

Nature cannot
shoulder all the
blame city going
down under (mumbai
rains)

[Environment](#), [Nature](#)



Our weather is changing rapidly & it is resulting in more and more mega natural disasters like giant storms, tsunamis, droughts, floods, etc. the list goes on...In the same way “ Mumbai” the capital city of the Indian state of Maharashtra, being a low lying and saucer area, gets flooded almost each and every year during rainy seasons and high tides. Being the financial capital of India Mumbai contributes huge losses to the nation’s economy, due to the closed downs during flooding.

The MCGM has carried out various projects to reduce the floods every year since the havoc caused in 2005, but all in vain. It is essential to take care of nature, if we don’t take care of it variety of problem going to arise like flooding, water clogs etc. Human need to face such a haunting problems just because of their own deeds. The situation in the past years is better but we live-in different climate and in upcoming years it will be completely different if you think that it is come due to the nature, then you are wrong , human beings are responsible for this cause.

Introduction

Mumbai is a city located on the coast of Arabian Sea, is said to be the financial capital of India and also the capital city of Indian state of Maharashtra. Being a low lying and saucer area always gets flooded almost each and every year. The heaviest of them was seen on 26th of July, 2016. Floods in Mumbai are said to be caused by heavy rains accompanied with high tides but, these are not only the reasons that contributes to the floods every year various other reasons accompanied by these are responsible for the heavy flooding in Mumbai. We cannot blame nature for that entire crisis

which the humans are facing now a days regarding water clogging and flooding. Because all these are the just the results of humans deeds.

Objective

Floods are without doubt the most devastating natural disasters, striking numerous regions in the world each year. During the last decades the trend in flood damages has been growing exponentially. This is a consequence of the increasing frequency of heavy rain, changes in upstream land-use and a continuously increasing concentration of population and assets in flood prone areas. In general, less developed countries are the most vulnerable to floods, causing damages that significantly affect the national GDP. At country and community levels important initiatives have and are being devoted to implement appropriate countermeasures, both structural and non-structural, aiming to alleviate the persistent threats of water-related disasters. Flood Forecasting forms an important tool in reducing vulnerabilities and flood risk and form an important ingredient of the strategy to “ live with floods”, thereby contributing to national sustainable development.

Methodology

This study combined a rigorous methodology with a strong consultative process, with the following steps:

1. High resolution climate change and floods modelling for Mumbai.
2. District-specific assessment of climate change impacts for priority district and cross-spectral issues.
3. Identification of district-level specific adaptation strategies.

4. District-level vulnerability index development and identification of six vulnerability hotspot districts.
5. Quantitative household-level surveys with farming and fishing households in vulnerability hotspot district.
6. Detailed stakeholder consultations and preparation of district-level adaptation action for vulnerability hotspot district and Mumbai Metropolitan Region.
7. Validation of findings and discussion of adaptation strategies with state lineDepartments and district administration.

To identify areas in Mumbai Metropolitan Region that are prone to flooding when exposed to heavy rainfall events, flood maps were generated for different rainfall events. These maps simulate the rain flow and water level variations, using satellite imagery and rainfall data.

They consider tidal variations since the drainage system is overloaded during high tide. These maps were validated using the observed data sets from the disaster management reports of the Municipal Corporation of Greater Mumbai.

Case Study: 26 July, 2005 Mumbai flood

Introduction:

1. The 2005 Maharashtra floods refers to the flooding of many parts of the Maharashtra including large areas of the metropolis Mumbai a city located on the coast of the Arabian Sea.
2. The average rain fall of Mumbai is 242. 42mm.

3. The floods were caused by the heaviest ever recorded 24- hour rainfall figure of 994 mm.
4. The previous record high rainfall in a 4-hour period for Mumbai was 575 mm. in 1974.

