Water Management: From Scarcity to Sustainability

This editorial is based on "Drying up: What Urban India needs to fix its water problem" which was published in The Indian Express on 11/06/2024. The article brings into picture India's escalating water crisis, emphasizing the urgent need for a comprehensive policy to manage dwindling river flows and aquifers.

For Prelims: Ministry of Jal Shakti, Central Water Commission, Central Groundwater Board, Central Pollution Control Board, Article 262, Flood irrigation, Cauvery water dispute, Pradhan Mantri Krishi Sinchayee Yojana, Jal Shakti Abhiyan- Catch the Rain Campaign, Atal Bhujal Yojana, Jal Jeevan Mission, National Mission for Clean Ganga

For Mains: Major Factors Driving Water Crisis in India, Government Initiatives To Tackle the Water Crisis in India.

India is staring at an **impending water catastrophe,** with large swathes of the country reeling under acute water scarcity. The **unrelenting heat waves** and **erratic rainfall** have exacerbated the crisis, depleting rivers and aquifers at an alarming rate.

Reduced water flow in rivers and **falling groundwater levels** have made this summer extremely difficult. In cities like **Bengaluru,** taps have run dry, leading to disputes between states over sharing of river waters. Providing tap water connections alone is not enough to tackle this crisis. India needs a long-term policy **focused on conserving resources, and ensuring fair distribution** and adopting a holistic strategy for **sustainable water management.**

What is the Structure of Water Management in India?

- **Central Level**:
  - **Ministry of Jal Shakti (MoJS):** Established in **May 2019**, it is the apex body responsible for formulating national water policies and overseeing water resource management activities across the country.
  - **Central Water Commission (CWC)**: A technical organization under MoJS that provides **technical guidance on water resource development project**s and river basin planning.
  - **Central Groundwater Board (CGWB)**: Responsible for assessing, monitoring, and managing groundwater resources in India.
  - **Central Pollution Control Board (CPCB):** The CPCB's principal function, as defined in the **Water Act of 1974** is to promote the cleanliness of streams and wells across states b**y preventing, controlling, and reducing water pollution.**
- **State Level:**
  - **State Water Resources Departments:** Responsible for implementing water policies and

managing water resources within their respective states.
    - **Irrigation Departments:** Focus on managing irrigation systems and ensuring water distribution for agricultural purposes.
    - **State Pollution Control Boards (SPCBs):** Responsible for monitoring and controlling water pollution.
- **Local Level:**
    - **Panchayats (Village Councils)**: Play a crucial role in managing water resources at the village level, including promoting water conservation and ensuring equitable distribution.
    - **Municipalities:** Responsible for managing water supply and sanitation in urban areas.
    - **Water User Associations (WUAs)**: Groups of farmers formed to manage and maintain irrigation systems at the local level.

What are the Constitutional Provisions Related to Water?

- **Fundamental Right:** Water, essential for human survival, is encompassed within the right to life under **Article 21 of the Indian Constitution**.
- **Entry 56 of Union List:** The central government is authorized to **regulate and develop inter-state rivers** and river valleys as deemed necessary by Parliament for the public interest.
- **Entry 17 of State List:** This entry pertains to **water supply, irrigation, canals, drainage,** embankments, water storage, and water power.
- **Article 262:** In cases of water-related disputes, Parliament can legislate to resolve issues regarding the use, distribution, or control of inter-state rivers or river valleys.
    - Additionally, Parliament may enact laws to **exclude such disputes from the jurisdiction of any court, including the Supreme Court.**

What are the Major Factors Driving Water Crisis in India?

- **Rapidly Depleting Groundwater Resources: India is the largest extractor of groundwater globally, accounting for around 25% of the world's groundwater extraction (**World Bank **).**
    - Excessive withdrawal has led to alarming depletion of aquifers.
- **Increasing Water Demand from Agriculture:** Agriculture accounts for around **78% of India's freshwater usage** (virtual water).
    - The Green Revolution led to the over-exploitation of groundwater for irrigation, with states like Punjab and Haryana experiencing a drastic drop in water tables.
        - **Flood irrigation,** a highly inefficient method, is still widely practiced, leading to significant water losses.
    - About **74% area under wheat cultivation** and **65% area under rice cultivation** faces extreme levels of water scarcity (**NITI Aayog**).
- **Inadequate Water Infrastructure: India's water infrastructure is plagued by aging systems, poor maintenance, and significant losses due to leakages and theft.**
    - Mumbai loses around **700 million liters** of water daily due to leakages.
    - **A report by the NITI Aayog stated that around 2 lakh people die in India every year due to inadequate water supply.**
- **Urban Sprawl and Industrial Growth:** Rapid **urbanization and industrialization** have increased water demand, while also contributing to water pollution.
    - **According to the NITI Aayog, 5 of the world's 20 largest cities under water stress are in India and about 70% of India's surface water resources are polluted.**
- **Sand Mining: Unregulated sand mining** from riverbeds disrupts river ecology and reduces their water carrying capacity.
    - This not only impacts downstream water availability but also increases the risk of flash

floods and riverbank erosion.
    - The **rampant sand mining in the Yamuna river** is a case in point.
- **Fragmented Governance:** Water management in India is often fragmented across different ministries and departments at the central and state levels.
    - This lack of coordination leads to duplication of efforts, inefficient resource allocation, and conflicting policies.
    - The ongoing **Cauvery water dispute between Karnataka and Tamil Nadu** is a result of such fragmentation.
- **Inadequate Focus on Demand-Side Management: India's water policies have primarily focused on increasing supply through large infrastructure projects, neglecting demand-side management.**
    - Measures like water-efficient technologies and recycling have received limited attention.
    - Only 30% of India's wastewater is recycled, compared to **89-90% in Israel**.
- **Sea Level Rise and Salinization:** Rising sea levels due to climate change threaten coastal aquifers with **saltwater intrusion.**
    - This salinization renders freshwater sources unusable for agriculture and drinking, posing a significant threat to coastal communities.
    - The increasing salinity of groundwater in parts of **Gujarat and Andhra Pradesh** is a worrying trend.

