



# **Policy Brief**

## **Water Degradation in India: Any Hope for the Future?**

**LexQuest Foundation**

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## **About the Organisation:**

LexQuest Foundation (LQF) is an independent, non-profit, research and action organisation, established in 2014, in New Delhi. We are striving to create, advocate and implement effective solutions for a diverse range of development issues.

To endorse participative governance, we engage with a broad spectrum of stakeholders, from various sections of the society, to ensure that policy-making remains a democratic process. We utilize pragmatic and futuristic research to disseminate actionable knowledge to decision-makers, experts and the general public.

Our key activities include capacity and skill-building workshops, policy advisory programs, public outreach, and stakeholder consultations. We collaborate with the government, other organizations and individuals for impactful policy formulation and execution.

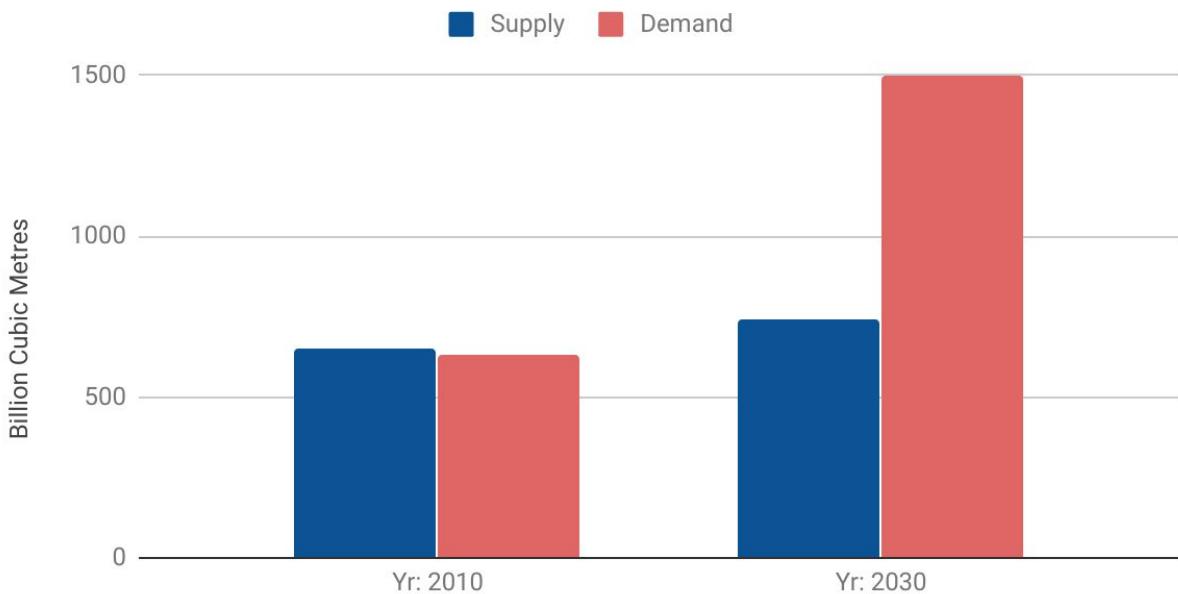
By employing sustainable and equitable solutions through our multidisciplinary, intersectional initiatives and programs, we are constantly working towards creating empowered communities.



Every individual requires a minimum of 25 liters of water to meet their daily hygiene and food needs (WHO). In the past year, over 600 million Indians faced high to extreme water stress and about 2,00,000 people died due to inadequate access to safe water. A recent [Composite Water Management Index \(CWMI\) Report](#) released by the Niti Aayog warned of a catastrophic water crisis in India. The report stated that the demand for potable water will outstrip supply by 2030 if immediate steps are not taken to preserve the quality and quantity of water.

