

DELINEATING GROUND WATER POTENTIAL ZONES IN THE MARGINAL ALLUVIAL AREAS OF GANGETIC PLAIN - A CASE STUDY FROM NALANDA DISTRICT, BIHAR

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ABSTRACT

Ground water resource development in marginal alluvial areas of Mid-Gangetic plain in Bihar bordering the Precambrian highlands to the south, is a challenging task in view of limited thickness (less than 120 m) of the alluvial deposits and predominantly argillaceous nature of the sediments. The present investigation has been carried out in 250 sq km area, bordering the northern fringe of Chhotanagpur Gneissic Complex. The entire water demand of the area is met up from unconsolidated aquifers within the Quaternary alluvial deposits, laid over northerly sloping Precambrian bedrocks. A total of 20 Vertical Electrical Soundings, using Schlumberger configuration have been carried out in the investigated area to delineate and configure the geometry of the aquifers. The litho-units with resistivity values of 15-150 ohm-m were interpreted as sands of various size grades, which are accumulated along the trough of the bedrock forming potential aquifers. Clay and sandy clay show resistivity values of less than 10 ohm-m and 10-15 ohm-m respectively. Geometry of the various lithounits, prepared by geo-electrical section and panel diagram, reveals frequent lateral facies changes over short distances. A clay blanket with variable thickness of 5-58 m, at the top of the succession, puts the aquifer below under semi-confined condition. Promising aquifers identified for ground water development are: (i) a channellag deposit in the western part and (ii) sand deposit along the palaeo-channel of the Panchana, an ephemeral river draining along the eastern part of the study area. Pumping tests conducted in two wells indicate transmissivity of the palaeo-channel deposits ($> 500 \text{ m}^2/\text{day}$) to be much better than that of the channel-lag deposits ($320 \text{ m}^2/\text{day}$). Storage coefficient of the aquifers ranges from 4.3×10^{-3} to 5.3×10^{-3} .