

Hazard Risk Mitigation: Non Structural Measures

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Sendai Framework for Disaster Risk Reduction 2015-2030

Priority Areas of Action

- Understand the Risks
- Improve Governance of the Risks
- Invest in Risk Reduction
- Preparedness for Effective Response and Build Back Better

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Targets

- Reduce mortality
- Reduce number of affected people
- Reduce economic losses
- Reduce damage to critical infrastructure and basic services
- Prepare DRR strategies
- Increase International cooperation
- Improve Early Warning

Loss events worldwide 2014

Geographical overview

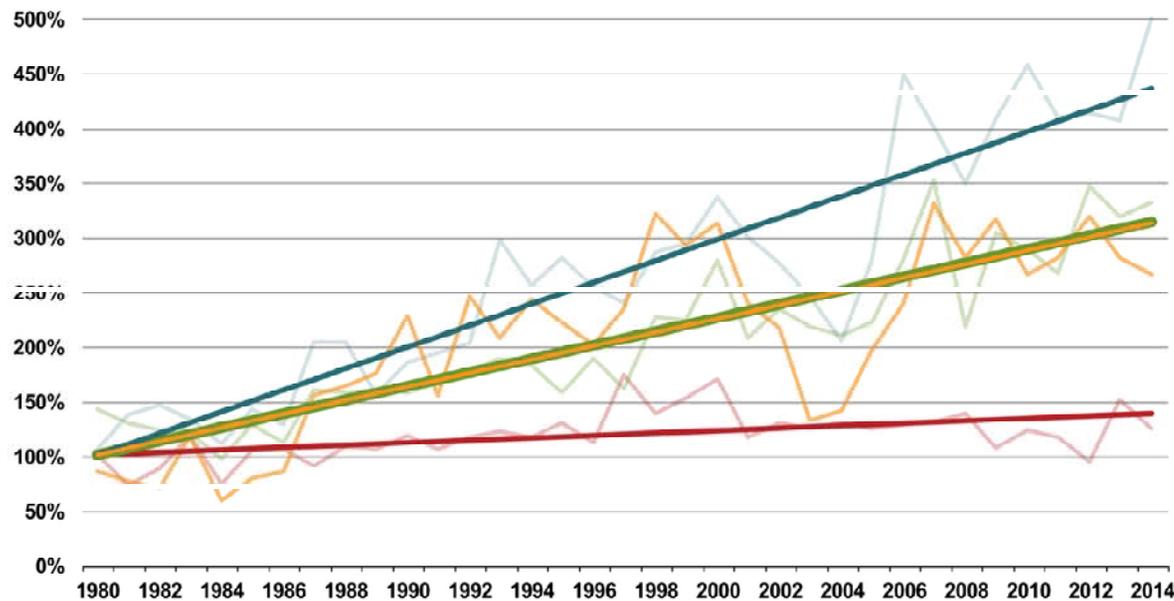


- **Loss events**
- **Selection of catastrophes**
Overall losses \geq US\$ 1,500m
- **Geophysical events**
(Earthquake, tsunami, volcanic activity)
- **Meteorological events**
(Tropical storm, extratropical storm, convective storm, local storm)
- **Hydrological events**
(Flood, mass movement)
- **Climatological events**
(Extreme temperature, drought, wildfire)

Loss events worldwide 1980 – 2014

Number of events with relative trend

Number



Geophysical events
(Earthquake, tsunami, volcanic eruption)

Meteorological events
(Tropical storm, extratropical storm, convective storm, local storm)

Hydrological events
(Flood, mass movement)

Climatological events
(Extreme temperature, drought, forest fire)

