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Urban flooding: Act before cars and bikes start floating in streets again

By [Urmi Goswami](#), ET Bureau | Aug 20, 2016, 06.11 AM IST

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Shilpa Srivastava, an upwardly mobile executive, moved into an upscale residential complex in Gurgaon. Beautiful, landscaped and equipped with modern amenities, Srivastava thought she and her family would have the time of their lives.

Then, one July evening, the rains turned her plans of life in a posh gated community into mush. "It doesn't rain a lot here, but the mess is terrible. You are stuck on the road for hours, then you are completely cut off because of the waterlogging. You are used to the idea of floods in rural Bihar, but floods in Gurgaon or Delhi? That is not something one considers," says Srivastava.



During intense or prolonged rainfall, the capacity of natural and built-up drainage is overwhelmed; this is when flooding occurs. Typically, it begins as localised waterlogging. As the rain continues, the water level rises and larger areas are inundated.

Flooding and disruption have become the new normal for the **monsoon** season in **urban** India. Water runoff on paved surfaces is common during rains. Towns and cities have a high proportion of built-up areas, tarmacked and paved surfaces. Paucity of open areas slows the pace at which rainwater percolates to the ground.

SINK CITY

Events	Impact	Economic Losses
Chennai floods (Nov-Dec 2015) Complete disruption of life. Some 18 lakh people displaced, nearly 1,000 persons died. Suburban train services crippled, flights cancelled and diverted. Estimated loss between ₹50,000 crore to ₹100,000 crore		
Srinagar (Sep 2014) 215 people died, 2,600 villages affected, 390 villages submerged Infrastructure damage exceeding ₹6,000 crore. Crop loss.		
Hyderabad (Aug 2008) Disruption of normal life, 14 people died, 52 residential areas in and around the city inundated due to overflowing in 20 tanks and major storm water drain		
Kolkata (2007) Estimated 15 million people affected, 800 feared dead Damage to Infrastructure, houses, crops and livestock estimated at \$680 million		
	Surat (2006) Diamond industry forced to come to a standstill. 22 towns/cities affected. Surat worst affected—six of the seven wards in the city inundated. Uninsured loss at \$2 billion	
	Vishakhapatnam (2006) Airport inundated for 10 days	
	Bhopal (Aug 2006) Low-lying houses inundated Loss: ₹85 crore	
	Mumbai (July 2005) 419 people dead. Total collapse of transport and communication systems. Suburban trains could not operate for 36 hours. Loss: ₹450 crore	
	Bharauch (Aug 2004) Highways in the district blocked off due to heavy waterlogging and floods. Totally cut off. Communication and power supply cut off in many areas. Loss: ₹10 crore	

Source: Rafiq et al, Urban Floods IN India

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MORE URBAN FLOODS

Waterlogging during rains is part of the urban experience. However, in the past decade, there has been an increase in urban flood events across the world. Scientists and urban planners say that climate change and increased urbanisation are contributing factors. And that the incidence and intensity of urban floods will escalate.

Climate scientists say that global warming has altered rainfall patterns; that, along with melting glaciers and rising sea levels, has increased the risk of urban floods. Scientists in India have found a growing trend of intense rainfall in short durations. Given the unplanned development and poorly maintained drainage systems, the increased intensity of rain results in higher chances of urban floods in India.

But fixing its existing drainage systems will not be enough. India is projected to urbanise rapidly. At the projected compounded annual growth rate of 2.1%, almost 600 million people and a large proportion of assets will be located in urban centres by 2031.

In their paper in the International Journal of Scientific & Engineering Research, Farhat Rafiq and Sirajuddin Ahmed of Jamia Milia Islamia in New Delhi, Shamsad Ahmad of King Abdulaziz University in Saudi Arabia and Amir Ali Khan of the National Institute of Disaster Management stressed on addressing unplanned development of buildings and infrastructure and poor management of urban drainage - warning that increased urbanisation would raise the risk of floods "by up to three times."

