WATER SECURITY AND SUSTAINED DRINKING WATER SUPPLY

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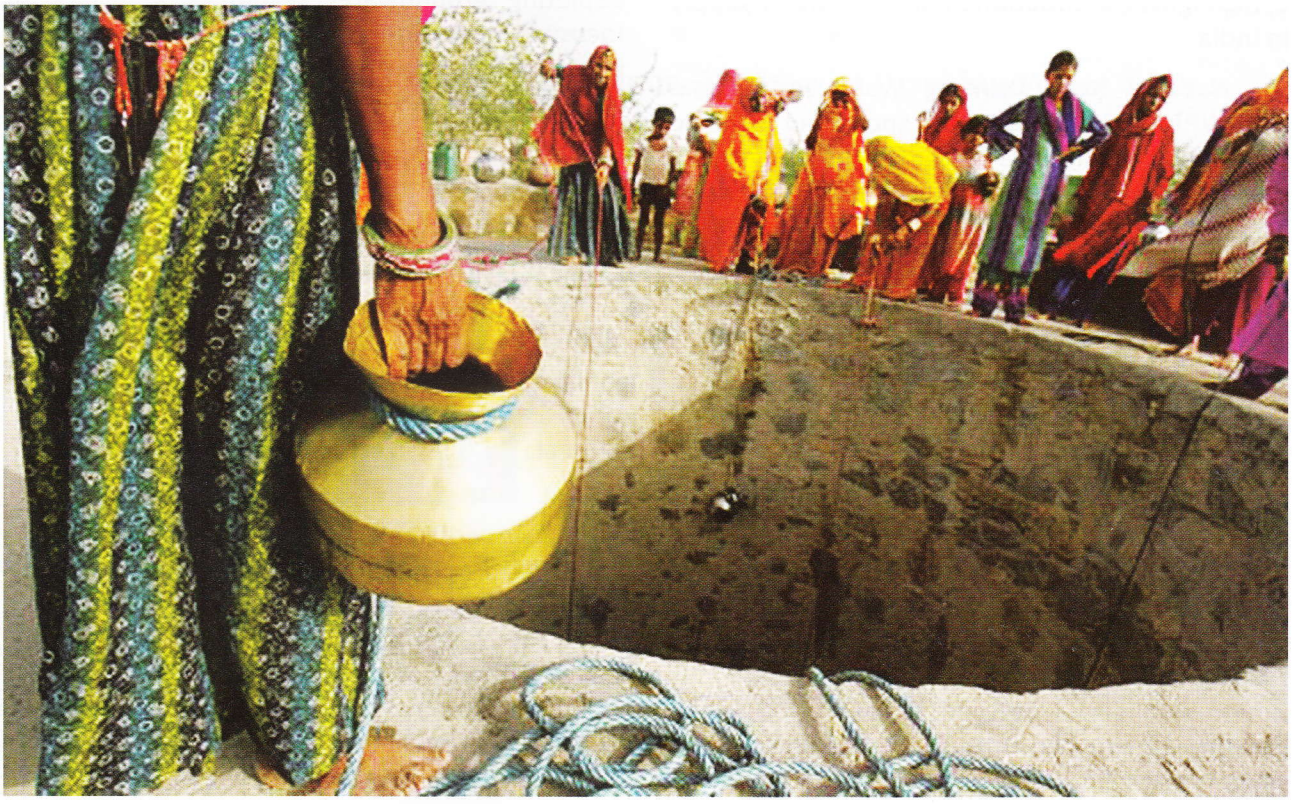
For making India a water secured nation, especially the rural regions of the country, a lot of challenges need to be addressed. Demand pressures from various sectors, changing cropping pattern, high rate of urbanisation and industrialisation and most importantly, climate change are some of the factors that need to be addressed. Water pollution is another big challenge that India is facing today. The effort required to build a water secured nation is massive.

As India is a vast country the challenges related to drinking water in rural regions would be unique for different regions. India receives an average annual rainfall of around 1100 mm but there is a huge regional and temporal variation in the distribution of rainfall. The country receives more than 80 per cent of the rainfall from June to September. The unequal spatial distribution could be easily observed by the fact that the Brahmaputra and Barak basin, with only 7.3 per cent of the geographical area and 4.2 per cent of the country's population, have 31 per cent of the annual water resources (CPCB (2014) States of Water Quality in India). Across the year, it could be found that one region is facing floods while some other region is having drought at the same time. This shows the diversity in rainfall pattern across the country. Also, the same region might experience floods followed by droughts during different months in a year. Over-reliance on centralised systems and insufficient attention towards traditional water harvesting systems and disconnect of the community from water management is one of the major cause of such situation.