## India's Water Crisis

Standing Sub-committee of Ministry of Water Resources, KPMG Analysis





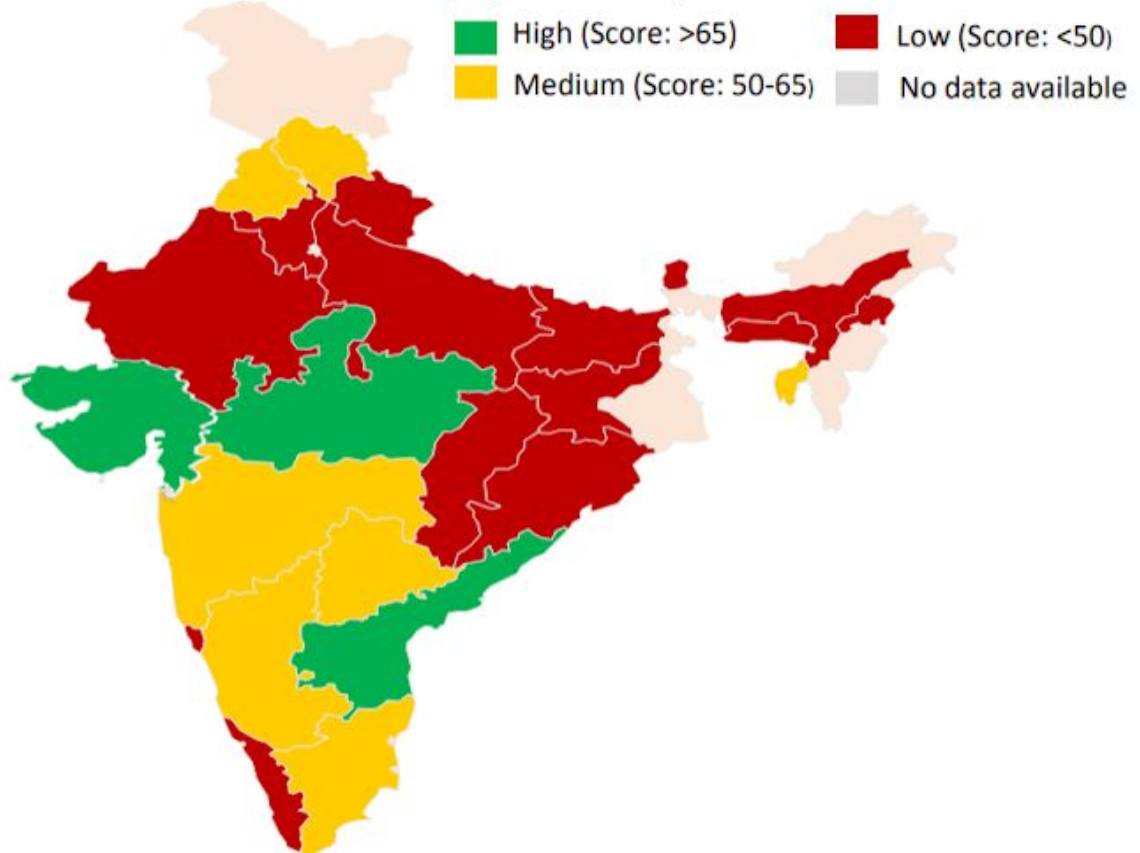
## **The Problem**

India earlier had a robust system of water supply consisting of perennial rivers, lakes, reservoirs, and groundwater sources. A large part of this supply was dependent on the abundant monsoon rains. However, **overutilization and drastic climate change have marred this system of water supply. A quarter of the country's population — over 330 million people — have been suffering through a severe drought. This number is only set to increase as almost 50 percent of the country will face drought-like conditions due to critically low amounts of rainfall.**



### High, medium, low-performing states

Water index composite scores (Reference Year)



The CWMI report ranked the States on how well they manage their water and about 60 percent of the States fell under the low-performers category. Many of these low performing States inclusive of **Uttar Pradesh, Odisha, Chhattisgarh** — **account for 30% of India's agricultural output and a significant food shortage is predicted with the rapid decline of**



**water resources.** The report named 21 major cities that are bound to reach zero groundwater levels by 2020- including Delhi, Bengaluru, Hyderabad, and Chennai. Many different studies cite years of deficient rains, excessive groundwater pumping, and an inefficient water management system as the main culprits.

The report also raised concerns regarding the quality of water, stating that **70 percent of India's water supply is contaminated. Most surface water sources in India are polluted because of untreated sewage, agricultural runoff, and effluents being released from small and large scale industries.** Research has shown that the discharge of untreated sewage is the largest source of both surface and groundwater pollution in India.

