



## Addressing India's Looming Water Crisis

*This editorial is based on “[A major new report makes the case for water as a global common good](#)” which was published in *The Indian Express* on 21/10/2024. The article highlights the urgent global water crisis, warning that demand may exceed supply by 40% by 2030, severely impacting economies and food security. For India, it underscores the need for decisive action on inter-state water disputes and water conservation.*

**For Prelims:** [Water Resource Management](#), [15th Finance Commission](#), [Water stress](#), [NITI Aayog's Composite Water Management Index](#), [Central Water Commission](#), [Central Pollution Control Board](#), [Biochemical Oxygen Demand](#), [Ken-Betwa Link Project](#), [Cauvery water dispute](#), [Indus Waters Treaty](#), [Teesta River](#), [Jal Shakti Abhiyan](#), [Pradhan Mantri Krishi Sinchai Yojana](#), [Central Ground Water Board](#), [Mission Amrit Sarovar](#).

**For Mains:** Current Status of Water Availability and Water Stress Level in India, Primary Water-Related Challenges Confronting India.

A recent report by the **Global Commission on the Economics of Water** warns of a [global water crisis](#), with demand projected to **exceed supply by 40% by 2030**, threatening food production and economies. For India, already grappling with [inter-state water disputes](#) and **conservation challenges**, this report underscores the urgent need for decisive policy reforms to address water stress.

### What is the Current Status of Water Availability and Water Stress Level in India?

- **Current Status of Availability:**
  - The average annual per capita water availability in India has declined from **1,816 cubic meters** in 2001 to **1,545 cubic meters** based on the 2011 census.
  - Projections by the Central Water Commission indicate further decreases to **1,434 cubic meters** by 2025 and **1,219 cubic meters** by 2050.
- **Water Stress Indicators:**
  - Annual per capita water availability below **1,700 cubic meters** signifies water stress, while below **1,000 cubic meters** indicates water scarcity.
    - As of now, **India is experiencing water stress**, with geographic and climatic variability causing regional disparities.
  - According to the [15th Finance Commission](#), approximately **600 million Indians** faced high to **extreme water stress** in 2020.

### What are the Primary Water-Related Challenges Confronting India?

- **Groundwater Depletion:** India is facing severe groundwater depletion, **particularly in agricultural states**.