Vulnerability is complex

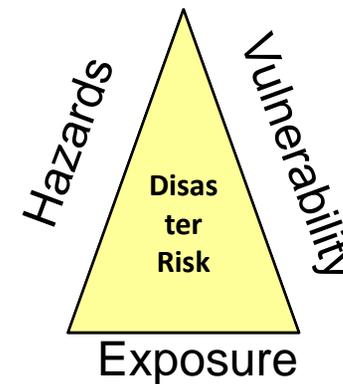
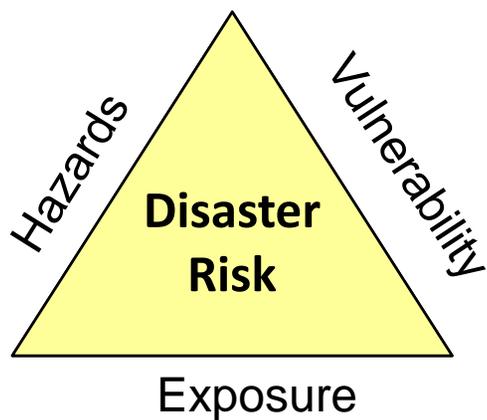
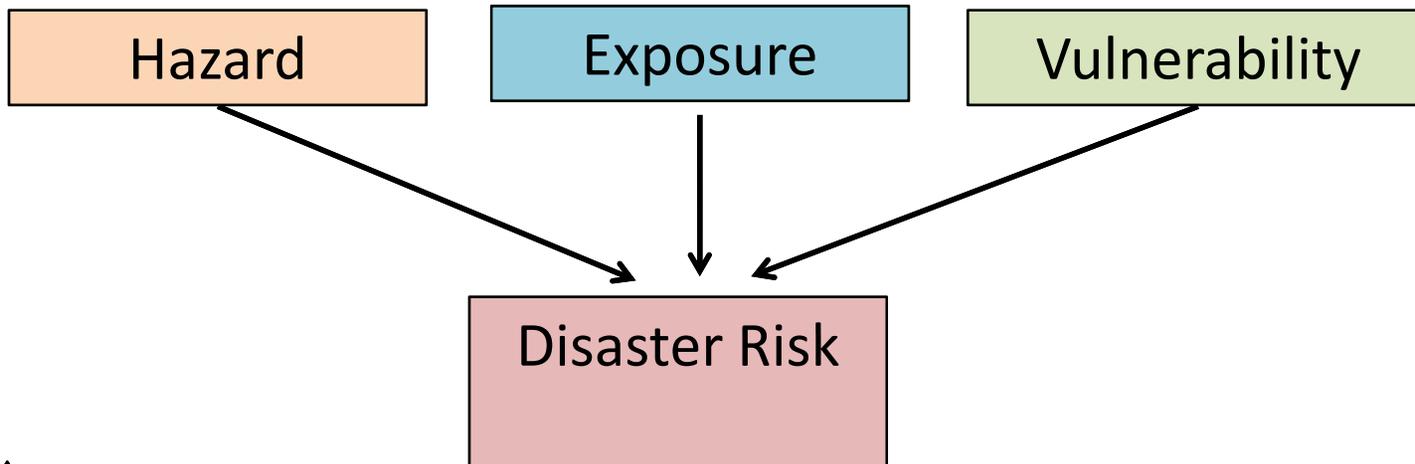
Disaster risk not only depends on the severity of hazard or the exposure to the hazard, but also on the susceptibility of people and economic assets to suffer loss and damage.

Physical factors: e.g. poor design and construction of buildings, unregulated land use planning, etc.

Social factors: e.g. poverty and inequality, marginalisation, social exclusion and discrimination by gender, social status, disability and age (amongst other factors) psychological factors, etc.

Economic factors: e.g. the uninsured informal sector, vulnerable rural livelihoods, dependence on single industries, globalisation of business and supply chains, etc.

