

UNIT 1

INTRODUCTION TO DISASTER

DISASTER

A disaster is a manmade event or natural event that negatively affects the life, property, livelihood or industry often result in permanent changes to human societies, ecosystem and environment.

Types of disaster

- Natural disaster (earthquake, landslide, flood, drought, wildfire..etc)
- Manmade disaster (nuclear, chemical, biological, radiological)

Hazard

A hazard is any agent that can cause harm or damage to human, property or the environment

Vulnerability

It refers to the inability to withstand and recover from the impact of a natural or manmade hazard.

Types of vulnerability

1. Physical Vulnerability may be determined by aspects such as population density levels, remoteness of a settlement, the site, design and materials used for critical infrastructure and for housing .

Example: Wooden homes are less likely to collapse in an earthquake, but are more vulnerable to fire.

2. Social Vulnerability refers to the inability of people, organizations and societies to withstand adverse impacts to hazards due to characteristics inherent in social interactions, institutions and systems of cultural values.

Example: When flooding occurs some citizens, such as children, elderly and differently-able, may be unable to protect themselves or evacuate if necessary.

3. Economic Vulnerability. The level of vulnerability is highly dependent upon the economic status of individuals, communities and nations The poor are usually more vulnerable to disasters because they lack the resources to build structures and put other engineering measures in place to protect themselves from being negatively impacted by disasters.

Example: Poorer families may live in squatter settlements because they cannot afford to live in safer (more expensive) areas.

4. Environmental Vulnerability. Natural resource depletion and resource degradation are key aspects of environmental vulnerability.

Example: Wetlands, such as the Caroni Swamp, are sensitive to increasing salinity from sea water, and pollution from stormwater runoff containing agricultural chemicals, eroded soils, etc.

Disaster management

It can be defined as the organization and management of resources and responsibilities for dealing with all humanitarian aspects of emergencies in particular, preparedness, response and recovery in order to lessen the impact of disaster. It means, all such measures should be taken so that the hazard cannot take the form of disaster.

Disaster resilience

Disaster resilience is the ability of individuals, communities, organizations and states to adapt to and recover from hazards, shocks or stresses without compromising long-term prospects for development.

Risk

It is expressed as the probability of loss of life, injury or destruction and damage from the disaster in a given period of time.

Goals of Disaster Management:

- (1) Reduce, or avoid, losses from hazards;
- (2) Assure prompt assistance to victims;
- (3) Achieve rapid and effective recovery.

PSYCOSOCIAL IMPACT OF DISASTER

- Depression
- Consuming excessive alcohol
- Feeling insecurity
- Other mental health condition

Factors of Vulnerability

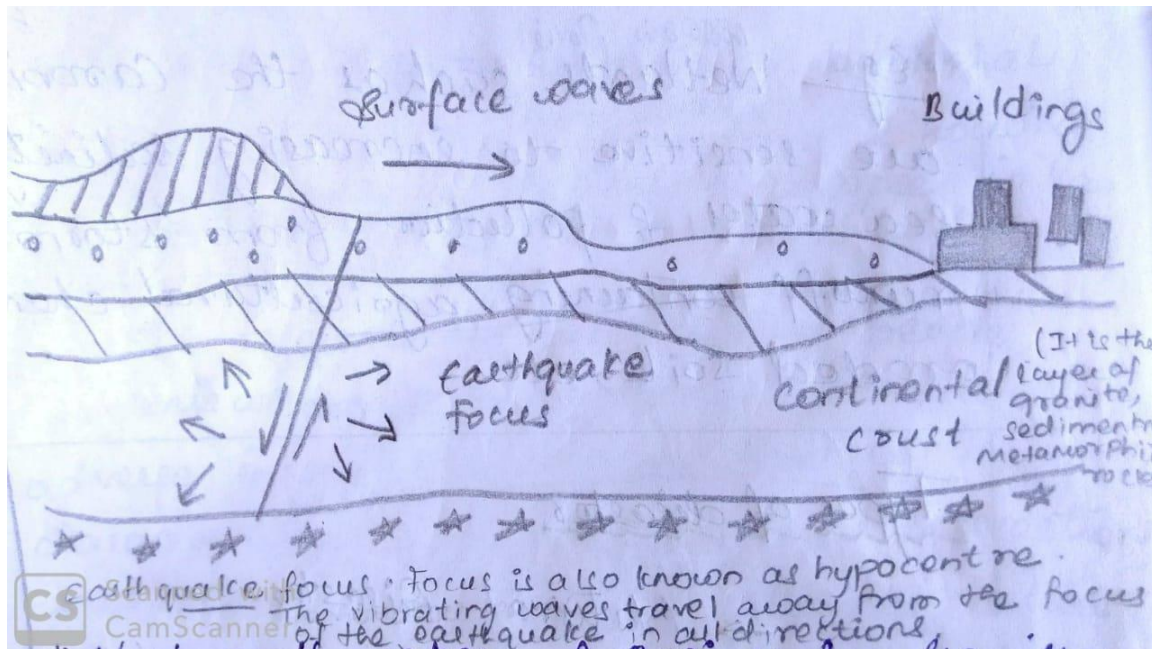
- ✓ Location of settlements in seismic areas and size of the population.
- ✓ Inadequate building practices and regulations.

