DISASTER RISK REDUCTION – A PLANNING APPROACH

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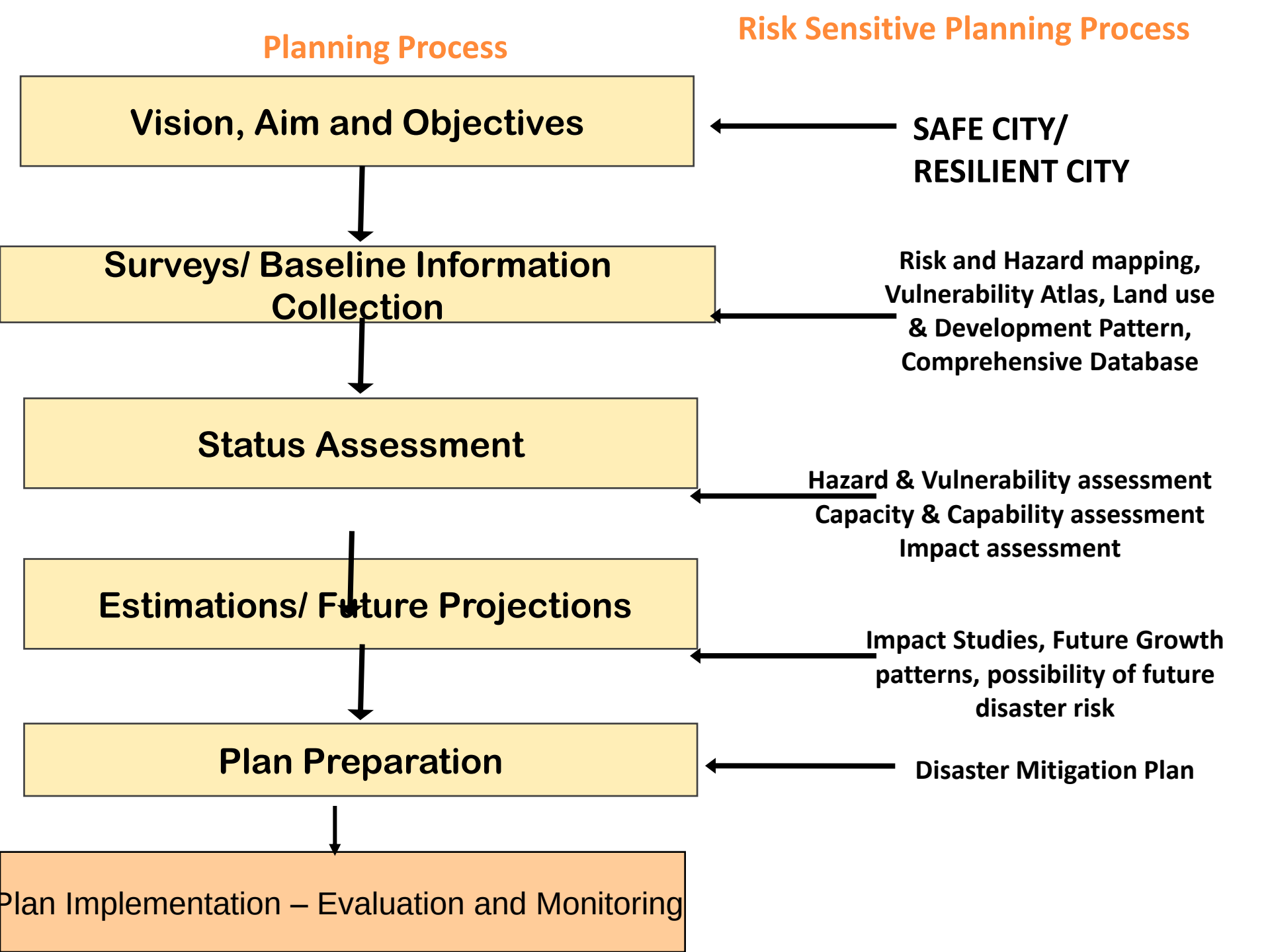
EMERGING AREAS

- Shift from Disaster relief and response to Disaster mitigation/risk reduction
- Participatory planning approach
- Multi hazard, multi stakeholder approach
- Linkages between government, non-government and people

The way forward

- Spatial context of social vulnerability
- Mainstreaming disaster risk management in the planning process
- Risk sensitive planning process


Planning Process
Risk Sensitive Planning Process
Vision, Aim and Objectives
SAFE CITY/
RESILIENT CITY
Surveys/ Baseline Information Collection
Risk and Hazard mapping, Vulnerability Atlas, Land use & Development Pattern, Comprehensive Database
Status Assessment
Hazard & Vulnerability assessment
Capacity & Capability assessment
Impact assessment
Estimations/ Future Projections
Impact Studies, Future Growth patterns, possibility of future disaster risk
Plan Preparation
Disaster Mitigation Plan
Plan Implementation – Evaluation and Monitoring

