Disaster Management through River Management: A case Study of Meethi River in Mumbai

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ABSTRACT

Developing societies are undergoing the mass urbanization in the late 20th century. As a result, rivers, which constitute major water resource for the urban society, are disturbed by various developmental projects. Because of this uncontrolled urbanization, disasters like recurrent floods continue to visit the metro cities. Consequently, the management of river is an urgent need and immediate priority of the 21st century urbanized world.

This paper focuses on the disaster of floods in the mega city like Mumbai and the management and better administration of its river system. This is a case study of Meethi river management in the background of floods caused by its swelling waters that wreaked havoc on Mumbai city on 26th July 2005. Following heavy rainfall, nearly 12 feet column of waters from Meethi River left the better parts of Mumbai submerged. The flash flood claimed around 419 lives and 216 died of consequent illnesses. Damage to public and private property had been colossal.

The paper elaborates the need for disaster management for Mumbai city, which, given its huge population and high structural density, is dangerously perched in an active seismological zone.

Improvement in the 'storm water drainage' system in Mumbai is the immediate requirement for disaster management. The paper refers to the causes of flooding and major recommendations delineated in the BRIMSTOWAD report.

The paper takes up the concern that unplanned and uncontrolled development projects are the major reason for flood disasters. Lack of planning, administrative failure and limitations of laws and management are what cause the massive flooding resulting in huge material as well as human loss. Need of social awareness and administrative promptness with proper implementation of policies is needed to avoid disasters.

This paper is based on the data provided by the government offices, research projects, various agencies, and reports of the committees appointed by the government as well as literature provided or published by the various NGOs. It also relies on NDMA presentation, a micro level study conducted by School of Planning and Architecture, New Delhi entitled 'Disaster Management and Mitigation for mega cities-Mumbai'. Presentation by Dr. Jairaj Phatak, Ex-Commissioner, Municipal Corporation of Greater Mumbai entitled, Management of Urban Floods Mumbai has also been referred to. The literature related to the topic river management and disaster management is the baseline of the paper.

The questions raised in the paper are:

- Can the proper management of river system be helpful in avoiding flood disaster in future?
- What type of administration as well as management is useful as a disaster management strategy in the developing society? The paper relies on use of analytical methods to explore the problem.

At the end of the paper some suggestions have been made relating to infrastructure improvement, better communication and public information systems and efficient land use policies and planning.

Introduction:

The Asia Pacific region is becoming increasingly vulnerable to a rising ferocity and frequency of disasters of many types, including floods. During the past decade, on average, more than 200 million people were affected and more than 70,000 people were killed by

natural disasters annually. With unsustainable changes being made in patterns of land use, catchment and coastal zones, increasing density of population and concrete structures occupying high-risk areas over mountains, migration patterns, consumer culture even in wilderness virgin ecosystem zones , the impact of disasters has increased manifold.

In India flood is most dangerous and frequent disaster has been facing by Indian urban and rural society. This is a case study of Meethi river management in the background of floods caused by its swelling waters that wreaked havoc on Mumbai city on 26th July 2005.

Experience of flood situation in Mumbai:

On 26 July 2005, around 2:00 p.m. the Mumbai Metropolitan Region was struck with a heavy storm. The Indian Meteorological Department (IMD) station in Santacruz had recorded a record 944 mm. of rain for the 24 hours ended at 08:30 a.m. on 27 July. The heavy rain and water logging in suburban areas, water logging and submergence of certain low lying pockets of the region such as Dharavi, Bandra-Kurla Complex, Chunabhatti, Chembur, Ghatkopar, Milan Subway and Sion either slowed down traffic, or in some areas, brought it to a grinding halt. The situation worsened when the cellphone networks went down around. Adding to the chaos was the lack of public information. Radio stations and many television stations did not receive any weather warnings or alerts by the civic agencies.

The Powai Lake had started overflowing at 4 p.m. and discharged 5.95 million cubic meters of water into the Mithi River. The rainfall hydrographs of 26 & 27 July later revealed that two flood waves were generated in the streams and river basins of Mumbai, the result was that the flood situation kept on aggravating throughout the night. There was some relief in sight only when the second ebb period commenced at 6 p.m. on 28 July.