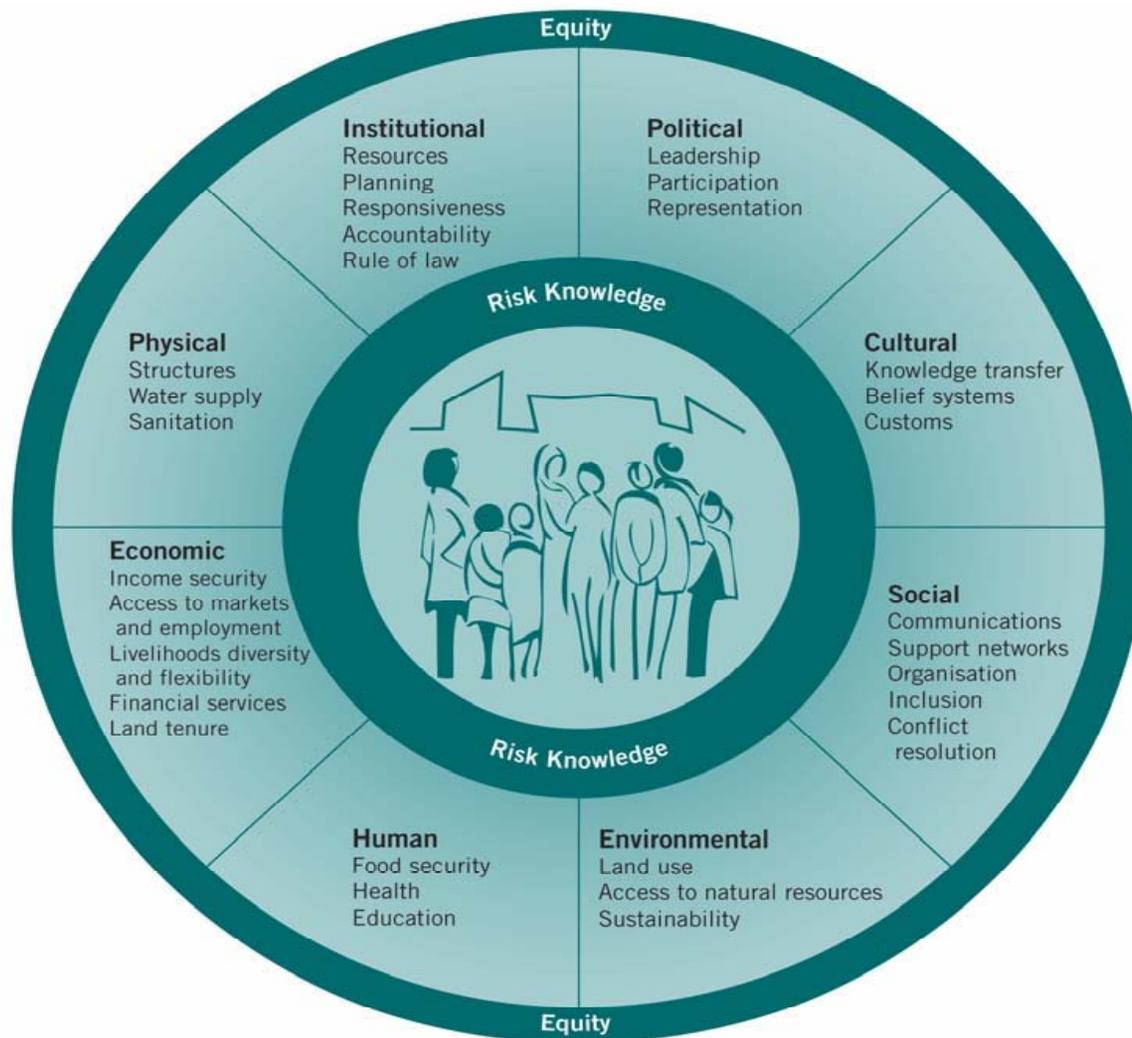
Environmental factors: e.g. poor environmental management, overconsumption of natural resources, decline of risk regulating ecosystem services, climate change, etc.



Approach to vulnerability reduction

Approach includes not just reduction of risks but also capacity improvement to resist and recover.

- Implementing building codes
- Insurance and social protection (risk)
- Emphasizing economic diversity and resilient livelihoods
- Knowledge and awareness raising
- Preparedness measures – Early warning, Evacuation, Quick response, Local capacity



