



# Global Best Practises in Flood Risk Management

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## Why in News?

[Climate change](#) is increasing severe [floods](#), making resilience vital. Global best practices such as **Tanzania's Msimbazi Basin Project** shows how nature-based solutions and modern infrastructure can reduce risks and strengthen climate resilience, **offering lessons for India's flood management strategies**.

## What are the Leading Global Best Practices in Flood Risk Management?

- **Tanzania's Msimbazi Basin Development Project:** A World Bank-funded project in **Dar es Salaam** aims to reduce flooding by dredging the river, improving drainage, and upgrading infrastructure.
  - It also relocates vulnerable residents and converts floodplains into green, climate-resilient areas.
- **Netherlands's Floating Homes:** Built with **concrete and glass**, these flood-resistant homes float during floods, preventing water intrusion. Solar panels and heat exchangers provide continuous power.
- **Vienna's Flood Protection System:** In 1969, **Vienna built a 21-km flood relief channel parallel to the Danube River**.
  - This channel absorbs excess floodwater, relieving pressure on the main river, and activates only when needed to protect the city.
- **China's Sponge Cities:** The "**Sponge Cities**" utilize nature-based solutions like **permeable surfaces and wetlands to absorb** and store rainwater, mimicking Earth's natural water absorption, unlike traditional cities that rapidly drain water via hard surfaces.
- **Denmark's Green Climate Screen:** A rainwater system channels water from gutters to mineral wool behind willow panels, **absorbing moisture naturally**.
  - Excess water flows to **planters or green spaces**, reducing flood risks without costly infrastructure or energy use.
- **Texas-Harnessing AI and Satellite Imagery:** The **University of Arizona and Google's Flood Hub** use **AI and satellite data to create detailed flood maps** and provide 7-day forecasts, improving flood justice and global preparedness.

## How Vulnerable is India to Flood Risks?

- **Extent of Flood-Prone Area:** Out of India's total 329 million hectares, over **40 million hectares are vulnerable to floods**.
  - India leads globally with over 158 million slum dwellers in flood-prone areas.
  - Also, India experienced **5.4 million internal displacements in 2024 due to floods, storms**, and other disasters- the highest number in 12 years.
- **Economic Impact:** Analysis of the past two decades shows **floods cause around 63% of India's annual economic losses**.
  - Monsoon patterns have become highly unpredictable, with sudden heavy rainfall causing

floods and prolonged dry spells leading to drought.

## What are the Key Strategies Adopted for Flood Risk Management in India?

- In India, **flood control** is primarily a **State subject**, thus, the responsibility for flood control lies largely with the **State Governments**, while the **Central Government's role** is more **technical, advisory, and supportive**.
- **Engineering/Structural Measures:**
  - **Interlinking of Rivers:** Under the [National Perspective Plan \(NPP\)](#), interlinking of rivers can help prevent floods by diverting excess water from flood-prone basins, such as the **Ganga-Brahmaputra-Meghna**, to water-scarce regions.
    - This **redistributes water flow, reduces peak discharge in rivers during heavy rains**, and minimizes the risk of overflowing banks and inundation in vulnerable areas.
  - **Reservoirs:** Help **moderate flood intensity by storing water during high discharge periods and releasing it after the peak flow**. Their effectiveness depends on capacity and proximity to flood-prone areas.
  - **Detention Basins:** These are natural depressions improved by constructing embankments and regulating water release. Examples include basins in **Rajasthan** and **Bihar**.
  - **Embankments:** Prevent floodwaters from spilling over. These are widely used but may have long-term issues like riverbed elevation and erosion. Maintenance is crucial, especially in places like **Assam** and **Bihar**.
  - **Channelization:** It involves controlling river courses and improving hydraulic conditions to prevent flooding. **Dredging** and **desilting** help rivers carry floodwaters efficiently.
  - **Diversion of Flood Waters:** **Diversion channels** and spillways help direct floodwaters away from vulnerable areas.
    - Examples include the **Krishna-Godavari Drainage Scheme** and **Thottapally Spillway** in Kerala.
- **Administrative/Non-Structural Measures:**
  - **Flood Forecasting and Warning:** The [Central Water Commission](#) provides real-time flood forecasts, which help authorities evacuate people and property to safer areas.
  - **Flood Plain Zoning:** Involves designating areas prone to flooding and regulating development in these regions to minimize flood damage.
  - **Flood Proofing:** This involves raising settlements above the flood levels, particularly in areas like **Uttar Pradesh, West Bengal, and Assam**.

## Keywords for Mains

- **“River as Resource, Not Risk”** : Restoring riverine ecosystems for flood control.
- **“Forecast to Forewarn”**: Leveraging AI, satellite imagery, and hydrological modeling for early warning systems.
- **“Resilience is the New Development”** – Growth that survives climate shocks.
- **“Communities at the Core”** – Inclusive planning with local populations for resilience and early response.

## Conclusion

Building flood resilience in India demands the **3Fs- Forecasting, Financing, and Frontline Preparedness** to shift from reactive relief to proactive risk reduction.

**Drishti Mains Question:**

Assess India's reliance on structural flood control measures and highlight the importance of integrating nature-based solutions, drawing insights from global best practices.

## UPSC Civil Services Examination, Previous Years Questions (PYQs)

### **Mains:**

**Q.** The interlinking of rivers can provide viable solutions to the multi-dimensional inter-related problems of droughts, floods, and interrupted navigation. Critically examine. **(2020)**

**Q.** Account for the huge flooding of million cities in India including the smart ones like Hyderabad and Pune. Suggest lasting remedial measures. **(2020)**

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