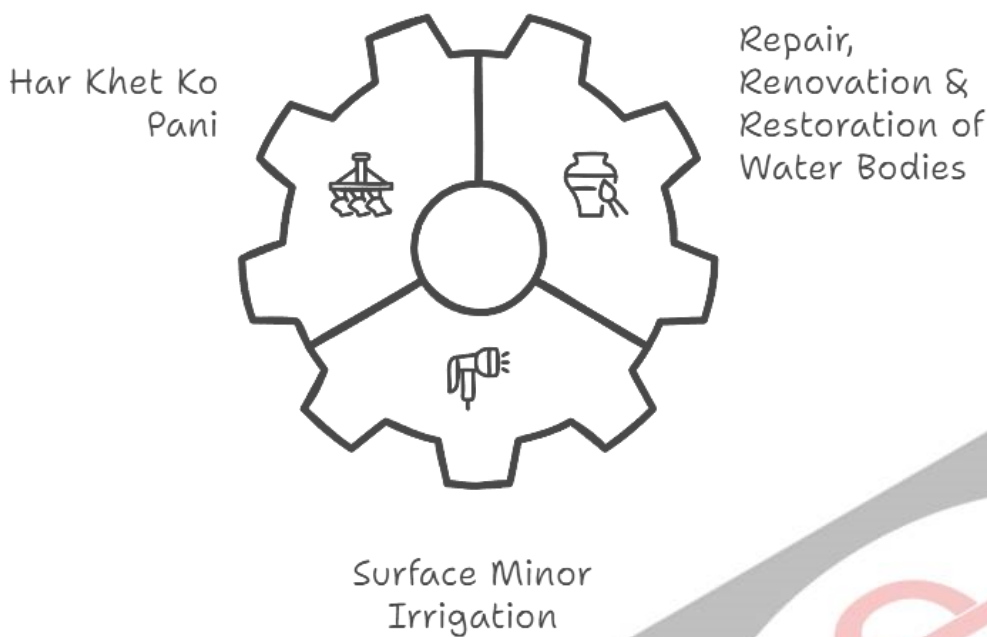
- **Overexploitation for irrigation** has led to rapidly falling water tables. For instance, in Punjab, rampant tube well irrigation is causing drastic water table drops.
  - Ideally, groundwater should be available at a **depth of 50 ft to 60 ft**, but in Punjab, its level has significantly dropped to **150ft to 200 ft** in most places (as of 2019).
- This issue is critical as groundwater is a **major source for both irrigation and domestic water supply**.
- **Urban Water Scarcity:** Rapid urbanization has intensified **water scarcity in Indian cities**.
  - **NITI Aayog's Composite Water Management Index** has shown that nearly **600 million people** are facing high to extreme water stress.
  - The **2019 Chennai water crisis**, where water had to be transported by train, exemplifies the severity of urban water issues.
  - Inadequate rainfall in 2023 led to a water crisis in the state of **Karnataka**, especially in its capital, the IT city of **Bengaluru**.
    - The Karnataka government termed **2023 as a drought year**.
  - In addition to this, **urban flooding** is increasingly becoming a significant issue. The **Central Water Commission** recorded **184** extreme and severe floods in 2022 and 145 in 2021.
    - A **CAG report (2024)** indicated that many recommendations from various committees on flood management remain unfulfilled, highlighting gaps in forecasting and implementation.
- **Irrigation Efficiency and Agricultural Water Use:** As per Central Water Commission, agriculture consumes about **78% of India's water resources**, often inefficiently.
  - The shift to **water-intensive crops and outdated irrigation practices** contribute to water stress.
  - **NITI Aayog** reported that Indian farmers utilize **three to five times** more water than farmers in the US, China, or Israel to produce equivalent crop yields.
  - According to recent estimates, India's **irrigation efficiency is around 38%**, significantly lower than the **global average of 50-60%**, indicating a **critical need for widespread adoption of water-efficient irrigation** technologies and crop diversification.
- **Water Pollution and River Rejuvenation:** India's rivers, particularly the Ganga, face severe pollution from untreated sewage and industrial effluents.
  - Over **100 towns** and cities along the Ganga **pour domestic sewage into the river**.
  - In 2022, the **Central Pollution Control Board** identified **311 polluted river** stretches across **279 rivers** in 30 States/UTs, based on **Biochemical Oxygen Demand (BOD)** levels exceeding **3 mg/L** during 2019 and 2021.
  - The **Standing Committee on Water Resources** highlighted significant pollution in Yamuna river due to **biomedical waste, construction debris, and untreated sewage**.
- **Climate Change Impact on Water Resources:** **Climate change is exacerbating India's water stress** by increasing the frequency and intensity of extreme weather events like floods and droughts.
  - The country's dependence on monsoon rains, which are becoming increasingly erratic, adds to the vulnerability.
  - For example, the **2023 monsoon season** saw extreme rainfall variations across India, with some regions experiencing severe floods while others faced drought-like conditions.
    - Despite the **2024 monsoon season concluding with 7.6% above-average rainfall**, inadequate water management continues to exacerbate the water crisis.
- **Fragmented Governance and Poor Coordination:** The water sector in India suffers from multiple authorities with overlapping jurisdictions - **including the Ministry of Jal Shakti, state water boards, municipal corporations, and panchayats**.
  - For instance, in Delhi alone, seven different agencies handle water management, leading to coordination failures.
  - The **National Water Development Agency** has identified **30** river interlinking projects under the **National Perspective Plan (1980)**.
    - As of now, **only the Ken-Betwa Link Project** has received approval, with completion expected by March 2030, highlighting lack of coordination among various levels of government.
- **Inter-State Water Disputes:** India faces numerous long-standing inter-state water disputes, which have become increasingly contentious as water scarcity grows.

- The **Cauvery water dispute** between Karnataka and Tamil Nadu is a prime example. Karnataka and Tamil Nadu are once again in conflict over sharing excess Cauvery water, with Karnataka requesting to adjust the surplus inflow against future releases, citing the **32% excess rainfall this monsoon**.
  - Tamil Nadu, however, insists on strict adherence to the **Supreme Court's 2018 ruling**, leading to renewed tensions
- The **Krishna-Godavari dispute** is another major issue. These disputes highlight the **need for more effective interstate water governance mechanisms** and basin-wide management approaches.
- **International Water Sharing Challenges:** India shares many of its river basins with neighboring countries, leading to complex transboundary water issues.
  - The **Indus Waters Treaty with Pakistan, signed in 1960**, has been under strain in recent years.
    - In **2023**, India issued a notice to modify the treaty, citing Pakistan's **"intransigence" in resolving disputes over hydroelectric projects**.
  - The **unresolved issue of Teesta River** water sharing between India and Bangladesh persists despite years of negotiations, further **complicated by recent political tensions in Bangladesh**.
  - The lack of a comprehensive water-sharing agreement for the **Brahmaputra with China is another major concern**, especially given **China's dam-building activities upstream**.
  - These international water challenges require diplomatic finesse and highlight the need for more robust transboundary water cooperation frameworks in **South Asia**.