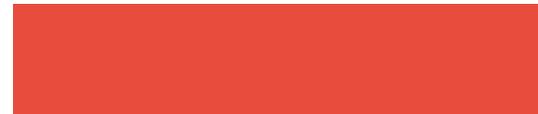
Source: Turnbull et al., 2013



Risk Mitigation involves

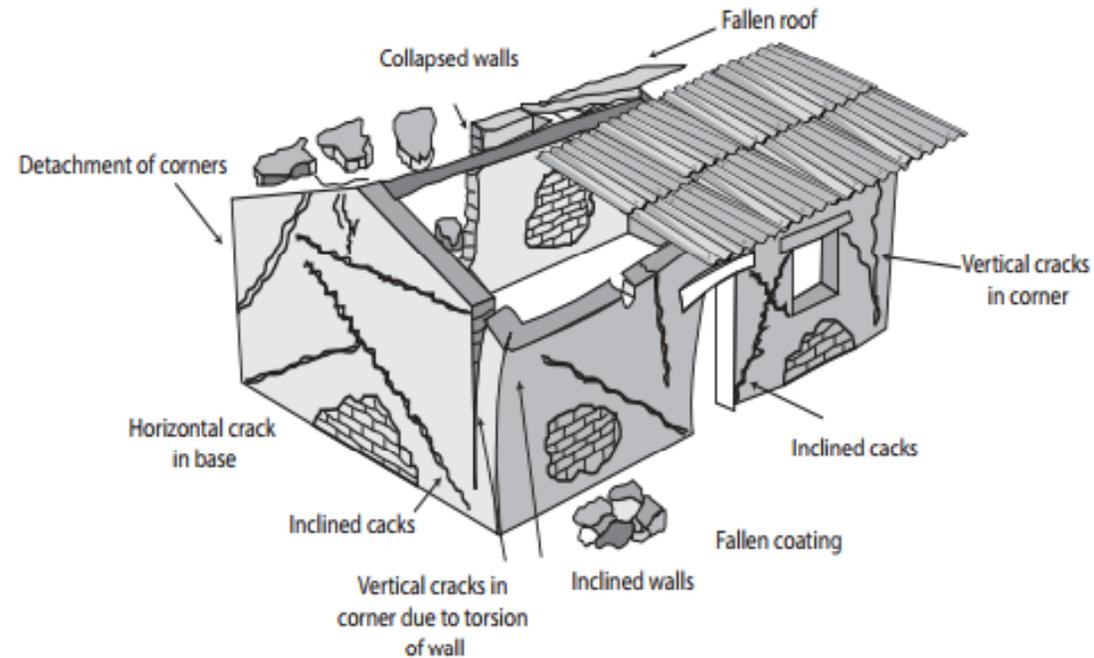
- Structural Measures
- Non-Structural Measures

What do we mean by these?



Why are the houses damaged?

- We do not build according to the technical standards of the construction code or regulations. (Poor quality materials, low specifications, technical gaps & mistakes)
- We have homes that have not undergone the required maintenance, and they are not longer up to standard.
- Many homes have already suffered damage from floods, earthquakes and other events, and were never repaired.
- Many homes are located in areas at risk for landslides, in flood plains or other such locations.



What can be **structural mitigation measures**?

