

EXPLAINED INFRASTRUCTURE

Floods & urbanisation in Delhi

The national capital is undergoing one of the world's fastest urban expansions, with little regard for the land's natural topography. This has left Delhi vulnerable to flooding during spells of intense rainfall

SHINY VARGHESE
NEW DELHI, JULY 1

UNCHECKED AND ill-thought-out urban expansion is the principal reason behind chronic urban flooding in Delhi, and the larger National Capital Region (NCR).

Last week, a spell of heavy rain brought parts of Delhi to a standstill, inundating streets, causing hours-long traffic snarls, lengthy power cuts, property damage, and at least 11 deaths. While last week saw record rainfall, flooding and water-logging have now become a part and parcel of Delhi's monsoons. Factors such as inadequate desilting of drains by civic authorities play a part, but at the heart of it, lies a deeper problem.

A rapidly growing city

Delhi is undergoing one of the world's fastest urban expansions. According to NASA data, Delhi's geographic size almost doubled from 1991 to 2011. Most of this expansion has occurred on the peripheries of New Delhi, with erstwhile rural areas becoming engulfed in the capital's urban sprawl. Cities outside Delhi, but a part of the NCR — Bahadurgarh, Ghaziabad, Faridabad, Noida, and Gurugram — have also witnessed rapid urbanisation.

According to the UN *The World's Cities in 2018* data booklet, Delhi will overtake Tokyo as the world's most populous city by 2030, with an estimated population of nearly 39 million, roughly two and a half times its population in 2000.

Topography and drainage

This urban expansion has paid little heed to Delhi's natural topography. "Topography determines drainage patterns," Manu Bhatnagar, principal director, Natural Heritage Division, INTACH, told *The Indian Express*. "If one looks at Delhi's historic cities — from Tughlakabad, Mehrauli, and Shahjahanabad to Civil Lines, New Delhi, and the Cantonment area — all were carefully selected, and built on higher ground. In Delhi's villages too, the centre of the village would always be five to six metres higher than the village periphery," he said.

This allowed rainwater to drain out. But as the city has expanded, the land's drainage capacities have not been kept in mind.

With high-intensity rain there is significant run-off (unconfined flow of water, when there is more water on the land's surface than it can absorb), and existing drainage systems have been inadequate, Bhatnagar explained.

Concrete everywhere

"The lay of the land slopes from the Ridge to the river... it is about a 100-metre drop," K T Ravindran, architect and urban designer, said.

But due to urbanisation, water cannot flow down this gradient. "Today, much of the

Low-lying areas around the Yamuna are flood prone



Areas on both sides of the Yamuna River are prone to flooding during the monsoon season.



Water-logging under the Minto Bridge in New Delhi on June 28. Praveen Khanna

MANY CITIES, SAME PROBLEM

BENGALURU

13 cm of rainfall in Bengaluru's Rainbow Drive Layout in 2022; one of the worst floods in 15 years

"We must not overlook the critical role of the storm water drain network in replenishing these (Bengaluru's lakes) water bodies. It is a network which is crucial to the health of the city and its lakes."

NARESH V NARASIMHAN,
ARCHITECT, URBAN PLANNER

MUMBAI

94.4 cm rain on July 26, 2005; wettest 24 hours ever; city stopped entirely; more than 1,000 dead

"We need to make an assessment of our storm water drains and see if they are capable of handling excessive rain... We need to then improve early warning systems... An evacuation strategy is important."

SUBIMAL GHOSH, HEAD OF
CLIMATE STUDIES, IIT BOMBAY

KOCHI & OTHER KERALA CITIES

Worst ever floods in mid-Aug 2018; 4 districts of Kerala submerged; Kochi inundated for days

"We need strong legal systems in place to ensure future structures follow the lay of the land, allow water to percolate, and don't narrow down streams."

MANOJ KINI, MD, KERALA
TOURISM INFRASTRUCTURE LTD.

SHIMLA & OTHER HILL TOWNS

Catastrophic rainfall in July-Aug 2023 wreaked havoc in Mandi, Kullu, Manali, Shimla

"There should be new paradigms of the architecture of governance. Communities should be made custodians and some kind of insurance model should be developed."

TIKENDER PANWAR,
URBAN SPECIALIST

(The experts spoke to *The Indian Express* in 2023)

water gets channelised into concretised *nallahs* (drains), which have been turned into sewage dumps," Ravindran said.

Construction in low-lying areas makes things worse. For instance, many *nallahs* from across South Delhi converge at Sarai Kale Khan, a low-lying area next to the Yamuna. This is why the bustling urban village sees intense flooding every year.

Construction in Delhi's flood plains began as early as the 1900s, when the British decided to build a railway line along the river bed. Much later, the Ring Road came up, again on the Yamuna flood plain.

Over the years, the floodplain has been used for building bridges, buildings, and much more. Delhi Metro built a maintenance shed on around 65 hectares of land near Kashmere Gate. During the 2010 Commonwealth Games, a bus maintenance facility was built over roughly 25 hectares, again on the floodplains.

The ITO-Pragati Maidan area, which is perennially flooded during monsoons, was once a low-lying wetland.

This concretisation leaves little room for rainwater to percolate into the soil, and leads to flooding. Environmentalist C R Babu, behind the ecological restoration of the Yamuna Biodiversity Park (YBP), said: "When storm drains are converted into sewers and land has been concretised, where will the water go?"

No 'water masterplan'

Ravindran said that urban planners need to come up with a "water masterplan".

"Today, land is seen as real estate. There has been a consistent neglect of water as a planning resource... In fact, water should be the primary driving factor behind any masterplanning," he said. No comprehensive planning accounting for the city's water flows has been carried out in the last 70 years.

This is why, for example, the Pragati Maidan Tunnel, inaugurated by the Prime Minister in 2022, is flooded each monsoon.

Water bodies which can help manage flooding have also been destroyed. "According to official records, Delhi has some 1,000 water bodies. But on the ground there are not more than 400. These 600 'missing' water bodies have been converted into valuable real estate," Bhatnagar said.

As Babu put it: "Unless we stop building in low-lying areas, de-concretise our lawns and pavements, and stop blocking the drains with solid waste, the floods won't stop. Understanding gradients and working with the lay of the land is crucial".

Ravindran suggested setting up proper filtration pits to carry the water to aquifers in low-lying areas. "We can't afford to pump out all of the water every time. We have to rely on gravitational flow," he said.