Following heavy rainfall, nearly 12 feet column of waters from Meethi River left the better parts of Mumbai submerged. The flash flood claimed around 419 lives and 216 died of consequent illnesses. Damage to public and private property had been colossal. ***(Maharashtra floods of 2005)***

History:

Mumbai city receives seasonal rainfall for four months, from June to September. Average rainfall is 2500 mm, of which 70 per cent is during July and August. Mumbai is lined on the west by Arabian Sea and is intercepted by number of creeks (Mahim, Mahul and Thane creeks), rivers (Mithi, Dahisa, Poisar and Oshiwara rivers, and their tributaries) and a complex nallah (drain) system. The Storm Water Drainage (SWD) system of Mumbai comprises a hierarchical network of roadside surface drains, underground drains and major and minor channels and 186 outfalls, which discharge all the surface runoff into rivers and the Arabian Sea. ***(CWPRS, 2006)***

Topography and Importance of the Mithi River

The Mithi River in Mumbai city is a confluence of tail water discharges of Powai and Vihar lakes. Originating at Powai, Mithi River flows through Saki Naka, Safed Pool, around Santacruz airstrip, passing through thickly populated and industrial areas like Jarimari, Bail Bazar, old airport road, Kalina (CST road), Vakola, Bandra-Kurla complex, Dharavi and meets the Arabian Sea at Mahim creek with a total length of about 17.84km and a catchment area of 7,295 ha. It serves a dual purpose of a sewer for the area carrying sewage as well as storm water to sea. The river bed is narrow in the initial stretch but it increases downstream. The present average depth of the river at the centerline is only 5.5 m.

The location of the Mithi river is an important administrative boundary that divides the City and the Suburbs. Flooding in the river has direct or indirect implications for disrupting traffic on five transport corridors; Central Railway Main Line, Central Railway

Harbor Line, Western Railway Line, Western Express Highway, and Eastern Express Highway.

Significance of the Problem in terms of City's Hazards cape:

The core of the present SWD system in city is about70 year old, comprising of underground drains and laterals built on the basis of population and weather conditions that existed at that time. The old SWD system is capable of handling rain intensity of 25mm per hour at low tide. If the rain intensity is more than 25 mm per hour and high tide occurs, there is always a possibility of water logging in some parts of the city. Since the discharge of all the storm water and treated sewage is into the Arabian Sea, tidal variation has a major bearing in the system of storm water drainage (SWD) resulting in flooding and water logging during heavy rains and recession of water during low tide. ***(NIRI Report 2011)***

Meethi River Management in Mumbai: Reviews of Various Studies:

The Mumbai city faces flood situation over three times in its history (1974, 1985 and 2005). In order to rejuvenate the river, various committees have been formed and requested to study the situation and suggest recommendations.

- Natu Committee Report (1974)
- Dharavi Storm water Drainage System Report by Shah Technical Consultants, Mumbai(1988)
- BRIMSTOWARD project: MGCM Master plan for Greater Bombay Storm Drainage and Sewer Rehabilitation for Mithi catchment by M/s Watso Hawksley International Ltd and Associated Industrial Consultants (India) Pvt. Ltd. (1993)
- NEERI's report on Mithi River flood prone areas and assessment (2004)
- Report by IIT-Bombay(2005)
- Report of CWPRS, Pune: 1-D Mathematical Model and Desk Studies for mitigating floods of the Mithi River (2006)
- Chitale Committee's Fact Finding Report for July 2005 flood of Mithi river (2006)

The recommendations made earlier in various reports (more than 10 years old) need to be looked at carefully as the ground situation of Mithi River has changed significantly due to large scale development and overall degradation of environmental infrastructure deterioration. Recent reports by CWPRS, IIT Bombay, Chitale Committee, MPCB have provided variable sand at times conflicting recommendations. For example, the recommendations on width, provision of sluice gates, deepening, holding / buffer area, retaining wall etc. are leading to confusion about what is the final vision of Mithi River rejuvenation. The widening and deepening has resulted in some minor improvement, especially due to better movement of tidal water.