Generation of Comprehensive Information Base

Detailed Data and Information of the

- Drainage patterns of the area surrounding the river basin
- Floodplain mapping
- Catchment areas
- Low-lying areas
- Other important geographical features
- Population densities therein
- Settlement patterns
- Land use pattern and activity structure
- Nature and types of buildings, etc

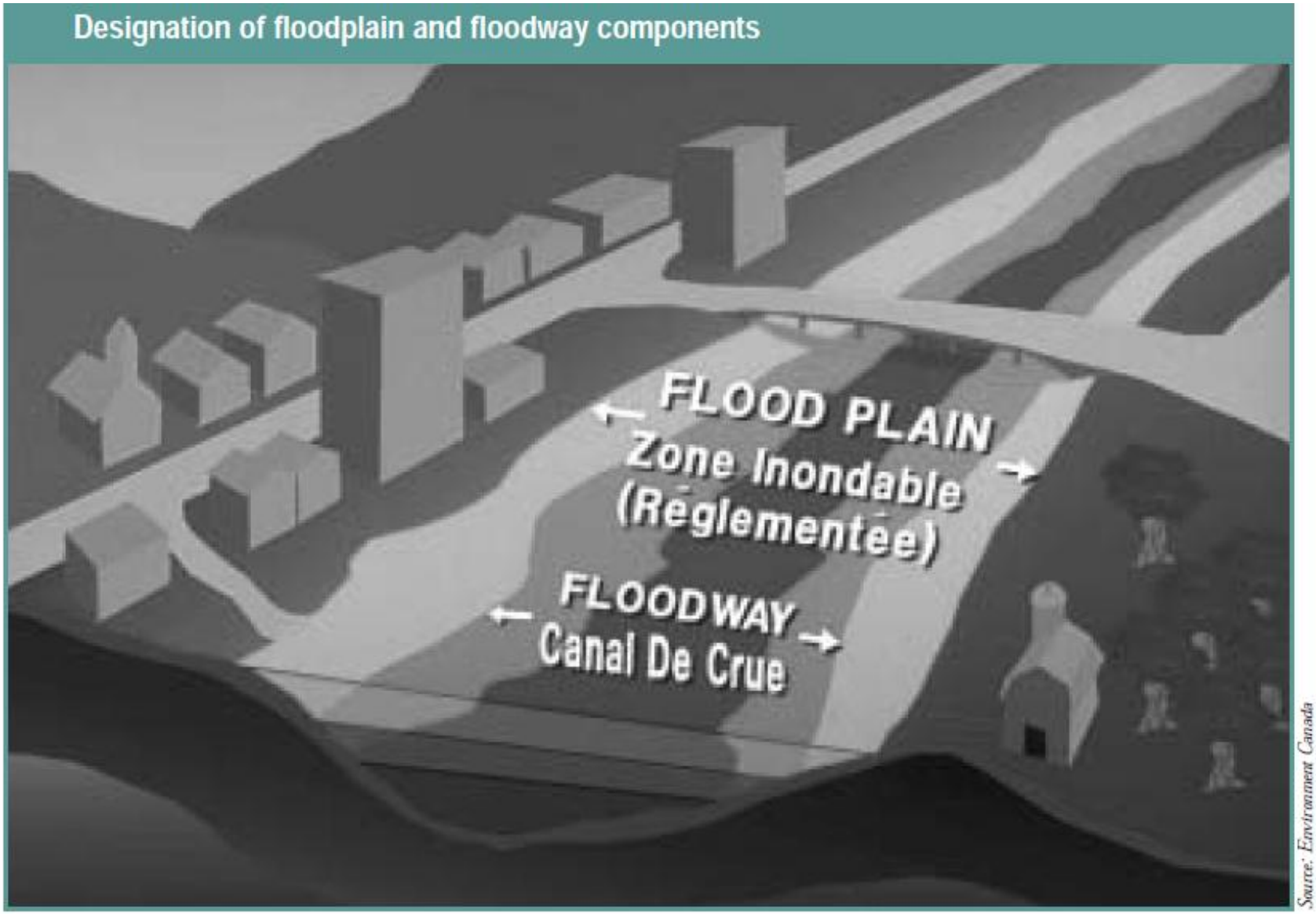
STRATEGIES FOR FLOOD PRONE AREAS

IDENTIFICATION OF FLOOD PRONE AREAS :

1. The Flood Prone Areas in the river plans (protected / unprotected) are indicated in the Flood Atlas of India.
2. Besides above areas, other areas can be flooded, mainly because of ;
    a. Heavy Intensity Rains,
    b. Inundation on Depression,
    c. Back flow in Drains,
    d. Inadequate Drainage,
    e. Failure of protection Works.
3. These areas can be identified through Local Contour Surveys, & Flood History of Planning Area.