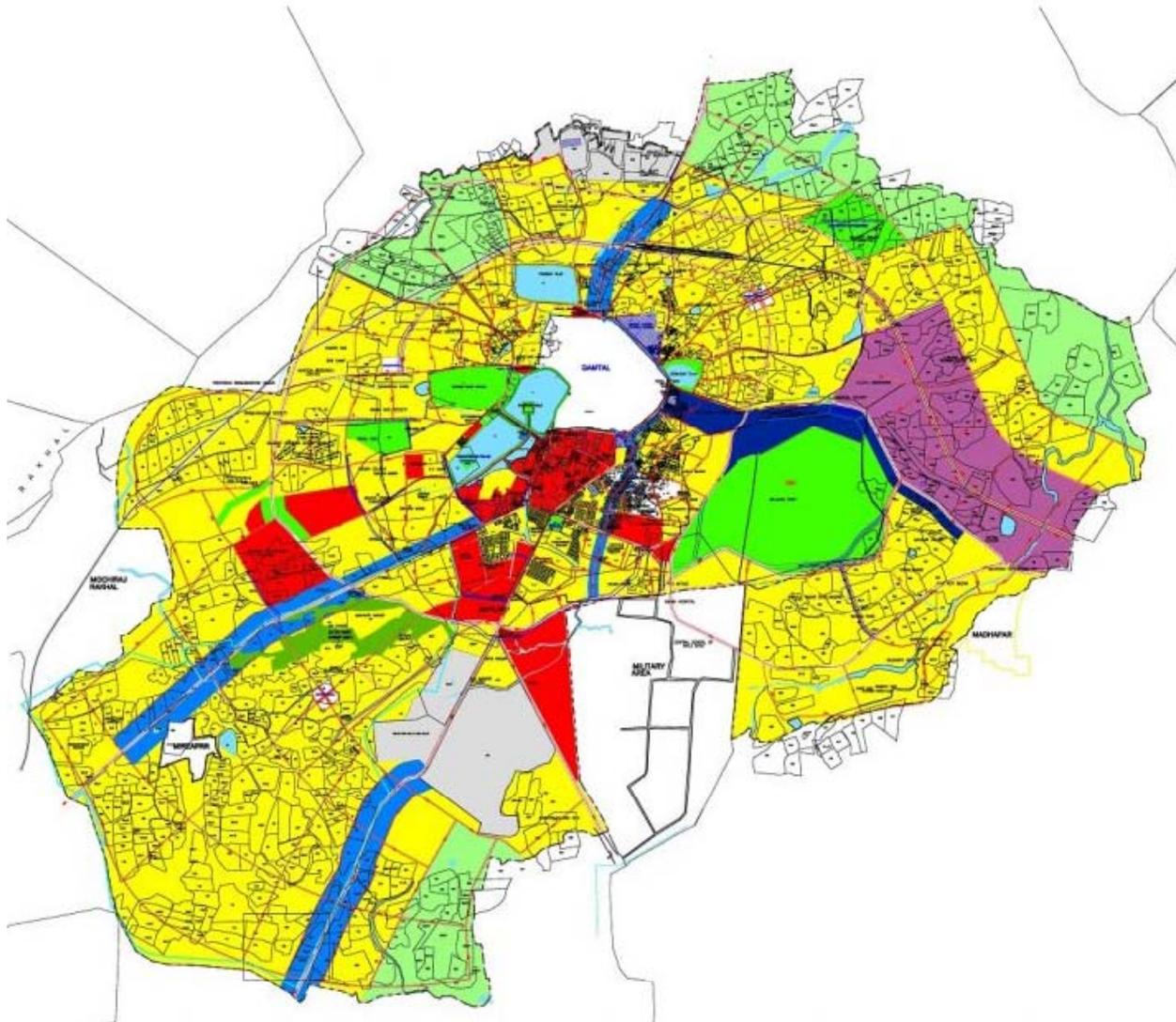
What can be **non-structural mitigation measures**?

Landuse

Refers to the manner of utilization of land, including its allocation, development and management.

Landuse planning: Emerging as important mitigation tool which is systematic, future-focussed decision making, and proactive measure. Therefore, it can help reduce disaster risks.

Landuse Plan



DRAFT DEVELOPMENT PLAN-2011AD, BHUJ
BHUJ AREA DEVELOPAMNT AUTHORITY

PROPOSED LANDUSE - A. D. A.
KEY MAP PLAN NO-1

LEGEND

- BRADA BOUNDARY
- VILLAGE BOUNDARY
- CITY SURVEY BOUNDARY
- MUNICIPAL BOUNDARY
- METER GAUGE RAILWAY LINE
- BROAD GAUGE RAILWAY LINE
- GAMTAL BOUNDARY
- LAKE
- WATERBODY
- DEFENSE AREA
- EXISTING ROAD
- EXISTING ASPHALT ROAD
- EXISTING STRUCTURE
- RESIDENTIAL ZONE
- GENERAL COMMERCIAL
- WHOLESALE COMMERCIAL
- INDUSTRIAL ZONE
- PUBLIC PURPOSE / INSTITUTIONAL ZONE
- OPEN SPACES / RECREATIONAL ZONE
- FOREST
- AGRICULTURE ZONE
- CEMETERY
- RESERVATION
- PROPOSED ROAD
- CENTERLINE OF PROPOSED ROAD

Land Use Plans

Land Subclassification is the act of determining and assigning the uses of classified public lands;

Zoning is the legislative act of delineating areas or districts within the territorial jurisdictions of cities and municipalities that may be put to specific uses and their regulation, subject to the limitations imposed by law or competent authority;

Land Use Conversion is the act of putting a piece or parcel of land into a type of use other than that for which it is currently being utilized.

