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URBAN FLOODING

A Youth4Water Plus Factsheet

Flooding, a natural catastrophe, occurs when water from rivers or lakes inundates dry areas due to factors like heavy rain, cyclones, or infrastructure failures. It leads to severe consequences, including fatalities, displacement, property damage, diseases, and disrupted services. Urban flooding, India's major recurring crisis, inflicts substantial economic losses.

URBAN FLOODING AS A CHALLENGE FOR THE NATION.

Urban flooding refers to flooded rivers and water bodies or flood like situation created due to excessive accumulation of rainwater runoff in urban areas. With increasing concentration of population, industry and public investments in cities and towns, urban flooding is becoming a major area of concern.



Figure 1: Recent floods in Delhi inundated crucial business areas, inter-city transport hub, University and even the iconic Red Fort. in Delhi. Just halfway through monsoon 2023 economic loss due to torrential rain in North India already pegged at 10-15000 crore.



Figure 2: A typical scene after a heavy downpour in Mumbai. Low-lying places are particularly vulnerable, including Dadar, Parel, and regions close to the Mithi River



Figure 3: Scene in Bhubaneswar after heavy rainfall caused by low pressure area over Bay of Bengal. The state's biggest cities, including the capital Bhubaneswar, Boudh, Cuttack, Jagatsinghpur, Kendrapara, Khurda, Puri (most affected), Sambalpur, Subarnapur, and Jagatsinghpur (most affected), frequently experience urban flooding.

REASONS FOR URBAN FLOODING

Across the country, all cities and towns, including big cities like Delhi, Mumbai, Chennai, Kolkata, Bengaluru, Ahmedabad, Guwahati, Hyderabad and Patna, experience urban flooding. For land locked cities like Hyderabad, Bengaluru, Bhubaneswar and Chennai, excessive rainwater runoff is the main cause. In coastal and river bank cities, the flooding is both because of flooded rivers and waterlogging caused by rainwater runoff.

Urban flooding is largely a man-made phenomenon. Typical causes are:

1

Water Insensitive Habitation Planning

Within the country, urban planners often overlook preparing for monsoon water flow. This leads to construction on natural drainage paths, developing low-lying zones, and creating flood-prone underpasses and tunnels.

2

Unplanned development

Unplanned urban growth and economic attractiveness draw populations beyond projections. This results in trespassing onto open lands, hindering water flow. Residents' unmanaged waste further blocks drainage, coating porous surfaces with plastic and impeding water absorption.

3

Deforestation, disappearing green spaces

Urban areas consist of concrete jungles hindering rainwater absorption. Rain hitting roads or buildings results in 80% runoff, while green spaces absorb 80%.

4

Purely decorative greens

Green spaces in most cities are developed with aesthetics in mind rather than as water absorption sinks. They are often above ground level, surrounded by walls thus preventing runoff from surrounding areas from entering and being absorbed by the earth.

5

Poorly planned and managed drainage

Drainage systems have been planned for a carrying capacity lesser than peak runoff requirements. The drains are not desilted regularly, are broken and encroached at several places and slopes are mostly not aligned.

6

Negligence in implementing flood control measures

Disaster management plans are made, advisories issued, but mostly ignored.

7



CHALLENGES FOR ODISHA

On India's east coast, the state of Odisha having 420 Km of coastline, large rivers and a heavy monsoon, is one of the most vulnerable towards floods. Some of Odisha's flood-prone areas are as follows:

- 1 Mahanadi River Basin:** The Mahanadi River is Odisha's major river, and it plays an important part in the state's water resources. Floods are common in its river basin districts of Cuttack, Puri, Kendrapara, Jagatsinghpur, and Nayagarh.
- 2 Brahmani River Basin:** The Brahmani River flows through various districts in Odisha, including Sundargarh, Dhenkanal, Angul, and Jajpur. These areas are prone to flooding, especially during the monsoon season.
- 3 Baitarani River Basin:** This includes the districts of Keonjhar, Jajpur, Bhadrak, and Balasore. These locations are prone to flooding, particularly when there is heavy rain or cyclonic activity in the vicinity.
- 4 Subarnarekha River Basin:** The Subarnarekha River flows through the districts of Mayurbhanj and Balasore, forming the border between Odisha and Jharkhand. These places are prone to flooding, especially during the monsoon season.
- 5 Rushikulya River Basin:** The Rushikulya River runs through Odisha's Ganjam district. While not as well-known as the Mahanadi or Brahmani rivers, the Rushikulya River and its environs can flood during heavy rains.



NATURAL SOLUTIONS TO PREVENT URBAN FLOODING:



Green Spaces and Parks:

Increase the number of green spaces and parks in urban areas. Align them with the surrounding catchment so that these areas can absorb rainwater and reduce runoff.