LAND USE ZONING FOR FLOOD SAFETY.

1. Preparation Flood Contour Map.
2. Regulation for Land Use Zoning.



TWO ZONE APPROACH : FLOOD-PRONE AREA MAY BE BROKEN DOWN INTO ***FLOODWAY*** AND ***FLOOD PLAIN*** COMPONENTS

ONE ZONE APPROACH

STRATEGIES FOR FLOOD PRONE AREAS

Land Use Restructuring & Zoning in the Flood plain

- The Land use and the activity pattern of the flood prone area is extremely crucial in the effectiveness of the flood mitigation measures.
- A detailed plot-wise land use survey needs to be conducted so as to create an accurate picture of the river basin as well as the surrounding flood prone areas.
- Some of the main measures to be undertaken during the landuse planning are-
  - Prohibition of any Industrial & manufacturing activities in the flood plain.
  - Creation of buffer zone all along the river and strong regulatory measures to prevent any encroachments.
  - Only recreational activities like parks, gardens, playareas may be allowed within the buffer zone. This will also add to the green cover of the city.
- Construction of strong, high, steep sloped embankment walls along the river would control the overflowing river during monsoons. This would also create a barrier to halt the encroachments on the river banks.

STRATEGIES FOR FLOOD PRONE AREAS

REGULATIONS FOR LAND USE ZONING FOR NATURAL HAZARD PRONE AREAS

Various legislations have been enacted regarding the land use zoning regulations in hazard prone area, with the purpose of

1.Providing regulations for development in particular area to serve desired purpose efficiently & to preserve its character.

2.Providing a legal tool fop guiding the use of land & protection of public health, welfare safety.

NOTIFIED UNDER SECTION :

1.u/s 73 (f) MODEL TOWN & COUNTRY PLANNING ACT 1960

2.u/s 143 (f) MODEL TOWN & COUNTRY PLANNING AND DEVELOPMMENT LAWS

3.u/s 180 (f) MODEL TOWN & COUNTRY PLANNING AND DEVELOPMMENT LAWS OF UDPFI GUIDELINES

Development Plan of Mumbai

No consideration of conserving/protecting the

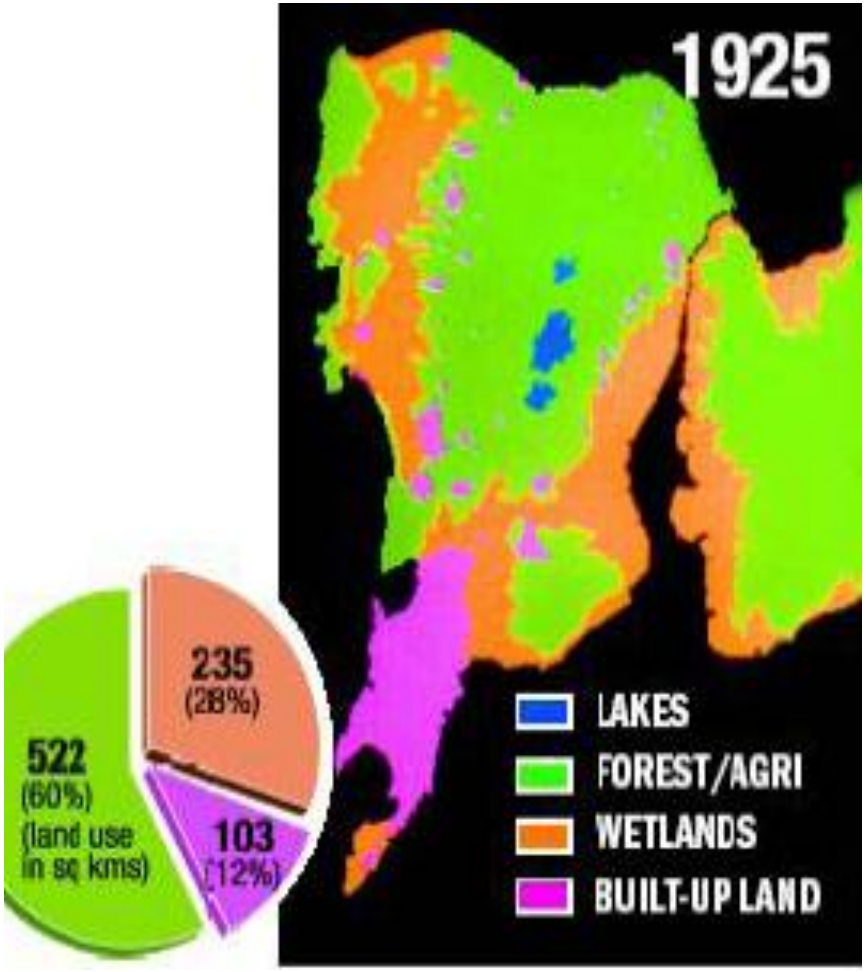
- natural drainage system of Greater Mumbai , that is a major problem in the city and have facilitated floods.
- watershed areas,
- river basins,
- drainage network, etc.
- wetlands, marshy areas, forest areas

