**How environmental conditions affect where and how human populations choose to live.**

**Natural environment**

* Natural environment has provided man with useful resources.
* Natural environment may be classified into four categories:
	+ Physical: energy, mineral and soil resources;
	+ Biotic: forest, fish, animal and other life resources
	+ Geomorphic: flat plains and others
	+ Locational: good location for transport, communication and defense.

**What are Natural Hazards?**

* The natural environment is unstable.
* People have been learning to deal with the environmental risks and changes produced by the unstable environment.
* Extreme natural process (flood, earthquake or landslide…..)has the potential to be a natural hazard if it occurs where people live or have their property (buildings or animals…).
* Natural disaster when it exceeds normal expectations of frequency or involved.

**Venn Diagram of Natural Hazards and Natural Disasters**



* Responding to those hazards, society may seek to modify the natural events system and the human use system of locations, livelihoods, and social organization.

**Six Indicators**

|  |  |
| --- | --- |
| * Magnitude
	+ It is the most important indicator.
	+ Magnitude rate as ‘extreme’ happenings and pose sufficient threats to the human system to be considered natural hazards.
	+ Example:
		- The Richter Scale
 | * Speed of onset
	+ It refers to the length of time between the first appearance or warning of an event and its peak.
	+ Example:
		- Slow-onset hazards (drought and soil erosion)
		- Rapid-onset hazards (floods and earthquakes)
 |
| * Duration
	+ It refers to the period of time over which it occurs.
	+ Example:
		- Droughts: seasons or years
		- Floods: days or weeks
		- Tornados: minutes or hours
 | * Frequency
	+ It refers to how often an event of a given magnitude may be expected to re-occur.
	+ ‘Return period’: a recurrence interval of 10 years is to say it has in any year a 10% chance of occurring.
 |
| * Areal reliability
	+ Predictability of an natural hazards occur in an given area.
	+ Predictable and possible for planning.
	+ Example:
		- Volcanic eruptions: fixed point (volcano)
		- Floods: channels and flood plains
		- Tropical cyclones: several erratic paths
		- Earthquakes: unknown
 | * Areal extent
	+ The area of natural hazards affect.
	+ Example:
		- Avalanche: short and narrow belt of the landscape.
		- Drought or flood: several thousand km.
 |

**Impacts of natural hazards and level of economic development**

* About 95% of disaster related deaths occur among the two thirds of the world's population that occupy developing countries.
* In contrast to (these) ... differences in death rate, economic loss from natural disaster is commensurate with income distribution.
	+ About three-quarters of absolute global loss occurs in the wealthy countries... (However) the ratio of loss to income is much higher in the developing countries ...
	+ In developing countries, disasters may be less frequent but are more catastrophic and more costly in lives and relative wealth, whereas they are increasingly costly in absolute wealth in industrial nations."

**What is Flooding?**

* Flood:
	+ Coastal flooding: (above average sea level)
		- Unusual atmospheric conditions (eg. Onshore hurricane, tornado…)
		- Earthquake or volcanic eruption that set up huge tidal surges.
	+ River flooding (flow exceeds bank-full capacity)
		- It is a common hazard and occur anywhere in a river channel at lower course
		- May be caused by
			* Heavy rain
			* Rapidly melting snow
			* Natural or man-made dams collapse
			* others

**Nature of flood**

* Floods are the most common of all natural hazards
	+ Covers the largest spatial area
	+ Causes the greatest loss of life and property
	+ Human beings settle on flood plains
		- Abundant water supply
		- Fertile soil for farming
		- Flat relief for development
		- Navigator (transportation)
	+ Damage of floods
		- Water inundating (flooding) land, utilities, buildings, crops, communication and transport facilities.
		- After flooding, debris block streets, reservoirs and cover fields.
		- Disrupt normal supply of water, food, shelter and medicine, which cause health and pollution problems.

**People’s perception**

|  |  |
| --- | --- |
| **Hazard Perception** 1. Deny the hazard exists at all 2. Accept the hazard as a natural and inevitable event 3. Hazards are inevitable, but controllable.  | **Common Responses** 1. Do noting
2. Do noting
3. Modify the causes of flooding
 |

**People’s perception – cont’d**

* Perception is influenced by the following:
	+ The past record of hazards (magnitude and frequency)
	+ The strength of traditional cultures (attitudes to the environment)
	+ Education standard of the community
	+ Wealth and economic development
	+ Community awareness and preparations
	+ Willingness of local and national government to spend money on
		- Long-term hazard prevention and damage reduction schemes, or
		- Short-term emergency relief after a disaster
* These factors emphasized the social or cultural framework in which people live.
* In fact, the range of choices open to people is very limited and controlled by the social, economic and political conditions and pressures.
* From this perspective, it can explain why people often do seemingly irrational things.
* Bounded rationality vs Satisfying behavior

|  |  |
| --- | --- |
| * **Bounded rationality**
	+ People like to make a rational choice of responses.
	+ However,
		- Few people have access to full information
		- Many are just not aware of all the alternative responses available
		- People differ in their ability
		- Few like to forget previous painful history
 | * **Satisfying behavior**
	+ People make choices that help them achieve a satisfactory level of reward, but
	+ Stop short of striving for the highest possible level.
	+ Satisfier
		- Accept ‘tolerable’ levels of hazard
		- Avoid the worst of the impact
		- Their property is insured anyway.
 |
| * **Behavioral**
	+ Accepting loss (Third World)
	+ Public relief funds
	+ Flood insurance
	+ Flood forecasting and warning
 | * **Structural**
	+ Reservoirs (dams building)
	+ Channel enlargement
	+ Channel straightening
	+ Embankments
	+ Flood relief channels
	+ Barrages
	+ Flood plain zoning
	+ Reforestation
 |

**What is drought?**

* More than 1/3 of land is dry or very dry.
* Desert: annual rainfall < 250 mm
* Definition of Drought:
	+ “a period of unusually or unexpectedly low rainfall, which upsets the ecological balance.”
	+ A condition in which the amount of water needed for transpiration and direct evaporation exceeds the amount available in the soil.
	+ In term of the water need of a particular crop growing under a specific combination of environmental conditions.

**Problems to man**

* Effects of droughts:
	+ People themselves and their way of life
	+ Crops and livestock
	+ Natural vegetation and wildlife
	+ Soil
	+ Population size and population redistribution

**Role of man in causing the drought hazard**

* The human context in which hazards offer is more important than the geophysical causes of the event.
* Some factors influencing the human impact of natural hazards
	+ Population density in the area affected,
	+ Prior experiences of hazards in the area,
	+ Traditional methods of coping with hazards
	+ The degree of accuracy in predicting the hazards,
	+ The effects of any warning, preparation and /or evacuation procedures,
	+ The overall level of economic development in the area affected

**Population Growth Effects**

* Population growth has put increasing pressure on the environment.
* This pressure increases the risk of human-induced hazards and disasters.
* For examples
	+ The hazards of disturbing natural ecosystems and food webs by the clearance of vegetation, the use of chemicals in the atmosphere, and pollution.
	+ The hazard of increasing the risk of drought, floods and soil erosion by farming marginal areas particularly in semi-arid regions.