

Opinion A rising Yamuna and the cost of unplanned growth in Delhi-NCR

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On September 2, heavy monsoon rains and record releases from upstream barrages pushed the Yamuna across the danger mark, bringing the Delhi-NCR region to a virtual standstill. Roads turned into rivers, underpasses and flyovers were submerged, technical snags and overcrowding strained metro services, and hundreds of flights were delayed as visibility and airport access deteriorated. Thousands of residents were evacuated from low-lying neighbourhoods, relief camps were activated, and offices and schools shifted to work-from-home and online classes. The immediate chaos exposed more than short-term

emergency strains; it illuminated structural vulnerabilities in a rapidly expanding metropolis confronting a changing climate and decades of unplanned urban growth.

This was not an isolated weather hiccup. Scientists and meteorological agencies have warned that climate change is intensifying the hydrological extremes of the South Asian monsoon: Heavier downpours concentrated in shorter windows, followed by longer dry spells. When intense rainfall falls on a city whose drainage capacity, natural buffers and spatial planning were not designed for these new extremes, the result is predictable: Floods, overwhelmed infrastructure, stranded commuters and people displaced from their homes.

Urban planning failures are central to the scale of the disruption. Floodplains that historically absorbed the seasonal swells of the Yamuna have been encroached upon by informal settlements, high-density housing and even formal developments. Wetlands and natural drainage corridors — critical for absorbing and slowing runoff — have been filled, fragmented or concreted over. Much of [Delhi](#)'s built environment consists of paved surfaces and culverted drains that accelerate surface-water runoff into limited outfalls. Drainage networks were not upgraded at the same pace as urban expansion, and stormwater systems designed for past rainfall patterns simply could not move the enormous volumes seen this season. The release of large discharges from the Hathnikund, Wazirabad and Okhla barrages compounded the problem. Still, release management alone cannot offset the cumulative risk of years of inappropriate land use.

The IPCC's AR6 is unequivocal: As the planet warms, extreme precipitation events will grow more intense and frequent, elevating urban flood risk — especially in densely built cities like Delhi that have lost natural drainage, wetlands and floodplains and rely on stormwater systems designed for a past climate. To avoid reliving the same crisis year after year, policymakers must translate this science into integrated, urgent action across land use, infrastructure, governance and finance.

That means enforcing no build zones on floodplains and river buffers, legally protecting remaining wetlands and khadar land, and instituting river setback policies that require developers to demonstrate zero net loss of flood retention capacity; it also means restoring and scaling nature based solutions — recreating urban wetlands, riparian buffers and floodplain parks and expanding green cover, bioswales, rain gardens, permeable pavements and green roofs — to slow and infiltrate runoff rather than funnel it straight into drains.

At the same time, drainage and stormwater systems must be redesigned for future extremes: Revisit design standards to reflect projected rainfall intensities, increase conveyance and storage capacity, deploy decentralised retention such as detention basins and retention ponds, and fit critical pumps and flood control nodes with backup power and smart controls.

Integrated water management across jurisdictions is essential — coordinated barrage and reservoir operations, real time data sharing and a metropolitan river basin governance framework can harmonise upstream releases with downstream safety. Strengthening early warning and response requires denser meteorological and river level monitoring networks, robust community alert systems, pre-positioned relief and resilient shelters, trained local response teams and regular drills.

Finally, these measures need predictable financing with climate proofing budgets, resilience bonds and incentives for developers to adopt blue green infrastructure, and stronger institutional mandates to

ensure implementation. The verdict from the IPCC is clear. What remains is the political will to act before another monsoon turns into a humanitarian and infrastructural crisis. Cities must also promote nature-based solutions by restoring urban wetlands, expanding green spaces, and utilising bioswales, rain gardens, and permeable pavements. These initiatives not only manage runoff but also enhance urban biodiversity and aesthetics.

A significant overhaul of existing drainage and stormwater systems is crucial to accommodate future climatic extremes. Infrastructure must be redesigned with updated standards to reflect projected rainfall patterns, integrating detention basins and retention ponds for excess water. A comprehensive governance framework is necessary to drive these initiatives forward, supported by predictable financing mechanisms such as resilience bonds and incentives for adopting sustainable infrastructure. With these measures, Delhi-NCR can prevent future floods from recurring crises, safeguarding human and environmental welfare.

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