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India's Sinking Cities

The paradox of progress is that when mankind rises, cities sink. Prosperity through technology causes large-scale migrations to urban areas, and pressure on resources, land and systems upset the balan

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The paradox of progress is that when mankind rises, cities sink. Prosperity through technology causes large-scale migrations to urban areas, and pressure on resources, land and systems upset the balance of Nature. Unchecked industry and pollution are the main culprits of climate change that ultimately leads to catastrophe. India's historic cities—Delhi, Mumbai, Chennai and Kolkata—are slowly sinking. So are other metros such as Bengaluru and Kochi, as well as a host of smaller cities. The root problem of monsoon disasters is uncontrolled urban population growth.

Between the top five metros—Mumbai, Delhi, Kolkata, Chennai and Bengaluru—the population is a whopping 37.8 crore and climbing; India is an urban disaster in the making. Forty million Indians are likely to be affected by rising sea levels as global warming drives temperatures up, causing ice sheets to melt. India is not saving up for a rainy day. Waterlogged roads, flood-related deaths and crippled infrastructure, urban displacement and economic loss make wearingly repetitive news every time it rains.

Kochi: Mahesh's house was located around five feet above the river bank of Keerithodu in Kochi region. When the river rose suddenly, he along with his wife and 10-month-old daughter had to seek shelter on higher ground as they watched all their worldly belongings being swept away. Water levels in the Periyar River, swollen by incessant rain, forced authorities to open the sluice gates of Idukki reservoir, 130 km away from the city. The water level had crossed the 2,401-ft mark by 7 am on August

9, inching closer to the maximum storage level of 2,403 ft. At least 4,000 people living in low-lying areas were evacuated to relief camps.

Delhi: Close to 80 people had a narrow escape after heavy rainfall on July 13, when a DTC bus was submerged at Minto Road Bridge. Firemen stepped in to rescue the passengers. The soon-to-be-opened Bhikaji Cama Place Metro Station was waterlogged after a portion of a pavement adjoining it caved in post rains on July 30. Just 10 days prior to this, Greater Kailash Metro Station had also witnessed a major cave-in near one of its entrance gates. On July 27, the water level in the Yamuna River crossed the danger mark, prompting officials to sound a flood alert.

Mumbai: Last year, Dr Deepak Amarapurkar lost his life after he slipped into an open manhole on a waterlogged street. It never stops with one. In the famously ‘resilient city’, a pedestrian bridge collapsed on a crucial railway line in Andheri on July 3 this year, injuring many, and causing urban paralysis. Four walls collapsed across the city, and trees were uprooted at 43 places. Chennai: The city witnessed heavy rains in 1943, 1978, 1985, 2002 and 2005 caused by heavy rain associated with cyclonic activity. These events of catastrophic flooding, besides the ‘manmade floods of 2015’, were found to be attributable to failure of the major rivers and other drainage systems to clear the inundations.

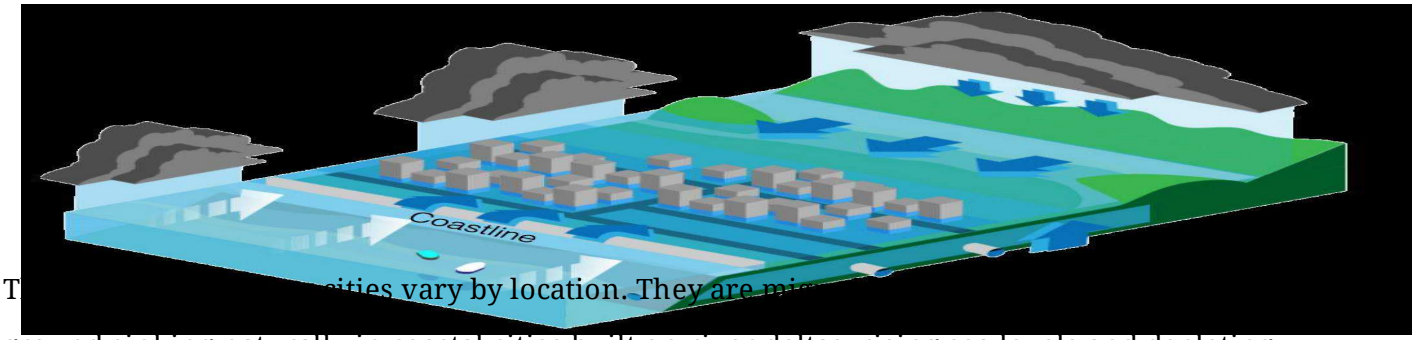
Bengaluru: India’s IT hub is the perfect example of how terrible things are in urban centres. Poor maintenance of roads and drains has made it vulnerable to flooding. Dumping of solid waste into stormwater drains coupled with illegal constructions blocking drains are affecting infrastructure. Kolkata: Heavy rains on July 22 prompted two traders to take shelter in a run-down building in Sealdah. But the building proved to be their death knell. They were buried under the debris when part of the building collapsed due to the rain. With its natural defences such as the Ganges and wetlands emptying into the mangrove-rich regions, this metro could have kept floods at bay. But it was not to be.