## What Key Steps has the Indian Government taken for Water Conservation and Rainwater Harvesting?

- **National Water Policy (2012):** This policy advocates for **rainwater harvesting and conservation**, emphasizing the need to augment water availability through direct rainfall utilization.
- **Jal Shakti Abhiyan (JSA):** Launched in 2019, JSA aims to promote water conservation and harvesting nationwide. The current phase, **Jal Shakti Abhiyan: Catch the Rain (JSA: CTR) 2024**, focuses on constructing and repairing rainwater harvesting structures in all districts, including rural and urban areas.
  - This initiative collaborates with various Central Government schemes, such as:
    - **MGNREGS**
    - **Atal Mission for Rejuvenation and Urban Transformation (AMRUT)**
    - **Pradhan Mantri Krishi Sinchai Yojana (PMKSY)**
- **Atal Bhujal Yojana:** Implemented in **8,213 water-stressed Gram Panchayats** across 80 districts in **7 states** (Haryana, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Uttar Pradesh), this scheme shifts the focus from groundwater development to sustainable management practices.
- **Urban Guidelines by the Ministry of Housing & Urban Affairs:** Guidelines like the **Unified Building Bye Laws (UBBL) of Delhi (2016)** and **Model Building Bye Laws (MBBL) (2016)** mandate rainwater harvesting and conservation measures, tailored to local conditions.
- **Pradhan Mantri Krishi Sinchai Yojana (PMKSY):** Aimed at improving irrigation accessibility and efficiency, PMKSY encompasses three components:

## Components of PMKSY



- **Mission Amrit Sarovar:** This mission focuses on creating and rejuvenating **at least 75 Amrit Sarovars (water bodies)** in every district to facilitate water harvesting and conservation.
- **National Aquifer Mapping (NAQUIM):** The **Central Ground Water Board (CGWB)** completed this project covering approximately **25 lakh sq. km.**
  - The management plans developed include various water conservation measures through recharge structures.

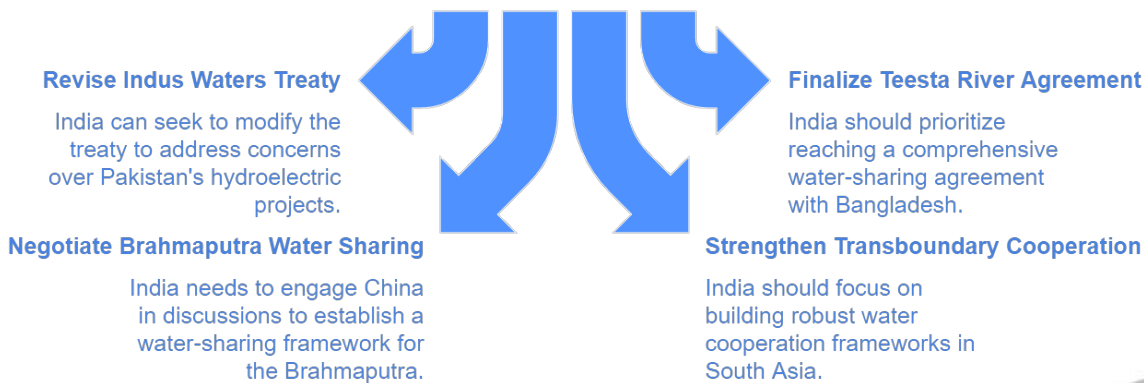
## What Measures can be Adopted for More Effective Water Management in India?

- **Modernizing Irrigation Systems:** Implementing **precision irrigation techniques** like drip and sprinkler systems can significantly improve water use efficiency in agriculture.
  - The Punjab government's "**Paani Bachao, Paisa Kamao**" scheme, which incentivizes farmers to reduce groundwater usage, is a promising model.
  - Scaling up such initiatives nationally, **coupled with promoting crop diversification away from water-intensive crops**, could dramatically reduce agricultural water consumption. The government could consider **linking farm subsidies to water-efficient practices to accelerate adoption.**
- **Urban Water Management and Recycling:** Cities need to focus on **reducing water losses**, implementing **water metering**, and **promoting water recycling.**
  - Chennai's initiative to recycle wastewater for industrial use is a model to emulate.
    - The city's **Tertiary Treatment Reverse Osmosis (TTRO) plants** can recycle about **20% of its Chennai sewage, reducing freshwater consumption.**
  - Other cities should adopt similar approaches, integrating water recycling into urban planning.
    - **Israel's successful Shafdan facility model** could be adapted for Indian cities too.
  - Implementing **rainwater harvesting in urban areas**, as mandated in cities like **Bengaluru**, can also significantly augment water resources. These measures, combined with smart water management systems and **leak detection technologies**, can

improve urban water security.