- ✓ Dense concentration of building with high occupancy.
- ✓ The absence of warning systems and lack of public awareness on earthquake risk

EARTHQUAKE

Earthquake is a sudden and violent shaking of ground causing great destruction as a result of movement of earth crust

Earthquake waves



Focus: the point within the earth where stress breaks

Epicenter : the point directly above the focus on the surface

Earthquake vibrations originate from the point of initiation of rupture and propagate in all directions

These vibrations travel through rocks in the form of elastic waves

1. primary waves (P-waves)
2. secondary waves (S- waves)
3. surface waves

Primary waves

- Fastest waves are called primary waves
- It is the first to reach any particular location after an earthquake occurs

- It travel though earth crust at an average speed of about 5 km/s
- It can pass through solids, liquids and gases
- Buildings experience push and pull as primary waves pass through the ground

Secondary waves

- It is the second seismic waves to arrive at any particular location after an earthquake
- It travel through earth's interior at about half the speed of primary waves
- It passes through a solid materials like rocks
- Unlike the primary waves it cannot pass through liquids or gas
- It moves small buildings back and froth as they pass

Surface waves

- Surface waves are the seismic waves that moves along the earth's surface not through its interior
- These waves travel slowly compared to other types of seismic waves
- Surface waves cause the largest ground movements and the most damage
- They make the ground roll up and down or shake side to side

Types of earthquakes

1. Tectonic earthquake
2. Induced earthquake
3. Volcanic earthquake
4. Collapse earthquake

Tectonic earthquake

- Earthquakes caused by plate tectonic are called plate tectonic
- They usually occur at the boundaries of tectonic plates

Induced earthquake

It is caused by human activity , like tunnel construction, filling reservoir or fracking projects

(pumping large amount of fluid under high pressure into a drilled hole to break the rock that will release gas or oil)

Volcanic earthquake

It is associated with active volcanism. They are not powerful as tectonic quakes and often occurs relatively near the surface

Collapse earthquake

It can be occurred by such phenomena as cave-in, mostly areas close to mining activities as a result of subsidence

Causes of earthquake

- The earth crust consists of 7 large lithospheric plate and numerous small plates
- These plates moves towards each other (convergent boundary), apart (divergent boundary) or past each other (transform boundary)
- Earthquakes are caused by sudden release of stress along faults in the earth crust
- **Fault –it is a thin zone of crushed rock separating blocks of earth crust**
- The resulting waves of seismic energy propogate through the ground and over its surface, causing the shaking is considered as earthquake

IMPACT ON SOCIETY

- Death of people
- Loss of communication
- Loss of property and money
- Affects the mental health



IMPACT ON ECONOMIC

- Loss of immovable assets
- Loss of movable assets
- Economic loss due business interruption
- Household income loss due to injury, job disruption

IMPACTS ON ENVIRONMENT

- It is divided into 2 types
- **Primary effect:** Primary effects: which are the surface expression of the seismogenic source (e.g., surface faulting), normally observed for crustal earthquakes above a given magnitude threshold (typically $M_w=5.5-6.0$)
- **Secondary effects:** mostly this is the intensity of the ground shaking (e.g., landslides, liquefaction, etc.)

