



Dynamic Ground Water Resource Assessment, 2022

For Prelims: Central Ground Water Board, heavy metal, Atal Bhujal Yojana, Jal Shakti Abhiyan

For Mains: Groundwater and challenges with its management

Why in News?

Recently, the Union Minister of Jal Shakti released the Dynamic Ground Water Resource Assessment Report for the entire country for the year 2022.

What are the Highlights of the Assessment?

▪ Findings:

- The total annual ground water recharge is 437.60 Billion Cubic Meters (BCM) and the annual ground water extraction is 239.16 BCM.
 - Assessment indicates an increase in ground water recharge.
 - **By comparison, an assessment in 2020 found that the annual groundwater recharge was 436 bcm** and extraction 245 bcm.
 - Groundwater Recharge is a **(hydrologic) process where the water from the surface of the earth seeps downwards** and gets collected in aquifers. So, the process is also known as deep drainage or deep percolation.
- The 2022 assessment suggests that groundwater extraction is the lowest since 2004, when it was 231 bcm.
- Further, out of the total 7089 assessment units in the country, **1006 units have been categorized as 'Over-exploited'**.
- About **87% of total annual groundwater extraction** i.e., 208.49 bcm **is for irrigation use**. Only 30.69 bcm is for Domestic & Industrial use, which is about 13 % of the total extraction.

▪ State wise Groundwater Extraction:

- The overall stage of **groundwater extraction in the country is 60.08%**.
- The stage of ground water extraction is **very high in the states of Haryana, Punjab, Rajasthan, Dadra & Nagar Haveli and Daman & Diu** where it is **more than 100%**.
- In the states of Delhi, Tamil Nadu, Uttar Pradesh, Karnataka and UTs of Chandigarh, Lakshadweep and Puducherry, the stage of **ground water extraction is between 60-100%**.
- In the rest of the states, the stage of ground water extraction is below 60 %.

What is the Status of Groundwater in India?

▪ About:

- **India is the largest user of groundwater** with a fourth of the total global withdrawal. Indian cities cater to about 48% of its water supply from groundwater.
 - There are over 4,400 statutory towns and cities in India, with around 400 million

residents, which will increase by up to 300 million by 2050.

▪ **Issues with Groundwater Depletion:**

- The **unmanaged groundwater and increasing population may result in seasonal water shortages by 2050** for an estimated 3.1 billion people and perpetual water shortage for almost a billion.
- Further, water and food security will also be compromised and lead to [poverty](#) in the cities despite having good infrastructure development.

What are the Challenges with Management of Groundwater in India?

▪ **Unregulated extraction**

- **Groundwater, regarded as a “common pool resource”**, has historically witnessed little control over its extraction.
- Driven by a rising population, [urbanisation](#) and expansion of irrigation activities, groundwater extraction has been on the rise for several decades.

▪ **Excessive Irrigation:**

- Groundwater irrigation popularised in the 1970s has led to socio-economic well-being, increased productivity and better livelihoods.

▪ **Poor Knowledge of Groundwater Management Systems:**

- **The mismatch in demand and supply at the local level** represents a large part of the problem in India.
- A growing population or rampant urban development are two examples of the reasons behind this phenomenon, but they may be less direct.
- For example, better economic status of a population may assert more demand for water supply and distribution.

▪ **Groundwater Pollution:**

- Water quality data obtained by the [Central Ground Water Board \(CGWB\)](#) shows that **groundwater in as many as 154 districts across 21 states has arsenic contamination.**
- The quality is largely compromised on **accounts of anthropogenic activities and geogenic sources.**
- This further **raises the level of contamination as heavy metal concentration** in the earth's crust is higher than on the surface.
- Additionally, **surface water pollution also affects groundwater quality as pollutants at the water surface percolate through the layers of the land**, contaminating groundwater, and may even alter the soil structure in case of oil leakages or spillage.

