JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

MUMBAI CASTROPHES ON 26 JULY 2005

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Abstract: The study has been undertaken to investigate the cause of flood in Mumbai city which brought the metropolitan to its knees for 48 hours. Will be discussing about public interaction on flood with natural drains, transport and open spaces. We conclude that managing flood-risk effectively in the scope of Mumbai can help reduce economic loss as well as the loss of lives and property. The benefits of steps we take today will be realized in the future.

Keywords **– Flood, Mumbai, Drainage, Open spaces, Natural drains.**

1. INTRODUCTION

On July 26, 2005, a cloudburst brought the Mumbai metropolitan region to its knees. 840 millimeters of rain in a 24-hour period flooded many parts of the city, and less, but still heavy rain in the days after, preventing a quick recovery, took a huge toll.

There was no systematic assessment of losses, but a reasonable estimate indicates that the calamity claimed at least 450 lives during the storm and another 248 afterward; another 300,000 residents required medical treatment. 20,000 automobiles, 2500 BEST buses, and an uncountable number of two- and three-wheelers were also damaged. Around 200,000 tonnes of waste had to be removed, including washed-away or water-soaked furniture, groceries, and appliances. In addition, 24 metric tonnes of bleaching powder and two metric tonnes of disinfectant were utilized to avert an outbreak of monsoon-related infections.

The cloudburst was a rare occurrence, with a severity larger than the city has witnessed since formal records were kept. It did, however, show the city's unchecked development. It also highlighted that our city authority was woefully unprepared to deal with a disaster. Following the floods, an experienced fact-finding team was formed to review Mumbai's disaster preparedness and handling. In 2006, a thorough study was released to act as a guidebook for the municipal corporation. It had a significant impact on the development of the 2009 national guidelines for urban flood control.

Potholes, overflowing sewers, and flooding in Mumbai are expressions of a bigger underlying planning fault. Mumbai has used planning to regulate development for over five decades, from 1967. This strategy is now in its third instalment. Its primary duty is to adapt to the city's current state with adequate foresight to steer development, safety, and progress over the next 20 years.

