Introduction to Disaster Management

Disaster :- A sudden accident or a natural catastrophe that causes great damage or loss of life.

Disaster Management :- It is defined as the organization & management of resources and responsibilities of dealing with all humanitarian aspects of emergencies, in particular, preparedness response and recovery inorder to lessen the impact of disasters

Disasters are the consequences of natural or human hazards.

DM refers to the conservation of lives & property during a natural or Man-made disaster.

Scope of DM for Civil Engineering :-

→ Construction of any building should be based on national building code, vulnerability of that area to various disasters, Building should withstand maximum possible intensity of disaster.

→ Though design is primarily responsibility of civil Engineer during construction must ensure maintaining standards of

Construction and not allow sub standard work

- In Mitigation works there is big part of structural mit

Eg:- Retrofitting, Embakment etc

→ In post disaster situation, as mentioned relief camp, proper arrangement of water hygiene.

→ Infrastructure facilities are severely damaged in disasters reconstructing these basic infra facilities.

Eg:- Roads, bridges, railway lines, etc is most important to provide relief to affected communities.

→ Assessing damaged structures being fit/unfit to use is also one of the task in post disasters.

→ In permanent rehabilitation/reconstruction building safer constructions, advocating for policy changes through pressure groups etc. can be done by civil Engineers

* Environmental stress :- pressure on the environment caused by human activities (such as generation of pollution) or by natural events (such as occurence of drought)

Disaster Management

UNIT - I

Environmental Hazards and Disasters

Hazard : It may be defined as a dangerous condition or Event, that which has the potential for causing injury to life or damage to property or Environment.

Environmental Hazard : It is the state of events which has the potential to threaten the surrounding natural environment and adversely affect peoples health.

Hazards → Natural hazards
Hazards → Socio-Economic hazards
Hazards → Human-induced hazards

i) **Natural hazards** :- It is caused because of natural phenomenal hazards with meteorological, geological or biological origin

Eg:- Cyclones, Tsunamis, Earthquakes & volcanic eruptions

ii) **Socio-Economic hazards** :- Landslides, floods, drought, fires are socio-economic hazards since their causes are both natural and man-made.

Eg:- Flooding may be caused because of heavy rains, landslides, or blocking of drains with human waste

Man-made hazards :- These are the hazards which are due to human negligence. These are associated with or energy generation facilities & include exploration, toxic waste, pollution, dam failure, wars or civil strife etc.

Disaster :- It is an event which damages or causes loss of infrastructure, Environment, Essential services or means of livelihood on such a scale which is beyond the normal capacity of the affected community to cope with

Disaster :- Disaster is a sudden, catastrophic event that causes widespread & immeasurable damage, loss, destruction & devastation to life, property, livelihood, economy & environment.

It is also described as a catastrophic situation in which the normal pattern of life or ecosystem has been disrupted and extra-ordinary emergency interventions are required to save and preserve lives and or the environment.

Types of Disasters : Disasters can be categorised into various types depending on speed and origin

on speed :- Disaster can be either slow or

i) Slow onset disaster :- A disaster that prevails for many days, months or even years like drought, environmental degradation, pest infestations, famine etc.

ii) Rapid onset disaster :- A disaster that is triggered by an instantaneous shock with little or no warning and minimal time to prepare

Eg:- Earthquake, flash flood, volcanic eruption

Based on the origin/cause, disasters can be natural or human induced

1) Natural disaster :- A natural disaster is an event that is caused by a natural hazard and leads to human, material, economic and environmental losses, which exceed the ability of those affected to cope.

Eg:- 2004, Indian ocean tsunami

2) Human induced disaster :- A serious disruption of normal life triggered by a human-induced hazard causing human, material, economic and environmental losses,

which exceed the ability of those affected to cop

Eg:- 1984 Bhopal Gas tragedy.

Hazard leading to a disaster :- A disaster occurs when the impact of a hazard on a section of society is such that the people are unable to cope with the event causing death injury, loss of property and for economic losses.

Vulnerability :- It is the condition determined by physical, social and economic & environmental factors or processes, which increases the susceptibility of a community to the impact of hazards.

Eg:- People who are socially & economically underprivileged are more vulnerable to disasters

ie, people in living in low lying areas are more prone to to floods.