### ***Deficient Rains***

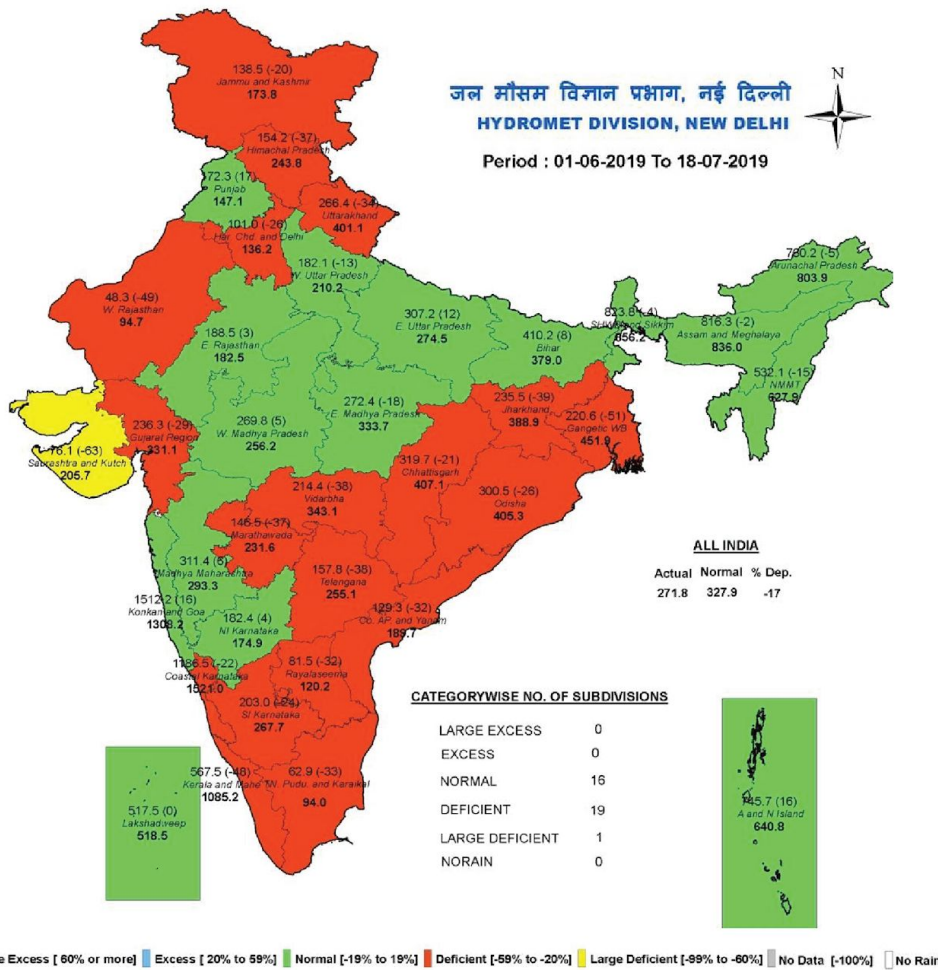
The monsoons are at the very center of water supply in India. A timely and sufficient monsoon season is important for cities and rural areas alike. However, due to climate change, the rains are becoming increasingly unreliable. This has resulted in severe water shortage and even acute droughts in several areas. **The average rainfall across the country has fallen short of the historical average for the past decade. Parts of Maharashtra, Uttar Pradesh, Bihar, and Chattisgarh have shown the most drastic decrease in rainfall and are already facing drought-like conditions. Even regions that receive above-average rainfall, like Uttarakhand, have shown a trend of extreme rainfall over short spans of time, the type of rains that cause floods.** According to research, even as overall rainfall has



declined, the number of extreme rainfall events has increased. Aggravating this is a lack of sufficient rainwater management policies.

## DEFICIENT RAINFALL LOOMS OVER INDIA

Over half the country has received deficient rainfall this monsoon



NOTES :  
a) RainFall figures are based on operation data.  
b) Small figures indicate actual rainfall (mm), while bold figures indicate Normal rainfall (mm).  
c) Percentage Departures of rainfall are shown in brackets.