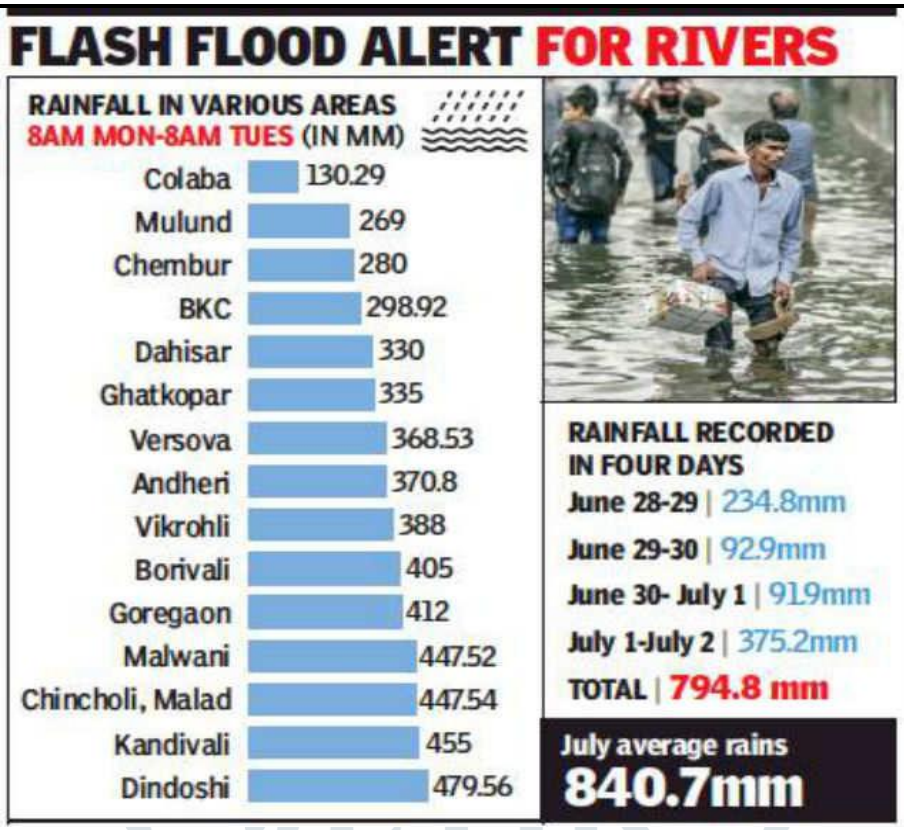

Table – Rainfall in various areas of Mumbai.

2. STUDY AREA

Mumbai is situated on Shasti Island, off India's western coast, at the entrance of the Ulhas River. The city's shoreline is indented with various bays and tidal streams. Except for the northern mountainous region of the city, which has a peak height of 450 m, much of Mumbai lies near to sea level, with an average height of around 8 m. The city covers an area of approximately 468 km2. The eastern section of Shasti Island is densely forested with mangrove marshes. Sanjay Gandhi National Park, around 40 kilometres north of Mumbai, protects roughly 104 square kilometres of forest.

Mumbai has a tropical climate that has two distinct seasons: wet (southwest monsoon) and dry (northeast monsoon). High humidity and maximum daily temperatures of more than 30°C define the rainy season (June-September). The city receives 2401 mm of rainfall on average every year, with more than 95 percent of it falling even during southwest monsoon during June and September.

During the dry season (November-February), Mumbai has moderate humidity and mild to cold temperatures. During January and February, northerly breezes offer a little cold, with daily lows about 17°C.

3. THE HEAVY RAIN OF 26 JULY 2005

Rainfall reported at the Santa Cruz station for rain gauges on July 26th, 2005 was exceptional, and its hourly strength was similarly uncommon, lasting an unbroken 7 hours. In the 7 hours between 2.30 p.m. and 9.30 p.m., the hourly intensity of rainfall recorded at the station was 100.2, 190.3, 90.3, 100.4, 95.0, 72.2, and 60.2mm. Sadly, the high tide of 4.48m happened at 3.30 p.m., and the Sea rejected any rain water flow. As a result, backwater accumulated and floods occurred.

In general, Mumbai's road and railway systems are built at a level that may flood twice or three times in a regular year. On July 26th, the majority of the length of these networks was inundated. All four key routes, namely the Eastern and Western Express Highways, the S.V. Road, and the L.B.S. Road, were under water for a significant amount of time and finally became operational in the evening of July 27, 2005. Though the rainfall intensity on the island city was not particularly high, chronic flooding areas such as Lalbaug, Parel, Tardeo, Dadar TT, King Circle, Hindmata, and others faced flooding. When the water level reaches the tracks, the railway electronic signalling system stops working, and trains are instructed to slow

down to a crawling pace of 15km/h. When the water level rises to 10 cm above the rail top level, all train movements are halted. This occurred about 3.30 p.m. on that day, coinciding with the onrush of commuters racing back to their homes. As a result, there was an unprecedented crowding at railway stations.

The main electricity supply was turned off due to floods and the risk of electrocution. At the same time, the generators and standby power system were inoperable after being flooded. The failure of the communication system added to the turmoil because nobody knew what was going on. Because the television system fell down, even essential messages were unable to be broadcast to the public. As an option to the train, 500 more buses were dispatched to remove the crowd. They, too, suffered a similar fate when they were unable to reach their destinations due to the obstruction on major highways caused by broken down and dumped automobiles. Even rescue activities were impeded since rescue trucks were unable to approach the victims.

4. PUBLIC INTERACTION ON FLOOD

Natural drains

It is also critical that we examine the streams, riverbeds, and storm drains that environment has provided for us. Riverbeds are naturally seasonal, drying up during the monsoon. Mumbai, like the rest of Konkan, features natural streams and riverbeds. Or, more accurately, had a riverbed. They are now permanently stinking gutters transporting black saturated solution into the Arabian Sea. Aside from slums having open gutters carrying garbage into the riverbed, companies pipe their polluted effluents straight into them. There are also areas where sewage lines flow into natural storm-water drains. All of these contribute silt to the riverbed, and shallower riverbeds have less ability to absorb and discharge storm water flows.