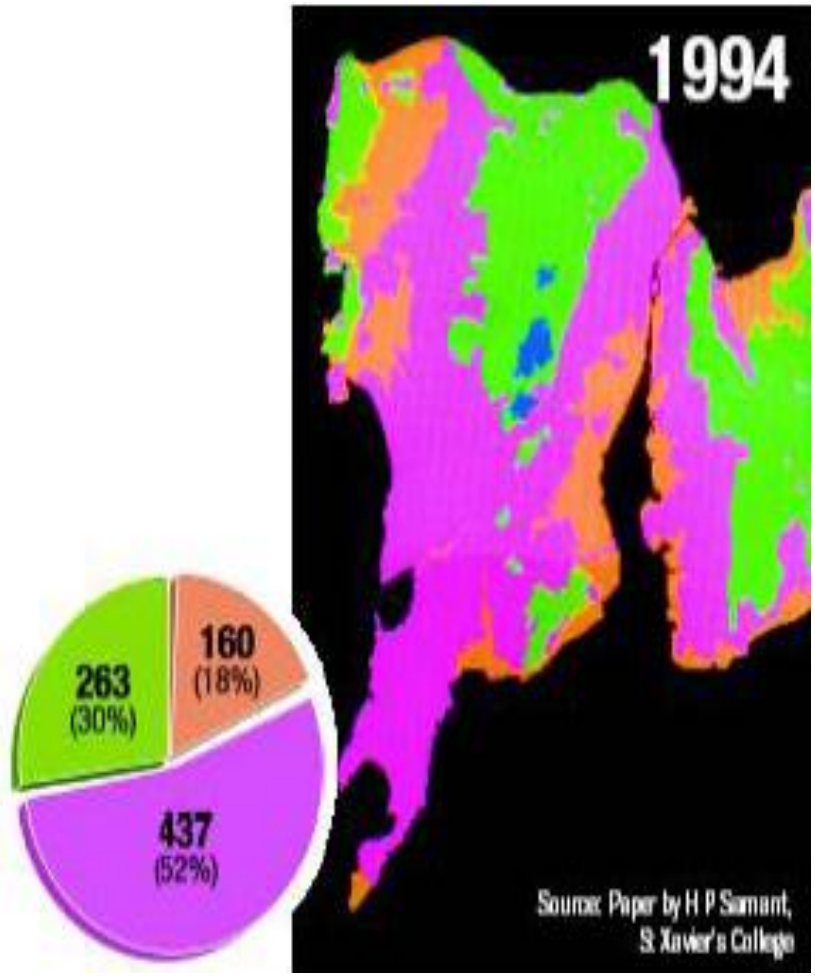
No attempt to identify the vulnerable communities due to high densities, poor built structures and infrastructure status.

No mention about the adaptive capacities of the people, institutions, localised options in case of emergency.

No focus on capacity building and community empowerment

Land use changes in Mumbai





The way forward

- Coherent process of Policies - Plans – Programmes – Projects
- Implementation and post implementation management of risk reduction projects
- Coordinated effort by organisations/ overcoming jurisdictional conflicts
- Regulating the development
- Enforcement of zoning regulations
- Interface within Disaster Management Act, State Town and Country Planning Act and Municipal Acts

STRATEGIES FOR FLOOD PRONE AREAS

Vulnerability Indicators

- ***Geological & Seismic Conditions***
- ***Density***
- ***Housing Conditions***
- ***Land use Changes***

LESSONS FROM STUDIES…….

- ***Curitiba***: integrated urban drainage and flood plain master plan are the main instruments developed as sustainable policy to manage flood impact in urban area.
- ***Dresden***: after the disastrous floods of 2002, a flood management ordinance was enacted on July 27, 2004 3000 ha area fixed by law as flood hazard area were to follow strict building regulation.

Tools for Mainstreaming Disaster Risk Reduction (DRR)

- Environmental assessment (EIA) & social impact assessment (SIA)
- Poverty reduction strategies.
- Project cycle management- at project level how to integrate DRR and create synergy
- Logical and result-based frameworks
- Economic analysis
- Vulnerability and capacity analysis
- Sustainable livelihoods approaches
- Construction design, building standards & site selection
- Evaluating DRR initiatives

STRATEGIES FOR FLOOD PRONE AREAS

Steps to successful mainstreaming……

Restriction of development on high hazard prone areas:

anthropogenic activities on unsuitable lands exacerbate disaster putting the built-up and population at high risk. This could be made possible by strategies such as:

• Scientific vulnerability assessment and micro zoning of disasters.