Preventive measures

- Listen to the radio and follow the instructions issued by the authorities
- Participate in disaster training
- Always prepare to carry an emergency kit
- Supply of food and drinking water.

- Construction of may be building designed as resistable

Do's

- Cover your mouth with a handkerchief or clothing
- Teach all family members how and when to turn off gas, electricity, and water.
- Teach children how and when to call police, or fire department and which radio station to tune for emergency information
- Keep calm.
- Stay away from glass windows, doors, almirahs, mirrors etc.
- Stay away from falling plaster, bricks or stones.
- Get under a table or a sturdy cot so that you are not hurt by falling objects.
- Stay under strong desk or table
- If open space is available nearby, go there.
- Keep away from tall chimneys, buildings, balconies and other projections.

DON'TS

- Do not run through streets; hoardings or lamps may fall on you.
- Do not crowd around damaged areas or buildings.
- Do not waste water
- Do not move the seriously hurt people. Wait for medical help to arrive.

DROUGHT

- Occurs due to below average rainfall that results in shortage of water supply that is surface water or ground water
- It can last for months or years or may be few days
- It affect the ecosystem and agriculture and harmful to economy
- In dry season there is a chance of drought developing and bush fires
- Increase in heat makes the water to evaporate

Types of drought

1.Meterological drought

- ✓ occurs when there is prolonged time with less average rainfall.

2.Hydrological drought

- ✓ It refers to low volume of water in streams and reservoirs lasting months or years

- ✓ Hydrological drought usually related to meteorological drought

3. Agricultural drought

- ✓ Various characteristics like rainfall shortages, reduced groundwater ..etc
- ✓ It affects the crop production
- ✓ Poorly planned agriculture crops cause lack of water

4. Socioeconomic drought

- ✓ It is associated with the supply and demand of some economic good with elements of meteorological, hydrological, and agricultural drought.
- ✓ It differs from other types of drought
- ✓ It depends on supply and demand
- ✓ Demand for economic goods increasing as a result population growth and economic development
- ✓ Supply increase because of improved technology or construction of reservoirs.
- ✓ When both supply and demand increase the critical factor has relative change
- ✓ Socioeconomic drought is formed when the demand for water for economic activities far exceeds the supply

CAUSES OF DROUGHT

- Drying out surface water and underground water
- Drought can also be supply and demand of water issue
- Change in temperature
- Loss of production in agriculture
- Change in weather and air condition

ECONOMIC IMPACT

- Farmers have to spend lot of money for irrigation and watering animals

- Low yield equals to loss of income
- Business and industry that produce farm equipment may close down
- Shortage of rain produces drier conditions

ENVIRONMENTAL IMPACT

- Drought leads to death of water animals
- Leads to zero soil moisture
- Quality and health of surface water such as rivers, streams, lakes will be affected.
- Wildlife will be affected

SOCIAL IMPACT

- Drought leads to malnutrition, hunger and affects the human health due to scarcity of water
- Loss of human life
- Health problems related to dust
- Income reduced
- Reduction in social interaction



PSYCHOLOGICAL IMPACT

- Stress
- Anxiety
- Depression
- Mental health disorder

DO'S AND DON'TS FOR DROUGHT

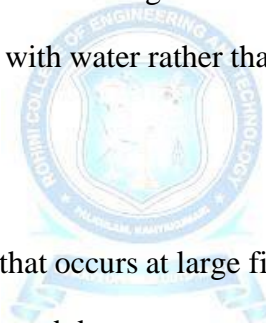
Do's

- Implement rain water harvesting
- Advice the farmers for taking up drought resistant crops and crops requiring less water

