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India — Water challenges and the way forward

Freddy Svane & Anshul Jain | Mar 22, 2014, 07:30AM IST

Global changes like population growth, climate variability, ever-expanding industrialization and urbanization — often combined with pollution — severely affect water availability and lead to chronic water shortages in a growing number of regions. India has been successful in the past to meet such water requirements for different usages with a phenomenal development of water resources. However, preserving the quality and availability of fresh water resources has now become a pressing environment challenge.



Freddy Svane (L) is a career diplomat, currently the ambassador of Denmark to India. Anshul Jain is a water sector expert and deputy head of trade at the Danish embassy in India.

The draft National Water Policy of the government of India also raises the following important points: (i) Growing pollution of water sources, especially through industrial effluents, thereby affecting the availability of safe water besides causing environmental and health hazards; (ii) Large parts of India already becoming water-stressed with a potential of causing societal challenges; (iii) Wide temporal and spatial variation in availability of water, which may increase substantially due to a combination of climate change and incidences like floods, increased erosion and increased frequency of droughts; (iv) Inequitable exploitation of ground water without any consideration to its sustainability; (v) Mismanagement of water resources; (vi) Low consciousness about overall scarcity and economic value of water resulting in its wastage and inefficient use; and (vii) Lack of adequate trained personnel for scientific planning, utilizing modern techniques and analytical capabilities and lack of a holistic and interdisciplinary approach to water related problems.

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With the use of globally available knowledge and technological advancements, India would be able to address some of its major problems related to water — lacking awareness of total ground water resources, wasted water due to leakages and flooding during monsoon or tropical storms. When actions are made regarding the mentioned challenges it will be possible to make smarter infrastructural decisions and thereby provide water to a larger share of the population, who currently receive intermittent or no supply.

Water is an essential precondition for life, and according to the UN it is a human right to have access to clean water. However, in India millions of people are living without direct access to safe water and based on the rapid population growth coupled with the fact that the water reserve is finite, it will be a very valuable and scarce resource within only a few years. In this light, there is an urgent need for decision makers to act in order to improve the conditions for effective use and supply of water to the Indian people now and in the future.

Denmark boasts of a high set of skills and competencies in the water sector, including: (i) Efficient and sustainable water resource management; (ii) Mapping ground water resources by overflying the ground; (iii) Reducing non-revenue water (NRW) by using efficient leakage detection systems; and (iv) Reducing water footprints for agriculture, industry and households by securing water efficiency and reuse of water (efficient waste water treatment).

Water resource management is part and parcel of Danish water supply and accordingly the groundwater is highly protected, especially in the rural areas, since the Danish water supply is 100% based on groundwater. All physical planning of development in Denmark is to a large degree controlled by availability of aquifers and how well the aquifers are protected against pollution. All borings and wells are registered and the geological information from the wells is used in assessing the groundwater layers and also how well the groundwater is protected in terms of overlying soil types.

This technology is at present tested in India as around 85 per cent of the rural population is solely dependent on ground water. The ensuring of ground water is a good offset for a more sustainable solution for water supply in the long run.

It can be hard to get an impression of where the ground water reserves are located and therefore it is also difficult to do an effort in order to protect the reserves from pollution. In some areas the

limited knowledge of where the ground water can be found leads to excessive pumping which can destroy the groundwater resources completely. The excessive pumping can in coastal areas result in the intrusion of salt water from the ocean into the ground water reservoirs which destroys them.

This Danish technology makes it possible to map groundwater by overflying the ground with a helicopter where the testing equipment is tied to a huge wooden frame. By using this technology it is possible to get a very accurate picture of where the ground water is located and will be a major resource to the policymakers. At present the pilot project is underway in six geographies within 5 Indian cities, to be implemented nationally based on the pilot results.

Non-revenue water (NRW) or water leaking from the water supply system is a vast problem in many cities across the world and comes from inadequate maintenance of the system, combined with few or no automatic measuring systems. It is unfortunately very common to find leakages of 40-70 % of the water produced and pumped to the end-users. However, it is not only water which is lost, but also the energy used to produce and distribute the water, which is wasted.

