



## Slums in Floodplains

**For Prelims:** [UN-HABITAT](#), [Smart Cities Mission](#), [Atal Mission for Rejuvenation and Urban Transformation](#), [National Sample Survey Office](#), [Ganga](#).

**For Mains:** Urbanisation and associated problems, Social justice and vulnerable sections, rights of slum dwellers.

[Source: TH](#)

### Why in News?

A global study, published in *Nature Cities*, has revealed that **India has the world's highest number of slum clusters** located in flood-prone areas.

### What are the Global Trends in Flood Risk and Slum Settlements?

- **Flood-exposed Slum Dwellers:** India tops the global list, with **over 158 million slum dwellers** living in flood-prone areas, particularly in the [Ganga River delta](#), which is naturally flood-prone.
  - In India, **40% of slum dwellers live in urban and suburban areas**, where flood risk is high due to overcrowded conditions and poorly managed infrastructure.
  - India, followed by Indonesia, Bangladesh, and Pakistan, has the largest numbers of vulnerable slum populations.
  - Globally, slum-dwellers are 32% more likely to live in floodplains compared to other areas. These zones are **often the only affordable housing option due to low land value**.
    - In cities like Mumbai and Jakarta (Indonesia), high flood risk correlates with high slum density.
- **Disproportionate Vulnerability in the Global South:** 33% of informal settlements in low- and middle-income countries lie in areas already exposed to flooding.
  - Major hotspots outside South Asia include Rwanda, northern Morocco, and coastal Rio de Janeiro.
- **Floods Amplify Socioeconomic Inequities:** Slum dwellers face greater flood impacts like **job loss, displacement, and poor access to healthcare and education due to weak infrastructure** and lack of drainage or preparedness.
  - Socioeconomic factors such as low education and limited access to resources like flood insurance increase their vulnerability.

### Factors Responsible for Flooding in India

- **Riverine Floods:** Occur when rivers overflow their banks, usually due to heavy rainfall, snowmelt, or dam failure.
  - Among the river basins, most of the observed flash floods occurred in the **Brahmaputra River basin followed by Ganga and Krishna River basins**. Himalayan regions face

higher risk due to **steep slopes**.

- **Urban Expansion:** Cities like Bengaluru and Mumbai are expanding into floodplains, worsening flood risks. **India ranked 3rd globally (1985-2015) in urban growth into flood-prone areas.**
- **Flash Floods Rising:** **Flash flood** incidents rose from 132 (2020) to 184 (2022), driven by extreme rain and saturated soil. Major incidents seen in **Himachal Pradesh (July 2025)**, **Kerala's Wayanad** (July 2024), Ladakh (June 2024), and Sikkim (October 2023) highlight their growing severity.
  - 75% of **flash floods** are due to a mix of extreme rain and saturated ground, **not rainfall alone**.
- **Climate Change Impact:** **Extreme rainfall events** have doubled (1981-2020); monsoon rains up by 56%, intensifying flood threats.
- **Poor Drainage:** Cities like Delhi, Mumbai, Hyderabad, and Bengaluru **suffer from outdated or blocked drains, causing waterlogging during heavy rain.**
- **Weak Oversight:** Encroachments and plastic waste block stormwater drains exacerbating **urban flooding**; e.g., **Chennai 2015 floods worsened by clogged canals.**
- **Lack of Local Strategies:** Absence of **region-specific flood risk assessments** hampers effective forecasting, land-use planning, and infrastructure upgrades.

# URBAN FLOODING

## MEANING

- ⦿ Flooding of land/property in a built environment, particularly in cities
- ⦿ Caused not just by higher precipitation but also **unplanned urbanisation**

## CAUSES OF EXACERBATION

- ⦿ **Encroachments** on drainage channels (Lakes, wetlands, riverbeds)
- ⦿ **Climate change** (increased frequency of short duration heavy rainfall)
- ⦿ Uninformed **release of water from dams** (e.g. Chennai Floods 2015)
- ⦿ **Mining** activities (depletes natural riverbed and water retention capacity)
- ⦿ Urban heat island effect
- ⦿ **Storm surges** affecting coastal cities/ towns

## IMPACTS

- ⦿ Loss of life and property
- ⦿ Spread of diseases
- ⦿ Disruptions in supply of power & water and communication
- ⦿ Ecological impacts

## SUGGESTIONS TO MITIGATE

- ⦿ Creating a unified **flood control implementing agency**
- ⦿ **Blue-Green Infra** for urban and climatic challenges
  - Blue - Water bodies such as rivers and tanks
  - Green - Trees, Parks, and Gardens
- ⦿ Mapping of Flood Vulnerability
- ⦿ Construction of **flood walls, raised platforms** along basins