- Optimum usage of water
- Awareness programs should be conducted
- Teaching through education

Don'ts

- Don't waste more water for bathing and washing clothes
- Avoid unnecessary flushing of water in toilets
- Place a bucket in the shower to catch excess water for watering plants
- Don't let the tap to run water while brushing or washing the face
- Clean vegetables in a pan filled with water rather than running water from the tap



WILDFIRE

- Wildfire is an uncontrolled fire that occurs at large field areas of land.
- It is commonly occur during hot and dry seasons.
- Typically fires started out of a lightning strike or people carelessly started it or accidentally or even arson that went un-noticed and got out of land.
- These fires sometimes burn for days and weeks.
- They can wipe out entire forests and destroy almost every organic matter in the forest.

TYPES OF FIRES

1. Forests fires
2. Surface fires
3. Ground fires
4. Crown fires
5. Underground fires
6. Firestorms

FORESTS FIRES

- A forest is an entire ecosystem consists of
 - * Biotic factors like animals, insects, birds, bacteria, plants and trees.
 - * Abiotic factors like water, rocks and climate.
- If wildfire strikes in such ecosystem, all life forms will be lost.
- Air and water will be heavily polluted.
- Soil will be affected and abiotic factors will be affected.

SURFACE FIRES

- A forest fire spreading along the ground as the surface litter (twigs and dry grasses etc) on the forest floor and is engulfed by the spreading flames

GROUND FIRES

- Fires that burn organic material in the soil is called ground fires.
- It is a slower burning fire under litter or under vegetation.
- They burn by glowing combustion.

CROWN FIRES

- A crown fire is one in which the crown of trees and shrubs burn by a surface fire.
- A crown fire is particularly very dangerous in a coniferous forest because resinous material given off burning logs burn furiously.
- On hill slopes, if the fire starts downhill, it spreads up fast as heated air adjacent to a slope tends to flow up the slope spreading flames along with it.

UNDERGROUND FIRES

- The fires of low intensity
- In dense forests a thick mantle of organic matter is found on top of the mineral soil.
- This fire spreads in by consuming such materials.
- These fires usually spread entirely underground and burn for some meters below the surface

- This fire spreads very slowly and in most of the cases it becomes very hard to detect and control such type of fires.
- They may continue to burn for months and destroy vegetative cover of the soil.

FIRESTORMS

- Among the forest fires, the most rapid spread fire is the firestorm.
- As the fire burns, heat rises and air rushes in, causing the fire to grow.
- More air makes the fire spin violently like a storm. Flames fly out from the base and burning starting smaller fires around it.
- Temperatures inside these storms can reach around 2,000 degrees Fahrenheit.

CAUSES OF WILDFIRE

- **Natural causes**

- * Many forest fires start from natural causes such as lightning which set trees on fire.
- * However, rain extinguishes such fires without causing much damage.
- * High atmospheric temperatures and dryness (low humidity) offer favorable circumstance for a fire to start.

- **Man made causes**

- * Fire is caused when a source of fire like naked flame, cigarette or bidi, electric spark or any source of ignition comes into contact with inflammable material.

EFFECTS OF WILDFIRE

- ❖ Loss of natural resources
- ❖ Loss of bio diversity and extinction of plants and animals
- ❖ Reduction of forests cover
- ❖ Global warming
- ❖ Change in climate with unhealthy living condition
- ❖ Loss of valuable timber resources

PREVENTING MEASURES

- Modern fire fighting like the Early Forest Fire Detection using radio acoustic sounding , doppler radar..etc
- Use of modern fire detection and monitoring systems with the help from the Forest Survey in India (FSI) and ISRO
- Prevention of forests fire through law and education
- Creating awarness among locals along with participation can be a better solution
- Keep fire service number handy