Bhubaneswar: A spate of low-pressure induced rains last month submerged most of the city, ranked among the Top 20 global Smart Cities and 32 among best 50 Smart City Governments. The whole city

turned into a landscape gripped by severe floods disrupting normal life. Water gushed into homes, which had even not witnessed any waterlogging outside their gates.

NASA scientists predict that melting ice sheets will force sea levels to rise, affecting Mangaluru, Mumbai and Kakinada. Over the next century, Mangaluru's sea level will rise by 15.98 cm and Mumbai's by 15.26. The Andaman and Nicobar islands are likely to be totally swallowed by the sea, said a 2017 World Bank report. A study by the Organisation for Economic Co-operation and Development found Mumbai and Kolkata can be submerged fully by 2070. The study encompassed 136 of the world's largest port cities. A Greenpeace report prepared by IIT-Chennai climate expert Sudhir Chellarajan has predicted that 4-5 degree rise in temperature due to greenhouse emissions will cause rise in sea levels of up to five metres, pushing most of Mumbai under water by 2100.

An international scientific community report forecasts that Chennai is at risk of submersion and that by 2050, Thiruvallur, Kanchipuram, Villupuram, Cuddalore, Nagapattinam, Thiruvarur, Thanjavur, Pudukottai, Ramanathapuram, Tuticorin, Tirunelveli and Kanyakumari districts will face storm surges to go four metre above sea level. Another study by the Tamil Nadu State Land Use Research Board predicts danger to 10 lakh residents and 144 sq km of land in Chennai should the sea level rise by a metre by 2050. The West Antartic Ice Sheet (WAIS), which seems to be melting, has enough water to raise sea levels by 4.8 metre. It's small comfort that cities such as New York, Miami and Jakarta are also predicted to go under. New Orleans has been sinking for decades. One of the major causes of sinking is the depletion of groundwater. India is the world's largest consumer of groundwater at 85 percent of its drinking water.



T cities vary by location. They are mi
ground sinking naturally in coastal cities built on river deltas, rising sea levels and depleting groundwater. Migration from the countryside into urban areas places stress on natural resources. The immense weight of huge buildings presses down on earth.

Land subsidence is increased by the building of levees and dams that prevent the river floods from replenishing the ground with silt and sand. Sea levels could rise in coastal cities from a few inches to a few feet over the next century. Geologist Sushmita Sengupta, whose book Why Urban India Floods

reviews the state of urban flooding, says, “Many Indian water bodies have been built over through the process of urbanisation because they are rarely recorded under municipal law. Planners only see land, not water. A rethinking is needed. Urban floods are capable of causing major economic losses and devastating social and environmental impacts.”

Financial Hub Drowns

If the sea is Mumbai’s life, rain is its nemesis. Every year the city floods during the monsoon with transport services grinding to a halt, massive power cuts, with the municipal drainage systems, newly made roads and old buildings collapsing. Last year, Mumbai floods claimed over 20 lives. The reason for the paralysis goes beyond mere planning and government apathy. Mumbai has expanded exponentially as it absorbed migrants looking to be part of the Bombay Dream.

This has resulted in massive expansion of both residential and commercial space. The fast-growing nexus between politics, the land mafia and organised crime has compromised the city’s ecosystem. Encroachment of stormwater drains and rampant illegal construction have led to natural water bodies being filled up beyond capacity. Felling of trees and concretisation compound the problem.

The fatal mistake city planners make is that all rainwater should be purged using pumps, channels and drainage. Redevelopment of older neighbourhoods has led to gigantic buildings coming up. These areas lose their green cover as the soil’s absorptive power is degraded. Rainwater is usually absorbed by the earth or flows into natural lakes and ponds, and is absorbed by flood plains, coastal wetlands, salt marshes, lakes, rivers, natural green cover, fields and non-concrete land which also recharge the groundwater. Concrete prevents this. The infamous high tide of Mumbai adds to nature’s wrath.