• Incentives and disincentives efforts to discourage construction on high hazard zones.

• Preparation and enforcement of planning tools that integrates risk and vulnerability assessment.

Urban green area to be conserved

•Green areas should be used as ground water recharge points & as buffers

Protection of major connectivity route and critical infrastructure

•Protection and strengthening critical public facilities and physical infrastructure, through proper design for adequate resilience to hazards.

Awareness raising

•"concept of community participation" in areas of disaster risk reduction and management by:

•Adopting specific policies, attribution of roles and responsibilities and the delegation of provision of the necessary authority and resources at grass root level.

Training & Technical support

Learning & experience sharing

STRATEGIES FOR FLOOD PRONE AREAS

FLOOD MANAGEMENT GUIDELINES IN INDIA

DISASTER MANAGEMENT ACT 2005

The NDMA has the responsibility of laying down the policies, plans and guidelines for effective Disaster Management emphasize :-

1.Importance of non-structural measures which are very effective in reducing loss of life and property and can be implemented in a short time.

2.Proposed to set up establishment of **River Basin Organizations** as a mechanism for inter state coordination .

3.Proposed to set up a **National Institute of Flood Management** for taking up training, research and development activities related to floods and their management.

4.The guidelines envisage that the **states will enact and enforce the flood plain zoning regulations** on the lines of model bill circulated by the ministry of water resources.

STRATEGIES FOR FLOOD PRONE AREAS

BUREAU OF INDIAN STANDARDS

Produced national standards, which are of direct relevance to the construction industry and some of them particular to the mitigation of disasters. IS 13739:1993 'Guidelines for estimation of flood damages; **Protection to the river banks** by construction of stone revetments, impermeable bed bars etc

Provide guidelines for:-

IS 13739:1993-Guidelines for estimation of flood damages

IS 13028:1991 -Guidelines for overall planning of river basin
Planning Of River Basin has 2 parts
(i)mitigation of flood damages
(ii)utilizing the flood waters for beneficial uses(Central Water Commission)

Flood control measures –

1.Structural measures include reservoirs, embankments, channel improvements etc.

2.Non-structural measures include flood plain zoning, watershed management, flood forecasting and flood warning.

In any given case, instead of a single measure, a combination of measures may be ideal and optimal

STRATEGIES FOR FLOOD PRONE AREAS

BUILDINGS

- High plinths; No basements allowed
- All buildings to be at least G+1 structures
- Mechanisms to prevent collapse, buckling and cave-ins of buildings during and after floods
- Minimum use of timber in construction(rails, posts, door frames) as it tends to rot.
- Emergency shutdown and evacuation mechanisms in every building (especially for lifts/escalators)
- All community facilities/centres/halls to be on high plinth or on upper floors (with open staircases) so that they can serve as emergency shelters during floods.

STRATEGIES FOR FLOOD PRONE AREAS

INFRASTRUCTURE

- ❑ Water Supply and sewage lines to be laid with minimum bends and joints
- ❑ Waterproof, leak proof casing for the pipelines, especially at the joints and bends

POWER SUPPLY (Most dangerous in case of floods)

- ❑ Electrical supply mains, wires, etc to be strictly overhead.
- ❑ High voltage installations strictly not allowed in the flood prone zone
- ❑ Electrical installations, transformers, etc, to be strictly placed at safe levels (mounted on poles or on high plinths.
- ❑ Planning and management of power supply networks

STRATEGIES FOR FLOOD PRONE AREAS

INDUSTRIES

- Survey needed to check the locations, numbers and types of industries, their equipments, waste generated, etc.
- Welding/fabricating works, chemical and other related industries, warehouses, workshops, other hazardous industries, etc. to be checked and mapped.
- All these industries to be either disallowed or compulsorily placed on high plinths/upper floors

STRATEGIES FOR FLOOD PRONE AREAS

DRAINAGE AND SOLID WASTE

- Detailed analysis of the drainage patterns and measures to keep them effectively working
- All the manholes/inspection chambers to be of larger dimensions than those in other normal areas
- Solid waste dumping is main cause for water clogging and flooding in most of the cases. A detailed survey is essential to locate such critical areas and measures taken to prevent dumping.
- Effective solid waste management systems to be set in place.