Inputs for Land Use Plan

Cadastral maps

Topographic maps

Hydrological maps

Watershed maps

Slope maps

Soil maps

Population density map

Land value maps

Land use map (existing)

Environmental maps

Hazard maps – floods, fault lines

Building Regulations

To ensure compliance with land use and development plan

- Development Control Regulations/ Bye-laws
- Building Permit – Plan approval and Building Use

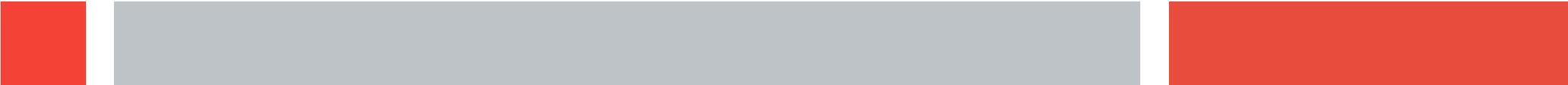
Most difficult to implement. WHY?

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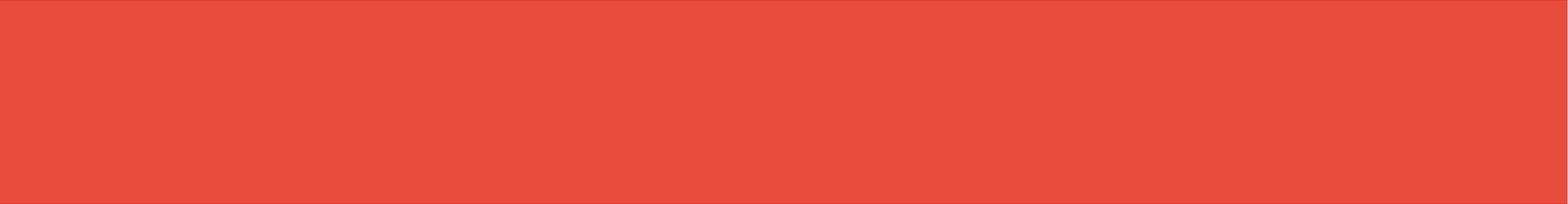
**How do Land Use Plans impact
Disaster Risks and Vulnerability?**

**How do we incorporate Land Use
Plans in Disaster Management
Plans?**



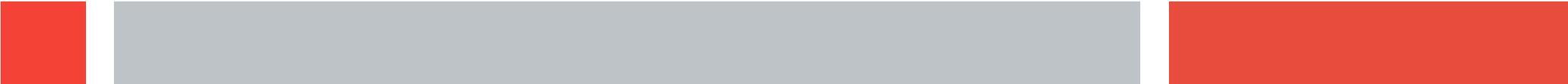
Case 1

There is a city called 'Vulatula' having population of 600,000. The city has three distinct parts – old walled city, southern new city and northern industrial park. It has an old walled city in the centre which has become dense and congested in last 2 decades. The historic wall is no more but its remains exist in many places reminding of glorious past. In last two decades, one observes that affluent families have been moving out of the walled city and going to newly developed areas in the south. There are many new gated communities of apartments and bungalows that private developers have been developing in the southern part. Many poor families (about 200,000 people) continue to stay back in old city. A large part of the old town has now become commercial hub for informal small enterprises manufacturing ready made clothes, utensils and leather goods and whole-sale business of grains, clothes, electronic goods. Like other typical historic towns it has narrow streets and cul-de-sac neighbourhoods. There are a few important historic monuments too in the old city. And usually one finds heavy traffic during the daytime as in any central business district. But it gets congested due to lack of parking space or other open spaces.



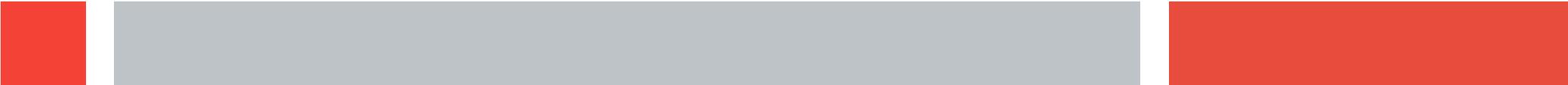
Most of the old city is mixed land use - residential, commercial and manufacturing. Some areas here have become slum-like over a period of time due to poor conditions of services. Sewerlines have not been laid out in this part due to complex, winding layout of narrow streets. However, it is amazing to see how the business - whole sale business and informal vendors - thrive in such a place. In old city, there have been lot of unauthorised modifications and additions to the old buildings. More floors have been added over old buildings. Houses have been converted into shops, godowns or manufacturing units. Usage and functions have changed over past two decades.

