MODELING OF STREAM-AQUIFER INTERACTION IN A PART OF HINDON BASIN

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ABSTRACT: Many rivers particularly small ones in northern India are flooded during the monsoon period but flood water flows off in a short time and cannot be utilized. However, potential shallow aquifers occur in these areas which are known to be interconnected with these rivers. Lowering of water-table in these areas may result into a substantial recharge of these aquifers due to the influent nature of these rivers (Gupta et al., 1985). It is therefore, necessary to quantify the extent of this recharge under different scenarios. An experiment is reported (Nabi Hasan et al., 1990) to have been carried out in a part of the river Hindon near Gagalheri, dist. Saharanpur, U.P. The water table in this area has gone down by 5 meters due to successive droughts during 1985-87. It was found that during 1988 when the monsoon was normal water-table has been found to be almost fully recouped.

A finite difference 2-D groundwater flow model has been prepared using nested square meshes to utilize the results of the experiment for prognosis of the stream-aquifer interaction for some probablistic scenarios. The entire area has been divided into 423 meshes of different sizes viz. 0.25 sq. Km., 0.0625 sq. Km. and 0.015625 sq. km. (Fig. 1) The smaller mesh of size 125m, chosen along the river, was with the view to study the interaction more closely. The boundary conditions have been inferred as no flow on Eastern and Western sides based on the general trend of the water-levels contours in the surrounding regions. The Northern and Southern boudaries are treated as inflow and outflow boundaries, respectively.

Aquifer characteristics viz., T and S were based on the pumping tests carried out in the area as well as on the lithologic characteristics. The yearly groundwater withdrawal of about 7.93 MCM has been distributed to different nodes of the model based on the well density in a mesh. The recharge has been distributed to individual nodes based on the infiltration rates, the rainfall and the top cover formation. The results of preliminary modeling are presented.

References:

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INDUCED RECHARGE STUDIES AT GAGALHERI
(HINDON RIVER) NESTED SQUARE FLOW MODEL
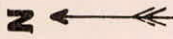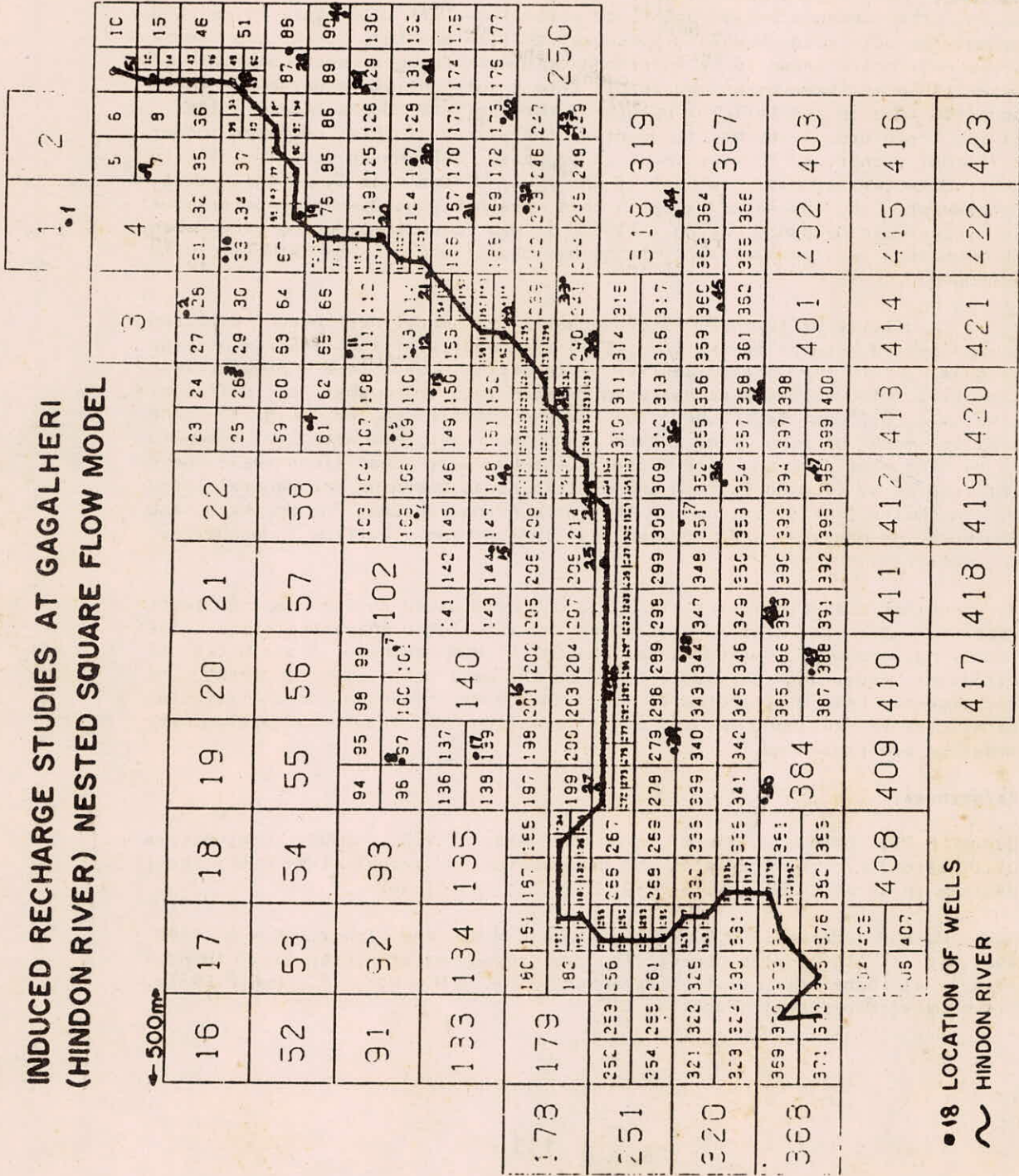
Fig. 1

● 18 LOCATION OF WELLS
〜 HINDON RIVER