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? India's Reservoir Storage Falls to a Decadal Low as Monsoon Deficit Intensifies Regional Water Stress

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Recent Developments:

- According to the **Central Water Commission (CWC)**, water storage in **178 major reservoirs** stood at about **70% of total capacity** in late September 2026, below the **10-year average of 76.62%** and the corresponding 2025 level of **79%**.
- The situation is particularly severe in **South India**, where reservoirs in Andhra Pradesh, Telangana, Karnataka, Kerala and Tamil Nadu held only **50% of capacity**, compared with **87.25%** during the corresponding period in 2025.
- The development coincides with drought-related stress in states such as **Maharashtra and Karnataka**, highlighting the uneven spatial distribution of monsoon rainfall and water availability.
- India's 2026 southwest monsoon ended with rainfall substantially below the long-period average; Reuters reported a **12.6% seasonal deficit**, while the India Meteorological Department had earlier forecast a below-normal monsoon.

Reservoir Storage and Water Security:

What is a Reservoir?

- A **reservoir** is an artificial or enlarged water body used to store water, commonly created through dams or other water-control structures.
- Reservoirs regulate seasonal water availability and support **irrigation, drinking-water supply, hydropower generation, flood moderation and industrial requirements**.
- In a monsoon-dependent country such as India, reservoir storage acts as a buffer between **seasonal rainfall and year-round water demand**.

Why Reservoir Storage Matters:

- Low storage at the end of the southwest monsoon reduces the water available during the subsequent **dry season**.
- Agricultural regions may face greater dependence on **groundwater and inter-basin transfers**, particularly where irrigation systems depend on regulated reservoir releases.
- Reduced reservoir levels can constrain **hydropower generation**, although actual electricity impacts depend on inflows, reservoir operation and the broader power mix.
- Urban and rural drinking-water systems may face greater stress where surface reservoirs are the principal source.
- Persistent deficits can contribute to **hydrological drought**, even when annual rainfall deficits appear moderate because rainfall distribution and storage conditions are also important.

Regional Pattern of Water Stress:

South India:

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- The reservoirs covering **Andhra Pradesh, Telangana, Karnataka, Kerala and Tamil Nadu** recorded the sharpest decline, with **27.926 BCM**, equivalent to about **50% of capacity**, against **87.25% in 2025**.
- The region recorded approximately **23% below-normal rainfall** by September 28, intensifying pressure on irrigation, drinking water and hydropower resources.
- The southern situation demonstrates how **regional rainfall distribution** can produce severe water stress even when other parts of the country retain comparatively higher storage.

East and Northeast India:

- **31 reservoirs** across Assam, Bihar, Jharkhand, Meghalaya, Mizoram, Nagaland, Odisha, Tripura and West Bengal held about **16.157 BCM**, or **73% of capacity**.
- Several areas recorded a seasonal rainfall deficit of around **25%**, although Odisha and parts of West Bengal experienced comparatively better conditions.

Northern India:

- The **11 reservoirs** across Himachal Pradesh, Punjab and Rajasthan held about **62% of capacity**, equivalent to **12.431 BCM**, compared with **92.3% in 2025**.
- This sharp year-on-year decline is significant because northern reservoirs support irrigation, drinking water and hydropower systems across the Himalayan and adjoining plains.

Western and Central India:

- Reservoirs in **Gujarat, Maharashtra and Goa** held about **84.61%**, compared with **95.79% in 2025**.
- Reservoirs across **Chhattisgarh, Madhya Pradesh, Uttar Pradesh and Uttarakhand** held about **85.55%**, against **91.89% in 2025**.
- These figures indicate that relatively higher storage does not necessarily imply an absence of water stress because **intra-state and basin-level variations** can be substantial.

Monsoon Deficit and Climate Drivers:

Southwest Monsoon:

- The southwest monsoon supplies **more than 70% of India's annual rainfall** and is critical for replenishing reservoirs, rivers, soil moisture and groundwater.
- The 2026 monsoon was affected by substantial rainfall deficits, with **June recording about a 35% deficit**, August about **16.3%**, while July remained close to normal.
- The monsoon therefore illustrates the importance of **both rainfall quantity and temporal-spatial distribution** for India's water security.

El Niño and ENSO:

- **El Niño** refers to abnormal warming of the central and eastern tropical Pacific Ocean and forms part of the broader **El Niño–Southern Oscillation (ENSO)** system.
- IMD notes that El Niño generally tends to weaken the Indian summer monsoon, although its impact varies between events and is not a deterministic predictor of drought.
- The Government has noted that among **16 El Niño years since 1950, seven were associated with below-normal Indian monsoon rainfall**, demonstrating that the relationship is significant but not absolute.
- Other factors, including the **Indian Ocean Dipole, atmospheric circulation, ocean temperatures and intra-seasonal variability**, also influence monsoon performance.