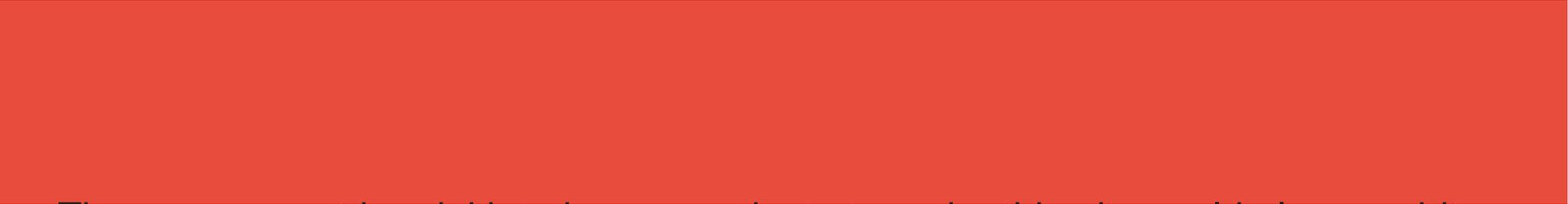
The suburban areas, actually no more sub-urban, where the affluent have shifted in last two decades has sprawled over large parts making city grow almost 6 times - mostly in the south of the old city towards 'Vulatula lake'. This lake which was once far away from the town is now within the city boundaries with new development coming up around it.





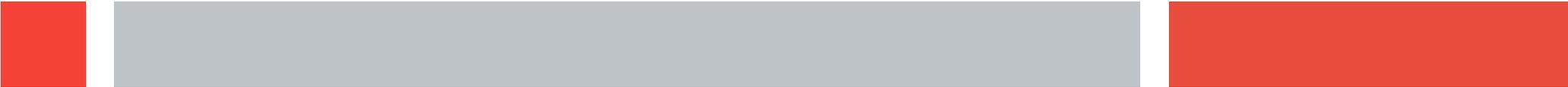
The ring road passing through this new part of the city has developed into a swanky commercial hub with wider roads having shopping malls, theatres, banks, restaurants and a stadium. This is some of the most expensive real estate of the city. A new public garden has been made near Vulatula lake. The new part of the city- southern suburbs – have seen lot of real estate activity and land prices in surrounding areas have soared. Many small ponds and lakes that existing earlier have now vanished to make place for new gated communities where the affluent families have settled. Even the total area of Vulatula lake has shrunk by 20% over last one decade. Many new apartments that have been built are not actually occupied and have been purchased only for investment purpose. At the same time, nearly 20% of total population of ‘Vulatula’ city is in slums located mostly in this new part of the city. In last 10 years many squatter settlements have cropped up where migrants (mostly) have come to settle for better livelihood opportunities. These slums provide household services for the rich and affluent families.





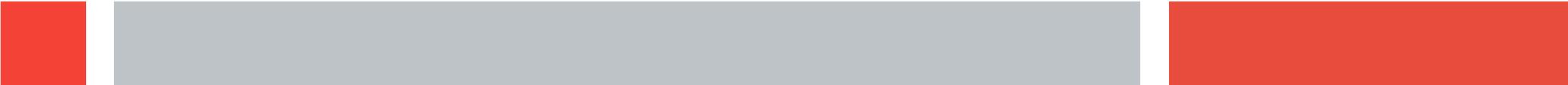
The government has initiated many projects to make this city world class and it can today boast of high speed Internet and reliable electricity. Many new flyovers have also been built in the new parts of 'vulatula' to ease congestion of cars which one observes despite wider roads. These flyovers connect southern part with the northern part where industrial park is being promoted by the government. This industrial park is to boost local employment and economy. City also has slum development project and has been trying to resettle slum dwellers in the northern part of the city where land is more cost effective. This has not been much successful.