The Indian Meteorological Department (IMD) data shows nine extremely heavy rainfall days exceeding 204.5 mm in Mumbai annualy along with the rise in the annual frequency of heavy rainfall. The deadly July 2005 downpour caused by an unexpected cloudburst claimed over 700 lives, injured 3,00,000, damaged 20,000 cars, and 2,500 BEST buses. Mumbai’s drainage system cannot handle such rains, because the system built during British times was not laid out depending on data: there was simply no data.

Capital Crisis

Every monsoon Delhi throws up a fresh surprise. This year, it was the scene of a waterlogged elevated road in Delhi-NCR in July. “I commute on the elevated road on a daily basis. An elevated road is supposed to be free of such ground-level problems as waterlogging. Why is there no water outlet?” asks a bewildered Bhaskar Sathe, who commutes from Noida to Delhi every day. Places such as Old Delhi, Mayur Vihar, Lakshmi Nagar, Indirapuram, Chhattarpur are continually submerged. One hour of incessant rain and most roads are waterlogged leading to traffic snarls that last for hours.

This year, schools in Indirapuram had to be shut after just a day's downpour—it was deemed 'too risky' for children to commute. The city, which has a growing population, is home to illegal constructions and encroachments. Even government projects such as flyovers and laying of Metro lines add to the debris that ends up on the Yamuna riverbed.

After the recent waterlogging in Delhi, a bench of Acting Chief Justice Gita Mittal and Justice C Hari Shankar questioned authorities on "why action taken is not visible". They said year after year waterlogging occurs and the Minto Bridge had become a proverbial issue. "This year, even the airport was flooded," the bench observed. It went on to add that the situation exposes the falsity in claims made by authorities. Commenting on the recent flooding on the elevated road, the bench said it was "shocking that the flyover which is considered a panacea for easing traffic is beset with waterlogging". It appointed a panel headed by the Delhi Jal Board (DJB) CEO to look into difficulties in drainage of stormwater and sewage, calling for "emergency efforts".

A Delhi civic body official on condition of anonymity said, "It is beyond us to manage the entire city. All departments have to work together—from the traffic police to the public works department to sanitation. Besides, while passing tenders for construction, the administration should look into all pros and cons. The Yamuna river belt is almost destroyed. Each year, the government issues flood warnings, but that has not stopped encroachments."

A foreign consultant to the DJB says Delhi, like Cape Town, would run out of water in a decade. The built-up area in the city increased sevenfold between 1970s and 1990s. To make space for the construction, the area under wetlands reduced to one-third of its earlier size. The last major flood to hit the city was in 2013, when the water level of Yamuna rose to 207.49 m, the highest ever.
The story is the same in Delhi's glamorous stepsister Gurgaon. Once mostly farmland and a few scattered villages, it has grown into a Millennial City. The farmers sold land to developers, multinationals and businessmen at outrageous prices and grew rich beyond their wildest dreams.

Gurgaon became a city of contrasts: swanky skyscraper offices, exclusive gated communities with clubs and malls on one side and on the other, claustrophobic illegal colonies populated by migrants living cheek by jowl with livestock, kachcha roads and open sewage lines. The Badkhal lake in

Faridabad that would overflow in the 1990s is now a bare patch of land on which housing colonies are coming up.

Awaiting a Tragedy

More than two years have passed since the 2015 floods that brought Chennai to a standstill, but stormwater drains across the city are yet to be completed. Also, the plan to rejuvenate 100 water bodies is still on paper and the removal of encroachments is a half-hearted attempt. It is another calamity waiting to happen. Association of Professional Town Planners president K M Sadanand says, “The deluge is a forgotten chapter. Many of the schemes are still on paper.” The fault lies in the state government for not enacting the Flood Plain Zoning (FPZ) mandated by the Central Water Commission which in 1975 circulated a model Bill of FPZ. Even the Second Master Plan prepared by the Chennai Metropolitan Development Authority did not provide for FPZ.

A Comptroller and Auditor General report has described Chennai’s 2015 floods as a ‘manmade disaster’. It states that land use plans were not adhered, as a result many water bodies, considered to be flood carriers, have shrunk or have vanished. Between 1979 and 2016, the area under water bodies declined by 9.67 sq km. While the First Master Plan and Second Master Plan projected a total increase in built-up area by 330.58 sq km (33,058 hectare) over the 50-year period between 1976 and 2026, the actual increase in built-up area as worked out using satellite imageries over 37 years between 1979 and 2016 was 450.26 sq km pointing to large-scale illegal constructions.