DO'S AND DON'TS OF WILDFIRE

Don'ts

- ✓ Don't throw smoldering cigarettes butts or bidi in forest
- ✓ Don't leave the burning sticks or wood in forests
- ✓ Don't enter the forests during fire
- ✓ Don't be scared while sudden fire occurs in the forests

Do's

- ✓ During fire listen regularly to radio in advance information and obey the instructions
- ✓ Move the farm animals and move the goods to safer place
- ✓ Teach the causes and harm of fire to our family
- ✓ Make people stay awake about forest fire safety

FLOOD

- It is an overflow of water that submerges the land that is usually dry.
- Occur from river, lake..etc that overflows or breaks resulting in escape of water.
- It damages homes and business
- It can develop in just few minutes

Types of flood

1. Areal flooding

- ✓ Floods happen on flat or low lying areas when water is supplied by rainfall or snow melt.

2. Slow rising flood

- ✓ commonly occur in large river with large catchment areas.
- ✓ The increase in flow may be result in sustained rainfall, snow melt..etc

3. Flash flooding

- Caused by heavy and sudden rainfall
- It happens when ground water cannot absorb the water quickly
- Flash flooding can be prevented by good drainage system

4. Ground water flood

- Opposite to flash flood
- As rain falls over an extended period the ground becomes completely wet and cannot absorb anymore
- Thus the water rises on the surface and causes flooding
- This type of flooding last for weeks or sometimes months

5. Urban flooding

- It causes due to the lack of drainages in urban areas
- It mainly occurs in densely populated area

CAUSES OF FLOOD

- Overflowing of water from the rivers
- Broken dams cause escaping or leakage of water
- Deforestation
- Melting of snow and ice

- Heavy rainfall cause increase in water content

ECONOMIC IMPACT

- Roads, bridges, farms, houses are destroyed
- It may take years to recover for the affected communities and business
- Fire man, police and other emergency recue teams help the affected, all these come to heavy cost to government.

ENVIRONMENT IMPACT

- Chemicals and other environment hazardous material will end up in water and got contaminated
- Flooding kills animals and other insects
- Disorting the natural balance of ecosystem



SOCIAL IMPACT

- Loss of people
- Many people will be homeless
- People will be affected by diseases like cholera ,dysentry ..etc

DO'S AND DON'TS FOR FLOOD

DO'S

- Switch off electrical and gas applainces and turn off the mains
- Always carry the emergency kit
- Stay away from poor electric lines
- Listen to radio for updates
- Try to keep away from flood water that may be contaminated with chemicals

DON'TS

- Don't walk through flowing water
- Don't swim through fast flowing water

- Don't eat any food that has come into contact with flood water
- Don'ts walk on bridges as they may collapse
- Don't reconnect the power supply until the EB checks

DIFFERENTIAL IMPACT

The term differential impact is experienced by the different individual, communities or groups when faced with an event with damaging impact

- With respect to the impact of disasters(natural or man made) a community or society can be broadly classified into following groups

1. females
- 2.males
- 3.poor
- 4.labourers
- 5.disabled
- 6.children
- 7.old people
- 8.affluent



GENDER

- Gender refers to the socio-cultural definition of man and woman, the way in which they are differentiated and assigned socially acceptable roles.
- Thus gender is a construction by the society through which men and women are categorized into two divisions.
- Each division is expected to behave in a specified way and perform certain roles and tasks.
- These are maintained, sustained by multiple structures like family, community, society, ethnicity, and through tools like culture, language, education, media and religion.

CLASS

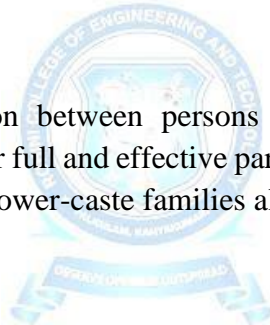
- Class is based on political and economic status, with landlords at the top and landless laborers at the bottom, representing a unique form of inequality that is perpetuated by caste
- At the same time, belonging to a privileged class can help women to overcome barriers that obstruct women from less thriving classes.