This city of Vulatula has faced floods twice in last decade due to high intensity of rainfall. In floods of 2017, many new parts of the city were submerged in upto 5-10' of water and many roads were water logged. The annual rainfall of 20" was the highest in last decade and 50% of it poured in 4 days. Many gated communities and slum areas were cut off and boats were used to rescue people. Nearly 50 hutments in slums were washed away completely in the flood. Basements of many popular malls, theaters and business complexes were flooded completely and have incurred quite a bit of damage to building and property. Access to even the newly built public hospital near the Ring road was cutoff due to the floods. Two persons – a woman and a child-lost life in the floods.





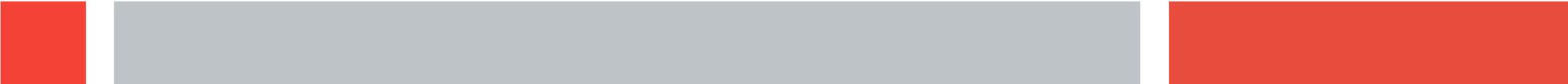
City found it difficult to house the evacuated. Schools and public halls were used. But providing basic services, food supply was major challenge and often resulted in chaos and poor hygienic conditions. Medical teams were on alert as many children and women fell sick. Old city performed better as it did not face any flooding due to being located on higher elevation. General topography indicates slope towards Vulatula lake in the south. However, due to poor weather condition of rains, an old building in the old city where water had leaked caught fire due to electric short circuit. In this accident, more than 10 shops and one godown were gutted. Goods worth \$500,000 were destroyed. Fire tenders could reach after lot of difficulty due to heavy traffic and narrow roads. The industrial park was not much flooded.

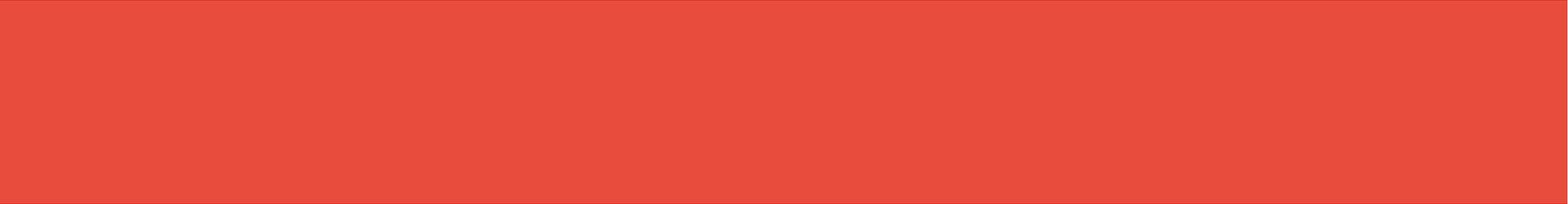




Municipality of Vumatula does not have a very good past record of regulating city development very well. Development around Vumatula lake, new slums, changes in old city, etc. indicate city management capacities have been poor. However, this recent flood disaster has shaken up the municipality and newly elected body. Insurance claims of people have mostly been rejected by the insurance companies as floods are considered 'acts of God' and hence not covered. However, a citizen activist group has argued flooding to be result of poor development management by the city government and not an 'act of God'.

Municipality has been very concerned about the safety of citizens and economic losses. They have received inputs from many experts that climate change might make such extreme weather events more frequent. The city continues to grow at rapid pace in terms of its population and economy. And such disasters impact people in major ways destroying their lives and livelihoods. The Land Development & Management Committee of the Municipality, which was in process of developing new land use plans for the city for 2017-2022, is meeting in the aftermath of these floods to review what had happened and prepare recommendations on what could be done to mitigate such a disaster in future.





Your group is this Land Development and Management committee.

- 1) Prepare a map of the city based on this description so as to communicate and discuss ideas.
 - 2) Present your understanding of existing landuse pattern.
 - 3) List down all the issues that arise of the situation described in the case study and underlying causes.
 - 4) Identify all the disaster risks.
 - 5) Provide recommendations for landuse planning to reduce furture disaster risks.
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