Tungabhadra Reservoir Project

Mains: *GS Paper I | Geography || GS Paper III | Disaster Management.*

Why in News?

The newly installed 33 spillway crest gates of the Tungabhadra Dam were inaugurated recently.

What are the origin & course of the Tungabhadra River?

- **Nomenclature -** The Tungabhadra takes its name from two streams, as it is formed by the confluence of the Tunga and the Bhadra, both of which rise in the Western Ghats.
- **Origin -** The river, formed near ***Shivamogga in Karnataka***, flows for about 531 km before joining the Krishna at Sangamaleshwaram in Andhra Pradesh.
- The combined waters then flow eastwards and enter the Bay of Bengal at Hamsaladeevi.
- **Course -** 382 km lies in Karnataka, 58 km forms the boundary between Karnataka and Andhra Pradesh, and 91 km flows through Andhra Pradesh.
- **Tributaries-** Major tributaries include the *Varada, Hagari (Vedavathi), and Kumudavathi.*
- **Wildlife sanctuaries –** The region comprises Tungabhadra Wildlife Sanctuary, Tungabhadra Otter Conservation Reserve, Bhadra Wildlife Sanctuary & Tiger Reserve.
- The river is largely dependent on the south-west monsoon.

What is the Tungabhadra Reservoir Project?

- **Commissioned in -** The early 1950s with its original crest gates installed in 1955, the Tungabhadra Dam is a vital multi-purpose, inter-state project.
- **Geography & River Course -** Built across the Tungabhadra River (a major tributary of the Krishna River) near Hosapete, Karnataka.
- **Riparian Stakeholders -** It is an inter-state project jointly involving Karnataka, Andhra Pradesh, and Telangana.
- **Socio-Economic Lifeline -** The reservoir irrigates over 16.38 lakh acres of agricultural land—comprising 9.26 lakh acres in Karnataka, 6.25 lakh acres in Andhra Pradesh, and 87,000 acres in Telangana.
- It also serves as the primary drinking water source for several towns and cities across 6 chronically drought-prone districts
    - Ballari, Koppal, and Raichur in Karnataka, alongside Anantapur, Kadapa, and Kurnool in Andhra Pradesh.

What is the role of the Krishna Water Disputes Tribunal (KWDT)?

- **Constituted by -** The Union Government in 1969 under the Inter-State River Water Disputes Act, 1956, the KWDT adjudicated the water sharing formula for the Krishna basin.

*Inter-state water disputes in India are governed by **Article 262**, empowers Parliament to enact laws to adjudicate conflicts over the use, distribution, and control of interstate rivers.*

- In 1976, the tribunal fixed the net water utilization (including evaporation losses) in a **65:35 ratio** between Karnataka and the undivided Andhra Pradesh.
- **Net Allocations -** Karnataka holds a share of 151.49 tmcft, Andhra Pradesh has an assured allocation of 78.51 tmcft, and Telangana's post-bifurcation share stands at 15.9 tmcft.
- **Dual Filling Assumption -** While the physical structural capacity of the dam stands lower at 134 tmcft, the KWDT allocated 230 tmcft for cumulative annual utilization.
- It accounts for the ecological fact that the reservoir historically fills twice a year.
- **The Tungabhadra Board -** Established on the recommendations of the KWDT.
- It is an *inter-state statutory body* that regulates water release to member states, monitors flows/evaporation losses, and manages common works like the Right Bank High Level and Low-Level Canals.

What are the key challenges confronting the project?

- **Structural Aging and Dam Safety Vulnerabilities -** Built in the mid-20th century, many crest gates and structural components suffer from material fatigue and corrosion.
- It requires proactive, holistic replacement rather than reactive, temporary repairs.
- **Upstream vs. Downstream Conflict (The Upper Bhadra Issue)-** The implementation of the Upper Bhadra Project by Karnataka (a lift irrigation scheme located upstream) has become a primary point of contention.
- Andhra Pradesh has approached the Supreme Court, arguing that upstream impoundment will intercept the water volumes allocated to it before they can reach the Tungabhadra dam.
- It heavily impacts the downstream canals feeding its drought-prone Rayalaseema region.
- **Allocation Deficits and Inter-State Friction -** Telangana has raised operational grievances, stating that it faces a recurring deficit of 5 to 6 tmcft against its sanctioned 15.9 tmcft allocation.
- It contends that uncoordinated, excess withdrawals by Andhra Pradesh

reduce downstream flows to the critical Srisailam reservoir, straining relations between the newly bifurcated states.

- **Siltation and Storage Capacity Loss -** Decades of agricultural runoff and catchment deforestation have led to severe sedimentation in the Tungabhadra reservoir.
- This silt accumulation has progressively reduced its gross storage capacity, testing the 1976 KWDT allocation models that relied on a clean reservoir filling twice annually.

Ethical Dimensions

- ***Environmental Ethics -*** *Neglecting siltation and structural decay passes down degraded, high-risk assets to future generations.*
- *Moving beyond resource extraction to maintain minimum river flows that sustain riparian ecosystems.*
- ***Duty to Vulnerable Communities -*** *Guaranteeing reliable water to drought-prone regions to safeguard marginalized agrarian livelihoods.*
- *Fulfilling the state's moral obligation to manage vital natural resources as a shared asset, not a political tool.*
- ***Balancing Development & Ecology -*** *Structuring upstream projects to meet localized growth without cutting off the survival needs of downstream regions.*
- *Substituting zero-sum resource hoarding with collaborative sharing to serve the collective public good.*

What is the way forward?

- **Institutionalize Dam Safety -** Transition from reactive repairs to strict asset-vulnerability mapping under the Dam Safety Act, 2021, using the 2026 gate replacement as a baseline protocol.
- **Deploy Real-Time Telemetry -** Install satellite-linked automated sensors along inter-state canals to establish a single source of transparent data and eliminate water-drawing disputes.
- **Practice Collaborative Federalism -** Utilize the Apex Council and Catchment Area Treatment programs to resolve upstream-downstream conflicts contractually while mitigating ecological reservoir siltation.

Reference

The Hindu | Tungabhadra reservoir project