## Some of the Most Notable Urban Floods in India



## What is the Status of Slums in India?

- **Defining Slums:** The **Pranab Sen Committee (2010)** defined slums as a **compact settlement of at least 20 households**, characterized by poorly built tenements, often of temporary nature, crowded together with inadequate sanitation and drinking water facilities, and typically in unhygienic conditions.
  - **UN-HABITAT** defines slums as **settlements lacking one or more of these conditions:** durable housing, sufficient living area, access to clean water, access to proper sanitation and secure tenure.
- **Slums in India:** As per **Census 2011**, about **17% of India's urban population lived in 1.39 crore slum households**.
  - The **National Sample Survey Office (NSSO)**, 2012 survey estimated 33,510 slums nationwide.
  - Major states like **Maharashtra, Andhra Pradesh, Uttar Pradesh and West Bengal** had the highest slum populations.
  - Cities like **Mumbai and Kolkata** have high slum populations, highlighting the strong link between rapid urban growth and informal settlements.
- **Regulation: 'Land' and 'Colonisation' are State subjects**, so housing and slum rehabilitation are led by State/UT governments.
  - The **Slum Areas (Improvement and Clearance) Act, 1956** aims to improve and clear slum areas in select Union Territories and protect tenants in these areas from eviction.
- **Schemes Related to Slums:**
  - **Pradhan Mantri Awas Yojana - Urban (PMAY-U):** The **PMAY** Aims to provide pucca houses with basic amenities to eligible urban beneficiaries, including slum dwellers.
    - As of December 2024, **118.64 lakh** houses have been sanctioned, with 29 lakh for slum dwellers.
  - **Urban Infrastructure Development:** Initiatives like **AMRUT (Atal Mission for Rejuvenation and Urban Transformation)** and **Smart Cities Mission** focus on improving infrastructure in urban poor areas, including drainage systems, water supply, and sanitation.
  - **Swachh Bharat Mission - Urban (SBM-U):** The **SBM-U 2.0** aims to make the city completely free of garbage.

## What Measures can be Adopted for Sustainable Slum and Flood Management?

- **Region-Specific Adaptation:** Develop flood strategies based on **topography** and **soil conditions**, improving **early warning systems** and disaster preparedness.
  - The **National Disaster Management Plan (NDMP)** emphasizes region-specific disaster risk reduction strategies.
- **Restrict Urban Expansion in Floodplains:** Enforce zoning laws under the **Smart Cities Mission** to restrict floodplain development and promote flood-resilient infrastructure.
  - Integrate **Sustainable Urban Drainage Systems (SUDS)** such as permeable pavements, rain gardens, and green spaces to manage stormwater effectively.
- **Upgrading Informal Settlements:** Under PMAY improve **flood resilience** in slums through **elevated housing, better drainage, and infrastructure upgrades**.
- **Data-Driven Risk Assessment:** Use satellite imagery data from the **National Remote Sensing Centre (NRSC)** and the **India Meteorological Department (IMD)**, along with Integrated Flood Warning Systems like **IFLOWS-Mumbai and CFLOWS-Chennai**, to monitor urban growth, map flood risks, identify emerging hotspots, and strengthen flood forecasting.
- **Adopt the Sponge City Concept:** The **Sponge City model** uses natural and engineered systems to absorb and manage rainwater, reducing floods. Shanghai has implemented it with green roofs and permeable surfaces.
  - Mumbai is now adopting this approach to boost flood resilience and recharge groundwater.
- **Climate Change Adaptation & Restoration of Water Bodies** Incorporate climate resilience into urban planning and restore urban lakes and wetlands for improved flood management.
  - Bengaluru's Jakkur Lake restoration shows how eco-restoration can help manage floods effectively.



## Conclusion

As the **2030 Agenda for Sustainable Development** deadline approaches, there is an urgent need to address flood vulnerability in slum settlements. Efforts must be accelerated to achieve **SDG Goal 11 (Sustainable Cities and Communities)**, **SDG Goal 6 (Clean Water and Sanitation)**, and **SDG Goal 1 (No Poverty)**, especially for communities already living in flood-exposed areas.

### ***Drishti Mains Question:***

"The growth of informal settlements in flood-prone zones reflects the failure of urban governance in India." Discuss.

## **UPSC Civil Services Examination, Previous Year Questions (PYQs)**

### **Prelims:**

**Q. La Nina is suspected to have caused recent floods in Australia. How is La Nina different from El Nino? (2011)**

1. La Nina is characterised by an usually cold ocean temperature in equatorial Indian Ocean whereas El Nino is characterised by unusually warm ocean temperature in the equatorial Pacific Ocean.
2. El Nino has adverse effect on south-west monsoon of India but La Nina has no effect on monsoon climate.

**Which of the statements given above is/are correct?**

- (a) 1 only  
(b) 2 only  
(c) Both 1 and 2  
(d) Neither 1 nor 2

**Ans: (d)**

### **Mains:**

**Q. Does urbanization lead to more segregation and/or marginalization of the poor in Indian metropolises? (2023)**

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

**Q. Discuss the various social problems which originated out of the speedy process of urbanization in India. (2013)**