

## Groundwater depletion in India may be linked to climate change

By Dinesh C Sharma

New Delhi, January 23: Overuse of groundwater for irrigation and other purposes has caused concern in India for a long time. Now scientists say that depletion of groundwater tables may have a connection with changing rainfall patterns, which in turn, is a result of warming oceans.

“Declining precipitation in northern India is linked to Indian Ocean warming, suggesting a previously unrecognized teleconnection between ocean temperatures and groundwater storage,” an international group of scientists led by researchers from the Indian Institute of Technology (IIT) Gandhinagar have concluded in their research paper published in the journal *Nature Geoscience*.

The conclusion is based on detailed analysis of data from multiple sources – satellite data from GRACE mission of NASA, observation data from wells across India collected by the Central Groundwater Board, historical data about rainfall from Indian met office, data on Sea Surface Temperatures (SST) and data from modeling. Gravity Recovery Climate Experiment (GRACE) data had previously indicated depletion of groundwater in a number of regions including northwest India.

The study examined hypothesis that rainfall deficit may have an impact on declining groundwater levels in northwestern India, which had been previously been mostly attributed to overdrawal of groundwater for pumping. Related to this was the theory that groundwater storage variability may be linked with large-scale climate change since weakening of the monsoon season rainfall is linked to climate variability.

It was found that a significant increase in rainfall resulted in positive trends in groundwater level in the past two decades despite these wells being located in areas where groundwater is heavily used for irrigation. On the other hand, wells located in areas with significant declines in rainfall showed declines in groundwater tables. This, according to scientists, suggests that changes in rainfall substantially influence groundwater storage.

The decline in groundwater levels in northern India also coincided with warmer SST levels in the Indian Ocean. “This can be explained on the basis of the relationship between rainfall and SST as well as rainfall and groundwater levels,” the study points out.

The study may have wider significance for water management. “The linkage between monsoon rainfall and groundwater can suggest ways to enhance groundwater recharge in India and especially in the regions where rainfall has been declining, such as the Indo-Gangetic Plain,” feels study leader Vimal Mishra of the IIT Gandhinagar.

“The impacts of climate change are extremely difficult to predict at a regional level, but our research suggests that we must focus more attention on this side of the equation if we want to sustainably manage water resources for the future,” Yoshihide Wada, a study coauthor from the International Institute for Applied Systems Analysis (IIASA) in Austria.

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