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EDITORIAL

Water security issues of India

The available quantity of surface and groundwater, and their quality for agricultural, industrial and domestic uses, determine the water security of a country. Water security at present and the problems that might arise in the future because of the effects of climate change, land use changes, land degradation and international water treaties with riparian countries – all influence the water security.

India has a utilizable annual replenishable resource of 690 BCM (billion cubic metres) of surface and 433 BCM of groundwater. Because of its large population of more than 1.3 billion, India belongs to the class of water-stressed countries with annual per capita availability of water less than 1700 m^3. Predictions show that it is moving towards water-scarce category.

Agricultural, industrial and municipal water supply sectors respectively, use 89%, 2% and 9% of the available water resources. Sixty per cent of irrigation water in the country is met by groundwater. Out of the total groundwater resources available, 89% gets used by agriculture. Exploitation of groundwater, exceeding the recharge capability has pushed 16 states and 2 union territories of India to the over-exploited category. They have already exploited 100% of groundwater, so that annual recharge cannot any more meet their requirement. Lesson learnt is that future groundwater exploitation needs to be guided by groundwater balance modelling. This has been taken up under the National Project on Aquifer Management. Use of water for irrigating a unit area of agricultural land, in excess of what is needed, must be controlled. This can be accomplished by replacing the flood irrigation by sprinkler and drip irrigation, recycling of irrigation water and use of treated industrial effluents in the lands close to industrial establishments or urban centres, need to be implemented. Growing of more nutritive, less water-consuming crops needs to be encouraged. For bringing in more responsible use of water in agriculture sector, water taxation needs to be revisited. Water extraction from the surface or groundwater resources could be metered and compliance to allotted amount of water per unit area enforced for reducing the consumption. The Government of India passed the Groundwater (Sustainable Management) Bill, 2017, to arrest indiscriminate use of groundwater. The bill empowers local bodies with regulatory control and treats groundwater as a public trust, just as the surface water.

The industrial sector, which was using 56 BCM of water in 2010, is expected to consume up to 151 BCM by the year 2050. Water treatment capacity should be enhanced in industrial centres and recycling of water enforced as a necessity. Public–private participation model could be the feasible approach in this case.

Twenty per cent of the municipal water supplies is met from the surface water resources and 80% by the groundwater. Heavy usage of groundwater is driving many cities to the brink of exhausting groundwater resources, as it has already happened in the Chennai City. The National Commission on Population (NCP) in its report of 2020, predicts that India's population would increase from 1.35 billion at present to 1.52 billion by 2036. It also predicts that 70% of this increase will be in the urban population, which will increase to 594 million from the present 377 million. At present, about 70% of water supplied to cities, goes out as sewage and wastewater. An estimate in 2018 of the gap that exists between the sewage generated, and the installed treatment capacity showed that nearly 62% of the sewage and wastewater generated goes untreated. Much of this water is not recycled and used effectively. The treatment of sewage and industrial wastewater to tertiary level, so that it can be reused, needs to be strengthened in the country. Water treatment and recycling is a necessity to keep the demand for freshwater under check. Conjunctive use of treated freshwater for drinking and cooking, harvested rainwater and recycled water for washing, sanitation and industrial uses, appears to be the sustainable way forward for the Indian cities.

There are serious quality issues in the surface and groundwater resources of the country. River water quality monitored at 434 water quality monitoring stations set up by the Central Water Commission, shows that 351 continuous river stretches on 323 rivers are polluted by organic and inorganic pollutants, making the water unsuitable for drinking, bathing and industrial uses. These contaminants are largely the result of discharge of untreated sewage, wastewater from industries including from the pharmaceutical industries and hospitals near the urban centres and untreated irrigation water in rural areas.

Groundwater, in addition to contamination from polluted surface water, also has geogenic contaminants like arsenic, fluoride, nitrate, iron, chromium and salinity.

The data from water quality wells monitored by the Central Groundwater Board show that groundwater in 103 districts in 20 states has arsenic contamination; 191 districts in 23 states have high fluoride contamination; 276 districts in 26 states have iron contamination; 337 districts in 20 states have excess nitrate; 166 districts in 19 states have high content of total dissolved solids (which is manifested as hardness and salinity); 86 districts in 14 states have chloride contamination. Of late uranium contamination in the groundwater has been recognized in the states of Rajasthan, Punjab, Gujarat, Andhra Pradesh, Telangana, eastern Karnataka and parts of Tamil Nadu.

