Making Groundwater 'Visible'

This editorial is based on ["Groundwater: A Valuable 'invisible' Resource"](#) which was published in Hindustan Times on 22/03/2022. It talks about how the invisible resource - groundwater can be made visible by groundwater management strategies.

For Prelims: World Water Day, Central Ground Water Board (CGWB), NAQUIM, Atal Bhujal Yojana, Master Plan for Artificial Recharge to Groundwater - 2020, Catch the Rain Campaign,

For Mains: Groundwater - depletion, management and government's initiatives, Sustainable Yield of groundwater, Urban groundwater-management-strategy, Making groundwater a visible resource.

India has 16% of the world's population, but **only 4% of its freshwater resources**. Given the existing consumption patterns, including **rampant groundwater extraction**, estimates suggest that **by 2030, India will only have half of the water it needs**.

As the climate crisis escalates, its impacts are causing significant changes in the flow of rivers, and in some cases, a shift in their course. There are, therefore, credible concerns about the access and availability of water to meet future water demands of cities.

Unlike some natural resources such as minerals or oil, groundwater is renewable. **If managed sustainably,** it can continue to serve as a reliable source of water supply for our cities in the future.

What is India's Groundwater Consumption Scenario?

- India is by far the **largest user of groundwater in the world,** accounting for **25% of the global water withdrawals; ~ 45% of the water supply in India's cities** is sourced from groundwater.
    - The **Central Ground Water Board (CGWB)** estimates that about 17% of the groundwater blocks across the country are overexploited, where the **rate of extraction is more than that of renewal**.
- According to the CGWB, with **230 BCM** (billion cubic metre) of **groundwater drawn out each year** for irrigating agricultural lands in India, many parts of the country are experiencing rapid depletion of groundwater.
    - The total estimated groundwater depletion in India is about 122–199 BCM.
- The **agriculture sector uses 89% of the groundwater** for irrigation while 11% is used by the domestic and industrial sectors. At the State level, in **Punjab, Haryana, Rajasthan and Delhi groundwater extraction is more than 100%**.

Why is Groundwater an 'Invisible' Resource?

- The theme for this year's **World Water Day** (March 22) is **"Groundwater: Making the**

Invisible, Visible".
- Unlike surface water (rivers, lakes, ponds, etc.), groundwater is "invisible". A quick internet search will yield that thousands of images of rivers or lakes are victims of encroachment, scarcity, and pollution.
  - But **while groundwater faces the same challenges, there is hardly any visual evidence**.
- Due to this, **groundwater-related issues and crises often go unnoticed,** especially at smaller scales - it is only when extensive studies involving huge budgets are carried out that these come to the fore.

What are the Government Initiatives for Groundwater Management?

- **National Project on Aquifer Management: NAQUIM** aims to provide **comprehensive and realistic information on groundwater resources** in different hydro-geological settings in real time.
  - This can help prepare, implement, and monitor the efficacy of various management interventions, which, in turn, can help achieve drinking water security, improved irrigation facilities and sustainability in water resources development.
- **Master Plan for Artificial Recharge to Groundwater - 2020:** CGWB in consultation with the state governments has prepared **The Master Plan - 2020** which envisages construction of about **1.42 crore Rain water harvesting and artificial recharge structures** in the Country to harness 185 BCM.
  - In addition, the government has also launched the **'Catch the Rain' campaign** to promote rainwater harvesting.
- **Atal Bhujal Yojana: Atal Bhujal Yojana (ABHY)**, co-funded by **World Bank** funding, was launched for **sustainable management of ground water with community participation** in the identified over-exploited and water stressed areas.

What Can Be Done to Manage Groundwater Resources?

- **Tech-Innovations for Watering Schedules:** Several start-ups have developed **precision-irrigation solutions** that provide predictive insights to farmers on the **optimal watering for crops** based on seasons, soil type and crop growth phase.
  - Embedded with **Machine Learning**, or the **Internet of Things**, such innovations monitor soil conditions, weather changes, evaporation rates and plant water use to determine and adjust watering schedules.
  - These innovations, if deployed at scale, can become **prime movers for achieving accelerated efficiencies in water usage**.
- **Role of Industries:** Not just the government or agricultural communities, the industries too can amplify the work through action in three areas of influence – **direct operations, supply chain and wider basin health**.
  - Companies can **implement water monitoring and reporting processes** to identify and **eliminate water leaks** and **adopt water-saving technologies**.
  - They can encourage the **use of renewable energy**, put supplier standards in place and assign **water expert teams** to help suppliers implement efficient solutions.
- **Inclusive Strategy and Investment for Innovations:** The need of the hour is an inclusive strategy that considers both **site- and catchment-based measures** supported by the collection and analysis of complex data as well as **joint investments from various stakeholders, collective water governance and accountability mechanisms**.
  - Efforts need to be undertaken to **identify and benchmark changes these innovations** can bring over time.
  - **Strategic investment of capital in proven solutions** will amplify the results many times over. With the large-scale adoption of innovative solutions, we can **ensure that our country has a food and water secure future**.

