

Recharging groundwater by water-harvesting measures



**SPEAKING OF
SCIENCE**

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When looking for a new home, one issue that is never forgotten is “how deep is the water table there”. The water table defines the depth at which cracks and pores in rocks are saturated with water. Such water, stored in subterranean spaces, is called groundwater and the water-bearing rock strata are called aquifers.

Groundwater is a critical resource. It is the principal water source for a fourth of the world’s population. India is the world’s largest groundwater user; nearly 250 cubic kilometre was taken out in 2017. About 90% of this was used for irrigation, the rest went to towns and villages.

The agrarian economy of the Indo-Gangetic plains is

sustained by groundwater. But there are fears that the Indo-Gangetic basin aquifer may soon be incapable of supporting so much irrigation. This is very noticeable in the States of Punjab, Haryana and Rajasthan (Joshi et al, *Journal of Hydrology*, 598 (2021)). The Green Revolution has been sustained by using tube wells. The lowering of the water table forces farmers to use high-powered submersible pumps, which has worsened the situation.

Satellite gravimetry has provided convincing evidence in support of the alarming rates of groundwater depletion. The data are reinforced with local-level water table measurements in wells. The average rate of groundwater decline in this part of India has been 1.4 cm per year in this century. Depletion is not so acute in regions where groundwater is brackish.

Raising the water table

Aquifers are recharged with water from rainfall and rivers.



Net gain: There is a net positive impact in the water table status in Saurashtra after check dams were built. AFP

Post-Independence, India saw an increase in the construction of canals for distributing water. These canals leak water, which also augments groundwater levels.

An important factor contributing to the good health of aquifers in some parts of our country is community-based movements to recharge groundwater. A good example is seen in the semi-arid regions of Saurashtra. Here, thousands of small and large check dams have been built across seasonal rivers and

streams. These slow the flow of water and contribute to groundwater recharge as well as to check soil erosion. In villages, *bori bandhs* are built, which are essentially sand-filled bags placed in the path of rainwater runoffs.

Recovering slowly

Have these small-scale water harvesting measures made a difference? Studies comparing the water table status in Saurashtra with the climatologically similar regions of Marathwada and Vidarbha show a

net positive impact. It is heartening to note that in the last decade, these regions of Maharashtra have also started their own Managed Aquifer Recharge programmes such as the Jalyukt Shivar.

Another part of the country facing a marked decline in groundwater levels is a region overlapping Tamil Nadu and Karnataka, where the aquifers are located in crystalline bedrock. In such rocks, water is found only in cracks and fissures as the rock itself is not porous. Under these circumstances, tanks and ponds do not contribute much to groundwater recharge.

In rural areas of this region, recharge is mostly affected from rainfall and irrigation-related recycling. Interestingly, the major source of groundwater recharge in an urban area (Bengaluru) is from leaks in water distribution pipes.

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