Communicable and non-communicable disease burden arising from the various contaminants runs into millions. While diseases arising from organic contaminants, arsenic and fluoride have received and are receiving considerable research attention and technology development, the diseases arising from other metal contaminants are yet to be studied in any detail in the country. Health care sector also receives the same water supply as any other municipal water supply and most of the health care facilities have no wastewater-treatment facilities.

Technological solutions provided by the National Environmental Engineering Research Institute (NEERI) and some of the NGOs, although have proved to be good and useful, are found unsustainable on a long-term basis in the Indian rural environment. Therefore, to address the problem of drinking water supply in the country, the Jal Jeevan Mission of the Government of India has taken steps to provide safe and adequate drinking water through individual household tap connections to all the households in rural India by 2024. This, it wants to accomplish through such major programmes like creating additional storage capacities and river linking projects. Ecological impacts related to river linking have not been adequately studied and addressed and researches on these aspects need to be intensified.

Future water security issues of India have new dimensions. Climate change-related sea level rise, very strong cyclones, intense precipitation events, glacial recession, land use changes – urbanization, land degradation and desertification – would all impact water security. Studies by the scientists of India Meteorological Department have brought to light that the sea level in the Northern Indian Ocean is rising at the rate of 3.5 mm per annum with some sectors in northern Bay of Bengal showing 5.5 mm rise. While tropical cyclone frequency is declining, very severe tropical cyclone events are increasing. Rainfall precipitation patterns are changing, with high-intensity rain occurrences (mini-cloud bursts) increasing along the west coast of India (at the rate of 5 per decade) and along the foothills of the western Himalayas (1 per decade).

Storm surges and intense rainfall events would cause flooding in the coastal areas and in the mainland respectively, affecting the quality of water by saline water intrusion and mixing of the sewage with surface water. Waterborne and vector-borne diseases would increase in the wake of floods.

Glaciers, especially in the Eastern Himalaya, are receding. Model predictions based on studies on Langtang glacier in Nepal and a few other glaciers in the Himalaya show that, contributions to rivers from glacial melting would decrease and the rivers in eastern Himalaya would transition into monsoon rivers. During the transition, glacial lake outburst floods (GLOFs) are expected to increase, affecting the river channels.

Studies by the Central Arid Zone Research Institute, Jodhpur and the Space Applications Centre, Ahmedabad, have revealed that, as of 2013, 96.40 mha of the country (29.32% of the total geographic area of the country) was undergoing process of land degradation because of land use changes, deforestation and excessive exploitation of surface and groundwater. Area under desertification (in the arid, semi-arid and dry sub-humid regions of the country) was 82.64 mha. During the decade between 2003 and 2013, it was observed that there was an increase of 1.87 mha of degraded land and 1.16 mha of desertic land. As desert and degraded lands do not promote groundwater recharge, it is essential to halt the progress of desertification. Government India honouring the UNCCD's (United Nations Convention to Combat Desertification) mandate has committed to take steps to halt further land degradation and to restore the degraded land. It has committed to restore 2.5% of its degraded land by 2030 through water harvesting, creation of windbreaks through afforestation, tree planting and ecosystem restoration, which can function as 'green walls' and 'green dams' which will reduce dust and sandstorms, and sand dune movement.

As India is a middle riparian country, all water resource developments in the country are also guided by international treaties for water sharing. Many of the existing treaties may have to be evaluated afresh and new treaties based on current hydrological knowledge need to be framed. For future water security, India has to work with some of the neighbouring countries to drive home the fact that the frozen and flowing waters of the Tibetan part of China are important resource for billions of people living in the South and Southeast Asian countries. The 1997 UN Convention on the Non-Navigational Uses of International Watercourses requires that the international water courses be used for development and protection in an equitable and reasonable manner. Therefore, steps need to be taken to continue formal arrangements on long lasting peaceful sharing of river waters between countries.

R. Srinivasan

Divecha Centre for Climate Change,
Indian Institute of Science,
Bengaluru 560 012, India
e-mail: srinimalu@gmail.com