Climate change impacts are predicted to further the challenges currently being faced by India. The frequency and intensity of rainfall is predicted to change and it will have huge implications on water resources management and associated systems such as agriculture, which makes India even more vulnerable as we have nearly 70 per cent population (large share of small and marginal farmers) relying on agriculture for livelihood (World Bank) and nearly 2/3 of the cultivated land is rain-fed (Water Statistics, CWC).

Groundwater (GW) which is currently the lifeline of Rural India, as it supports more than 85 per cent drinking water requirements in rural areas, is depleting at an unprecedented rate. Overall, India in real sense is mining groundwater and is way ahead, in terms of total groundwater withdrawal, of various countries (see Figure 1 below).

Drinking Water Situation in Rural India

Rural regions in India, which primarily have agricultural and domestic water requirements, suffer from many challenges such as water pollution and decreasing groundwater availability, etc. Arsenic and Fluoride contamination is very high in some of the regions of the country. Figure 2, highlights the situation of drinking water supply in India.

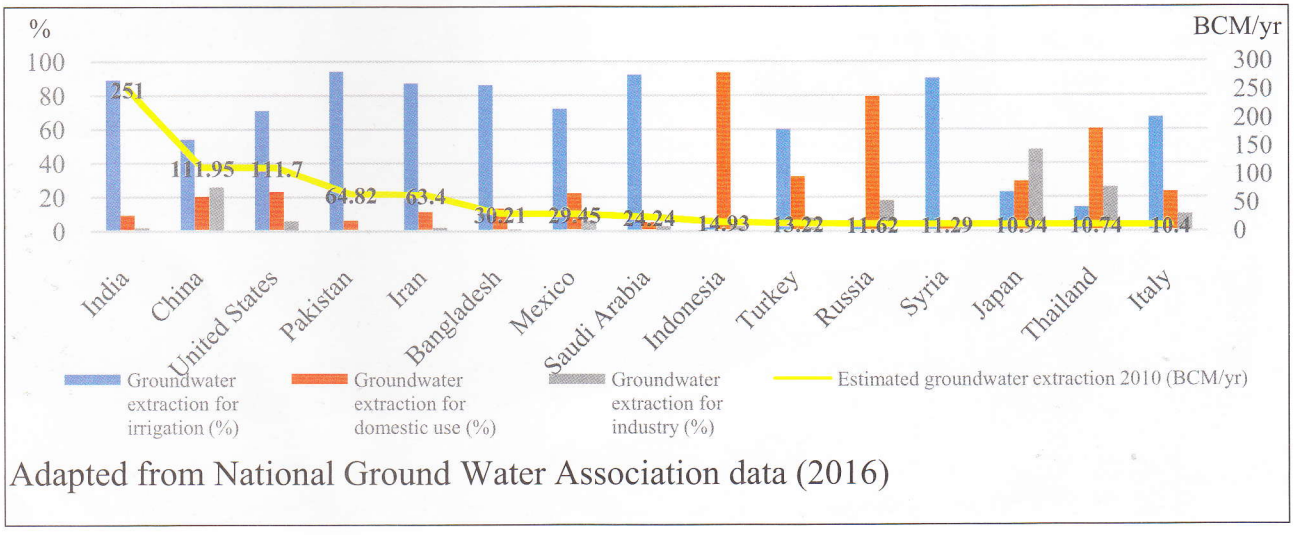
National Rural Drinking Water Programme (NRDWP): It is a Centrally Sponsored Scheme launched in April, 2009 aimed at providing every person in rural India with adequate safe water for drinking, cooking and other domestic basic needs on a sustainable basis. As per the Integrated Management Information System (Ministry of Drinking Water and Sanitation), more than 80 per cent of the rural habitations have reached Fully Covered status that means they are receiving 40 litres per capita per day. Whereas, around 15 per cent of the habitations are Partially Covered and 3.5 per cent habitations have some water quality related issues. This data is dynamic as it has been found in the past that many of the fully covered habitations have returned to partially covered status.Thus, providing infrastructure support alone is not enough for sustained rural water management.

A performance audit of the NRDWP was conducted by Comptroller and Auditor General (CAG) of India in 2018 to assess how far the objectives of the programme were achieved between 2012 to 2017 and examine various aspects of the Programme such as planning, delivery mechanism, fund management, implementation including coverage of partially covered and quality affected habitations, water quality monitoring and surveillance.

If we analyse this audit report, we find that insufficient community involvement, lack of long term sustainability plan, over-reliance on depleting groundwater resources and lack of focus on operation and maintenance of created infrastructure is not serving the purpose of building water secured rural India.

