Dam Safety and Water Resource Management in India

For Prelims: Dam Safety Act, 2021, National Hydrology Project (NHP)

For Mains: Related issues with the Dam Safety, Dams Construction and environmental challenges, Ageing of dams in India, Measures that can be taken to ensure dam safety.

Source: PIB

Why in News?

Recently, the Minister of State for Jal Shakti has shed light on India's significant strides in the realm of **dam safety and water resource management.**

What are the Highlighted Initiatives for Dam Safety Water Resource Management in India?

- **Dam Safety Act, 2021: A Regulatory Framework:**
  - Enactment of the **Dam Safety Act, 2021**, by the Union Government.
  - Focuses on **proper surveillance, inspection, operation, and maintenance of specified dams.**
  - Aims to prevent **dam failure-related disasters** and establish an institutional mechanism for safe functioning.
  - **Institutional Mechanism:**
    - **National Committee on Dam Safety (NCDS):**
      - Formation of the National Committee on Dam Safety at the national level.
      - Responsible for **evolving dam safety policies and recommending essential regulations.**
      - Provides a strategic platform for ensuring uniform safety standards.
    - **National Dam Safety Authority (NDSA):**
      - Creation of the National Dam Safety Authority as a regulatory body.
        - Tasks include implementing policies of the National Committee on Dam Safety.
      - Offers technical assistance to **State Dam Safety Organisations (SDSO)** and resolves inter-state disputes.
    - **State-level Dam Safety Measures:**
      - Empowerment of State Governments to establish **State Committee on Dam Safety.**
      - Creation of **State Dam Safety Organisations** responsible for enforcing dam safety standards.
      - Renders crucial instructions to dam owners regarding safety protocols and remedial actions.
- **National Hydrology Project (NHP):**
  - **National Hydrology Project (NHP)** is designed with four major components: **Water Resources Monitoring System, Water Resources Information System, Water**

Resources Operations and Planning System, and Institutional Capacity Enhancement.
    - The project aims to **enhance water resource management capabilities across the country.**
    - Supports **studies related to flood forecasting** undertaken by Implementing agencies.

What is the State of Indian Dams?

- India has **5745 numbers of dams (5334 are completed and 411 are under construction).**
- **India is ranked third in the world in terms of building large dams.**
- **Tehri Dam** in Uttarakhand is the **highest dam in India** built on the Bhagirathi River.
- **Hirakud Dam** in Odisha built on river Mahanadi is the longest dam in India.
- **Kallanai Dam** in Tamil Nadu is the **oldest dam in India**. It is built on the **Kaveri river** and is about 2000 years old.

What are the Other Related Water Resource Management Initiatives?

- **Swachh Bharat Mission.**
- **Jal Jeevan Mission.**
- **National Water Policy, 2012.**
- **Pradhan Mantri Krishi Sinchayee Yojana.**
- **Jal Shakti Abhiyan- Catch the Rain Campaign.**
- **Atal Bhujal Yojana.**
- **Sujalam 2.0.**
- **Amrit Sarovar Mission.**

What are the Challenges Associated with Dam Safety and Water Resource Management?

- **Geological and Geotechnical Challenges:**
    - Many regions in India are **seismically active**, which poses a risk of **earthquakes that could impact dam stability.**
    - Poor soil quality and unstable geological conditions in certain areas also contribute to challenges in ensuring dam safety.
- **Ageing Infrastructure:**
    - Several dams in India are aging **and may not meet modern safety standards.** Maintenance and rehabilitation of these older structures are essential to prevent potential failures.
- **Climate Change and Extreme Weather Events:**
    - Changing climate **patterns** and increasing instances of extreme weather events, such as **heavy rainfall and floods,** can strain dams and their reservoirs, potentially leading to overtopping or dam failure.
- **Interstate and International Cooperation:**
    - Many rivers in India are shared with neighbouring states or countries, requiring **coordinated efforts for dam safety and water management.** Disputes and lack of cooperation can impact effective dam management.
- **Emergency Response Infrastructure:**
    - Developing and maintaining effective **communication networks, evacuation plans, and emergency shelters** in the vicinity of dams is essential to manage potential disasters.
- **Community Resettlement and Rehabilitation:**
    - In cases where dam construction or operation requires the displacement of local communities, ensuring their proper resettlement and rehabilitation presents challenges.

Way Forward

- Develop a **dynamic and adaptable project plan** that incorporates **real-time monitoring, eco-friendly technologies, disaster preparedness, and ecosystem restoration**, ensuring long-

term environmental and social sustainability.

- Integrate **climate change considerations into dam design** and management, anticipating shifts in **weather patterns and implementing adaptive measures** to withstand extreme events.
- Continue organizing **training programs to equip dam safety professionals** with skills and knowledge.
- Strengthen **cooperation with neighbouring countries/states** to ensure effective management of shared river systems, and resolve conflicts.
- Prioritize meaningful engagement with **local ethnic communities, valuing their input, cultural heritage**, and concerns to foster a **harmonious project coexistence and ensure their well-being.**

UPSC Civil Services Examination, Previous Year Questions (PYQs)

Q. Suppose the Government of India is thinking of constructing a dam in a mountain valley bound by forests and inhabited by ethnic communities. What rational policy should resort to in dealing with unforeseen contingencies? **(2018)**