▪ **Climate Change:**

- The **cumulative effect of all the challenges mentioned above is intensified by the climate shocks** experienced by the country.
- The **problems groundwater faces in India feeds into worsening the climate** crisis, which further deepens the distress associated with groundwater availability.
- Disturbances in the hydrological cycle causing long spells of [floods](#) and [droughts](#) adversely affect the quality and quantity of groundwater.
 - For example, flood events risk increased runoff of chemicals and biotic contaminants into groundwater.

What are the Initiatives Taken by the Government?

- [Atal Bhujal Yojana \(Atal Jal\)](#): It is a Rs. 6000 crore **Central Sector Scheme** with **World Bank** assistance, for sustainable management of ground water resources with community participation.
- [Jal Shakti Abhiyan \(JSA\)](#): It was launched in 2019 in 256 water stressed districts in the country to improve water availability including ground water conditions in these areas.
 - It has special emphasis on creation of recharge structures, rejuvenation of traditional water bodies, intensive afforestation etc.
- **Aquifer Mapping and Management Programme**: The CGWB has taken up [Aquifer Mapping and Management Programme](#).
 - The program is aimed to delineate aquifer disposition and their characterization for preparation of aquifer/ area specific groundwater management plans with community participation.

- [Atal Mission for Rejuvenation and Urban Transformation \(AMRUT\)](#): The Mission focuses on development of basic urban infrastructure in the AMRUT cities, such as water supply, sewerage & septage management, storm water drainage, green spaces & parks, and non-motorized urban transport.

Way Forward

- **Integrated Water Resource Management framework:**
 - There is a need to focus on the Integrated Water Resource Management framework. It promotes the coordinated development and management of water, land and related resources.
- **Adopting Water Sensitive Urban Design:**
 - To begin with, adopting water-sensitive urban design and planning can help maintain the water cycle by managing groundwater, surface water and rainwater for water demand and supply.
- **Provision for Water Recycle and Reuse:**
 - Provision for wastewater recycle and its reuse to promote the circular economy of one water cycle will also help in source sustainability and groundwater pollution mitigation.
- **Other Interventions:**
 - Interventions like rainwater harvesting, stormwater harvesting, rain-garden and bio-retention ponds that intercept rainfall with vegetated land are low-maintenance alternatives to conventional systems. These help in groundwater recharge and urban flood mitigation.

UPSC Civil Services Examination Previous Year Question (PYQ)

Prelims

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)

- Based on groundwater levels, areas across the country are split into three categories: Over-exploited, Critical and Semi critical. The first refers to groundwater being extracted more than what's recharged i.e. extraction is more than 100%. Critical where the groundwater taken out is 90-100% of what's recharged and semi-critical where extraction rate is 70%-90%.
- As per the report 'National Compilation on Dynamic Groundwater Resources of India, 2017' of CGWA, out of the total 6881 assessment units (Blocks/ Mandals/Talukas) in the country, 1186 units in various States (17%) have been categorized as 'OverExploited', 313 units (5%) are 'Critical', and 972 are semi-critical units (14%). **Hence, statement 1 is not correct.**
- Note: As per National Compilation on Dynamic Groundwater Resources of India 2020; Out of the total 6965 assessment units (Blocks/ Mandals/ Talukas/ Firkas) in the country, 16 % have been categorized as 'Over-exploited, 4 % as Critical, 15 % as Semi-critical and 64 %) as 'Safe' units. Apart from these, there are 97 (1%) assessment units, which have been categorised as 'Saline'.
- The Central Ground Water Authority (CGWA) was constituted under Section 3(3) of the Environment (Protection) Act, 1986 to regulate, control development and management of ground water resources. **Hence, statement 2 is correct.**

- As per report of Food and Agriculture Organization (FAO) of UN, the countries with the largest extent of areas equipped for irrigation with groundwater, in absolute terms, are India (39 million ha), China (19 million ha) and the USA (17 million ha). **Hence, statement 3 is correct. Therefore, option (b) is the correct answer.**

Mains

Q. India is well endowed with fresh water resources. Critically examine why it still suffers from water scarcity. **(2015)**

Q. The idealsolution of depleting ground waterresourcesin India is water harvesting system". How can it be made effective in urban areas? **(2018)**

[Source: PIB](#)

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