• To restore their natural function, our city must do several things. Slum residents need their basic civic amenities; their waste must be treated and disposed of hygienically.
• Industries polluting these streams must be dealt with strictly and permanently.
• We, the citizens of Mumbai, can help too. We must stop dumping our garbage into storm drains.

Transport

Over 90% of the population makes use of the pedestrian paths and public transit. The suburb local trains convey 22 lakh passengers during peak hours. Every year, the rains arrive, and trains become clogged with water and suffering electrical outages, forcing passengers onto the highways. Which are jam-packed with private automobiles, with many more parked — and double-parked — on both sides of the roadway.

In this scenario, we see plans for... additional roadways for private automobiles! Following the Sea Connection and the Eastern Expressway, there are now proposals for further large-scale infrastructure projects, such as the Coastal Road.

• What the DP needs to do is pay more heed to upgrading existing pedestrian networks and public transport for the next 20 years.
• We also badly need to strengthen norms and pricing policies for parking.

Open spaces

Actual open space designated per individual in the RDDP to be attained by 2034, including leisure grounds and parks, is 2.8 square metres per person. This is somewhat more than one-fourth of the national Urban and Regional Development Planning Formulation and Implementation Guidelines established by the Ministry of Urban Development.

The RDDP also recommends creating No-Development Zones (NDZs) and building highways across mangroves as well as other natural areas. This is notwithstanding a recent High Court of Bombay admonition to the State administration for requesting that an existing order prohibiting construction on wetlands be modified..

Similarly, ideas such as encouraging the building of recreation grounds on open-to-sky podiums of building structures and incorporating these as open spaces, or allowing underground parking lots beneath gardens and playgrounds appear appealing at first glance: such plans appear to add large swaths of green to the city. However, they contradict a 2013 Supreme Court ruling on urban form. We must keep in mind that these "green" patches are located on impervious concrete surfaces.

5. CONCLUSION

The record day downpour of 944 mm on July 26, 2005, crippled Mumbai, causing great human misery and economic devastation. This research indicates so both physical and human elements contributed to the event's escalation. The city's drainage infrastructure was rapidly overwhelmed by the record rain. Due to the city's failure to appropriately prepare for and adapt to its expansion as a major metropolitan area, this infrastructure was incapable of handling the level of runoff. As such, this occurrence falls under the human ecological model of Gilbert White's hazard-based approach. However, it is worth noting that the government's proposed mitigation efforts are largely structural in nature.

- Shift from conventional / reactive approach to strategic approach
- Step up structural measures such as gates on Vihar and Tulsi lakes, holding ponds upstream of airport on Mithi river, augmentation of railway culverts
- Contour mapping of city required for better storm-water management
- Upgrade flood warning and forecasting measures to “nowcasting”. Network of Doppler Weather Radars to be put in place
- Restoration of existing water bodies, natural drainage, resettle the encroachment, enforcement of rain water harvesting etc. to moderate the discharge.
- Create public awareness about warnings, teach people how to react and ensure self-help grooming; collaborate with NGOs
- “Flood insurance” products have to be encouraged to cover partial loss to business.
- Sustainable and meticulously planned growth is key. Expert reports prepared for future planning
- In India - post 2005 Mumbai floods - disaster management bill passed, policy is emerging
- Political action is necessary. Regular monitoring by political executive became order of the day
- Informed, trained bureaucrats can offer co-ordinated response. Regular interaction with experts in training and research institutions
- Effective communication is key. It can make or break the response measures
- Disaster response has to be ‘people centric’. People with strong civic sense and resilience make all the difference
- Local committees trained in facilitating self help foster the government initiatives
- Empowered communities respond better

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