In terms of vulnerability, young children, elderly physically challenged are the ones who are likely to be affected more.

probability of harmful consequences or losses such as death, injuries, loss of livelihood, disruption in the economic activity and environmental degradation resulting from interactions b/w hazards and vulnerability conditions.

Risks often exist within social systems for example better employment opportunities attract people from the rural areas to cities. However, lack of adequate financial resources and high land prices in the city often force these immigrants to settle in slums that are unsafe and vulnerable

The level of risk depends upon:

a) Nature of the hazard

b) Vulnerability of the elements which are affected

c) Economic value of those elements.

Capacity: It can be defined as resources, means, strengths, which exist in households and communities and which enable them to cope with, withstand, prepare for, prevent, mitigate or quickly recover from a disaster.

Stressors of Environment :- They can be broadly categorized into the following types:

1. Physical stress :- Refers to the Kinetic energy developed in the earth by volcanic eruptions, windstorms and explosions.
2. Wild fire :- Forest fires causes combustion of biomass and also species of utmost importance.
3. Pollution :- Caused by pollutants such as oxides of N, S, C, O_3, CFCs, particulate matter, lead, pesticides, radioactive materials, sewage etc.
   ozone
4. Thermal stress :- Caused by the discharge/runoff of heated water from the industrial process (power plants, industries, factories) into the water bodies killing the aquatic organisms.
5. Radiation stress :- It is associated with the release of radioactive material into the environment from various sources such as production of nuclear fuel, use of isotopes in the industry, agriculture, medicine and scientific research.
6. Climatic stress :- It is associated with changes in the average weather such as temperature, wind pattern and

of a particular region.

6. Global warming, Late arrival of rains etc.

7. Biological stress :- It results from the complex and diverse interactions that occur among organisms of the same or different species. This type of stress occurs due to competion, parasitism (Tape worms), predation and also sometimes due to ind introduc -tion of exotic and non-native species.

Different approaches to disaster :-

Landscape approach :- It gives more importance to sustainability and conservation of biological diversity.

Importance of Landscape approach to disaster management is due to the following

i) It signifies the magnification of ecosystem based on conservation and sustainability.

ii) It involves communities in decision making.

iii) Proper exploitation of biodiversity to sustain judicious use of a healthy ecosystem

Ecosystem approach :- Involves effectively It is important to maintain a proper balance blw the conservation and

sustainable use in an equival way mainly human
are more effect on species and ecosystem diversity cause
-ction, modification, fragmentation of habitat, exotic species
harvesting and over exploitation as well as global climate
It is important in the fields of forestry, fisheries, farming
protected areas and urban planning etc.

Importance of this approach to disaster management has several advantages.

→ local livelihoods survive to restore the ecosystem.

→ preventing negative impact on ecosystem management & restoration

→ Help to recover the local communities for livelihood needs by increasing human well-beings.

3. <u>perception Approach</u> :- It is an interdisciplinary linkage involves in social influence risk communication, media coverage, Environmental perception information processing, decision making, psychological & psychological impacts of disaster.

Importance to disaster management to the following :-

→ Maintain healthy ecosystems that facilitate to reduce

disasters

→ use of Renewable land resources

→ Increase in the resilience of the ecosystem.

Human Ecology and its application in Geographical researches :-

In an Ecosystem, thermodynamics & biogeochemical cycles plays an important role in transfer of energy and mass.

Human Ecosystem involves the fundamental interactions of Ecology with the human social system.

→ Humans are bound to the natural world and they for a integral component of ecosystems.

Application in Geographical researches :-

→ Geographical Ecology of individual species, community and Ecosystem levels.

→ Interactions blw land and atmosphere.

→ Air pollution & urban climate.

→ water quality on landscape Ecosystem.

→ Urban growth.