What can be the Major Consequences of the Water Crisis?

- **Hindering Human Capital Development:** The time burden of water collection, **particularly on girls**, often forces them to miss school, hindering their education and long-term opportunities.
    - Also, waterborne illnesses and malnutrition caused by water scarcity can lead to **cognitive impairment** among children.
- **Long-Term Economic Risks:** The **World Bank** estimates that water scarcity could cost India up to **6% of its GDP by 2050** if left unaddressed. This can significantly hamper economic growth and development.
    - Water scarcity can **deter businesses from investing in water-intensive industries**, impacting job creation and economic opportunities.
- **Rise of Water Mafias**: In water-stressed cities like Bangalore, informal water markets have emerged, with **"water mafias"** controlling access to water tankers and charging exorbitant prices.
    - This exacerbates **social and economic inequalities** and creates a black market for a basic necessity.
- **Impact on Transboundary Water Disputes:** Water scarcity can exacerbate existing tensions between India and its neighboring countries like **Pakistan and Bangladesh,** which share river basins.
    - This could lead to regional instability and **increased conflict over water resources.**
- **Threat to Biodiversity:** Depleting water levels and pollution threaten the survival of freshwater fish, amphibians, and reptiles.
    - The endangered **Ganges River Dolphin** faces habitat loss due to declining river flows.

What are the Government Initiatives To Tackle the Water Crisis in India?

- National Water Policy, 2012
- Pradhan Mantri Krishi Sinchayee Yojana
- Jal Shakti Abhiyan- Catch the Rain Campaign
- Atal Bhujal Yojana
- Jal Jeevan Mission (JJM)
- **National Mission for Clean Ganga (NMCG)**

What Measures can be Adopted to Tackle Water Crisis?

- **Transforming Fallow Land into Recharging Units:** Converting underutilized land into strategically designed **"water parks"** dedicated to **groundwater recharge**.
    - These parks can incorporate **bioswales, constructed wetlands, and rainwater harvesting structures**, creating appealing spaces that actively replenish aquifers.
- **Desalination Powered by Renewable Energy and Waste:** Developing large-scale desalination plants fueled by a combination of **renewable energy sources** and waste-to-energy technology.
    - Desalination plants not only generate clean water but also **transform waste into a valuable resource,** creating a sustainable and self-sufficient water production system.
- **Urban Rainwater Harvesting Systems:** Mandating the installation of rainwater harvesting systems in **all new buildings** and **retrofitting existing structures**.
    - This can be coupled with **green roofs** that capture and retain rainwater, replenishing groundwater and reducing stormwater runoff.
    - 900 rainwater harvesting pits to be installed at **Regional Rapid Transit System**, to promote sustainable public transport options in the National Capital Region.
- **Promoting Drip Irrigation and Aquaponics:** Encouraging the widespread adoption of drip irrigation systems that deliver water directly to plant roots, minimizing evaporation losses.
    - Additionally, support the development of **aquaponics farms,** which combine **aquaculture (fish farming) with hydroponics (growing plants in water)** in a closed-loop system, reducing water consumption.
- **Smart Water Grids:** Developing **smart water grids** that integrate sensors and real-time monitoring systems throughout the water distribution network.
    - This allows for early detection of leaks, optimal pressure management, and improved overall efficiency.
- **Fog Harvesting:** Exploring **fog harvesting technologies** in hilly regions. Specialized mesh structures capture moisture droplets from fog, providing a valuable water source in areas with limited rainfall.
    - India can learn from successful fog harvesting projects that have been implemented in countries like **Chile, Morocco, and Peru.**
- **Decentralized Water Management:** There is a need to drive a decentralized, community-driven approach to rural water supply and sanitation like the **Uttarakhand's Swajal project.**
    - Also, promoting decentralized wastewater treatment systems at the community or building level.
    - These compact systems **treat wastewater for reuse in non-potable applications,** reducing the burden on centralized treatment plants and saving freshwater.
- **Public-Private Partnerships (PPPs) for Water Infrastructure:** Encouraging public-private partnerships for developing and maintaining water infrastructure projects.
    - This can leverage private sector expertise and financing to **bridge the gap in water infrastructure development.**
- **Zero Liquid Discharge for Industries:** Mandate the adoption of **zero liquid discharge (ZLD) systems** for water-intensive industries, where wastewater is treated and recycled for reuse.
    - Encouraging the **development of eco-industrial parks,** where industries can share and reuse water resources, reducing freshwater demand and pollution.

Drishti Mains Question:

Analyze the key causes of India's water crisis and propose effective solutions for sustainable water management.

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)**