Electrical water detection

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A quick and easy way to detect groundwater in semi-arid hard rock areas that is also economical could improve the siting of borewells to improve clean water supply in the developing world. Details of the approach are outlined in the *International Journal of Hydrology Science and Technology* this month.

P.D. Sreedevi, Dewashish Kumar and Shakeel Ahmed National Geophysical Research Institute in Hyderabad, India, explain how electrical conductivity (EC) logs of hard rock terrain recorded before and after the monsoon season can reveal differences that show where water accumulates most in subterranean rock fissures. By comparing the data with other geological measurements and drilling experiments, the team is available to correlate the EC data with regions of underground water without additional test drilling.

Understanding hard rock aquifers relies on hydrology of fractured rock and knowing details of the subterranean environment. Data is commonly obtained through drilling test boreholes or investigating underground openings. Such work is hazardous and time consuming and does not necessarily reveal the most appropriate site to sink a water well. However, anomalies in electrical conductivity measurements of which many have been made in various regions might be useful in finding the most abundant sources of groundwater.

The researchers demonstrated how effective the approach might be in correlating information from 25 boreholes in the Maheshwaram watershed situated in the Ranga Reddy district of Andhra Pradesh, India,

about 30 kilometers south of Hyderabad, covering an area of about 60 square kilometers. The area is semi-arid with average annual rainfall of 750 millimeters. The bedrock is mostly granite. The team points out that, based on the detailed geological and hydrogeological studies, the aquifer is classified as a two-tier coupled system with weathered and fractured layers that exist over almost the entire area. However, due to over-exploitation, the groundwater levels have affected the weathered layers and groundwater flow is currently in the fractured rock aquifer. There are no rivers feeding the aquifers so the system relies on the monsoon to for replenishment.

"Our approach is fast and cost effective and could be very useful as a screening tool prior to conducting hydraulic testing and water sampling," the team concludes.

More information: "Vertical disparity in electrical conductivity of groundwater: inferring water-bearing fractures in granitic aquifer" in *Int. J. Hydrology Science and Technology,* 2011, 1, 105-124.

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