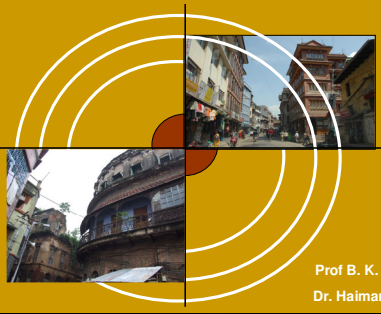
DISASTER MITIGATION STRATEGIES THROUGH LAND USE PLANNING AND ZONING IN AN URBAN CONTEXT



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In the past two decades, on an average more than 200 million people have been affected every year by disasters

Natural disasters attack the poor at three levels: interrupt income, reduce personal assets, and destroy essential public infrastructure.

Type of Disaster

Disaster risk arises when hazards interact with physical, social, economic and environmental vulnerabilities.

- **Cause loss of lives**
- **Result in major economic setbacks disappearing many years of investment in a moment**
- **Requires livelihoods have to start from beginning**
- **Needs houses and infrastructure to be rebuilt**

Events of hydro meteorological origin constitute large majority of disasters

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Disaster Risk Reduction

- **Disaster Risk Reduction is a method or tool to reduce the impacts of natural and human-made hazards.**
- **A strategic approach with technical components such as land-use planning, infrastructure planning, education, preparedness and response.**
- **A long – term development activity recognized as integral part of sustainable development**

Disaster is the impact of a hazard.

Hazard is defined as a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Risk is a real or potential threat of a disaster that can lead to major loss of life, livelihoods and infrastructure.

Risk of Disaster on a particular region is the cumulative effect of probability of hazard and the vulnerability of that particular region

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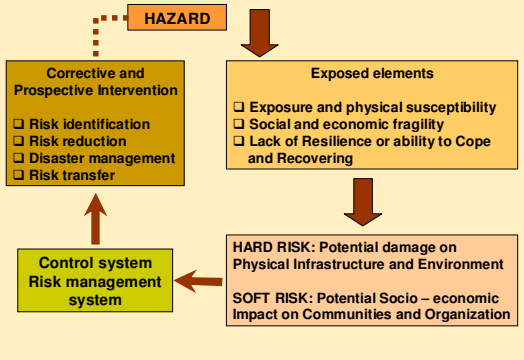
Disaster Risk = Hazard + Vulnerability

Vulnerability is defined as the conditions determined by physical, social, economic, and environmental factors or processes, which increase the susceptibility of a community to the impact of hazards.

Vulnerability is also related to the ability of individuals, social groups and societies to recover after a disaster has occurred.

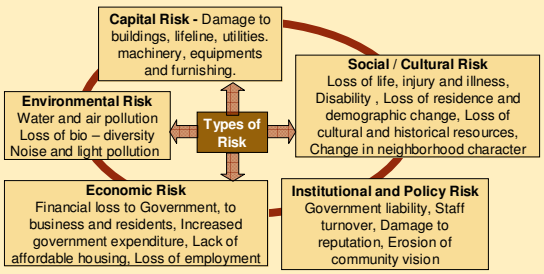
Disaster risk management (DRM) involves

(i) Risk identification
(ii) Risk reduction
(iii) Disaster management



Risk Identification - a multidisciplinary evaluation

- **Which are the most probable hazards?**
- **What is the probable intensity of different types of hazard?**
- **How often can these types of hazards occur?**



Assessment of Strength of Probable Hazard

Impact of natural hazard may be expressed as a function of intensity and frequency, i.e. $H = f(i, n)$

The intensity may be assessed by parameters like:

- area of damage
- loss of life
- loss of property or fixed assets at both individual and public level
- loss of livelihood
- loss of infrastructure
- time required to restore normal daily life of the inhabitants

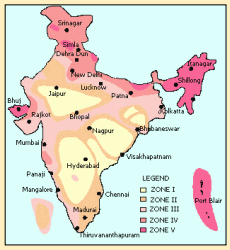
The physical risk intensified by the Aggravating Coefficient

- development level
- density of population
- preparedness
- supportive infrastructure
- rescue man power
- land use planning