Research by Delhi-based non-profit Centre for Science and Environment notes the more than 600 healthy water bodies in Chennai in the 1980s have dwindled to just a fraction. The state’s Water Resources Department records that the area of 19 major lakes had shrunk. Even a slightly heavy rainfall could bring back the unpleasant situation of 2015. Consider this: Chennai has only 855 km of stormwater drains against 2,847 km of urban roads. The Pallikarni marshland, 20 km south of Chennai that worked as a flood sink, today doubles as a waste disposal site and houses several residential projects.

Bay of Bengal Rises

Many lakes and canals in Kolkata today are just muck. Quite a few have completely vanished with buildings built on drained land—their sustainability is anybody’s guess. Swanky New Kolkata—a fast-growing planned satellite city—has usurped low-lying fields that once absorbed the runoff water. The rapid extraction of groundwater is also causing the landscape to sink. The Sundarbans, a UNESCO World Heritage Site, thanks to its natural mangrove forest, is fast losing its land as the Bay of Bengal is rising faster than the global average. The displaced people are pouring into Kolkata. They live in neighbourhoods where during monsoons one has to wade through the filthy and stinking

floodwaterwws. Kolkata, however, is working on increasing its green cover; from 290 parks a decade ago, it grew to 600 in 2010.

IT centre in Doldrums

A study led by Prof TV Ramachandra of the Indian Institute of Science, Bengaluru, predicts the death of the Karnataka capital by 2021. A field survey shows that 98 percent of water bodies have been encroached on. There is loss of catchment area, used as dumping yards. A latest field survey shows that nearly 66 percent of its existing lakes are sewage-fed, 14 percent are surrounded by slums and 72 percent show loss of catchment area. Satellite imagery and on-ground studies show built-up area in the Garden City has increased by 525 percent as water bodies and greenery declined by 70 percent. The water table has sunk to 1,000 ft and more.

Concretisation has seen a 925 percent growth since 1970.

Indian cities account for about 18 percent of the shrinking cities in the developing world. The lost city of Atlantis as mentioned by Greek philosopher Plato is an enduring myth and the Holy Grail of archaeologists the world over. Plato suggested the civilisation was destroyed overnight when an earthquake and tsunami struck caused by ecological damage. In 2016, archaeological remains of the washed away city of Dwarka were discovered 120 feet underwater in the Gulf of Cambay. If mankind doesn't step in, abandoning irresponsibility, greed and political connivance to protect these ecosystems, more cities like this are likely to be found by archaeologists millennia later. But for this generation, it will be too late. Inputs by S Sivakumar, Manoj Viswanathan and Gopika IS

pressing Concerns

The Management of Urban Flooding report, published by the National Disaster Management Authority (NDMA), says concretisation is a major problem. According to the Union Ministry of Urban Development, almost 50 percent of the country will be urbanised by 2050. Natural streams and watercourses have been altered to accommodate a growing populace. "As a result, the flow of water has increased. The natural drains should have been widened, but on the contrary, there have been large scale encroachments.

Consequently, the capacity of natural drains has decreased, resulting in flooding," says the report published in 2010. According to the NDMA, urban flooding is significantly different from rural flooding as urbanisation leads to developed catchments, which increases the flood peaks from 1.8 to 8 times and flood volumes by up to six times. Consequently, flooding occurs very quickly due to faster flow times (in a matter of minutes).

preventive measures

Green roofs: These roofs absorb rainwater and help mitigate flooding. The stormwater management tool prevents sewer overflow, neutralises acid rain effect.

Flood plains: There is a movement to restore flood plains because of their significant role in flood protection.

Better sewer system: To improve water management, cities are beginning to separate rainwater from the sewer system. This enables wastewater treatment plants to function properly without being overburdened.

Sponge cities: This concept
is popular in China. “A sponge city is one that can hold, clean, and drain water in a natural way, using an ecological approach,” says Kongjian Yu, the Dean of Peking University’s College of Architecture and Landscape Architecture. Rather than funnelling rainwater away, a sponge city retains it for its own use.

Sustainable drainage: Concrete is not permeable. It does not absorb rainwater, so it should be replaced with permeable materials such as grass and gardens.

Improve warning mechanisms: The earlier the warning arrives and is heeded, the easier it is to tackle the situation and contain overall damage.
Be flood-ready: Despite the best of efforts, a calamity does strike. The only solution is to plan ahead and be prepared for the worst.

what causes Floods

The reduction in water holding capacity of the city’s surface due to loss of green cover

Uncontrolled urban sprawl and loss of natural drainage

Drainage channels have been blocked and urban lakes filled and encroached

Canals degraded and heavily silted

Lack of unified flood control implementing agency

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