

Rains, Ruins, and Reforms

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Rains, Ruins, and Reforms: The Urban Drainage Dilemma in India

Context

Urban flooding has become a recurring crisis in major Indian cities such as **Delhi, Mumbai, and Bengaluru**. The primary causes include **dysfunctional drainage systems, unplanned urbanisation, climate change**, and rising **concretisation**. These developments have drawn urgent attention towards strengthening **urban flood management and stormwater infrastructure**.

What is Urban Drainage?

Urban drainage refers to the infrastructure and systems designed to **manage rainwater** and prevent **flooding in city areas**. This includes stormwater drains, natural water bodies, recharge structures, and drainage channels. However, many of these systems are now outdated, overloaded, or poorly maintained.

Urban Drainage Crisis in India: Recent Trends

According to the **Ministry of Housing and Urban Affairs (MoHUA)**:

- **Over 70% of urban areas** lack scientifically designed stormwater drainage systems.

Mumbai

- Drainage infrastructure built in the **1860s** handles only **25 mm/hour** rainfall.
- The city now frequently records **over 100 mm/hour**, far beyond current capacity.
- **80% of natural water bodies** have been lost in the past **four decades**.

Delhi

- Drainage standards based on **1976 norms**, designed for **50 mm/day** rainfall.
- In **May 2025**, the city received **185.9 mm in a single day—over 9 times the normal**.

Bengaluru

- Naturally lacks a river system; heavily dependent on interlinked lakes.
- Outdated and narrow stormwater drains are frequently overwhelmed.
- **Over 65% of lakes** have been **encroached**, especially Bellandur and Varthur, now surrounded by concrete.

Reasons Behind Drainage Failures

Natural Factors

- **Intensified Rainfall Patterns:** Climate change has increased the frequency of **short, high-intensity rainfall** events.
 - Example: In **2023**, Delhi recorded **over 100 mm** rainfall **within an hour**.
- **Low-Lying Topography:** Cities like Mumbai and Bengaluru are naturally prone to waterlogging due to their elevation profiles.

Man-Made Causes

- **Unplanned Urban Expansion:** Encroachment on floodplains, reduction in green cover, and unchecked concretisation have reduced the **ground's ability to absorb water**.
- **Inadequate Design Norms:** Many drains are designed for **1-in-2-year** storm events, which is no longer sufficient.
- **Illegal Constructions:** Encroachments and unauthorised coverings on drains make desilting and maintenance challenging.

- **Sewage and Drainage Overlap:** Cities like Patna and Bhopal do not have separate lines for sewage and stormwater, leading to backflow and blockages.
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Government Measures to Address the Drainage Challenge

- **Manual on Stormwater Drainage Systems (2019):** Recommends updating norms to accommodate **1-in-5 or 1-in-10 year** flood events.
 - **AMRUT 2.0:** Encourages integrated stormwater planning and **rainwater harvesting** near urban water bodies.
 - **Jal Shakti Abhiyan and Atal Bhujal Yojana:** Support **groundwater recharge** in urban regions through check dams and recharge pits.
 - **Model Building Bye-Laws (2016):** Mandates **rainwater harvesting** for plots larger than **100 sq. m.**
 - **Amrit Sarovar Mission:** Focused on rejuvenating **urban water bodies** to increase stormwater holding capacity.
 - **GIS-Based Mapping:** Cities like Delhi are adopting **simulation models** to redesign drains based on changing land-use patterns.
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Way Forward

- **Underground Rainwater Storage:** Construct **retention tanks** under parks and open spaces to absorb excess runoff.
- **Strict Enforcement of Codes:** Ensure compliance with **zoning regulations** and **building bye-laws** related to drainage and rainwater harvesting.
- **Decentralised Infrastructure:** Promote **rooftop gardens, permeable pavements, and bioswales** to slow and absorb water.
- **Regular Drain Maintenance:** Ensure periodic **desilting and cleaning**, especially before monsoon seasons.

- **Public Education:** Launch awareness drives on **waste disposal**, **water conservation**, and the importance of not encroaching water channels.
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Conclusion

The urban drainage crisis in India is a complex challenge shaped by **outdated infrastructure**, **rapid urbanisation**, and **climate extremes**. While the government has introduced several policy-level solutions, effective results require:

- **Multi-level coordination** between municipal, state, and central agencies.
- **Robust enforcement** of building and environmental norms.
- A shift from a **reactive approach** to a **resilience-based strategy** in urban planning.

Urban drainage must now be seen not just as a utility issue, but as a **critical component of sustainable and climate-resilient urban development**.