Implications for India:

Agriculture and Food Security:

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- Lower reservoir storage can reduce **assured irrigation**, particularly during dry periods.
- Greater dependence on groundwater can accelerate **aquifer depletion** where extraction exceeds natural recharge.
- Water-intensive crops grown in water-stressed regions can increase the mismatch between **cropping patterns and local water availability**.
- Persistent water stress can affect agricultural output, farm incomes and food-price stability.

Energy Security:

- Reservoirs support **hydropower generation**, making water availability relevant to electricity supply.
- Lower inflows can reduce hydropower output and increase reliance on alternative generation sources, depending on system conditions.

Drinking Water and Public Health:

- Declining surface-water storage can increase pressure on **urban reservoirs, rural water systems and groundwater sources**.
- Water scarcity can also increase competition among domestic, agricultural and industrial users.

Federalism and Inter-State Water Relations:

- Water scarcity can intensify disputes over shared river systems because upstream and downstream states have competing demands.
- **Article 262** provides the constitutional basis for Parliament to create mechanisms for adjudicating inter-State river-water disputes.
- The **Inter-State River Water Disputes Act, 1956** provides the statutory framework for adjudicating disputes relating to waters of inter-State rivers and river valleys.
- The **River Boards Act, 1956** provides for mechanisms aimed at coordination and development of inter-State rivers and river valleys, including irrigation, water supply, hydropower and flood control.

Central Water Commission:

Institutional Role:

- The **Central Water Commission (CWC)** is a premier technical organisation under the Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti.
- Its headquarters is located in **New Delhi**, and it is headed by a **Chairman with the status of an ex-officio Secretary to the Government of India**.
- The CWC undertakes **hydrological assessment, basin planning, reservoir monitoring, flood forecasting, irrigation planning, dam-safety studies and technical assistance on inter-State water issues**.
- Its reservoir monitoring provides an important indicator of India's **seasonal water-security position**.

Water Governance Challenges:

Structural Issues:

- India has a highly **seasonal and spatially uneven rainfall regime**, creating substantial differences between water availability and demand.
- Rapid urbanisation, agricultural intensification and industrialisation are increasing competition for freshwater resources.
- Excessive groundwater extraction can weaken the resilience provided by surface-water reservoirs.
- Water governance remains fragmented across multiple institutions and administrative levels, making **basin-level coordination** important.

Climate Change Dimension:

- Climate change can increase the frequency and intensity of **hydro-climatic extremes**, including droughts, floods and intense rainfall events.
- Heavy rainfall over short periods does not necessarily translate into adequate annual storage because runoff, evaporation, soil infiltration and reservoir-management capacity determine how much water is retained.
- Therefore, **water security cannot be assessed solely through annual rainfall totals**.

Way Forward:

Integrated Water-Resource Management:

- Adopt **river-basin-level water budgeting** instead of relying primarily on administrative boundaries.
- Improve coordination among reservoirs to optimise **storage, releases, irrigation and hydropower generation**.
- Expand **rainwater harvesting, watershed development and aquifer recharge** to improve local water resilience.
- Promote **micro-irrigation, drought-resilient crops and regionally appropriate cropping patterns**.
- Strengthen real-time monitoring of **reservoirs, groundwater, rainfall and soil moisture** through digital hydrological systems.
- Rejuvenate **wetlands, traditional water bodies and local drainage systems** to improve water retention and groundwater recharge.
- Strengthen **early-warning systems and anticipatory drought management** so that water-saving measures begin before severe shortages emerge.
- Improve inter-State cooperation through **transparent hydrological data sharing and basin-level coordination mechanisms**.

Value Addition for UPSC:

Prelims Linkages:

- **CWC:** Premier technical organisation for water-resource development and management.
- **Article 262:** Constitutional provision concerning adjudication of inter-State river-water disputes.
- **Inter-State River Water Disputes Act, 1956:** Statutory framework for adjudicating inter-State river-water disputes.
- **ENSO:** Pacific Ocean–atmosphere phenomenon influencing global climate and Indian monsoon variability.
- **Southwest Monsoon:** Major source of India’s annual rainfall and a critical determinant of reservoir replenishment.

Mains GS-III Linkage:

- The reservoir crisis connects **water security, climate variability, agriculture, groundwater depletion, energy security, disaster management and cooperative federalism**.
- A strong answer should distinguish between **meteorological drought, agricultural drought and hydrological drought** and explain how deficient or poorly distributed rainfall can move through this chain.
- The issue also demonstrates why India needs to shift from **post-crisis water management towards integrated, basin-based and climate-resilient water governance**.

Keywords for Answer Writing:

Water security, hydrological drought, groundwater stress, reservoir management, river-basin approach, integrated water-resource management, climate variability, ENSO, cooperative federalism, water-use efficiency, aquifer recharge, drought resilience.