How Can We Make Groundwater 'Visible'?

- **Sustainable Yield:** Cities extract way more groundwater than can be replenished naturally which

is why cities like Delhi, Bengaluru, and Hyderabad have seen a rapid depletion in their groundwater levels.

- The term **"sustainable yield" of groundwater** was coined to address such challenges in the late 1990s.
  - This is defined as the amount of **groundwater extraction that can be maintained indefinitely without causing unacceptable environmental, economic, and social consequences**.
- The sustainable yield of groundwater depends upon a number of site-specific factors; therefore, it is vital for the **cities to have a contextualised understanding of this parameter** to avoid irreversible damage.
  - **Urban Water-Management-Strategy:** From an urban perspective, "making the invisible, visible" essentially involves having an **improved understanding of this "hidden" resource,** and **mainstreaming it within the overall water management strategy** of the city in a sustainable manner.
    - For starters, cities need to **map their groundwater resources** to **develop credible knowledge** about the quantity and quality of the resources available.
    - Given that most of our urban areas rely heavily on groundwater, having a **robust database of this resource** is key to informing sustainable strategies to **reduce the demand-supply gap**.
  - **Citizen Engagement:** Citizen engagement is vital for success, more so because the "invisible" nature of the resource makes it easy for people to get away with indiscretions.
    - Citizens will need to step up and **share the onus of action**. And the first step to make this happen is to **engage them in two-way dialogues** for **building collective consciousness** on the need for **community ownership of groundwater management**.

Conclusion

Securing India's water future needs to evolve into a movement with everyone getting involved. We need to **move from being merely "users of water" to more active stewardship of water** and ensure that water consumption is not only **environmentally sustainable** or **economically beneficial** but is also **socially and culturally fair**.

> **Drishti Mains Question**
> Discuss why groundwater is an invisible resource available to us and suggest measures to address the issues of groundwater depletion.

UPSC Civil Services Examination, Previous Year Questions (PYQs):

Q. With reference to the water on the planet Earth, consider the following statements:

1. The amount of water in the rivers and lakes is more than the amount of groundwater.

2. The amount of water in polar ice caps and glaciers is more than the amount of groundwater.

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 only

(c) Both 1 and 2

(d) Neither 1 nor 2

Ans: (b)

Q. What are the benefits of implementing the 'Integrated Watershed Development Programme'? (2014)

1. Prevention of soil runoff

2. Linking the country's perennial rivers with seasonal rivers

3. Rainwater harvesting and recharge of groundwater table

4. Regeneration of natural vegetation

Select the correct answer using the code given below:

(a) 1 and 2 only

(b) 2, 3 and 4 only

(c) 1, 3 and 4 only

(d) 1, 2, 3 and 4

Ans: (c)

Q. On the planet earth, most of the freshwater exists as ice caps and glaciers. Out of the remaining freshwater, the largest proportion (2013)

(a) is found in atmosphere as moisture and clouds

(b) is found in freshwater lakes and rivers

(c) exists as groundwater

(d) exists as soil moisture

Ans: (c)

Q. Which of the following can be found as pollutants in the drinking water in some parts of India? (2013)

1. Arsenic

2. Sorbitol

3. Fluoride

4. Formaldehyde

5. Uranium

Select the correct answer using the codes given below:

(a) 1 and 3 only

(b) 2, 4 and 5 only

(c) 1, 3 and 5 only

(d) 1, 2, 3, 4 and 5

Ans: (c)

Q. Consider the following statements: (2020)

1. 36% of India's districts are classified as "overexploited" or "critical" by the Central Ground Water Authority (CGWA).

2. CGWA was formed under the Environment (Protection) Act.

3. India has the largest area under groundwater irrigation in the world.

Which of the statements given above is/are correct?

(a) 1 only

(b) 2 and 3 only

(c) 2 only

(d) 1 and 3 only

Ans: (b)