- **Community-Led Groundwater Management:** Empowering local communities to manage groundwater resources can lead to sustainable usage.
  - The **Atal Bhujal Yojana** is one of the world's largest **community-led groundwater** management programs. It helps villagers understand their water availability and usage patterns to budget water use. Expanding this program and **integrating it with technologies like [remote sensing](#) and [GIS for aquifer mapping](#)** can enable more informed decision-making at the local level.
  - Coupling this with **awareness campaigns and capacity building of local water user associations** can ensure long-term sustainability.
- **Water-Sensitive Infrastructure Design:** Incorporating water-sensitive design principles like **[Blue-Green Infrastructure Model](#) in urban planning** can significantly improve water management.
  - This includes creating **permeable surfaces to enhance groundwater recharge, developing urban wetlands** for natural water treatment, and integrating stormwater management with urban landscaping.
  - For instance, **Indore's efforts in reviving 330 traditional water supply sources (wells & bawdies)** have not only improved water availability but also enhanced the urban environment.
  - Mainstreaming these approaches in urban development policies and municipal bylaws across India can lead to more water-resilient cities.
  - Design **Mandate climate stress testing** and adaptive design for all new water infrastructure. Implement "**[sponge city](#)**" concepts adapted from **China's successful model**.
- **Enhancing Water Storage and Recharge:** Given **India's monsoon-dependent water cycle**, improving water storage is crucial.
  - This does not necessarily mean large dams, **but a network of smaller, decentralized storage structures**.
  - The success of **Rajasthan's Jal Swavlamban Abhiyan**, which created numerous **small water harvesting structures**, demonstrates the potential of this approach.
  - It has **helped recharge groundwater and improve water availability in arid regions**. Combining traditional water harvesting methods with modern technology for site selection and design can create a robust, locally-adapted water storage network across the country.
- **Data-Driven Water Management:** Leveraging technology for real-time monitoring and data-driven decision-making in water management is essential.
  - The **[National Hydrology Project](#), supported by the [World Bank](#)**, has introduced systems that give reservoir managers accurate, real-time information.
  - Expanding this to cover **all major water bodies and integrating it with AI and machine learning** can revolutionize water management.
  - For instance, **Bengaluru's use of IoT devices for monitoring borewells** has improved water distribution efficiency.
  - Nationwide implementation of such systems can lead to more responsive and efficient water management.
- **Smart Water Pricing Reform:** Introduce **dynamic water pricing based on availability, quality, and usage patterns**.
  - **Singapore's tiered pricing model could be adapted**. Use smart meters with AI-driven analytics to implement real-time pricing.
  - Also, **implement strict industrial water reuse requirements with technology support**. Provide technical assistance and financial incentives for transition. Establish **water reuse markets between industries and agriculture**.

## How should India address its water-sharing disputes with neighboring countries?



### Conclusion:

The urgency of the water crisis demands decisive action from the Indian government and a collective effort to improve water management practices. Emphasizing effective governance, community involvement, and technological advancements will be crucial in overcoming the current water-related obstacles and fostering a resilient water management framework for the country. This aligns with **Sustainable Development Goal 6 (SDG 6)**, which aims to ensure **availability and sustainable management of water and sanitation for all**.

#### **Drishti Mains Question:**

"Water scarcity and management have emerged as critical challenges in India, exacerbated by factors such as urbanization, climate change, and population growth". What solutions can be implemented to enhance sustainable water management practices in the country?

### UPSC Civil Services Examination, Previous Year Question (PYQ)

#### **Prelims:**

**Q.1. Which one of the following ancient towns is well known for its elaborate system of water harvesting and management by building a series of dams and channelizing water into connected reservoirs? (2021)**

- (a) Dholavira
- (b) Kalibangan
- (c) Rakhigarhi
- (d) Ropar

**Ans: A**

**Q.2. With reference to 'Water Credit', consider the following statements: (2021)**

1. It puts microfinance tools to work in the water and sanitation sector.
2. It is a global initiative launched under the aegis of the World Health Organization and the World Bank.
3. It aims to enable the poor people to meet their water needs without depending on subsidies.

**Which of the statements given above are correct?**

- (a) 1 and 2 only
- (b) 2 and 3 only
- (c) 1 and 3 only
- (d) 1, 2 and 3

**Ans: C**

**Mains:**

**Q.1** What are the salient features of the Jal Shakti Abhiyan launched by the Government of India for water conservation and water security? **(2020)**

**Q.2** Suggest measures to improve water storage and irrigation system to make its judicious use under the depleting scenario. **(2020)**

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