Source: IMD, Kotak Institutional Equities Research

Bloomberg | Quint



### ***Depletion of Groundwater***

Groundwater, which ensues from rainwater seeping into the ground, forms a large chunk of the water used for both irrigation and domestic purposes. The world bank has found that **62 percent of Indian farmers rely on groundwater as a source of irrigation** and with a rise in the deficiencies of the monsoons and an increase in the demand for water, **groundwater levels are depleting rapidly across the country**. In 1998, the average depth at which groundwater could be accessed was 7.5 meters, but this had increased to 9.2 meters in 2018.

### ***Water Pollution***

The **key cause for water pollution is the large gap between the generation of waste and its treatment**. There is not only a lack of treatment capacity but the existing treatment plants are not maintained properly or used efficiently. This results in the release of untreated sewage and industrial wastes into water bodies-- disrupting the natural ecology. Studies monitoring the water quality found that **most rivers in India have extremely high levels of biochemical oxygen demand (BOD)**. A BOD above 20 mg/l is considered ecologically unsafe and polluted but Indian rivers show drastically high mg/l. This **increase in BOD is serious near the cities and major towns, resulting in the death of aquatic life and the water becoming toxic**. Rivers like Ganga, Yamuna, Gomti, Chambal, and Godavari are among the most polluted water bodies in India. They show **high levels of coliform pollution** in many sections thereby making the water unsafe for human irrigation.





Groundwater is generally considered less susceptible to contamination when compared to surface water bodies. However, a variety of land and water-based human activities are causing pollution in the water table. Discharge of toxic elements from industries and other sources of pollution like fertilizers and pesticides has resulted in severe contamination of groundwater. The **nitrate levels exceed the permissible limit** in over 50 percent of India. The **groundwater is polluted with the presence of iron, arsenic, fluorides, lead, and other heavy metals**. The presence of these chemicals beyond the permissible limits results in severe health hazards like cancer, diabetes, high blood pressure, and reproductive disorders.

### ***Cities in Focus***

Delhi relies majorly on surface water sources with 80 percent of the water supply coming from the rivers Yamuna and Ganga. This water supply, however, is scattered and not sufficient to meet the needs of the growing population. A large amount of water extracted from rivers is lost to leakage and does not reach the supply destination. The water level in the rivers also decreases during the summers, increasing the dependency on groundwater. **A study by the National Geophysical Research Institute (NGRI) found that the groundwater levels in the National Capital Region are depleting at a rapid and unsustainable rate of 10 cm per year. This depletion is caused due to unchecked extraction of groundwater in areas where the surface water supply is not sufficient.** Along with the rapid decrease in the quantity of groundwater, the quality is also deteriorating and it has been reported as unfit for human consumption in several areas.



At a stark contrast, Bangalore sits at the center of the lower half of the Indian peninsula with no perennial water source of its own. The city partly relies on the river Cauvery for its water needs, having to pump water over a 100 km and up nearly 900 feet. This water does not reach everybody and a quarter of the city's population relies exclusively on groundwater. **Rampant and unmonitored extraction of groundwater in the city has caused the water table to fall below 1,000 feet. The groundwater is now below the level of the Cauvery in several places and hence the river has begun to feed the water table.** Owing to such conditions, the rains have become the only source to both replenish the Cauvery and recharge the groundwater. However, a study done by Coffee Agroforestry Network (CAFNET) shows that this region has seen a decrease of 14 rainy days a year over the past few decades. This change can be attributed to large-scale deforestation that affects South Asia's monsoon. Despite the decrease in the amount of rainwater, it is enough to meet the city's growing needs if augmented efficiently.



