

4. Mullaperiyar Dam

Recently, the Supreme Court of India issued notices to various stakeholders calling for urgent directions to reinforce the aging structure of the 130-year-old Mullaperiyar dam.

Mullaperiyar Dam

It is a gravity dam built on the Periyar River in the Idukki district of Kerala that was constructed between 1887 and 1895. The dam is operated and maintained by Tamil Nadu, under a 999-year lease agreement signed in 1886 between the Maharaja of Travancore and the British government. It diverts water to the Vaigai basin in Tamil Nadu for irrigation across 68,558 hectares.

India's Dam Landscape

1. Overview – India ranks third globally in the number of large dams, after China and the United States, as per the National Register of Large Dams (NRLD) maintained by the Central Water Commission (CWC). There are over 6,000 operational large dams in India, with hundreds more under construction. Dams perform multiple critical functions –

1. **Irrigation** – Supporting agriculture in water-scarce regions.
2. **Hydropower Generation** – Contributing to renewable energy production.
3. **Flood Control** – Protecting downstream areas from seasonal flooding.
4. **Drinking Water Supply** – Ensuring potable water for urban and rural populations.

2. Types of Dams – Dams in India are constructed based on topography, geology, and hydrological requirements –

Concrete Gravity Dams – e.g., Bhakra Dam, designed to hold water by their weight.

Earthen Dams – e.g., Banasura Sagar Dam, made of compacted earth.

Rock-Fill Dams – Using rocks with an impervious core.

Arch Dams – Rare in India, built in narrow, rocky gorges to transfer water pressure to the valley walls.

Why Dam Safety Is Urgent

1. Aging Infrastructure – Nearly 80% of dams are over 25 years old. More than 1,000 dams are 50–100 years old, and 230+ are over a century old. Many were constructed with outdated engineering standards, making them vulnerable to –

- i. Structural fatigue and erosion.
- ii. Sedimentation reducing reservoir capacity.
- iii. Climate-induced stress due to changing rainfall patterns.

Impact – Aging dams pose serious risks to human lives, property, and ecosystems, especially during extreme weather events.

2. Inconsistent Safety Practices – Safety protocols vary across states and agencies, creating gaps in inspection, surveillance, and maintenance. The Dam Safety Act, 2021, aims to unify safety practices across India.

3. Risk of Catastrophic Failure – Events like glacial lake outburst floods (GLOFs) have demonstrated the destructive potential of dam failure. The Supreme Court of India has repeatedly expressed concerns, e.g., Mullaperiyar Dam, warning that breaches could endanger lakhs of lives.

Legal and Institutional Framework

1. Dam Safety Act, 2021 – Enacted to strengthen dam surveillance, inspection, operation, and maintenance.

Key Provisions –

1. Hazard classification of dams based on potential damage.
2. Mandatory emergency action plans for high-risk dams.
3. Periodic safety reviews by independent expert panels.
4. Formation of State Committees and a National Authority to oversee dam safety.

2. National Dam Safety Authority (NDSA) – Coordinates dam safety efforts across states. Maintains the

National Register of Large Dams. Promotes capacity building, technical standards, and public awareness.

3. State-Level Implementation – States have formed Dam Safety Review Panels. Pre- and post-monsoon inspections are conducted on thousands of dams to identify structural issues and operational risks.

4. Dam Rehabilitation and Improvement Project (DRIP) – Launched by CWC with World Bank support. Focuses on –

1. Rehabilitation of aging dams.
2. Improved safety monitoring.
3. Capacity building for dam operators and engineers.

DRIP Phases II & III currently cover 700+ dams across 19 states.

5. Digital Monitoring and Reservoir Management – Web-based Reservoir Storage Monitoring System for real-time data. Flood Watch India App provides – Flood alerts, Reservoir storage data, Early warning information for downstream populations.

Strengthening Measures for Dam Safety

1. Retrofitting and Rehabilitation – Prioritize structural upgrades for high-risk dams, addressing issues like spillway capacity, concrete repair, and embankment strengthening.

2. Use of AI & Analytics

Sensors and real-time monitoring systems track –

1. Water pressure.
2. Seepage and leakage.
3. Structural integrity indicators.

Predictive maintenance helps prevent catastrophic failures.

3. Climate Resilience

Safety norms are being updated to account for changing hydrological patterns, including –

1. Intense rainfall events.
2. Increased reservoir inflows.
3. Extreme flood scenarios.

4. Public Awareness and Transparency – Safety audits and emergency plans are increasingly made accessible to the public. Promotes community preparedness and accountability of dam authorities.

Key Takeaways

India's large dam network is crucial for water security, energy, and agriculture, but aging infrastructure and climate risks pose serious challenges. The Dam Safety Act, 2021, NDSA, and DRIP form the backbone of India's institutional and legal framework for dam safety. Integration of technology, AI, and real-time monitoring, along with community awareness, is essential for risk mitigation and climate resilience. Proactive management is critical to ensure that dams continue to serve socio-economic needs while safeguarding human lives and ecosystems.

Source – <https://www.thehindu.com/news/national/supreme-court-notice-to-centre-kerala-tn-ndma-on-plea-for-new-dam-to-replace-mullaperiyar/article70157616.ece>