Disaster Management · GS - III

Dam failures are always catastrophic, especially on the downstream side, resulting in a colossal loss of life and property. Analyze the various causes of dam failures. Give two examples of large dam failures.

EXAM YEAR	PAPER	SUBJECT
2023	GS - III	Disaster Management

MARKS	WORD LIMIT
10	~150 words

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Answer Hint

Dam failure results from structural, geological, hydrological, operational or human factors, while downstream vulnerability magnifies consequences; robust design, monitoring, maintenance and emergency action plans are therefore essential.

Model Answer

Introduction

Dams are critical infrastructure for irrigation, power generation and water management, but their failure can release enormous volumes of water suddenly and cause catastrophic downstream flooding.

Body

Causes of Dam Failures

Structural deficiencies: Poor design, construction defects, ageing infrastructure and material deterioration can weaken dams.

Hydrological causes: Extreme rainfall, unprecedented floods and inadequate spillway capacity may cause overtopping.

Geological factors: Weak foundations, landslides, seepage and unstable surrounding geology can compromise structural integrity.

Seepage and piping: Internal erosion can progressively weaken embankment dams.

Poor maintenance: Failure to detect cracks, seepage or deformation can allow minor defects to become catastrophic.

Operational errors: Incorrect reservoir management during extreme weather can increase risk.

Earthquakes: Seismic activity can damage dam structures and foundations.

Examples

Machchu-II Dam failure, Gujarat (1979): Extreme rainfall and reservoir overtopping contributed to the failure, causing devastating downstream flooding in Morbi.

Banqiao Dam failure, China (1975): Exceptional rainfall overwhelmed the reservoir system, resulting in catastrophic downstream flooding and extensive loss of life.

Way Forward

Dam safety requires regular structural audits, real-time monitoring, updated design standards, reservoir management, emergency action plans, downstream warning systems and effective implementation of the **Dam Safety Act, 2021**.

Conclusion

Dam safety must shift from a reactive approach to **risk-based preventive management**, integrating engineering, hydrology, climate projections and downstream disaster preparedness.

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