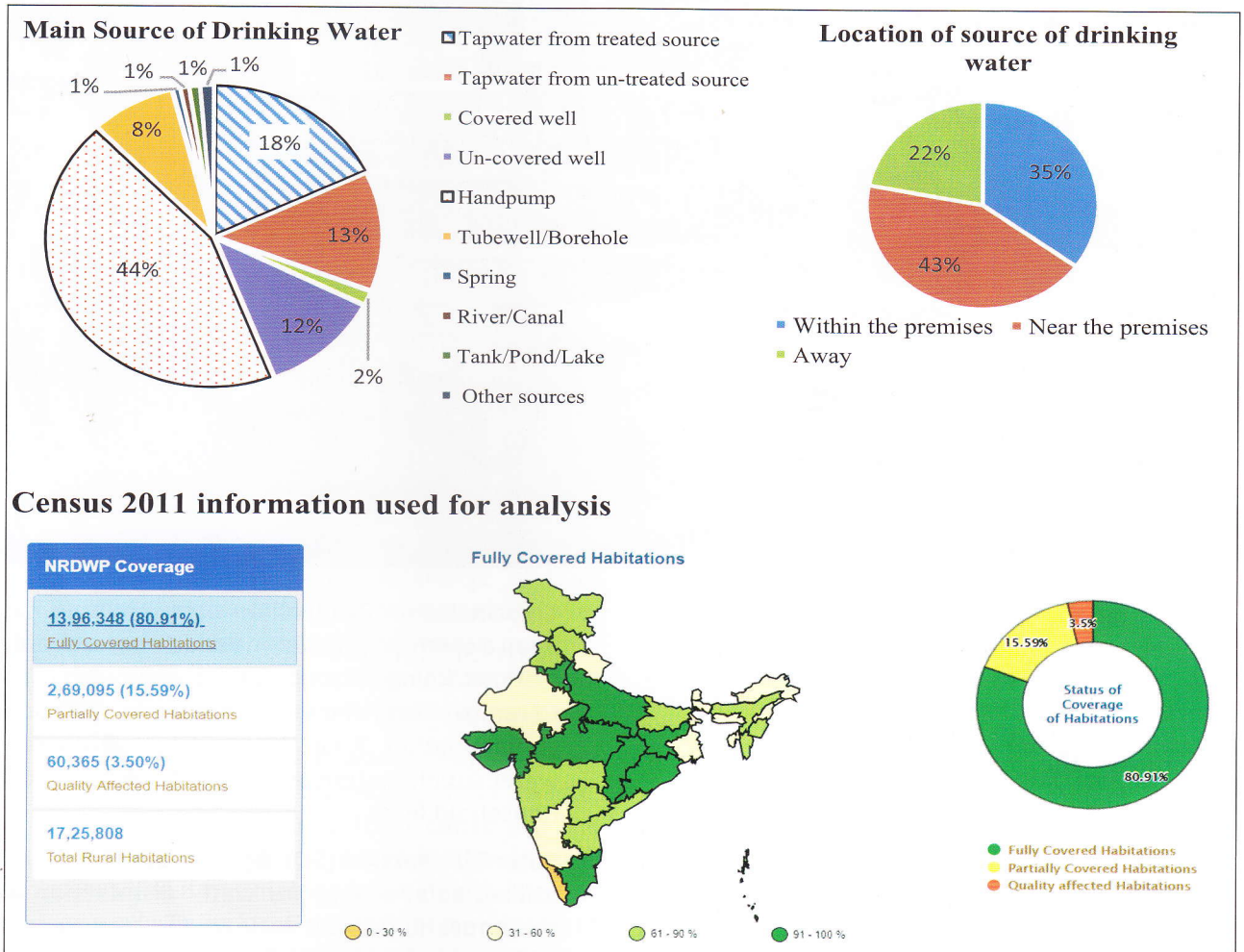
The larger question is do we always need to create new infrastructure and systems or

Figure 1: Top 15 nations with the largest estimated annual groundwater extractions



Adapted from National Ground Water Association data (2016)

Figure 2: Drinking Water Situation in Rural India



reviving traditional systems that worked for us for generations is a possibility.

Historically, communities in India managed water and had their unique mechanism of fighting climate extremes. Due to different topography and agro-climatic conditions, various regions in India had different structures to utilize and conserve water. Broadly these practices could be classified into the following three categories:

(i) **Obstructing/diverting the flow of stream/river:** In this practice, the natural flow of the stream/river is obstructed and water is stored by using gully bunds/check dams/gabion structures etc. Prominently built in hilly regions, these structures in addition to water conservation and groundwater recharge, also act as soil trap.

(ii) **Storage in wells/step wells/below ground level storage structure:** Mainly used to meet domestic water requirements, such structures could be found in western arid regions of India. The step-wells traps rainwater and because of no direct exposure to sunlight and surface temperatures it reduces evaporation losses. These were treated as auspicious as temples in Gujarat and Rajasthan.