Figure 4: A Delhi park with RainGarden. A green area absorbs 70% runoff. A specially designed RainGarden can absorb more than 95%

Permeable Pavement:

Install permeable or porous pavements that allow rainwater to infiltrate the ground instead of accumulating on the surface. This helps reduce runoff and allows water to recharge groundwater.

Figure 5: The underlying sand absorbs rainwater and the grass that grows naturally slows down the speed of runoff and makes absorption easier



Wetlands and Natural Drainage Systems:

Preserve or create wetlands and natural drainage systems that can store excess water during heavy rainfall and slowly release it over time, reducing the risk of flooding downstream.

Figure 6: Chilika Lake Wetland absorbs excess runoff, removes pollutants and creates a rich biodiversity

Reforestation, Plantation:

Promote and expand tree planting and reforestation efforts in urban areas. Trees help absorb rainwater, reduce soil erosion, and increase water infiltration. In Odisha, Bamboo plantation, can be specially useful because it also has high commercial value.

Figure 7: Bamboo is a nationalised product in Odisha since 1988



Rainwater Harvesting:

Encourage rainwater harvesting systems in buildings and public spaces. Collecting rainwater for later use or for groundwater recharge can alleviate pressure on drainage systems during heavy rain events.

Figure 8: Rainwater Harvesting simply means - Catch and store water, where it falls, when it falls

MAN-MADE SOLUTIONS:



- ▶ **Improved Drainage Infrastructure:** Upgrade and maintain the existing drainage systems, including pipes, culverts, and stormwater drains. Ensure regular cleaning and desilting to prevent blockages and increase their capacity.
- ▶ **Flood Control Channels and Retention Ponds:** Construct flood control channels and retention ponds to divert excess water away from urban areas. These structures can temporarily store water during heavy rain events and release it gradually.
- ▶ **Stormwater Management Systems:** Implement effective stormwater management systems, including detention basins, infiltration trenches, and swales. These systems help manage and slow down stormwater runoff, reducing the risk of flooding.
- ▶ **Flood Barriers and Floodwalls:** Build flood barriers and floodwalls in vulnerable areas to protect against rising water levels. These structures can be designed to withstand floods and redirect water away from urban areas.
- ▶ **Urban Planning and Zoning:** Incorporate flood-resilient urban planning and zoning practices. Avoid construction in flood-prone areas and enforce regulations that promote sustainable drainage systems and flood-resistant building designs.

CREATIVE SOLUTIONS:



Sponge Cities:

Implement the concept of "sponge cities" that focuses on maximizing water absorption and retention. This involves integrating water-absorbing materials and features such as green roofs, rain gardens, and permeable surfaces throughout the city.

Figure 9: An emerging concept, Sponge Cities effectively realize a benign water cycle within cities by absorbing, storing, infiltrating, and purifying rainwater resources



Vertical Gardens:

Install vertical gardens on building facades and walls. These gardens not only enhance the aesthetics of urban areas but also help absorb rainwater and reduce runoff.

Figure 10: A building with vertical gardens

Floating Infrastructure:

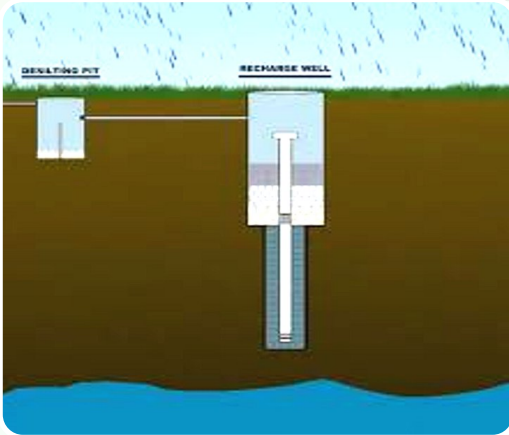
Construct floating infrastructure such as floating parks, walkways, and buildings in flood-prone areas. These structures rise and fall with water levels, minimizing the impact of flooding.

Figure 11: Floating walkways will adjust to changes in water level and so prevent disruption in vital supplies during floods



Water-Permeable Art Installations:

Create public art installations that also function as water-permeable structures. For example, artistic pavement designs or sculptures with porous materials can help absorb water during rainfall.



Aquifer Recharge Wells:

Build aquifer recharge wells that recharge groundwater by directing excess rainwater into underground storage. This helps replenish water sources and reduces the risk of surface flooding.

Figure 12: Use surplus rainwater runoff to recharge your groundwater

Green Roofs with Rainwater Harvesting:

Combine green roofs with rainwater harvesting systems. The green roofs absorb rainwater while the harvested water can be used for various purposes, reducing the load on drainage systems.

Urban Flooding is a problem that all cities need to plan for. Its root cause is simply natural water flow that finds its way blocked and so accumulates to fill spaces not designed to accommodate it. If we respect water's seasonal need for space, plan our homes and cities to allow safe passage or safe storage of water, urban flooding will cease to be problem.

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500000+ youths are connected through social media to amplify the voices of youth.



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