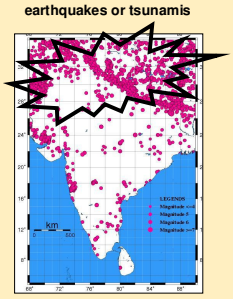
Prediction of Hazard:

Hazard which can be easily predicted: cyclones, floods, droughts

Hazard which are difficult to predict: earthquakes or tsunamis



Map of seismic zones and earthquakes that happened

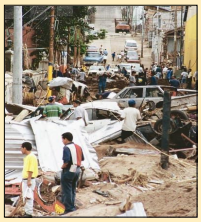


Assessment of Vulnerability of a Region

- To identify the elements that can experience hazard. These include people, buildings, economic activities, finances, infrastructure and the like.
- Next step is to assess how each exposed element is likely to be damaged in case of a hazard.

Vulnerability of a region may be reduced by adopting two basic principles

- Increasing the intrinsic disaster fighting potential
- Ensuring connectivity to other regions for availing external help at the earliest in cases of emergency.



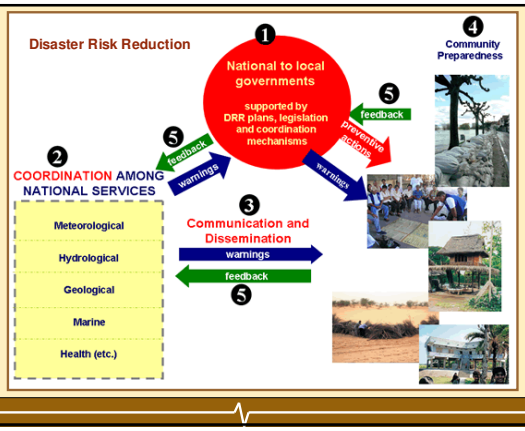
Risk Reduction

Risk reduction as a more appropriate term than Risk elimination. Land use planning is the most important tool and the same needs to be integrated with disaster management plan of a region both at macro and micro level.

Global Programmes and Strategies for Disaster Risk Reduction

The World Conference on Disaster Reduction held from 18 to 22 January 2005 in Kobe, Hyogo, Japan adopted the Framework for Action 2005-2015

- Governance: Ensure that disaster risk reduction (DRR) is a national and local priority with a strong institutional basis for implementation.
- Early warning systems: Identify, assess and monitor disaster risks and enhance early warning
- Communication and advocacy: Use knowledge, innovation and education to raise awareness of Disaster Risk Reduction at all levels.
- Prevention, Preparedness, Response: Reduce the underlying risk factors and strengthen disaster preparedness for effective response at all levels



Land Use Planning for Disaster Risk Reduction

Urban Risk Factors

- Unplanned development pattern and uncontrolled urban sprawl making it difficult to manage the megacity even during normal times.
- Hazardous industrial plants existing with congested informal settlements
- Informal construction made up of substandard materials
- A built environment susceptible to natural hazards resulting from unregulated building practices
- Historical buildings that are not restored or properly secured for hazards

Vulnerability of urban regions to disaster is intensified by:

- physical densification of settlements
- high concentration of business investments and economic assets
- convergence of vital networks, along with critical facilities and transportation

Urban Risk Factors



Dense development without adequate escape route

Unsafe old structure


Informal construction made up of substandard materials

Hazardous land use existing with congested informal settlements

Integration of disaster mitigation planning into land use planning

The preliminary activities include

- Preparatory work (data collection, research and analysis of available documentation)
- Creation of a project team
- Coordination with ULB s and field investigation
- Formulation of the risk-sensitive land use plan
- Advocacy campaigns
- Drafting of zoning ordinance
- Formulating and implementing building codes customized for a particular region based on the region's vulnerability
- Inter-institutional coordination
- Strengthening of local institutions.

The vulnerability of a region may be reduced by adopting 2 basic principles:

Increasing the intrinsic disaster fighting potential
Ensuring connectivity to other regions for availing external help at the earliest in cases of emergency.