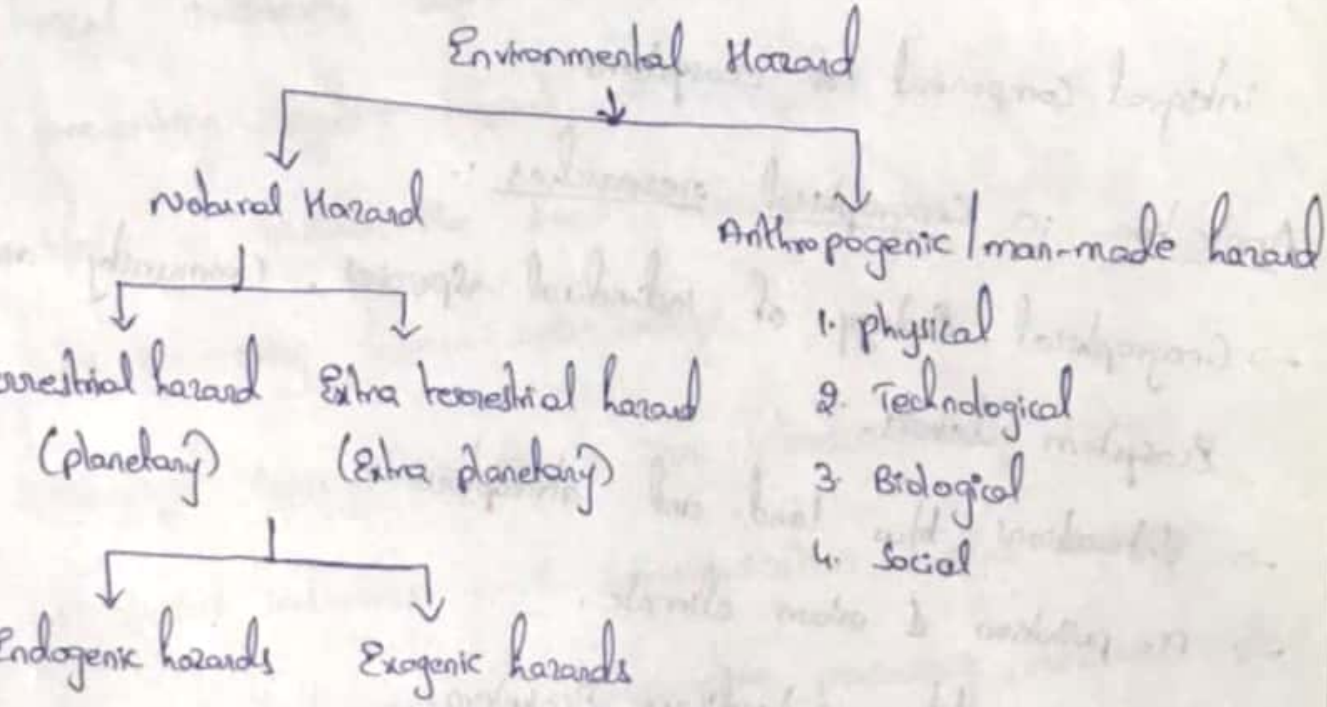
→ Environmental history of water & forests.

→ Understanding the linkage blw biological, climatic, geologic and hydrologic processes acting on the earth's surface.

→ Globalization and world cities.
→ Global biogeochemistry.
→ Geomorphological proces
→ spatial analysis
→ species distribution & ecosystem modeling by remote sensing.
→ Historical geography of migration, modernity and new world resettlement.

Types of Environmental Hazards and Disasters

Classification of Hazard :-



Eg:- Earthquake
volcanic eruptions
Tsunamis
Landslides
Avalanches
natural radio activity

Eg:- climatic hazards Eg:- El-Nino, sealevel rise, melting of ice
chronic → Eg:- drought, resource degradation etc.
Hydrologic Eg:- cyclones, hail, floods
Meteorological Eg:- storms, heat waves, cold waves
Infrequent events Eg:- Cyclones, lightening, hail storms

of Disaster :-

Based on origin disaster are.

- natural disaster
  - Major natural disasters
    - Eg:- flood, cyclone, draught, Earthquakes.
  - Minor natural disasters.
    - Eg:- Thunderstorms, cold waves, heat waves, landslides, storms.
- Man-Made disaster.
  - Major Man-made disasters
    - Eg:- forest fires, deforestation, pollution, war.
  - Minor-Man-made disaster.
    - Eg:- Road/train accidents, food poisoning, bomb blasts.

I) Terrestrial hazards :- arise from tectonic movements of lithosphere causing sudden violent movement of the earth's surface and also in the ocean which eventually result in great damage to the life and property.

a) Endogenic hazards :- The high pressure and high temperature present beneath the Earth's surface which produce internal forces to cause the movement of plates resulting in a disaster with great intensity and impact. And also known as geomorphic / geologic hazards.