Chennai presents an entirely different case with no access to large reservoirs or rivers. The city depends on four small municipal reservoirs that are fed by the rains. While these reservoirs — when filled — can accommodate the needs of 35 percent of the population, close to seven million people are dependent on fossil groundwater. Hence, the State only controls 35 percent of the water supply while the rest is monetized by private interests. **The rapid growth in Chennai’s real estate sector has resulted in the disappearance of wetlands and lakes under urban construction. This prevents the groundwater from being recharged by the rains. The city gets flooded during the monsoon months and then runs dry during the summer. This year, Chennai hit day zero as the four municipal reservoirs ran dry due to inadequate rainfall.**



## **Policies in Place**

The Constitution of India guarantees the right to life and personal liberty under Article 21. **The right to live in a pollution free environment and have access to clean water is a fundamental right and cannot be denied to any individual. Article 48-A, and Article 51A(g) imposes the duty to protect and improve the environment on not just the State but also on its citizens.** A few key policies to prevent water depletion and pollution are:

### ***Water Act***

The Water (Prevention and Control of Pollution) Act was passed in 1974 as a means to prevent and control water pollution and maintain the wholesomeness of water. The Act was later amended in 1988 and 2003 and has evolved into extensive legislation with more than sixty sections for the prevention and control of water pollution. **As the topic of water management falls under the State List, the power to make laws under this Act was also relayed to the individual States with the Center having power over only a few topics such as inter-state rivers.** The Act provides for the establishment of Boards for the Prevention and Control of Water Pollution -- including the Central Pollution Control Board and other State Pollution Control Board(s). These bodies' primary agenda is to promote cleanliness of rivers, streams, lakes, and wells. They are responsible for planning a comprehensive program for the prevention of pollution of water bodies by focusing on various aspects such as laying down annual effluent standards for sewage, regulate discharge



of sewage or trade effluents, take regular water samples for analysis, appeals, revision, set minimum and maximum penalties for offenders, hand out permits for establishment of industries etc. They are also required to disseminate information to the general public about water pollution and the methods to prevent the same.

Although we have a standard framework for making laws for the utilization of water resources, **there is no competent statutory authority for formulating the water policy.** 90% of the laws enacted for the utilization of water resources are at the State level and depict a lack of coordination between various bodies and levels of government. When the Water Act was first passed the focus was primarily on the utilization of water and not on environmental issues of pollution and depletion. Until recently, there was a general lack of vigor in most States to implement comprehensive policies to protect and preserve water resources. Even now, **there are great discrepancies in the way different States treat the water problem** as is evident from the CWMI ranking list where States like Gujarat, Madhya Pradesh, Andhra Pradesh, Karnataka, and Maharashtra fared better in terms of water management while States like Rajasthan, Jharkhand, Haryana, Uttar Pradesh, and Bihar have gotten low scores. **The Act also does not take into account groundwater management policies** which have become a growing concern in recent times. With an increased reliance on groundwater, especially in big cities, **there is a need for a comprehensive framework to ensure its quality and quantity.** The Act is also **focused on the point discharges and industrial discharges and does not have sufficient provisions for municipal wastewater,**



**agricultural runoffs, stormwater overflow, oil discharges or spills during oil extraction, mining wastewater, etc. and prevention and treatment of the same.**

### ***Jal Shakti Abhiyan***

To garner a more integrated and holistic approach to water conservation, the Jal Shakti Ministry was formed by the Modi Government. This Ministry merged the Ministry of Water Resources, River Development & Ganga Rejuvenation and Ministry of Drinking Water and Sanitation into one. As a maiden project, the Ministry launched the Jal Shakti Abhiyan to help alleviate water-stressed Districts across the country. **The selected Districts with critical or over-exploited groundwater levels are being aided in the conservation and management of water resources by focusing on accelerated implementation of five target intervention- water conservation and rainwater harvesting, renovation of traditional and other water bodies/tanks, building of reuse and recharge structures, development of watershed projects, and intensive deforestation. The program has also made provisions for special intervention areas such as Krishi Vigyan Kendra Melas to promote efficient water use for irrigation and a better choice of crops for water conservation and Urban Waste Water Reuse plans for cities.**

The Jal Shakti Abhiyan, however, has no additional funding specific targets. It is instead aimed at bringing sensitivity to the subject of water conservation and provide a focused approach to water policies across the country. The campaign will push to implement existing water conservation schemes in the 256 water-stressed Districts. The scheme follows a similar



pattern as that of Swachh Bharat Abhiyan by making water conservation everyone's responsibility and turning it into a mass people's movement. While this seems like a good idea in theory the Jal Shakti Abhiyan will face problems associated with government introduced public led movements — short-lived vigor, unequal implementation, and uncertain results.