(iii) **Collection and use of rainwater on surface:** Commonly found across India, these structures are constructed in the flow of a seasonal stream or the excess runoff is diverted into this. Some examples of such structures include *nadis, kundis, talabs, jaldhar, farm ponds etc.* The bottom of the

surface is generally pervious but it could be made impervious using plastic sheets to prevent GW recharge.

In addition to the construction of these structures, the community was involved in regular maintenance work thus ensuring the longevity of water bodies. Annual cleaning of ponds, conservation of forests, distribution of resources etc. was observed as a regular practice across India without any government/external support. There is no reason why we cannot revive such practices which have sustained us for generations.

Drinking Water Treatment

While the quantity of water is generally considered as the parameter to define access to water, however, understanding the quality of water would be necessary to provide clean and safe water to rural households. The choice of treatment technologies would be largely determined by the quality of raw water and the nature of demand. Few of the basic water treatment technologies/ methods are discussed below:

- **Slow sand filters (SSF) –** SSF is one of the most recommended methods of water treatment for rural areas. If designed properly, it purifies the water efficiently by reducing turbidity and bacterial contamination and it does not require highly skilled labour for operation and maintenance.
- **Chlorination –** Disinfection using chlorine has been a common practice in various water supply systems. Being a strong oxidant, chlorine is used to remove taste and odour, as well as biological contamination. It can be used for community water supply system as well as at the individual household level.
- **Solar Disinfection (SODIS) -** The SODIS method utilizes solar energy for water disinfection at the household level. A clean and transparent PET plastic bottle (preferably below 2 litres) is filled with water and kept in direct sunlight for 6 hours during noon on sunny days and two days if the sky is more than 50 per cent clouded. It has no chemical and external energy requirements thus making it an affordable choice. As reported, it removes 99.9 per cent of micro-organisms. The major limitations are that the raw water should not have turbidity more than 30 NTU and there is sufficient sunlight available.

Policy Recommendations

Different states in India face completely different water related challenges and thus "one size fits all" approach would not be applicable. Major policy reforms in regard to rural water management are discussed below:

i. **Better data:** The first and foremost step is to develop better data, on water quality and quantity, and a robust hydrological information

system for developing precise information about the resource availability and planning accordingly.

ii. **Basin/Sub-basin level water management** – As advocated by experts and also being realised by the people working on the ground, integrated water resources management is only possible at a larger scale as the resources supply and use are interconnected. Several basins are inter-state thus it would require the riparian states to come to a consensus, which is a complex process and would take time. Therefore, water management at the sub-basin level should be initiated.

iii. **Water source improvement:** Currently, as per a CPCB report 2018, 351 river stretches on 275 rivers across the country have got polluted due to the discharge of both municipal and industrial waste water over the years. Also, the ground water quantity and quality is degrading at an unprecedented rate which needs an immediate response.

iv. **Integrated water and waste management:** Open defecation, domestic solid waste, wastewater and waste from cattle are the major cause of water contamination in rural areas and it has high negative health impacts as well. Therefore, sanitation management would be a crucial element in achieving water security.

v. **Supply and access augmentation:** On the supply side, wastewater reuse and recycling and rain water harvesting should be encouraged across the country without further delay. On the access front, households and farms with poor access to water should be targeted on priority. The government should also look into decentralised solutions for topographies which are difficult to be connected to centralised systems. Decentralised systems need to be promoted in a big way to complement the existing water infrastructure.

vi. **Demand side management:** Water use efficiency across sectors is poor in India as compared to available best practices. Most of the rural population is still dependent on groundwater for drinking water and irrigation needs. The Government will have to come up with innovative policies, incentives and subsidies, for increased adoption of water efficient practices and agro-ecology based crop selection in the agriculture sector as the groundwater sources are finite.

vii. **Capacity building:** Capacity building of institutions involved in water resources management would encourage informed decisions. It would also trigger more interactions between such institutions, which are currently not so frequent.

viii. **Institutional and legislative reforms:** Water is segregated amongst so many institutions that accountability is difficult to be defined. There is no umbrella agency that controls the governance of the water sector. We would definitely need such bodies as well as better legislation for controlling ground water extraction and pollution.

ix. **Revival of traditional wisdom:** The first and most important initiative to preserve traditional knowledge is the documentation of traditional customs and practices. Also, the community needs to be made the guardian of water resources in their locality. It is essential to acknowledge and recognise the knowledge and contribution of indigenous communities. None of the suggested interventions could work without a collective effort. Thus, collective effort should be directed towards reviving traditional systems by reminding people about the long term benefits and the necessity of their participation. Schemes such as Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS) could act as a supporting mechanism for such initiatives.

x. **Preparedness for disasters:** Rural areas are vulnerable to both floods and droughts thus preparation of integrated plans for extreme climatic should be done. Drinking water is heavily affected during such extreme events, thus people should be made aware of actions to be taken for restoring drinking water sources.

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