Eg:- volcanic eruptions, earthquake, tsunamis, avalanches etc.

i) Exogenic hazards :- Also known as atmospher

hazards arise when there is some change in the atm

Eg:- storms, cyclones, floods, drought etc.

classified further to :-

i) climatic hazards :- (a) El-nino effect

(b) sea level rise

(c) Melting of glaciers

ii) climatic hazards chronic hazards :- It occurs due to long term conditions/problems

Eg:- drought, resources degradation etc.

iii) Hydrological hazards :-

Eg:- cyclones, hails, ice, snow, floods.

) Meteorological hazards :-

g:- storms, heat waves, cold waves etc.

Infrequent events :-

cyclones lightening & hail storms.

Extra planetary hazards :- (Super hazards) :- It is caused by collision of celestial bodies & the resultant falling

on the earth's surface.

magnetic storms, catastrophic earth charges, meteroite impacts & impacts from near earth objects (NEO)

Magnetic storms :- It is also referred to as a geomagnetic storms. It is the magnetic disturbance caused by the solar flares from the sun or the coronal mass ejections (CME)

Impacts :-

1. Disruption of communication & navigation systems due to ionospheric disturbances
2. Charged particles will be carried from the sun to the Earth by solar wind with ionic & interact producing electrons. These electrons will make O_2 & N_2 in the atmosphere to glow in different colour called Aurora

III. Anthropogenic hazards :- Include Environmental pollution, terrorism, destruction of property, wide spread hunger, road & rail accidents, bomb, Explosions, chemical spills

nuclear accidents, industrial accidents etc

② Physical hazards :- These hazards arise due to industrialization and urbanization leading to environmental degradation (such as deforestation, desertification, loss of natural resources, pollution, waste disposal etc.

① Technological hazards :- Include explosions, terrorism, release of toxic substances into the environment, oil spills, nuclear disasters etc. Generally caused by interaction of society technology & natural systems.

Environmentalists have further classified these into the following

(i) Industrial hazards :- Industrial processes, storage & transportation of hazard substances.

ii) Structural collapse hazards :- Due to poor Engineering collapse of construction projects, buildings, dams etc. occurs

iii) nuclear hazards :- It occurs as a result of release of massive amounts of radiation & radioactive material into the environment

iv) Computer hazards :- Caused by electronic appliances Computer eye strain, Computer vision syndrome.

v) Transportation hazards :- Accidents occuring on roads, railways, airways/waterways

(c) Biological hazards :- originates from biological sources such as bacteria, viruses, medical waste etc. Several diseases occur as epidemics.

Eg:- cholera, malaria etc.

Bio hazards
- pathogens :- causative agents of diseases like anthrax, plague etc.
- Toxins :- poisonous substances synthesized by plants & animals.

(d) Social hazards :- (also called as intentional hazards) These are originated from social systems such as population explosion, famine (extreme scarcity of food), war, conflict, terror attack, hijacking etc.

Types of disasters :- natural disasters, Man-made disasters

natural disaster :- Major, minor natural disasters

- major natural disasters are flood, cyclone, droughts, earthquakes, while minor natural disaster are cold waves, thunderstorms, heat waves, landslides, storms etc.

Man-Made disaster may be further classified into two types. they are :-

a) major man-made disasters :- forest fires, epidemic, deforestration, pollution pollution and wars, while the minor man-made disasters are road/train accidents, food poisoning, riots, bomb blasts and industrial disasters (Eg: Bhopal gas tragedy)

→ planetary hazards/disasters :-

Module II

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Classification of Hazards

Endogeneous Hazards :-

Volconoes :- volcano is an opening in the Earth's crust through which molten lava, volcanic gases (water vapour, carbondioxide, hydrogen sulfide, carbonmonoxide) and fragments of rocks are ejected from the interior of the earth through the vent pipe to the surface of the earth.

The process involved in the volcanic eruption are :-

The name volcano originates from Vulcan, the name of God of fire in Roman mythology. Study of volcanos are called volcanology.

Volcanos are generally found where tectonic plates are diverging or converging.

