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“Utilisation of diversity in land use systems:
Sustainable and organic approaches to meet human needs”

Hydrological and Hydro-Chemical Investigation for Sustainable Agricultural Management in Bangladesh

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Abstract

The study area is in the North-West part of Bangladesh, which is one of the driest parts of Bangladesh, normally less rain from November to April. Bangladesh government has decided to increase the crop coverage in this part and thus need a sustainable agricultural practice and management for that area. In this study, hydrological and hydro-chemical investigations have been carried out to determine the basic parameters required for development of groundwater model, in turns to assist sustainable agricultural management. About 1233 bore-hole logs have been collected from hydrological analysis and model preparation. On the basis of subsurface lithological information, a regional (Manda, Raninagar, Naogaon, Bagmara and Mohanpur ‘Upazila’) and two local scale hydrostratigraphic model, fence diagrams and cross-sections have been prepared using rockworks software 2004. The Hydrostratigraphic model and fence diagram show the presence of two major aquifer systems in the study area, which is separated by a thin aquitard layer. Model cross sections show that in some places the upper aquifer merges with the lower aquifer. The model cross sections also show that the thickness of the upper aquitard is not uniform in the study area. It shows that in the south—western part thickness of upper clay is about 30 m higher than the north-east part. On the other hand, the thickness of the main aquifer (lower aquifer) is higher in north-east than the south west. Thickness map of the aquifer constructed using the sounding interpretation results for the ‘Manda upazila’ block shows the maximum thickness of 125 m in Chak Siddeshwari and Talpatila areas and gradually decreases towards the surrounding areas. The sounding results comparing with available water quality data reveals that the aquifer in the lower part bears saline water. Depth contours along the upper surface of the saline zone show the maximum depth to the saline zone occurs at Talpatila and Chok Siddeshawari areas reaching 114 m. Hydro-chemical investigations show no remarkable aquifer contamination with arsenic. For better management of crop production in the area, the information of the study will assist to prepare an interactive information system and DSS for the government.

Keywords: Aquifer system, bangladesh, hydrostratigraphic model, irrigation, rockware 2004