### ***Nal Se Jal Scheme***

The Jal Shakti Ministry is also pioneering the Nal se Jal Scheme which aims at providing guaranteed piped water connection to every household by 2024. **This sizeable aim is to be achieved by setting up water treatment plants and laying down several thousand meters of pipes.** The entire scheme has been provided with a budget of 28,261.59 crores in the 2019 budget but experts say that it will cost almost an astonishing 6.3 trillion rupees to be completed.

The scheme is modeled after Telangana's Mission Bhagiratha. Experts have raised concerns that the scheme is a blanket policy that is incapable of answering the specific needs of different geographical regions. A policy that worked in Telangana may not be the best fit for arid regions in Rajasthan which often receives less than five millimeters of rain in a year. Another important criticism is that the policy focuses largely on building infrastructure for the transportation of water and does little to address the dwindling water reservoirs in the country.



### ***River-interlinking Project***

Reservoir levels have plummeted in several States across India and are at an all-time low of below 10 percent. These reservoirs form the source for several other water policies like the Jal Shakti Abhiyaan and the Nal Se Jal Scheme. With the reservoirs drying up, the government has planned an ambitious river-interlinking project to fill the hundreds of reservoirs that are to be built. This project is **aimed at transferring water from water surplus basins to water-deficit basins, minimize the amount of water going to sea unutilized, and to balance the effects of extremities like floods and droughts.**

This large-scale project will require several years and a very hefty budget. The projected costs to complete all the proposed links are above 100,000 crores. **Environmentalists have raised concerns regarding the massive ecological impact that the project will have. It will cause problems like waterlogging, desertification, increased salinity, and endanger several species of flora and fauna. The project will also displace huge cohorts of people and affect the livelihoods of people who rely on the fishery.**





## **The Road Ahead**

With the speed and extent at which India's water crisis is growing, the current policies are just not enough. **The Water Act needs to be overhauled to become more rigorous and address modern concerns. The Jal Shakti Ministry needs to reevaluate its policies to make them more achievable in terms of scope and cost.** The environmental impact of these policies must also be taken into consideration to provide a more sustainable long-term impact. Keeping in mind the immediate need for time-bound policies that are both efficient and tailored to the specific needs of the various regions in the country, the following are some policy suggestions:

### ***Revision of Water Act***

In order to make the Water Act a true backbone of water conservation and utilization, these key points must be considered:

- ❑ Explain the scope of the Act to apply to the whole of India, just like the Air Act.
- ❑ Expand the scope of the Act beyond point discharges and industrial discharges to address various parameters like municipal wastewater, agricultural runoff, and oil spills
- ❑ Provide a sound framework for the conservation and utilization of groundwater.
- ❑ Provide rules and regulations for the management of wastewater in both rural and urban settings.



- ❑ Provide for the largest share of central funding to eliminate the factor of inadequate funds.
- ❑ Lay more emphasis on research and development of economical options that are ecologically sustainable.
- ❑ Set up a competent national body for the monitoring and regulation of the implementation of the Act.

### ***Groundwater Augmentation***

Increasing demand for water and decreasing rainfall has led to the **rapid depletion of groundwater and manmade intervention is required to ensure sustainable recharge.**

One way to achieve this is through systematic rainwater harvesting. Rainwater harvesting refers to the collection of water during the monsoon months which can then either be directly used or redirected to replenish the water table. Rainwater harvesting is not a new concept to India and has been a traditional practice in all water-scarce areas and has also been made partially mandatory in only a few cities like Chennai, Bangalore, and Pune. The need of the hour is to expand this as a nation-wide policy that can be customized for different regions. A sound rainwater harvesting policy would include:

- ❑ Government incentives and subsidies to implement the policy at the domestic level;
- ❑ Government investment and asset building through other schemes like MGNREGA which can aid in building watersheds, tanks, canals, etc.;



- ❑ Decentralization of the planning and responsibilities to ensure the policy is tailored to the needs of the area;
- ❑ Community participation in decision making and implementation to ensure maximum cooperation.