Actual case

The onset of the southwest monsoon is associated with a sudden increase of rainfall and a decrease in temperature along the coastal areas of India. On certain occasions rainfall exceeds 200 mm per day. Historical data for more than a hundred years indicates that Mumbai has received more than 200 mm of rainfall in a single day on 50 occasions and more than 300 mm on 13 occasions. These intensive rainfall events are confined to small areas of a few square kilometers and are attributed to mesoscale convective systems. The extreme rainfall event of 26 July 2005 resulted in the highest 24-hour rainfall ever recorded at Mumbai. Data supplied by the National Data Center of the Indian Meteorological Department indicate that the rainfall which occurred on 26 July 2005 in Mumbai was extremely localized. The rainfall varied greatly among different points in the city. Amounts ranged from 1040 mm at Vihar Lake to 50 mm at Tansa Lake. Santacruz, the official observing station located at the Mumbai airport, recorded 944 mm of rain. Rainfall amounts were heaviest in the central core of the region encompassing Bhandup to Dharavi, and diminish drastically to the north and south.

Tansa Lake northeast of Mumbai and Bhira located to the southeast help to define the compact nature of this extreme rainfall event. Each is within about 100 km of the center of Mumbai.

Human-environment interaction and the Mumbai flood

The unprecedented rainfall in Mumbai resulted in a near complete inundation of the city as flood waters rose to engulf the first floor of most buildings. The population exposed to this natural disaster was about 13 million, with a density of about 28, 000 persons per square kilometer. Both flash flooding and river flooding contributed to the damage. Drainage infrastructure was incapable of accommodating the volume of runoff water resulting in failure of the sanitary sewer system. The Mithi and other rivers overflowed as discharge exceeded capacity. The resulting floods cut off rail and road systems. Residents reported having to spend the night stranded in cars or wading home through the high water. More than 100, 000 residential and commercial buildings reported damage, along with 30, 000 vehicles.

The flood produced an estimated \$1 billion (US) in damage. The business economy was especially hard hit; the airport was closed for two days, trading on the stock exchange was suspended for a day, and many areas of the city remained flooded and were without power for more than a week. Slum dwellers were especially hard hit as poor drainage and infrastructure hindered receding water. Residents were left with no choice but to live in their flooded dwellings. Areas reported no clean drinking water for up to a week after the flood.

The floods impacted the health of the Mumbai population in several ways. Total deaths in the city were over 400 with over 3000 serious illnesses also reported. Drowning was the number one cause of death followed by landslides and stampedes due to false rumors of an approaching tsunami.

Three years after the disaster a complete accounting of the victims remains problematic. The lack of clean drinking water led to outbreaks of diseases such as hepatitis, fever, conjunctivitis, gastrointestinal illness, and nose and throat infections. Increased cases of malaria and leptospirosis (contracted by wading through waterinfected by animal waste) were also reported. Bhagat et al. (2006) examined the flood from an urban planning perspective and concluded that land-use decisions and a lack of coordinated planning were responsible for the flooding. Of the six major natural drainage systems of the area, four of them are over 40 percent built up. The rivers themselves are often clogged with garbage due to inadequate wastemanagement. Open gutters in the suburban area of Mumbai carry both storm water and sewage. After the flood these became slow-draining cesspools which contributed to the disease outbreak. Government agencies with legislatively mandated responsibilities share planning authority but lack effective coordination. Thus India's most populous city has no integrated urban planning system and agencies are free to blame other agencies after a disaster.

Reasons for floods in Mumbai

1. Heavy Rains and Rising Sea Levels: Heavy rains to a magnitude of more than 240 mm are almost of a regular occurrence in Mumbai at the onset of monsoons. However, after the monsoon sets in and moves into its active phase, the situation is conducive to the occurrence of very heavy rains over Mumbai, when they are collectively a result of development of low pressure belt over the sea & as the folks say global warming is causing a intensive rise in sea levels which results in high tides during the monsoons in Mumbai.