The major areas of concern which have still not / fully resolved are: Inputs of untreated sewage, Inputs of untreated industrial wastewater, Garbage from residential and industrial activities, River bank protection and Widening and deepening of river bed.

The partial implementation of different committee's recommendations, the clarity on river rejuvenation plan is lost. Therefore, there is a need to undertake fresh assessment of various aspects of implementation such as: The status of river width, Status of river depth including sediment depth, River flow characteristics along the channel, Effect of retaining wall, wherever constructed on mangroves or other features, Water and sediment quality within the river stretch as well as sources discharging into the river.

Even after many years after the 2005 flood, the measures implemented have not led to apparent improvement as desired. Some of the recommendations will take long time to get implemented or may not get implemented due to social, administrative or other factors.

Development of Action Plan for Environmental Improvement of Mithi River and along its banks (2006) by Indian Institute of Technology (IIT), Bombay:

Report includes assessment of all environmental aspects for 200 m stretch on either side of Mithi river and development of action plan for improvement of Mithi river along its bank. , encroachments on river course and banks need immediate removal, remove all hutments in two phases, provide properly engineered storm water drains, stop dumping and discarding of solid waste along the river, municipal Corporation should review solid waste collection and disposal within 500 m on either side.

Development and Protection Plan of Mithi River and its Surroundings (2006) by MRDPA

The report summaries the status of the Mithi river and Vakola nala in terms of pollution load, legal aspects, implementation plans suggested, public awareness, infrastructural facilities like water supply, sewerage, SWD, solid waste management etc. and ecological aspects. Chapter 10 covers Observations and Recommendations. It recommended that banks of Mithi river, Vakola nala and all tributaries including the areas around Vihar and Powai lakes should be immediately declared as "ECOZONE".

Most of the key reasons for flooding apart from tidal variations, flat gradients downstream of Mithi river, and mud flats (in the eastern catchments, which cause excessive siltation), are the inappropriate levels of manmade outfalls, poor placement of drainage channels, loss of holding ponds due to land development over the years, increase in runoff coefficient due to widespread development and paving of open areas, dilapidated drains encroachments on drains, enhanced silting and choking of drains due to sewage inflows and garbage dumping in drains, obstruction due to crossing utility lines, poor structural conditions, etc.

Improvement Options Considered by MMRDA:

After the floods in Mumbai on 26 July 2005, Government of Maharashtra had established "Mithi River Development and Protection Authority" (MRDPA) for protection and development of Mithi river. The empowered committee was formed by this authority to review the status of river and to check the feasibility of all the recommendations stipulated by various institutions for development and improvement of Mithi river situation.

After the 4th meeting, held on 20th April, 2007 - Municipal Commissioner, MCGM informed that Mithi river is to be widened by considering there commendation of Chitale Committee. There are many difficulties in implementing recommendations of CPWRS as it involves relocation of authorized industrial and residential structures. He also opined that further widening is not necessary.

Though various institutions provide basic recommendations for improvement of Mithi river status it is not possible to implement all these recommendation because of financial and technical constraints as well as intervention from illegal or unauthorized encroachment, industrial establishment, involvement and interest of political parties etc. Therefore, the river environment throughout its entire stretch and along the bank still remains unchanged.

Shortcomings and administration failures:

The flood caused the natural aggravation as well as man made mistakes which are reflecting in the disaster.

1. Multiplicity of Agencies- Involvement of Multiple agencies for carrying out same functions and lack of co-ordination for diverse functions
2. Lack of Community Participation- Lack of community participation in managing disaster risks.
3. Low level of awareness- Low level of awareness of impacts of river ecology and environmental

4. hazards. *(Kavas Kapadia 2011)*
5. Lack of political and administrators will
6. Absence of seriousness and or casual attitude of officers
7. Vote bank politics

Conclusion:

After the July 2005 floods, the Brihan mumbai Municipal Corporation (BMC) publicly declared its intent to rid the city of flooding, one step at a time. Several projects were announced, including the revival of the ambitious Brimstowad project for a complete overhaul of the city's drain network and proposal for eight pumping stations to pump out flood water. Seven years later, only two pumping stations are ready, and only 15 of 58 Brimstowad projects are complete. These, among other long-term measures for a permanent solution to flooding, have been brazenly ignored, but the civic body continues to spend crores every year for desilting nullahs.

