

Saving India's groundwater

Over 70 per cent of India's water comes from below the ground. India is, by far, the largest and fastest growing consumer of groundwater in the world. China and the US are in second and third positions, respectively, but India uses more than the two of them put together. Over the last four decades, around 84 per cent of the addition to irrigated area came from groundwater. Most of this was from deep drilling of tubewells or borewells, which are the single largest source of irrigation, as also drinking water, in both rural and urban India.

Tubewells, which were once seen as the solution to India's water problem, have tragically ended up becoming the main cause of the crisis. This is because we have indiscriminately drilled borewells without paying attention to aquifers, the rock formations within which our groundwater is stored. Much of India is underlain by hard rock formations, which have limited capacity to store groundwater and have very low rates of natural recharge. Once we extract water from them, it takes very long for water to regain its original level.

For decades, we have drilled aquifers at progressively greater depths, lowering water tables and water quality everywhere. Water quality is impacted because at certain depths we encounter deposits that gravely pollute groundwater. Official estimates indicate problems of high fluoride in 203 districts, iron in 206 districts and arsenic in 35 districts. Fluorosis is estimated to afflict 65 million and leads to crippling, skeletal problems and severe bone deformities. Arsenicosis affects around 10 million people and causes skin lesions and develops into cancer of lungs and the bladder. Overall, we have reached a situation where nearly 60 per cent of India's districts have either seriously fallen water tables or low groundwater quality or both.

It is also not often understood that perhaps the single most important cause of our peninsular rivers drying up is over-extraction of groundwater. After the rains stop, for these rivers to keep flowing, they need base-flows of groundwater. But when we over-extract

groundwater, the direction of these flows is reversed and "gaining" rivers get converted into "losing" rivers. In a similar way, in our mountainous regions, springs, which have historically been the main source of water of the population there, are drying up.

To understand how we can reverse this dire situation requires a careful reflection on the nature of groundwater and a recognition that it is a common-pool resource. By its very nature, it is a shared heritage. We can divide the land under which this water is located but we cannot divide the water, which moves

in a fluid and fugitive manner, below the surface. Competitive, individual extraction leads to a mutually destructive cycle, where each user tries to outdo the others in drilling deeper and deeper, till the point — which is being reached in so many aquifers in India today — where virtually no groundwater is left.

How then can we protect and continue to use arguably India's single most important natural resource without driving it to extinction? Can we save the goose that lays the golden egg? One commonly proposed solution is to meter and license the use of groundwater. While this might make

sense for the few very large consumers, such as industrial units, it would be impossible to implement on a large-scale, bearing in mind that we have more than 30 million wells and tubewells in India.

Fortunately for us, there are a few examples, which show the way forward. A million farmers in the hard rock districts of Andhra Pradesh have come together to demonstrate how we can use groundwater in an equitable and sustainable manner. Of course, this initiative required a strong mooring in both science and social mobilisation. With the co-operation of hydrogeologists and civil society organisations, facilitated by the government, these farmers clearly understood the nature of their aquifers and the kinds of crops that could be grown with the groundwater they had. Careful crop-water budgeting enabled them to switch to less water-intensive crops, more suited to their specific agro-ecology. Such examples have mushroomed all over India, especially in Maharashtra, Madhya

Pradesh, Kutch and Sikkim. All of them are based on collective action by farmers, who come together to jointly manage their precious shared resource. They develop protocols for pumping of water, sequencing of water use, distance norms between wells and tube-wells and strictly adhere to them once they understand that this is the only way they can manage to meet both their farm and domestic requirements.

Of course, taking these innovations to scale requires massive support from government. Paradoxically, as groundwater has become more and more important, groundwater departments, at the Centre and in all states, have only become weaker over time. We need to urgently reverse this trend, strengthening state capacities in a multi-disciplinary manner. The 12th Plan saw the initiation of the National Aquifer Management Programme and the NDA government subsequently launched the Atal Bhujal Yojana. Both of these are pioneering initiatives, the likes of which the world has never seen before. However, they have failed to take off primarily because the requisite multi-disciplinary capacities are missing within government. But also because they cannot be implemented by government alone. They demand a large network of partnerships with stakeholders, across the board: universities, research centres, panchayati paj institutions and urban local bodies, civil society organisations, industry, and the people themselves.

At the same time, we need profound changes in the structure of incentives to support farmers in moving towards less water-intensive crops, which were elaborated in the first article in this column. We also need to break the groundwater-energy nexus that has only encouraged the mining of groundwater. The Jyotigram Yojana of Gujarat shows the way forward here through the separation of power feeders. This needs to be urgently implemented through the length and breadth of India. We also need to replace archaic British law, which has only helped in the destruction of India's groundwater, as I will explain in the last article in this column.

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WATER: REFORM OR PERISH

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