In Denmark the NRW is between 4-8 %, which is considered an acceptable and financially viable level and water is delivered 24/7 to the users in a high and safe quality. All Danish supply systems are equipped with pressure sensors in several points in the network and the supply companies use the pressure measurements as indicators of leakage.

On the administrative level all networks have been digitized and the age and wear of the system categorized. This helps the supply companies to plan for pipe replacement, based on life expectation of the pipes. In addition, having digitized networks also allows for using numerical models to calculate flow, wear, distribution, etc.

In India it is estimated that between 40 and 50 per cent of the supplied water is lost due to leakages in pipes and connections. Because of this, a lot of water ends up being wasted while at the same time many Indians still do not have access to water. If the share of water wasted was brought down to 15 per cent, as is now the official goal, millions of people could have their share of water without a need for more water to be produced.

A pilot project in an Indian municipality conducted by a Danish research-based organization has proved that a new technology quickly and efficiently can detect leakages, even if the leakage is underground and therefore not visible to the eye. Through a very precise detection it is possible to repair the leakages faster and with the use of fewer resources as the need for digging is reduced substantially. The low costs of repairing combined with the minimized amount of water wasted mean that the government can save a substantial amount of money by engaging in leakage detection.

Along with leakage detection it is possible to install smart systems enabling less use of energy in the pumping solutions. If this is done, the water can be supplied 24/7 to the recipients, who will be able to take out water whenever they need it, and not only at specific time slots. At the same time the need for storage of water will be redundant freeing up precious resources of municipalities that now build huge water storage towers.

Additionally, energy optimization exercises can be done by the water supply companies to lower their operational costs. Although high-energy-efficient pumps may have a higher price, life-cycle analysis shows that 85% of the costs used during the lifetime of a pump is the energy costs and therefore a high-energy-efficient pump saves a huge amount of money during the lifetime of the pump as opposed to a cheap pump with low efficiency. Pumping systems when operated using frequency converters, will allow a much better pump-control and provide pumping at a variety of speed and deliverance.

Another challenge in the recent years is the heavy floods in India affecting a lot of its inhabitants, most recently the floods in Uttarakhand. Different forecasts predict that flooding will be a common problem in the years to come due to the climate changes that makes glaciers melt and cause monsoons to intensify. Floods can have severe consequences for the people living in the areas where they happen and often they lead to serious economic aftermath.

Danish institutions have been using advanced software program methods, allowing users to forecast flooding and manage rivers and wetlands. The program is unique in the sense that it covers the entire water area in an integrated way. The ability to forecast floods is a very valuable tool that can help governments in their planning of infrastructure to meet the requirements needed with the changing climate. Denmark is collaborating closely with Indian universities and water organizations in this technology upgradation.

One solution to be considered in the more urban areas is water brakes. Water brakes do not have any moving parts, are easily implementable in the piping system and work as a very cost-efficient solution. If flooding occurs upstream the brakes prevent flooding downstream while at the same time the flooding is less harmful as the excessive water from rains or the like are cleaner since it has not yet been mixed with sanitary sewers. Water brakes help to save damages to physical assets because the pipe dimensions needed to prevent flooding downstream are much smaller when the water is delayed in the brakes.

By implementing such technologies India could see substantial improvements for its inhabitants and for the future management of water issues. Altogether by addressing these challenges, more water would be available to cater to more people, a more constant supply to those who already have access to water, and a more secure tomorrow even despite prospects of heavier monsoons in the future. It is not possible to address all the issues immediately but an earnest start in right direction is the need of the hour. With the use of globally available water technologies, the change can happen faster and cheaper. Denmark is at the forefront of such water technologies globally and is steadfastly cooperating with India in ushering in the Blue Revolution. All of us have to take individual responsibility to save every drop of water for the sake of our next generations.

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