SINS OF THE PAST AND PRESENT

Urban planners say haphazard construction, with little regard for natural drainage patterns and topography, and the near-total absence of soft areas (not concretised) have contributed to making Indian cities veritable nightmares. The practice of reclaiming wetlands for development, choking avenues of natural drainage, made things worse.

"There is a growing realisation that reclaiming wetlands for urban development is not desirable," says Raina Singh, Fellow, Centre for Research on Sustainable Urban Development and Transport Systems at the New Delhi-based think tank The [Energy](#) and Resources

Institute.

This is reflected in the Chennai Corporation's efforts to restore the city's buffer zones. "Extensive efforts for restoration have been undertaken over the last few years. But rebuilding a wetland takes way longer than destroying it. The good news is that urban planners are beginning to understand the importance of wetlands," says Singh.

Guwahati and Panjim are making similar efforts. The appreciation, however, is not universal. The Supreme Court recently had to order builders in Bengaluru to push back their projects from the city's lakes and wetlands. Poor drainage makes matters worse.

"The drainage infrastructure doesn't have adequate capacities. These were developed some 30 or 40 years ago for much lower levels of rainfall," explains Singh.

It's not just inadequate capacity. Manit Rastogi, who heads the architecture and urban design practice Morphogenesis, says the problem is compounded by poor planning, maintenance and misuse. Rastogi says that since Delhi gets intermittent rains, the city's drains are not cleaned all year round, which is why they are choked. When desilted, the waste is rarely disposed of properly and is often kept along the drain and in time, it ends up back in there.

He said the drain network also carries sewage. Additionally, in many places, the drains have been blocked off or built over.

"There is no plan for groundwater percolation. Say the water cannot flow through the drains effectively, the next best thing is for it to seep through the ground. This does not happen either as much of our land is paved over or built upon," says Rastogi. Singh, too, points to a compromised drainage network: houses building ramps over drains, roads built by cutting off drains and drains clogged with solid waste - making the already inadequate infrastructure even less effective and resulting in massive flooding, like in Gurgaon, Mumbai and Bengaluru.

PLANNING FOR FLOODS

Efforts at reducing urban floods must begin with the planning process. Authorities must conduct vulnerability assessments, demarcate no-development areas, build urban drainage infrastructure in sync with natural drainage patterns and allow for redundancies.

To fix existing conditions in the cities, Singh suggests retrofitting. Providing porous pavements to allow infiltration of water and large tanks to store rainwater.

"There is no single solution. The main cause for flooding in every area is different. Each area needs to be analysed in order to adopt the most effective and optimum retrofitting measure," says Singh. Alternatives, too, need to be explored.

"Our current approach of connecting local drains to larger networks that in turn empty into our rivers is ineffective as conditions currently stand. A far more practical solution would be to short-circuit the drains to local parks that can incorporate bioswales and aquifers, which will effect groundwater percolation very well. It will also have a greater impact on improving the groundwater table," says Rastogi.

MORE THAN DRAINS

"Authorities say that things will improve. Will it?" asks Srivastava.

A sustainable solution will require more than planning and technical intervention. It requires stakeholders to work together - urban centres are administered in silos.

"There are design and technical interventions that have been proposed, but these are rendered meaningless when there is no single cohesive entity to ensure these are deployed and used in an effective manner. The real problem in most of our urban centres is how you deal with the multiplicity of governance structures when tackling a problem that requires a cohesive approach," says Rastogi.


The lack of cohesion means that every authority approaches the problem from its own perspective and often works at odds with other stakeholders. The result: an urban mess.

A plan to overhaul India's towns and cities will require tackling multiple ownership of land, which is a hurdle to implementing a cohesive vision of an urban centre.

"We need to start looking at our new smart cities through the lens of urban design as against one of master planning. The land-use concept that underpins our urban centres is that land is divided into multiple ownerships—private and public. What an effective urban plan requires is that the horizontal plane is all owned by the state - that is roads, pavements and city centres - while the vertical plane - that is built volumes - can have private/mixed ownership.

It means fewer barriers and better-managed infrastructure as a result," says Rastogi.

Not addressing these fundamental issues will mean continuing to tinker around the edges and the next heavy downpour could well turn our towns and cities into mush.

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