



## Decline in Usable Groundwater

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A team from the Indian Institute of Technology (IIT) Kharagpur, West Bengal and Athabasca University, Canada, has compiled the **first estimates of Usable Groundwater Storage (UGWS)** at the state-level across India using both in situ and satellite-based measurements.

- For the compilation, the groundwater-level data was used from 3,907 in situ monitoring wells across the country.
- The compilation includes total UGWS **estimation between the years 2005 and 2013**.
- Till now, the government agencies have been able to estimate the total groundwater, not the UGWS.
- **India is the largest user of groundwater in the world**. It uses an estimated 230 km<sup>3</sup> of groundwater per year - over a quarter of the global total.

### Key Findings

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- More than **85 %** of the groundwater usage in India is linked with **irrigation abstraction practices**.
- The estimates show rapid depletion of usable groundwater storage during 2005-2013 in most of the **northern parts** of the country, which **lost 8.5 km<sup>3</sup> / year** of the total groundwater, and the **eastern parts** which **lost 5 km<sup>3</sup> / year** of the total groundwater.
- Rapid depletion of UGWS in Assam, Punjab, Haryana, Uttar Pradesh, Bihar, and West Bengal.
  - A northeastern state like **Assam** which has always been regarded as a water-affluent; **lost 2 %** of its usable groundwater resource and is at the brink of suffering drought and famine in impending years.
  - **Haryana**, which gets an annual precipitation of 689 mm, had the **highest level of usable groundwater with 3,593 cm** while **Himachal Pradesh** with a precipitation of 1,147 mm per year had the **lowest UGWS level of 520 cm**.
  - Some pockets in Uttar Pradesh also saw a dip in groundwater table.
  - In these areas, increase in agricultural production has been at the cost of non-renewable loss in the groundwater volume.

- Reasons cited
  - **Lack of an organised water supply** leads to increased dependence on groundwater.
  - Depletion in groundwater is positively linked with the increased cropping practice of **water intensive crops**.
  - **Overexploitation of the groundwater**: About 85 %of rural drinking water needs and 65 %of irrigation needs and 50 %of urban drinking water and industrial needs are fulfilled from the ground water.
- Consequences
  - Rapid depletion in UGWS would accelerate the **decline in food production and availability of drinking water**, two of the prime goals under UN Sustainable Development Goals 2030. This would affect more than 120 million people in the Gangetic states.
  - **Summer groundwater droughts** that some states are facing; would intensify in recent future years, will become severe to very severe by 2050, with the possibility of spreading over all the seasons.
  - **Decline in the flow in the adjoining rivers**, including Ganga, thus also impacting river-aquifer interaction.
- Suggestions
  - In order to develop a sustainable groundwater management programme, it is important to **know the exact water-stress**.
  - India needs to develop a much **robust quantitative approach**, possibly with the help of advanced hydroscience and data science techniques to understand the conjunctive water demands and usages.
- The **southern and western Indian states** like Andhra Pradesh, Maharashtra, Gujarat, Chattisgarh have shown **replenishing usable groundwater storage trends**.