STRATEGIES FOR FLOOD PRONE AREAS

Others

- ❑ All cars (now-a-days with automatic functions) to have manual door, window opening/closing facility
- ❑ Emergency toolkits inside every car in case a person gets trapped.
- ❑ All possible evacuation routes to be no-parking zones
- ❑ Emergency pumping facilities at critical locations
- ❑ Systems for preventing spread of epidemics after the floods (hospitals, clinics, cleaning, etc)

The way forward

- Rejuvenation of Mithi river , cleaning and widening
- Floodplain zoning / Land use restructuring/ activities along Mithi river
- Solid waste management in order to reduce choking of the drains and river
- Protection of water bodies from encroachments
- Resettlement options
- Phasing

The way forward

1. Strategies & Proposals for Mumbai Mega City
- Greater Mumbai Level
- Mithi River Area Level
- Local Hotspots – Kalina & Rajiv Gandhi Nagar
2. Strategies for Flood Prone Areas

STRATEGIES & PROPOSALS FOR MUMBAI MEGA CITY

Greater Mumbai Level

Unplanned development and encroachment

- Slum upgradation with density considerations should be done by providing infrastructure facilities to reduce the impact of flood and other hazards.
- Removal of encroachments and modifications in the development control norms.

Reclamation

- Relocation of landfill sites
- Decentralization of solid waste management to reduce the burden on land fill sites
- Wetland and mangrove reclamation should be prohibited.

STRATEGIES & PROPOSALS FOR MUMBAI MEGA CITY

Greater Mumbai Level

CRZ Regulations

- Integration of CRZ norms in the development projects.

Fragile Areas

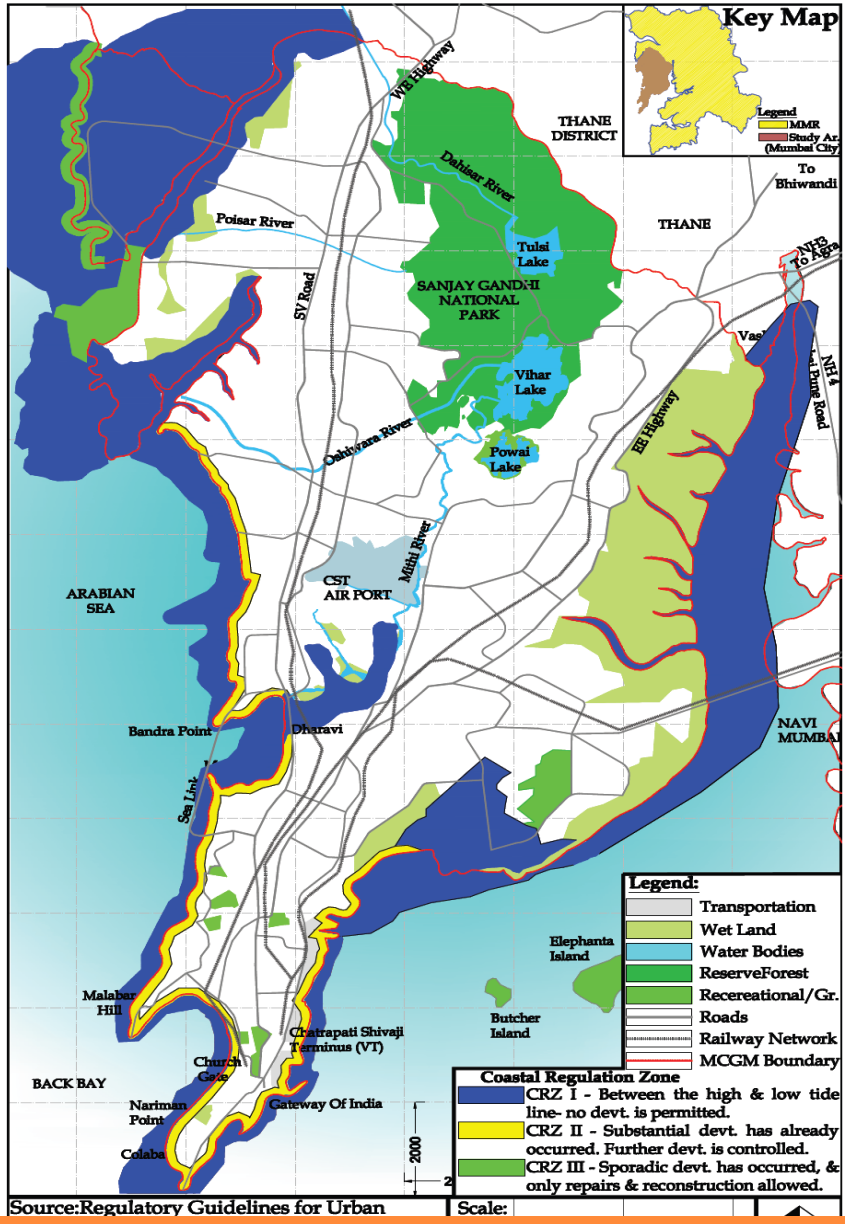
- Modifications in the development control norms.
- Formulation of norms for development in hazard prone areas for various types of disasters.