At the mid oceanic ridges, two tectonic plates diverge from one another. The crust is very thin at mid-oceanic ridges

due to the pull of tectonic plates. The release of pressure due to the thinning of the crust leads to adiabatic expansion and the partial melting of the mantle. Causing volcanism, and creating new oceanic crust. Most divergent plate boundaries are at the bottom of ocean, therefore most volcanic activity is submarine

Eg:- Black Smokers. However, where the mid-oceanic ridge is above sea-level, volcanic islands are formed.

Eg:- Iceland

Subduction zones are the places where two plates, usually an oceanic plate & a continental plate collide. As such the oceanic plate submerge under the continental plate forming a deep ocean trench just offshore. water released from the subducting plate however the melting temperature of the mantle thus giving rise to viscous substance called magma. Magma has high silica content and due to its high viscous nature, very often it does not reach the surface and cools at depth. However, when it reaches the surface a volcano is formed Eg:- Mount Etna.

Process involved in the volcanic eruptions :-

1) Degeneration of radio active elements in the earth's interior generates heat & thus raises the temperature.

2) Due to rise in temperature, the rock melts & results in the formation of molten rock material called magma

3) During this process accumulation of water vapour & other gases occur resulting in development of pressure that tends the magma to ascend.

4) It finally results into eruption of volcanoes.

I. Types of volcanoes :-

a) Les volcanos rouges :- (Red volcanoes) :- These emit red lava, generally found in mid oceanic islands.

b) Grey volcanos :- [Les volcanoes gris] :- These explosive eruptions contain grey ash. These volcanoes are generally found in islands or edges of continents.

II. Based on activities :-

a) Active volcanoes :- volcanoes that erupt regularly are called active volcanoes. Eg :- Along the pacific ring of fire.

US is home to 50 active volcanoes.

b) Dormant volcanoes :- They have erupted in historical times but which have remained dormant for many years are called dormant volcanoes.

Eg:- four peaked mountain in Alaska 8000 BC 2006 sept erupted

c) Extinct volcanoes :- volcanoes that have no previous record of eruption and have remained quiet are referred as extinct or dead volcanoes.

Eg:- volcanoes on the Hawaiian - empelor sea mount chain in the pacific ocean.

Volcanic features :- (Depending on the shape) :- The most common perception of a volcano is of a conical mountain, spewing lava and poisonous gases from a crater.

There are many types :-

1) fissure vents :- volcanic fissure vents are flat, linear cracks through which lava emerges.

2) shield volcanoes :- They are broad, sheild like & are formed by the eruption of low viscosity lava that can flow over a larger distance from the vent. and generally do not explode catastrophically since low viscosity magma is typically

how in Silica, shield volcanoes are common in oceanic than Continental settings

Eg:- Hawaiin volcanic chain is a series of shield cones.

ii) Lava domes :- These volcanoes have cone-like structure with steep slopes. They are produced from violent and explosive eruptions with thick and highly viscous, silicate rich acid lava and do not flow far from the vent.

iii) Ash and cindercones :- The molten lava flows from the volcanoes vent into the atmosphere to form lava fountains. It contains small, solid fragments of ash & rock.

Eg:- Craters of moon in Idaho, USA.

iv) Strato volcanoes :- They are also known as composite volcanoes. These are tall conical mountains composed of lava flows and other ejecta like ash in the alternate layers. These volcanoes are made of cinders, ash & lava.

Eg:- Mt. Fuji in Japan, Mayon volcano in philipp.

v) Calderas :- These volcanoes have circular depressions with a width of several Kilometers in diameter.

Eg:- San Juan mountains in U.S.

vi) Super volcano :- It is a large volcano that usually has a large caldera and can potentially produce devastation on an enormous scale. such eruptions would be able to cause severe

cooling of global temperatures for many years afterwards because of the huge volumes of sulphur and ash erupted. They are the most dangerous type of volcano.

Eg: Yellow stone caldera in yellow stone national park, valles caldera in new men.

Submarine volcanoes :- These are the common features on the ocean floor. Some of them are active.

Distribution of volcanoes in the world :-

Circum pacific belt :- Zone starts Andes of South America, Central America, US, New zealand, Japan, phillippines, New Guinea and Hawaiin islands. As it surrounds the pacific ocean basin, it is popularly known as the "pacific ring of fire".

