

## Scaled-up solutions for a future of water scarcity

Precious evolutionary living resources, natural infrastructure, are going extinct. While we thoughtlessly build artificial infrastructure, we forget that this kills natural infrastructure which took evolution aeons to create and cannot be engineered. We are missing the essential point that this is our lifeline on the planet. Forests, rivers, mountains, aquifers and soil are being lost at an alarming rate. Today, India is in the midst of a suicidal water crisis as urban and rural landscapes go thirsty.

Over the years, we have seen activists, scientists and experts from across India working on bottom-up schemes to revive and rejuvenate lakes, wetlands, streams and other small water bodies. While these movements have brought about a significant change at the local level, the scale of our water problems is much larger.

Here we have two intractable issues. First, cities today are vast agglomerations that continue to spread, with bursting populations of tens of millions. They are huge parasites on water, food, energy and all other resources. High densities of our cities do not allow for water harvesting to fill the gap. Until now, invasive schemes like dams to service these large cities and the huge needs of agriculture have caused extreme ecological devastation.

Second, in our global market economies, the products and services that are derived from natural infrastructure have often led to the terminal loss of the source itself. The global free market, and with it the scale of human intervention, now exceeds the scale of the planet. These resources (forests, mountains, floodplains and rivers) are often lost to the greed of governments, institutions, corporations and individuals. This is long-term loss for short-term gain. Natural resources are living evolutionary resources that are constantly renewed by natural cycles. Therefore, they provide us perennial value as long as we use them with natural wisdom and not kill them with exploitation — which is the order of the day.

Large-scale non-invasive schemes are scarce because they are far more challenging. We shall highlight a few such projects on the ground. These are large-scale schemes that can provide a perennial supply of water to large populations in cities and towns, engage the natural landscape, sustain ecological balance and have major economic and health benefits. If we were to recognise the true value of our natural infrastructure and 'conserve and use' our evolutionary resources with the help of science, it would secure the future for humanity and the natural world.

Our research shows that floodplains of rivers are exceptional aquifers where any withdrawal is compensated by gravity flow from a large surrounding area and can be used as a source of providing water to cities. Floodplains are formed over millions of years by the flooding of rivers with deposition of sand on riverbanks. Some floodplains, such as those of Himalayan rivers, contain up to 20 times more water than the virgin flow in rivers in a year. Since recharge is by rainfall and during late floods, the water quality is good. If we conserve and use the floodplain, it can be a self-sustaining aquifer wherein every year, the river and floodplain are preserved in the same healthy condition as the year before.

The Delhi Palla floodplain project on the Yamuna is an example of this. By utilising 20 sq.km of the river length and running at half its capacity, it provides water to almost a million people daily. Piezometers and a control system have been installed to monitor water levels and other parameters through the year, to ensure sustainable withdrawal. Besides, it provides huge revenue to the Delhi Jal Board.

Preserving the floodplain in a pristine condition is essential for this scheme to work. Land on the floodplains can be leased from farmers in return for a fixed income from the water sold to cities. The farmers can be encouraged to grow orchards/food forests to secure and restore the ecological balance of the river ecosystem.

Currently, mineral water is brought from faraway mountain springs, putting huge pressure on the mountains. It is packaged and consumed in plastic bottles that end up in landfills. Forested hills are a result of evolution over millions of years. They are not polluted and sit on a treasure of underground aquifers that contain natural mineral water comparable to that found in a mountain spring. This is because the rain falls on the forest and seeps through the various layers of humus and cracked rock pathways, picking up nutrients and minerals and flows into underground mineral water aquifers.

Our research shows that the water in these aquifers is comparable to several international natural spring mineral waters. It also shows that if a scheme of 'conserve and use' is applied correctly, it would allow a forest (like Asola Bhatti in Delhi) to be sustained as a mineral water sanctuary. About 30 sq.km of the forest could then provide enough natural mineral water to 5 million people in the city. The Aravalli forested hills can provide mineral water to all major towns of Rajasthan. This water can substantially improve the health of citizens and preserve forests at the same time. The marvel is that we can provide quality natural mineral water for all from a local forest tract for 20 times less than the market price and yet reap great economic returns.

Such non-invasive, local, large-scale 'conserve and use' projects till now have not been part of our living scheme. They change the relationship between nature, water and cities. They differ in scale from the small, community-driven projects of check dams, water harvesting and lakes and can service large populations. Unlike large-scale dams, these projects work with nature rather than against it. They can be used around the globe.

Finally, these evolutionary resources once lost, will be lost forever. It is time we understood this is natural infrastructure bequeathed to us by nature, or....

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