendous scarcity of irrigation water. Also the quality of supplied water is not good in some cases. There are currently 1505 operating deep tubewells and 45060 shallow tube wells in the area. In this study a groundwater modelling methodology is applied to assess groundwater resources, zoning of areas suitable for DTW and STW, determination of new irrigation areas and spacing of tube wells. The groundwater modelling will further help in determining aquifer characteristics, safe and sustainable yield, recharge patterns and lead to recommendations for protecting the quality of water.

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