**A policy comprising of similar features has been implemented successfully in rural Thailand. The government introduced three small scale technologies- jars and tanks for drinking water, shallow wells for domestic water and small weirs for agriculture. The planning and implementation responsibility were administered at the District level. Today, close to half of the rural population rely on rainwater harvesting. The Thai government also started to expand the policy to the urban centers and has witnessed similar results. This is one of the largest examples of sustainable self-supply of water in the world. Not just India's weather conditions but also its state structure is an exact fit for such a project.**

### ***Restoring Existing Water Bodies***

The current policy solutions are focused largely on building new infrastructure- laying down of pipes, constructing dams and artificial reservoirs. **Existing water bodies- lakes, ponds/tanks, baolis and other such natural or man-made structures- have been left out of the ambit of these policies.** However, these water bodies are important to recharge groundwater and also absorb excess rain to prevent flash flooding. They are being **lost due to encroachment, dumping of sewage and waste, and a shift from a community-based**



**water-use system to an individual-oriented system that relies heavily on groundwater. Restoring or reviving the said water bodies has become important with the mounting water crisis.** The following steps must be taken to ensure their revival:

- ❑ Gather comprehensive data on the number of water bodies characterized into- in use, not in use, and lost;
- ❑ Plan and implement remedial measures for water bodies not in use due to lack of access, excessive pollution, or any other reversible reason;
- ❑ Repurpose and renovate water bodies according to the meteorological conditions and water needs of the region;
- ❑ Construction of small-scale water harvesting structures to revive groundwater and replenish surface water;
- ❑ Build sustainable local water reservoirs to minimize the need to transport water over long distances;
- ❑ Prevent pollution by formulating and enforcing rules prohibiting the discharge of industrial and domestic pollutants into water bodies;
- ❑ Prevent encroachment by promulgating strict checks and balances on all developmental activities.

A book by Shri Anupam Mishra documents the life and work of individuals and communities across India, in setting up water harvesting and management systems. It emphasizes the need for these time-tested water harvesting systems. Several individuals and environmental groups have taken to reviving water bodies, leading to incredible results. Rajasthan has shown

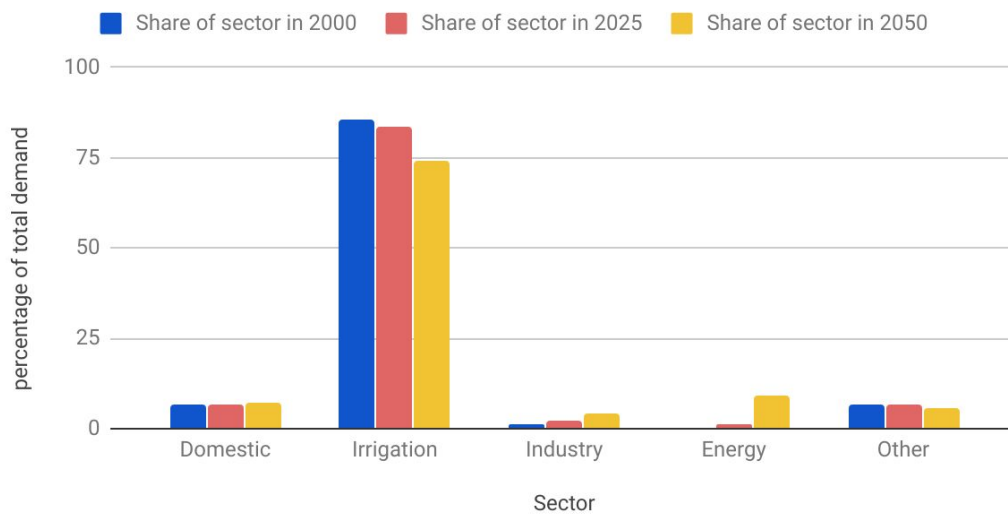


incredible improvement in water management with the Mukhya Mantri Jal Swavlamban Abhiyan (MJSA) that aims to make all villages in the state water-sufficient by focusing on reviving water bodies and increasing groundwater levels.