Budget Allocation

- Budget allocation for disaster management to various wards should be in proportion to vulnerable population in these wards.

Socio-economic aspects

- Socio economic surveys and short term and long term assessment of disasters to be done



STRATEGIES & PROPOSALS FOR MUMBAI MEGA CITY

Greater Mumbai Level

Land Use

- Hazardous activities should be shifted away from the high density areas and ecologically sensitive areas.

Development on low lying areas

- Indigeneous methods to be adopted to reduce the impact of floods

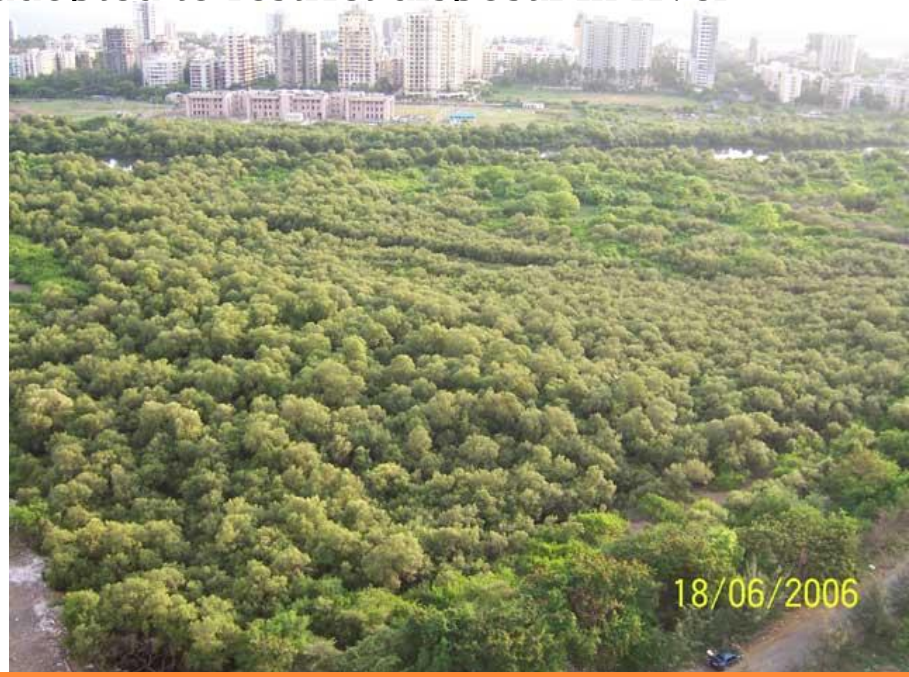
Inadequacy in Infrastructure provisions

- Provide adequate Municipal infrastructure in slums and other areas.
- Provision of fire hydrants at strategic locations
- Solid Waste Management to be improved
- Organise cleaning of Bada Nallah

STRATEGIES & PROPOSALS FOR MUMBAI MEGA CITY

Mithi River Area Level

- **Monitoring Wetlands and Mangroves** for upkeep and reclamation should be strictly prohibited.
- **Conservation of Ecologically sensitive** areas like Mangroves, city greens like bird sanctuaries by strict development norms to avoid reclamation and encroachments
- **Solid waste Management** to be improved with area specific solutions with proper segregation and disposal methods adopted to restrict disposal in river course.



STRATEGIES & PROPOSALS FOR MUMBAI MEGA CITY

Mithi River Area Level

- **Regular Monitoring of Water quality** of the river specially in slums and industrial areas
- **Pre-monsoon cleaning of Mithi River Basin** should be ensured to increase its carrying capacity thereby reducing flood risk.
- **Formation of a Nodal Agency** responsible for management of Mithi river to avoid overlapping jurisdiction.

STRATEGIES & PROPOSALS FOR MUMBAI MEGA CITY

Local Area Level

•**Slum up gradation/improvement** should be done by providing infrastructure facilities to reduce the impact of flood and other hazards.

•Only the **environment friendly developments** along this course of river should be permitted.

•Hazardous industries shifted outside.