The civic body's approach to flood relief has been myopic – while it stepped up several short-term measures, such as upgrading its disaster management cell, installing dewatering pumps at flood-prone spots and setting up a monsoon website to guide citizens about traffic and water logging situation during rains, among others, the same urgency was not shown for the bigger picture. Experts insist the BMC should have focused on a permanent solution. "The approach was to boost the disaster-control mechanisms and flood-control measures instead of flood prevention. There needs to be a sustained effort to speed up long-term projects.

Proper management of river system might be helpful in avoiding disaster of flood in future. Participatory governance rather than hierarchical structure of administrative systems is useful as a disaster management strategy in the developing society

Suggestions:

To overcome above mistakes we should recommend some administrative and governance related remedies.

All the concepts that underpin the urban flood risk management framework are based on participatory principles. Traditionally, flood control has been driven by top-down decision making. Following the hierarchical structure of administrative systems, flood control measures are planned without the participation of the affected communities and other stakeholders. In many cases, this results in unsustainable measures which don't meet the needs of relevant stakeholders. In more severe cases, exclusive top-down decision making can even lead to serious conflicts.

These shortcomings can be overcome by establishing participatory planning process as a basic principle in urban flood risk management. In this context, decision-making is understood as a combination of top-down and bottom-up approaches which enables the involvement of all stakeholders on the basis of equity. The process where the aspirations, concerns, capabilities and participation from local households to communities to local authorities to district and national institutions are adequately included in an iterative manner.

In order to ensure that all stakeholders have a possibility to be involved at some level of the decision making process, it is crucial for the success of the participation process to carefully identify stakeholders. This has to bed one in an inclusive manner in order to prevent potential conflicts which may result from the exclusion of relevant stakeholders. In urban flood risk management relevant stakeholders may comprise: The responsible municipal authorities, Citizens and communities which are affected by the implementation or non-implementation of measures (on- site as well as up- and downstream), River basin organizations/authorities, Regional development authorities, Scientific institutions, the private sector, and NGOs.

The involvement of stakeholder's meets three main goals. First, it brings knowledge from different perspectives together and thus enables a more profound understanding of flood risks. Second, members of affected communities have the chance to express the community's needs and to promote the integration of their demands in decision making. Finally, and based upon the first two goals, stakeholder involvement allows for the identification and implementation of flood management measures, which are effective and sustainable because the majority of stakeholders support them, although a consensus among all stakeholders can rarely be found, especially in cities, where spatial resources for flood mitigation are scarce, experiences shows that seriously practised participation is decisive for the mediation of conflicts. In urban areas, although there may be advantages of concentration of stakeholders as well as the medium of communication, there is always a shortage of time for participation in such activities. Particularly, in sub-urban areas, people have little time to spare from their livelihood engagements and time they perforce spend in travelling to their place of work. Special means have to be found to make use of the advantages and address the shortcomings.

References:

- Maharashtra floods of 2005: http://en.wikipedia.org/wiki/Maharashtra_floods_of_2005
- CWPRS 2006: "1-D Mathematical Model and Desk Studies for mitigating floods of MIthi River of Mumbai", Technical Report No. 4297, CWPRS, Pune, January 2006.
- NIRI Report 2011: Report, Current Status of Mithi River and Possible Solutions, National Environmental Engineering Research Institute, January 2011
- Kawas Kapadia 2011: Disaster Management And Mitigation For Mega Cities –Mumbai part –I : Issues (Micro Level) Kavas Kapadia, Professor & Dean Of Studies, Dept. of Urban Planning, School Of Planning & Architecture New Delhi, India