Dam Safety in India

Why in news?

Bhakra dam and other dams in the Sutlej basin were blamed for contributing to the flood disaster in Himachal Pradesh in 2023.

Status of Dams in India
• India has almost *6,000 large dams* and about 80% of them are more than 25 years old and carry safety risks. • According to a parliamentary panel, there are 234 functional large dams in India that are more than 100 years old, some of them over 300 years old. • India has the *3rd largest number of dams* in the world, after China and the USA. • However, its per capita storage capacity is only *225 cubic meters*, which is far less than China's 1,200 cubic meters.

What are the causes of dam failure?

- Overtopping, usually caused by floods that exceed the capacity of the dam
- Structural failure of materials used in dam construction
- Inadequate maintenance and upkeep
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams
- Deliberate acts of sabotage

How are dams regulated in India?

- **Dam Safety Act 2021** – It aims to prevent dam failure related disasters and provide for institutional mechanisms for surveillance, inspection, operation and maintenance of the specified dams.
- **Central Water Commission (CWC)** - It provides technical expertise and guidance on all matters related to dams.
- **Dam Rehabilitation and Improvement Project (DRIP)-** It was launched in 2012 with World Bank assistance to improve the safety and operational performance of selected dams, coupled with institutional strengthening through a system wide management approach.
- **National Centre for Earthquake Safety of Dam** – Located in Malaviya National Institute of Technology (MNIT), Jaipur, Rajasthan, it is an initiative of Ministry of Jal Shakti towards effective implementation of Dam Safety Act 2021.
- **Efforts of States** - *Bihar* was the 1st State to enact the *Dam Safety Act in 2006.*

Under the 7th Schedule of the Constitution, water and water storage is a state

subject. Therefore legislating dam safety is the responsibility of state governments.

What are the key provisions of Dam Safety Act 2021?

- **Applicability-** Applies to all specified dams in India, which are
  - height - more than 15 metres or
  - storage capacity - more than 1 million cubic metres or
  - pose potential hazards to human life, property or the environment
- **Institutional setup**-

National level	
Institution	**About**
National Committee on Dam Safety (NCDS)	To oversee dam safety policies and regulations
National Dam Safety Authority (NDSA)	To implement and enforce the provisions of the Act It is headed by the Chairman of the Central Water Commission (CWC) and provides secretarial assistance to NCDS
State level	
Institution	**About**
State Committee on Dam Safety (SCDS)	To assess potential implication of failure of a specified dam in the state on any downstream state, and coordinate mitigation measures
State Dam Safety Organisation (SDSO)	To carry out the functions assigned to them under the Act

- **Role of States-** The Act mandates that states shall classify the dam based on the hazard potential, conduct regular inspections, prepare an emergency action plan, establish an emergency flood warning system, and undertake safety reviews and periodic risk assessment studies.
- **Role of NDSA-** NDSA, the supreme body for dam safety has been entrusted to inspect any specified dam and issue directions for proper maintenance and operation of the dam.
- **Emergency response-** It is the obligation of dam owner to
  - Prevent the development of harmful situations
  - Issue warnings
  - Limit the damage and adverse consequences
- **Fund-** The Act provides for the establishment of a *National Dam Safety Fund and a State Dam Safety Fund* for financing the activities related to dam safety.
- **Penalty**- The offences are punishable with imprisonment up to 2 years or fine up to 1 crore rupees or both.

CWC Guidelines on Hazard Classification of Dams

• It is based on 4 major categories
  - Class I- Capital value of the project
  - Class II- Potential for loss of life
  - Class III- Potential for property damage
  - Class IV- Potential for environmental and cultural impact
• Class IV is the most vulnerable and hazard-prone dam.

What are the concerns with the Dam Safety Act 2021?

- **Lack of data**- States were asked to report and record incidents of dam failures, but the data is not available.
    - As per National Institute of Public Finance and Policy, the CWC keeps a record but the list is not updated regularly.
- **Lack of governance**- Recent glacial lake outburst flooding in Sikkim exemplifies loopholes in the Act and its implementation.
- It reveals poor compliance at all levels, from the dam's design to the spillway capacity which controls the release of water from a reservoir.
- **Lack of transparency**- The Act does not promote risk based decision making and fails to incentivise transparency.
- **Operational safety** - The Act is focusses on structural safety of dams, and has very little provision for operational safety of the dam.
- **Non-compliance**- The Himachal Pradesh government recently served notices to 21 hydroelectric projects, finding them guilty of non-compliance with the DSA during the recent floods.
- **Vague**- The Act requires dam builders to conduct comprehensive dam safety evaluations, but there is no standardisation of how the failure is analysed and reported.

What lies ahead?

- India needs a transparent, accountable and participatory dam safety mechanism.
- The need of the hour is to make the Dam Safety Act more robust by allowing different stakeholders to access information easily as dam safety is a public purpose function.
- Periodic review is must as it would bring forth fresh inundation maps.
- Hazard classification of dam should be aligned with countries like Sweden and in many states of the US where a dam is assigned a dam safety class i.e. A, B or C.
- Flood plain zoning of rivers and effective catchment area treatment plans needs to be done on war footing to minimise flood disasters around our future development and also to reduce the hazard creep.

References

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