Groundwater modeling studies to understand hydrogeological conditions and to develop a groundwater management strategy in parts of Dewas District, Central India

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The high dependency of India on its agrarian economy has caused overexploitation of aquifers in many parts of the country. The need of the hour is to develop a sustainable groundwater management strategy, which is not only based on social makeup of an area but also considers the hydrogeological variables in the region.
Groundwater models are computer models of groundwater flow systems and are used to simulate and predict aquifer conditions. Groundwater modeling was undertaken in a part of the *Central Drylands* of India as a part of this study. BGSPT-PTSIM program package by Barker (1989) was used specifically to simulate time-drawdown behaviour for a specified set of parameters.
The radius of influence as an effect of the pumping was modelled for different shallow aquifers in the area of approximately 600 km^2, based on their Transmissivity and Storativity values. Numerous simulation runs were conducted with various data sets. The modelling considered estimates of aquifer properties like Transmissivity and Storativity and also the rates of pumping (Q) that were recorded during pumping tests as well as on the basis of observations made during the inventory of wells from time to time during the research work.
The behaviour of the water levels in the area was understood and further from these simulations, the safe distance between wells was calculated. Safe distance between wells implies the spacing between wells which will not lead to an accelerated dewatering of the aquifers, in general. The last set of simulations was created using the actual well distances in the different areas and the cone of influence of the wells, pumping for a complete pumping season i.e. about 100 days. These simulations indicate that, in the current situation, there are areas where the aquifers are free from major well-interference, due to fewer numbers of wells and because of the aquifer characteristics. However, there are a few aquifers where the higher number of wells actually causes the cones of depression of the pumping wells to interfere with each other causing a quicker dewatering of the aquifers, leading to over-abstraction and unsustainable pumping conditions.
This study is one of the first studies in the country where hydrogeological analyses and groundwater modeling data was used to develop a groundwater management strategy in the region.

Keywords: Groundwater modeling, BGSPT-PTSIM, radius of influence, dewatering of aquifers, groundwater management strategy