CASTE

- Caste is based on a ritualized purity, with the Brahman on top and the (former) untouchables" or the low caste at the bottom of the hierarchy.
- Even though being lower caste is undoubtedly a separate cause of disparity, its impact

Disability:

Disability results from the interaction between persons with disability and attitudinal and environmental barriers that hinders their full and effective participation in society on an equal basis with others. is all the greater when the lower-caste families also happen to be very poor



Differential Impact on age

- Unable to hear
- Difficult in projection
- Difficult in getting relief and compensation money

Differential impact on disability

- They are not homogenous
- Different disabilities requires different requirements

Differential impact on gender

- Identifying and understanding the different lives of men and women
- Not spending the same on men and women
- Temporary shelter
- Violence against women

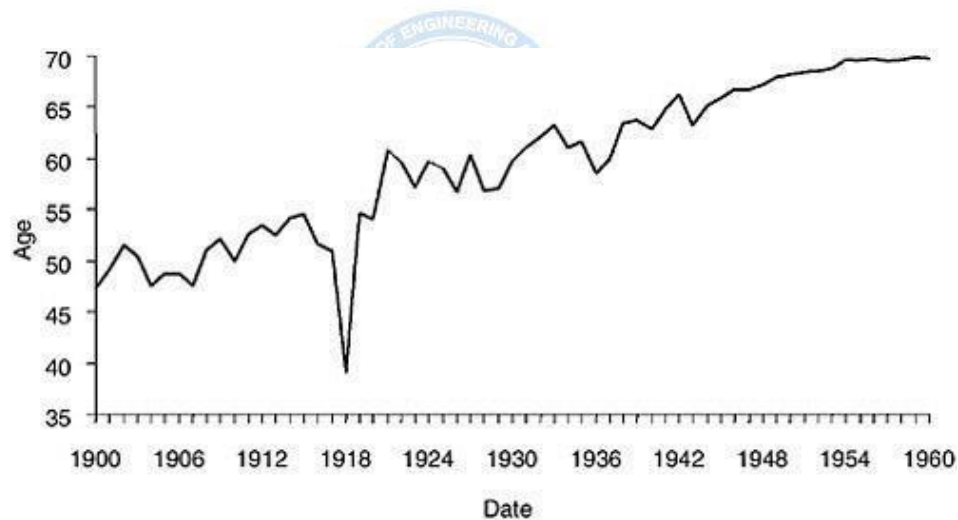
GLOBAL TRENDS

A general development or change in situation that affects many countries and peoples in the world

It shows the number of reported disaster and people affected.

PANDEMICS

- Pandemics are the epidemics of diseases that occur in world wide scale and traditionally caused by infectious diseases such as influenza
- They are unpredictable in their timing, but recent history indicates that influenza pandemics expected to occur in every 10 to 15 years
- Almost all human will be vulnerable, so the government should plan the preventive measures that can be carried out
- The overall strategy for responding to an emerging pandemics is to plan number of measures
- Graph for epidemics is shown below



MEASURES

- Slow the spread of the pandemic virus by sanitation system
- Encouraging social distancing, personal hygiene management strategies
- Awareness programs should be conducted
- Care and treatment for the ill
- Successful planning and response
- Cost effective strategies should be adopted

IMPACTS

- It arise rapidly and spread quickly
- It make the people very ill and likely to die
- Individual behaviour changes such as fear at workplaces

- It occurs in several waves, each lasting for several months
- It cause significant wide spread increasing in morbidity and mortality

COMPLEX EMERGENCIES

- The term complex emergencies is used to describe situation of disrupted livelihood and threat produced by warfare
- It is normally associated with problems of displaced people
- It is isolated from a government or private support structures
- Some people intent to not returning to their native countries are considered as refugees and they may be affected by complex emergencies
- Disaster or emergency situation are caused by identifiable human actions apart from “technological and ecological disaster”
- Technological disaster are structural collapse such as bridges, buildings and also industrial accidents such as chemical or nuclear explosion
- Ecological disaster are Bhopal gas leak, gulf war oil spill..etc
- This mainly involves situation in which loss of life, livelihood, property
- Human made emergencies can be rapid or slow and it lead to complex emergencies
- Some of the examples are ground water contamination, chemical spills..etc