Mid continental belt :- This belt includes Alpine mountain chain, Mediterrean sea, Mt. Ararat, Elburz & Hindukush, It is also known as the volcanic zones of convergent continental plate margins.

Mid Atlantic belt :- This zone is near the center of the Atlantic ocean basin with volcanoes in iceland, Ascenso island, southern tip of Africa, Red sea & East Africa.

Earthquakes

Earthquakes are the most destructive natural hazards. They can occur at any time of the years, day or night, with sudden impact and little warning. They destroy buildings & infrastructure in seconds, killing or injury the inhabitants thus de-stabilizing the government, economy & social of the country.

Earthquake :- It is a sudden & violent shaking of the earth's crust. The impact of an earthquake is sudden and there is hardly any warning, making it impossible to predict.

→ Earth is made of three layers :-

i) a hard outer crust
ii) a soft middle layer or mantle rich in magnesium and iron.
iii) Central core composed of iron and nickel.

The outercrust and rigid part of the mantle constitute lithosphere which is 10Km in depth. Underneath, the lithosphere, the asthenosphere which consists of molten rock material (600Km)

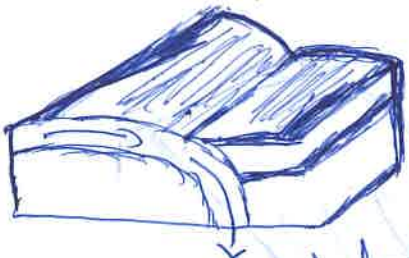
→ Causes of Earthquake :-

Tectonic Causes :- According to theory of plate tectonics, the earth's outer shell is broken into gigantic rocks or plates called as oceanic & Continental plates like the African, north American, South American, Eurasian, Antartic & pacific plates & minor plates like the Arabian, Nazia & phillipines plates. These plates float

on the molten aesthenosphere carrying within the continents & ocean basins. This movement of plates is due to convection currents generated by radioactive heating of the planets earth's core. The movement of the plates is at the rate of 2-4 inches per year. The edges of the plates slide past one another & bump into each other & is referred as plate boundaries. The gaps where the plates one's together is called faults. The edges of the plates interact with each other in one of the following three ways.

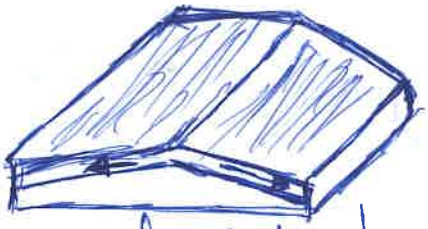
→ The earthquakes are usually caused when rock underground suddenly breaks along a fault. This sudden release of energy causes the seismic waves that make the ground shake. when two blocks of rock or two plates are rubbing against each other, they stick a little. They don't just slide smoothly, the rocks catch on each other.

→ (1) Convergent plate boundaries :- when two plates converge or come together, the plate boundaries push against each other, rise upwards & form mountains. for instance, an oceanic plate may crash into continental plate, the leading edge of one plate may be subducted beneath the margin of the other plate, which gets incorporated into aesthenosphere. the rock part of oceanic plate melts which upwells through the continental plate causing earthquakes



Convergent plate boundary.

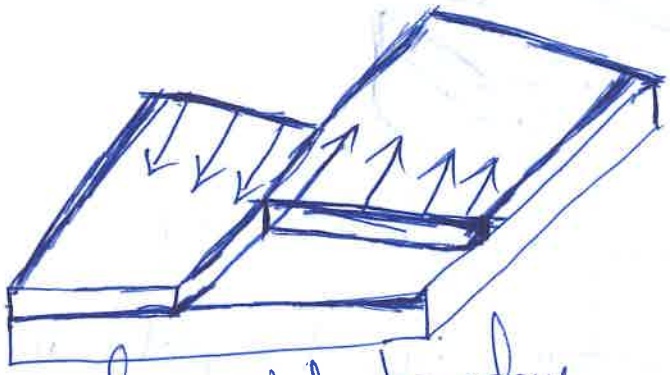
② Divergent plate boundary :- The two plates move apart along parallel faults & tilt slightly outwards. The magma (molten rock) rises to the surface, cools down & forms new parts of the crust. volcanoes may be produced giving rise to violent and huge erruptions. However the earthquakes are less common & less intense.



Divergent plate boundary.

