ASSAR
Adaption at Scale in Semi-Arid Regions

HOW MUCH WATER IS IN THE GROUND, AND WHAT DOES THIS MEAN FOR VULNERABILITY?

RESEARCH BRIEF

Mapping of groundwater scarcity in India's Ahmednagar district finds majority of villages have 'high' to 'extreme' groundwater vulnerability, highlighting the need for reexamination of current water management practices.

WHAT WAS DONE, AND WHAT WAS NOVEL?

Groundwater is a renewable and finite natural resource that is a vital source of sustenance in semi-arid areas. Working in 17 villages in the Sangamner and Akole blocks of Ahmednagar district, India, the authors mapped and assessed areas that are naturally the most susceptible to groundwater scarcity and at risk of depletion due to over extraction.

Unlike previous studies for the region, this work offers a down-scaled assessment of groundwater vulnerability, using multiple local ground data points and including data from automatic weather stations. In addition to understanding hydrogeological variation it also takes into account other important biophysical factors that influence groundwater availability.

KEY FINDINGS

The majority (almost 87%) of the region studied can be classified as having 'high' to 'extreme' groundwater vulnerability with very low hydraulic yields and low storage capacities of basalt, making it all the more important to use the groundwater resource judiciously. People living nearby to each other within the same area, or even the same village, can have vastly different groundwater vulnerabilities.

Current trends of groundwater use (adding new wells; tapping multiple aquifers; pumping out groundwater to store in farm ponds) can cause areas to shift from being 'low' vulnerability zones to being 'high' and 'extreme' vulnerability zones in the coming years.

KEY IMPLICATIONS FOR POLICY, PRACTICE AND RESEARCH

The current drought-proofing schemes and policy instruments that are aimed at managing groundwater need to be re-examined. Steps must be taken at both watershed and aquifer levels to ensure that state groundwater regulations and water schemes are socially and ecologically sustainable.

This work contributes towards bridging the knowledge gaps pertaining to hydrogeological information at the community level. It has applications that can make groundwater management plans more robust, and can guide the regulation of borewell drilling, the best placement of water saving/ recharge structures and crop planning.

The methods developed here help to better understand spatial distribution of groundwater vulnerability and heterogeneity of multiple-layered aquifers. These methods could be applied to other drought-prone areas to precisely delineate areas vulnerable to groundwater scarcity.

Journal article: Thomas, R. and Duraisamy, V. (2016). Hydrogeological delineation of groundwater vulnerability to droughts in semi-arid areas of western Ahmednagar district. The Egyptian Journal of Remote Sensing Space Science. Download it here.

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