### ***Sustainable Irrigation***

#### Share of Sector (Irrigation Dominates)

Source: Central Water Commission



The growing demand for water in India is almost entirely driven by farmers. More than 80 percent of water is used for farming and this percentage allocation isn't projected to decrease even by 2050. Out of the 160 million hectares of land being cultivated, 39 million hectares are irrigated by groundwater, 22 million hectares by canals and the rest is dependent on the monsoon. Irrigation for agriculture is not just one of the largest consumers of water, it is also a prime source of water pollution. A large portion of the water used for irrigation is lost as



surface runoff or leached back into the ground, usually contaminated by pesticides and fertilizers. **Data on water use efficiency indicates that India uses 2-3 times more water to produce one unit of food crop compared to other major agricultural countries like China, Brazil and the US. There is an immediate need to adopt an efficiently designed system of irrigation across the country.** A sustainable irrigation policy would include:

- ❑ Government incentives for sprinkler and drip irrigation systems that are significantly more water-efficient in areas with low water supply. Currently, out of the gross irrigated area-sprinkler system is implemented in less than 2.5 percent and drip irrigation in less than 4 percent. This can be expanded significantly;
- ❑ Encouraging new agronomic practices like raised bed planting, ridge-furrow method of sowing, subsurface irrigation, and precision farming to replace the traditional methods across the country. These methods have been demonstrated to be beneficial in pockets of West Bengal, Uttar Pradesh, Maharashtra, Rajasthan, Andhra Pradesh, Karnataka, and Tamil Nadu. However, these are mostly pilot projects consisting of a small fraction of the total agricultural system and can be upscaled to cover much larger areas;
- ❑ Support an integrated approach for irrigation technology adoption so that new technologies such as micro-irrigation can be integrated with the existing irrigation systems of canals and drains.



- ❑ Strengthening of the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) that provides a comprehensive framework for the expansion and effective use of water for irrigation through more funding and a wider reach;
- ❑ Using information technology to dispense information regarding best practices.

Israel has been the pioneer in technological innovations in areas like drip irrigation and water security. Despite being a water-scarce country, they have been able to use their water resources efficiently even with the growth in their population and agriculture. Widespread implementation of drip irrigation has helped maximize water efficiency to 90 percent and helped in saving close to 50 percent of the water used for irrigation. Israel was a partner in [India Water Week 2016](#) and asserted that India can also achieve such breakthroughs by using similar technological innovations.

### ***Efficient Wastewater Management***

Urban areas have become highly dependent on groundwater to sustain their growing populations. With a rise in the built-up area leaving no room for natural recharge of groundwater, most of these cities will run dry very soon. **Out of all the water used, close to 80 percent is released to rural areas in the form of wastewater that is usually untreated and thick with sewage and hazardous heavy metals.** To make this process more efficient, all urban centers must adopt the following:

- ❑ Strict laws regarding the disposal of both greywater and blackwater;



- ❑ Building and maintenance of wastewater treatment plants to ensure the quality of water being released into water bodies and rural areas;
- ❑ Framework for the utilization of treated water to increase efficiency;
- ❑ Water, cleaned of heavy metals but still rich in nutrients like phosphorus, should be returned to rural areas for use in agriculture;
- ❑ Water that is treated further can be used to recharge groundwater.

If the recent reports are to be believed, **India is hurtling headfirst towards Day Zero. Several cities will run out of groundwater by 2020. India's demand for water will surpass its supply resources by 2030.** This will affect the quality of life across India and stagnate the country's development. People will be forced to rely on unsafe water, triggering widespread illness leading to more deaths and higher infant mortality. The country will face a severe food shortage and famines will take many lives. A state of desperation will curtail civil rights, democracy and the rule of law. India has a meagre five years to avoid this dystopian future and it has to act now.

While the CWMI report has raised urgent concerns regarding the state of water conservation in different parts of the country, it has also shown a beacon of hope — the scores improved on an average of 1.8 percentage points between 2015 and 2017. This improvement is also being spearheaded by the low performing states with Rajasthan, Jharkhand, and several of the northeastern states showing maximum improvement. If efficient and time-bound policy solutions are put in place, India could very well limit the damage and even avoid the crisis.





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