



# **DAILY EDITORIAL ANALYSIS**

**TOPIC**

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**HIDDEN COST OF POLLUTED  
GROUNDWATER**

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## HIDDEN COST OF POLLUTED GROUNDWATER

### Context

- Polluted groundwater poses a devastating threat to public health, agriculture, and economic stability across India.

### Status of India's Groundwater

- According to the **Annual Groundwater Quality Report (2024)**, India's dependence on groundwater—used by **600 million people** for drinking and agriculture.
  - ♦ Over **85% of rural drinking water** and **65% of irrigation water** come from below the surface.
- The **World Bank estimates** environmental degradation costs India **\$80 billion annually**, about **6% of GDP**.
- **Scope of Contamination:** According to the **Central Ground Water Board (CGWB) 2024 Annual Report**:
  - ♦ **20% of samples** across **440 districts** were nitrate-contaminated, primarily due to fertilizer misuse and septic tank leaks.
  - ♦ **Excessive fluoride** appeared in **9% of samples**, causing skeletal and dental fluorosis in Rajasthan, Andhra Pradesh, and Telangana.
  - ♦ **Arsenic concentrations** in Punjab and Bihar exceeded **WHO's 10 µg/L limit**, increasing cancer risks.
  - ♦ **Uranium levels above 100 ppb** were detected in Punjab, Rajasthan, and Andhra Pradesh.
  - ♦ **13% of samples** contained excess iron, linked to gastrointestinal and developmental disorders.

### Impacts of Contaminated Groundwater

- **On Agriculture & Related Activities:** Nearly **one-third of the country's land** suffers from soil degradation, aggravated by polluted irrigation water.
  - ♦ Heavy metals and chemical residues infiltrate crops, reducing yields and income.
  - ♦ The **economic ripple effects** are alarming:
    - Farms near polluted water bodies record **significant productivity losses**.
    - 440 districts reported **excessive nitrate levels** in 2023, up from 359 in 2017—a sharp rise **attributed to subsidized fertilizer use**.
    - Contaminated produce threatens **India's \$50-billion agricultural export sector**, as global markets increasingly demand traceability and food safety.
  - ♦ **Export rejections** due to contamination have already dented **India's reputation abroad**.
- **Health Impacts:**
  - ♦ **Fluoride and Fluorosis:** Fluoride contamination spans **230 districts across 20 states**, affecting **66 million people**.
    - Districts like Sonbhadra (UP) show a **52.3% prevalence rate**, far exceeding the WHO's 1.5 mg/L limit.
  - ♦ **Arsenic and Cancer:** The **Gangetic belt**—West Bengal, Bihar, Uttar Pradesh, Jharkhand, and Assam—is the worst affected.
    - In **Ballia (UP)**, arsenic levels reached **200 µg/L**, linked to **10,000+ cancer cases**.
    - A **Nature Scientific Reports (2021)** study found **1 in 100 people** in arsenic zones highly vulnerable to cancer.
    - Bihar's Bagpat recorded **40 mg/L**, nearly **4,000 times** the safe limit.
  - ♦ **Nitrates and Infant Health:** Over **56% of districts** in India exceed safe nitrate levels.
    - **Mixing baby formula** with such water leads to '**blue baby syndrome**', with a **28% rise in hospitalizations** reported over five years.
  - ♦ **Uranium and Organ Damage:** In **Punjab's Malwa region**, uranium exceeded **WHO's 30 µg/L threshold**.
    - Studies show **66% of children** and **44% of adults** exposed face health risks, including **chronic kidney damage**.
  - ♦ **Heavy Metals and Sewage:** Lead, mercury, and chromium from industrial effluents are common in clusters like **Kanpur** and **Vapi**.

- Contaminated wells have led to **cholera, dysentery, and hepatitis outbreaks**.
- **Fueling Social Inequality:** Groundwater contamination **deepens social divides**, as **wealthier families** can shield themselves **with technology and cleaner water sources**, however, the **rural poor** remain trapped in a **cycle of contamination and disease**.
  - ♦ Children exposed to toxins face impaired learning, limiting their future prospects and perpetuating intergenerational poverty.