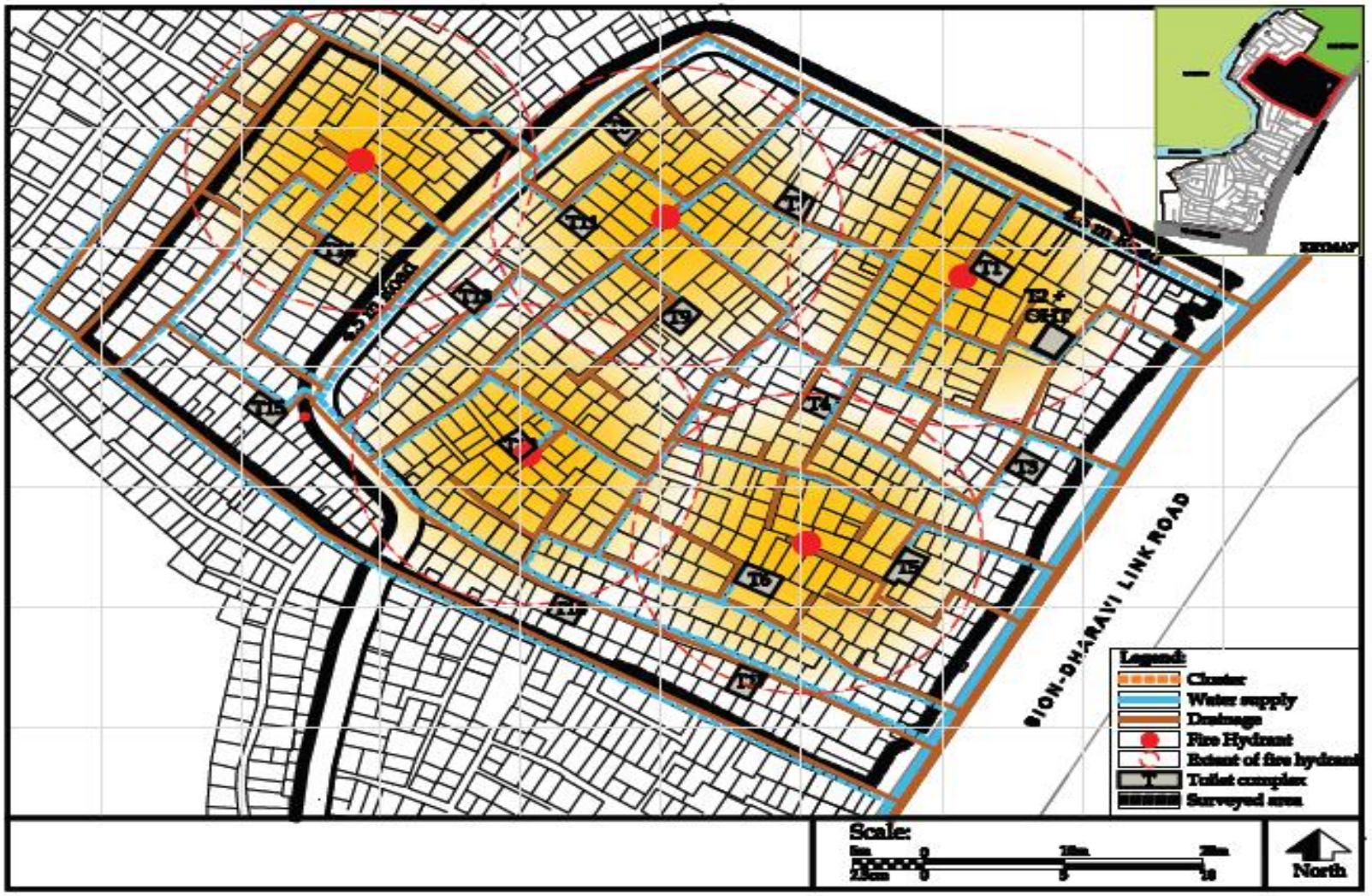
STRATEGIES & PROPOSALS FOR MUMBAI MEGA CITY
Local Area Level

•**Sewerage network** for slum pockets should be improved; **Dumping of solid waste** directly in the river should be **restricted** with involvement of the community.

•**Involvement of stakeholders and community based organization** at each level, for overall development of the slum pockets with adequate infrastructural facilities.

STRATEGIES & PROPOSALS FOR MUMBAI MEGA CITY

Local Area Level



Proposed Infrastructure For Rajiv Gandhi Nagar on the basis of Clustered development

STRATEGIES FOR FLOOD PRONE AREAS

Institutional Set-up

- Various agencies have their jurisdictions across the entire stretch of Mithi river. This creates issues of conflicting and overlapping functions and responsibilities.

- Therefore there is need for a single agency in charge of the operations across the entire Mithi River Basin.

- The Mithi River Development Authority can be assigned the authority and responsibility for the development & maintenance of the entire Mithi River Basin as well as the Flood Mitigation measures to be undertaken.

GOVERNANCE

AN UMBRELLA AUTHORITY FOR GOVERNING THE MITHI RIVER BASIN

WITH REPRESENTATIVES FROM

- MITHI RIVER DEVELOPMENT AUTHORITY
- DHARAVI DEVELOPMENT AUTHORITY
- AIRPORT AUTHORITY
- MIDC
- WARD LEVEL REPRESENTATIVES

ROLES AND RESPONSIBILITIES