IMPACTS

- People livelihood will be affected
- Loss of property
- Environment will be affected
- Ground water contamination due chemicals..etc

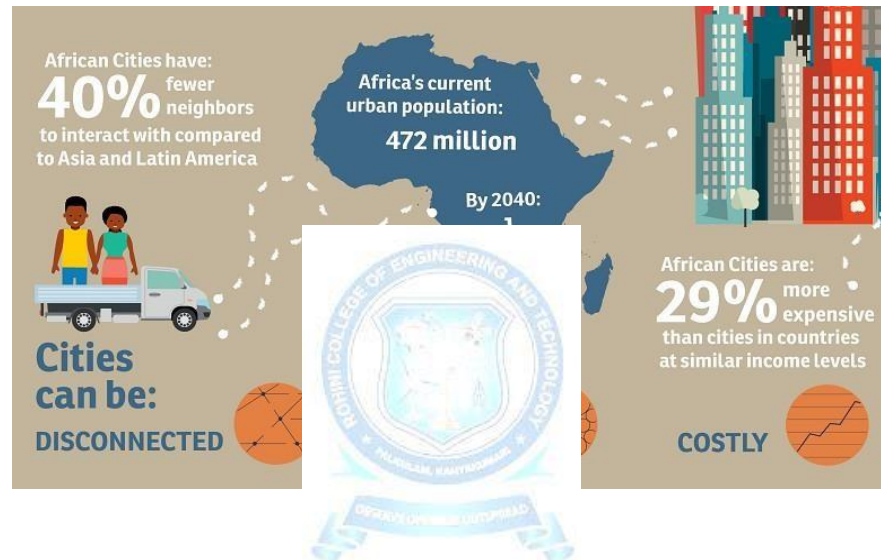
MEASURES

- ▲ Public awareness should be increased
- ▲ Co-ordinaton between NGO's provide better solution
- ▲ Increase and improve collection of data by age, gender..etc
- ▲ Document, compare and validate the information

URBAN DISASTER

- ✓ The urbanization of the world's population is accelerating
- ✓ By 2008, more than 50 percent of the global population was already with more than 1 billion people living in slums
- ✓ The mega centre of urbanization suggests that by 2050 more than 67 percent of the population will be increased

- ✓ With climate change and other problems threat the urban poor and population are particularly at risk
- ✓ The key aspects such social, economic, technological and natural system function different in urban areas
- ✓ We must develop necessary response to the rising urbanization trend to meet the world
- ✓ Example : African countries



IMPACTS

- It leads to loss of unemployment
- Increase in price for food
- Increase in price for shelter
- Demand for water will be high
- Lack in financial and physical assets such as property, money..etc

MEASURES

- Working closely with urban centre of expertise
- Changing the approaches and development activities
- Developing new skills and capacities
- Co-ordination between departments

GLOBAL TRENDS IN CLIMATE CHANGE

- Changing the climate across a wide range of observations
- Global warming of the past 50 years is primarily due to human activities
- Magnitude of climate change depend upon amount of heat

- Scientists and engineers from around the world have combined the evidence using satellite, weather balloons, thermometer and many other types of observing systems that monitors the earth's weather and climate.
- The sum total of this evidence tells i.e, the planet is warming
- Temperature at surface and ocean have increased over recent decades
- With scientific understanding the largest increases in temperature , especially in the arctic

In worldwide, the observed changes in average conditions have been accompanied by increasing extreme heat and decrease in extreme cold



IMPACTS

- Affects the human health
- Continuous change of climate cause infectious disease
- Environment will be polluted
- Cutting down of trees increase the heat

MEASURES

- Plant more trees
- Continuous monitoring of public health by government
- Maintain energy efficient vehicle
- Prevent wastage of water