2. **Faltering Drainage Systems: Mumbai's existing storm water drainage system** has largely contributed in the inundation of the city. The city's storm water drainage system is basically a complicated system of simple drains and rivers, creeks, drains and ponds. " The network comprises of a hierarchical system of roadside surface drains (about 2,000 km mainly in the suburbs), underground drains and laterals (about 440 km in the island city area), major and minor canals (200 km and 87 km respectively) and over 180 outfalls, which discharge all the surface runoff into the rivers and the Arabian Sea.
3. **Mumbai's Natural Drain: Mithi River:** The Mithi river constitutes a major component of the city's SWD system. The location of the river is important from the point of view of the city as it serves as a dividing line between the city and its suburbs. Thus, its flooding has direct or indirect repercussions on the disruption of the traffic on the five transport corridors viz. Central Railways, Western Railways, Western Express Highway, Eastern Express Highway & the Harbour Railway Line. The storm water drainage of the river is encroached upon by a large number of hutments, storages, processing industries, workshops and scrap yards situated along its banks. These settlements make it difficult even to define the path of the river. Direct discharges of the untreated sewage, wastewater, trash from the unauthorized settlements and industrial effluents flow into the river's course and choke it up, thus raising the level of water during heavy rains.
4. **Reduction in the catchment area of Mithi river:** The Mithi rivers catchment area being reduced due to extensive reclamation of land

contributes a lot towards the flooding along its path. The flooding of Mithi River has direct or indirect repercussions on the disruption of the traffic on the five transport corridors viz. Central Railways, Western Railways, Western Express Highway, Eastern Express Highway & the Harbor Railway Line.

5. Bandra - Worli sea link: The construction of Bandra Worli sea link has greatly affected the flooding in Mumbai. It has constricted the mouth of Mithi River at the Mahim bay. So, when the water from the river is discharged into the bay, during the high tides, due to its mouth being constricted the water surges back and overflows from the bank resulting in devastating floods.
6. Path of the Mithi River being changed due to CSIA's runway: The runway for CSIA (Chatrapati Shivaji International Airport) has been elongated over the path of Mithi River which changes its path. So what happens is, when during high rainfall the water runs down with great pressure the water, instead of changing its path it climbs above the land surface and penetrates in the city causing flood.

Conclusion

The record daily rainfall of 944 mm on 26 July 2005 paralyzed the major Indian city of Mumbai, causing enormous human suffering and economic damage. This analysis shows both physical and human factors combined to exacerbate the event. The record rain quickly overwhelmed the city drainage system. This system was not capable of handling the volume of runoff due to the failure of the city to adequately plan for and respond to its growth as a major population center. As such, this event fits within the human ecological

framework of the hazard-based approach of Gilbert White. However, it is sobering to note that the mitigation projects proposed by the government are mostly structural in nature.

The statistics tells that there is a good general awareness about this topic. A majority of the people surveyed are of opinion that human weren't meant to rule the nature and human have no rights to modify the natural environment to suit their needs. Major concern amongst people opposing this fact is that it reduces the importance and values given to the Mother Nature there must be a law which depicts the conservation of nature and environment Mumbai and in our country as well.

Recommendation

Mumbai, being one of the most vulnerable cities in the world for floods, mostly because of its population density and poor drainage system. There are always huge monetary and emotional losses because of floods in Mumbai but if proper preventive measures are taken then all this can be stopped. Keeping this in mind I thought of developing a descriptive poster which shows what steps should be taken before and after floods. It has been designed keeping in mind the "Mumbaikars" as they face serious issues during monsoon. Taking small steps as using NYLON SAP bags which gets aerated when water droplets get in touch with it can prevent water logging in the house. Keeping the basic necessities like food, water, first aid ready always hel . Getting to higher platforms in case of floods. These kinds of posters will make people aware and they can take preventive measures even

before the disaster strikes. To prevent monetary losses people should get their flood -vulnerable items insured.

Finally , humanity also plays an important role in case of disaster, so my personal request to all my peers is that in case of any risk or Disaster please help others if they are in need in any possible way.