### Why Does the Groundwater Crisis Persist?

- **Institutional Fragmentation:** Multiple agencies—**CGWB, CPCB, SPCBs, Ministry of Jal Shakti**—operate in silos.
  - ♦ Their overlapping mandates hinder coordinated action.
- **Weak Enforcement:** The **Water (Prevention and Control of Pollution) Act, 1974**, scarcely covers groundwater, leaving vast legal loopholes.
  - ♦ Polluters exploit lax compliance and poor oversight.
- **Lack of Transparency and Monitoring:** There is **no real-time, publicly accessible data**. Without early-warning systems, contamination is often discovered **after severe health damage** occurs.
- **Over-Extraction and Pollution Concentration:** Excessive groundwater pumping lowers tables, concentrating pollutants and mobilising **geogenic toxins** like arsenic and fluoride.

### Efforts & Initiatives To Improve Quality of Groundwater

- **Groundwater Recharge Structures:** Structures like **recharge shafts, pits, percolation ponds, and injection wells** help direct surface water into the ground, improving both quantity and quality of groundwater.
- **Atal Bhujal Yojana (Atal Jal):** It focuses on **Gram Panchayat-level** water budgeting and **Water Security Plans**.
  - ♦ It encourages behavioral change and regular monitoring of groundwater quantity and quality.
  - ♦ It includes **Disbursement Linked Indicators (DLIs)** tied to monitoring and sustainable practices.
- **Technological and Institutional Innovations:** **Elevated Electrical Conductivity (EC)** can indicate contamination **from agricultural runoff, industrial discharge, or saline intrusion**.
  - ♦ A working paper by EAC-PM advocates for:
    - Institutionalizing groundwater rights;
    - Adopting smart technologies for monitoring and irrigation;
    - Reducing overreliance on groundwater for agriculture;
- **Awareness Campaign:** The Ministry of Jal Shakti promotes the mantra: **‘Reduce, Reuse, Recharge, and Recycle’** to secure water sustainability.

### Other Related Initiatives

- Ground Water Assessment and Management Initiatives;
- Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS);
- **15th Finance Commission Grants** for rainwater harvesting and other water conservation activities;
- **Jal Shakti Abhiyan (JSA):** Catch the Rain (2024), focusing on rainwater harvesting and water conservation across rural and urban districts;
- **Atal Mission for Rejuvenation and Urban Transformation (AMRUT) 2.0;**
- **Bureau of Water Use Efficiency (BWUE)** under the National Water Mission, 2022
- Mission Amrit Sarovar (2022);
- **National Aquifer Mapping (NAQUIM)** by the Central Ground Water Board (CGWB);

### Way Forward: From Crisis to Action

- **Establish a National Groundwater Pollution Control Framework:** Empower the **CGWB** with statutory authority and integrate all agencies under a single, accountable framework.
- **Modernize Monitoring Infrastructure:** Deploy **real-time sensors, remote sensing**, and **open-access dashboards**. Integrate with **public health data systems** for early alerts.

- **Targeted Remediation and Health Interventions:** Install **arsenic and fluoride removal units**, expand **pipled water coverage**, and run **public awareness campaigns** in high-risk areas.
- **Reform Urban and Industrial Waste Management:** Mandate **Zero Liquid Discharge (ZLD)**, enforce **penalties for illegal dumping**, and regulate **landfills and effluents**.
- **Promote Sustainable Agriculture:** Reduce fertiliser overuse through **balanced nutrient management**, **organic farming**, and **soil health programs**.
- **Enable Citizen-Centric Governance:** Empower **panchayats, local water groups, and schools** to participate in **testing, monitoring, and reporting** contamination.
- **Safeguarding Export Reputation:** India needs to **tighten quality checks** and **train farmers** to protect agricultural exports, sustainable practices.
  - ♦ Food safety is not just a trade issue—it's a national security imperative.

### Conclusion

- Groundwater contamination is not a marginal issue—it is a **silent drain on India's economy, health, and future**. Contamination is often irreversible, unlike water scarcity.
- Only bold, coordinated action can prevent this environmental crisis from becoming an irreversible national catastrophe.

Source: TH

### Daily Mains Practice Question

[Q] Discuss the multifaceted impact of polluted groundwater on public health, agriculture, and the economy in India. What policy measures could mitigate them?