Key strategies for Risk – Sensitive Urban Land Use planning

Planning tool	Specific measure	Disaster risk reduction	Incidental benefit
Zoning	Identify vulnerable areas within a region (areas prone to flood, cyclone, settlement of soil etc).	Reduction of damage to property.	
	Keep a check on density – strict vigilance is required on buildable area allowed and actually built. (implement limits on building heights if necessary)	Minimize life loss due to building collapse.	Better QOL – more open space, less pressure on infrastructure.
	Control or prohibit development in over developed areas - declare as Development Control Zone	Reduction of damage to property.	Creation of a more livable environment.
	Encourage a mix of land use to have a fair of distribution of population at all places at any point of time.	Minimize life loss due to building collapse.	Balanced land use with efficient transportation

Key strategies for Risk – Sensitive Urban Land Use planning

Planning tool	Specific measure	Disaster risk reduction	Incidental benefit
Land use Planning	Provide adequate space which can be used as refuge areas like an open space during earthquake, or raised shelters during a flood..	Reduction in loss of life	More open space for community enjoyment.
	Provide roads of adequate ROW to facilitate movement of emergency vehicles after a disaster.	Fast rescue of casualties/ quick relief.	A well managed flow of traffic in normal times
	Ensure strategic placement of essential physical infrastructure like hospitals to cater to the needs at various localities post disaster.	Greater chance of life saving.	A well planned land use catering to daily needs
	Strengthen connectivity with neighboring regions from where aids will be received post disaster.	Avail quick supplies and medical aids	Better regional prosperity

Key strategies for Risk – Sensitive Urban Land Use planning

Planning tool	Specific measure	Disaster risk reduction	Incidental benefit
Land use Planning	Stabilization of river bank slopes and redevelopment of river ways.	Reduction of loss of life and property	River can be used as connectivity with neighboring areas post disaster
	Provide / recover side walks in congested areas.	Easy evacuation	Healthy environment.
Infra – Structure Planning	Construction of a good drainage network system	Reduction in flooding	Reduce water logging.
	Construction of a good water supply and sewerage network	Facilitate recovery	Reduce health risk Better environment.
	Construction of a secure system for laying electrical or LV cables.	Easy to call for relief.	Better quality of life.

Key strategies for Risk – Sensitive Urban Land Use planning

Planning tool	Specific measure	Disaster risk reduction	Incidental benefit
Building regulation	Local authorities to enforce that all new and existing buildings meant for public use and high rise residential buildings must consider seismic safety in the design.	Minimize the loss of life due to building collapse	
	Relocation of informal settlers and people residing in unsafe structures to properly engineered housing which are affordable	Reduction of need for evacuation during disasters.	A more decongested and cleaner environment.
	Incorporate retrofitting measures for disaster fighting in buildings of historical and cultural relevance.	Reduction of risk of buildings.	Preservation of heritage.

Disaster management

Communities have to be knowledgeable about hazard risks and be empowered through basic skills to protect themselves and their communities to be prepared to future disasters

At work place:

- Develop a comprehensive emergency management plan, evacuation plan and a recovery plan.
- Conduct training classes with all employees at regular intervals
- Have a Television / Radio in office for official notification of any predictable disaster.
- Maintain an accurate list of all employees, their phone numbers and emergency contact numbers for use in the event of an emergency.
- Keep a back-up of all hard and soft data off-site to facilitate recovery.
- Identify an alternate site for business operation.
- Business should have adequate insurance to cover disaster losses

At home

- Choose a place where the family can meet after a disaster in case the members are apart when a disaster happens.
- Choose a person outside the immediate area to contact if family members are separated. The contact person should live far enough away that they are not involved in the same emergency.
- Know how children can be contacted at their school or daycare and when and where they can be picked up after a disaster.
- Put together an emergency supply kit and a small amount of cash
- Learn how to shut off the water, gas, and electricity.
- Make copies of vital records and store them in a safe deposit box in another city or state.
- Take photos and videotapes of the home and valuables and keep them in safe deposit box.

Conclusion

Disaster Risk Reduction can not prevent hazards from taking place, but can definitely reduce the impacts of hazards

Efforts to reduce disaster risks must be systematically integrated into policies, plans and programmes for sustainable development and poverty reduction, and supported through bilateral, regional and international cooperation, including partnerships

Sustainable development, poverty reduction, good governance and disaster risk reduction are mutually supportive objectives, and in order to meet the challenges ahead, accelerated efforts must be made to build the necessary capacities at the community and national levels to manage and reduce risk

Thank You