



## Mains Practice Question

**Q.** Critically examine the role of dams in India's water and energy security and discuss the challenges and opportunities for sustainable dam development in the context of climate change. (250 words)

14 Jun, 2023 GS Paper 3 Bio-diversity & Environment

### Approach:

- **Introduction:** Provide a brief overview of the importance of dams in India's water and energy security.
- **Body:** Discuss various challenges posed by dams on sustainable development and measures to overcome the challenges.
- **Conclusion:** Summarize the key points and conclude with a forward-looking approach.

### Introduction

Dams are an important component of India's water and energy security, as they provide multiple benefits such as irrigation, drinking water supply, flood control, hydropower generation, and recreation. According to the Central Water Commission, India has 5000+ large dams, which together account for about 18% of the country's total water storage capacity and 13% of its total electricity generation.

### Body:

**However, dams also pose several challenges for sustainable development:**

- **Dam Failures:** The risk of dam failure or breach due to aging infrastructure, poor maintenance, design flaws, natural hazards, or sabotage, which can cause catastrophic floods and damage downstream.
- **Impact on Natural Hydrological Cycle etc.:** The impact of dams on the natural hydrological regime, biodiversity, sediment transport, water quality, and aquatic ecosystems, which can affect the livelihoods and well-being of millions of people dependent on riverine resources.
- **Effect on Climate Change:** The vulnerability of dams to the effects of climate change, such as changes in precipitation patterns, glacier melt, droughts, floods, and extreme events, which can affect their performance, reliability, and safety.
- **Water Conflicts:** The trade-offs and conflicts between different water users and stakeholders, especially in transboundary rivers, which can create political and social tensions and hamper cooperation and coordination.

**Some of the possible measures to overcome these challenges and harness the opportunities for sustainable dam development:**

- **Adopting a risk-based approach** to dam safety management, which involves conducting regular dam break analyses, consequence assessments, risk evaluations, and emergency action plans for existing and new dams.
- **Implementing environmental and social safeguards** for dam projects, which include conducting environmental impact assessments, environmental management plans, public consultations, resettlement and rehabilitation plans, benefit-sharing mechanisms, and grievance

redressal mechanisms.

- **Enhancing the resilience and adaptability** of dams to climate change, which involves incorporating climate change scenarios and projections into dam planning, design, operation, and decommissioning; adopting flexible and adaptive strategies; and promoting climate-smart technologies and practices.
- **Fostering integrated water resources management and governance** for dams, which involves considering the trade-offs and synergies among different sectors and objectives; engaging with diverse stakeholders and communities; strengthening institutional capacities and coordination; and promoting regional and international cooperation.

## Conclusion

Dams play a vital role in India's water and energy security. However, sustainable dam development must address the challenges posed by climate change. By integrating climate resilience measures, implementing environmental flow regimes, and engaging stakeholders, India can enhance the sustainability of dam projects and ensure water and energy security in the face of a changing climate.

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