③ Transform plate boundaries :- At certain places, the boundaries of two plates may grind, slip & slip past one another along the faults in the crust. These gaps or faults are called transform faults. Sometimes, the plates may stick to one another causing the development of pressure which may be released in the form an earthquake.

The point at which the earthquake starts deep below the earth's surface is called the focus also known as hypocenter. Epicenter of an earthquake refers to the point on the earth's surface directly above the focus.



Transform plate boundary

Earthquakes may be characterised based on the depth of the focus of the earthquake.

a) Shallow or normal :- The focus point of earthquake is less than 60Km.

b) Intermediate :- The focus/hypocentre of the earthquake is b/w 60Km & 300Km.

c) Deep :- the focus of this type of earthquake is b/w 300Km-700Km.

→ Earthquakes are caused by the release of an energy that generates waves which travel in all directions causing the shaking of an earth's surface. These waves are called seismic waves and there are of two types, They are Body waves & surface waves.

→ Body waves are p waves and s waves.

1) p waves :-

i) p waves are also known as primary waves.

ii) These waves are formed, when after the adjustment happened,

ii) After adjustments of plates has happened, energy gets released where this energy forms a wave.

iii) the first wave after energy gets released was p wave.

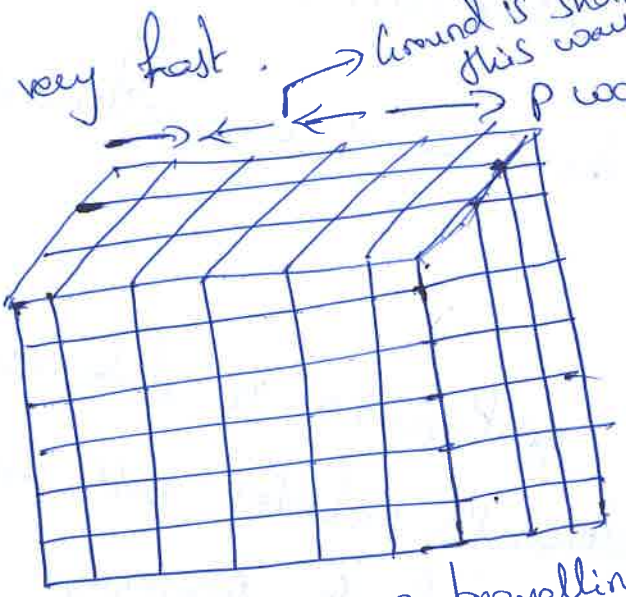
iv) p waves are also known as 'longitudinal' waves which travels like push & pull motion.

v) It moves with a push-pull motion

vi) these waves arrive first.

vii) It travels through both solid & liquid as below earth has mantle, core etc where liquid area & solid area are present.

viii) primary waves are first waves, so it has high intensity & it moves very fast.



→ waves are travelling this way.

2) S waves i) they are also known as secondary waves.

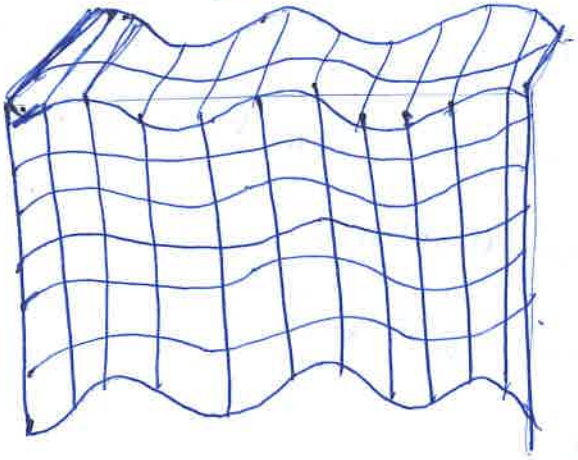
ii) these waves arrive second.

iii) moves with a side to side motion

iv) There are in transverse motion

v) It travels only through solids.

S waves.



3) Surface waves:-

i) Combination of P & S waves.

ii) Travels slow but they creates lots of damage.

iii) Move with an up & down & side to side to motion.

P > S > Surface waves.

iv) Surface waves are slowest waves but creates lots of damage.

→ The magnitude of earthquake is determined by the ground shaking during an earthquake. includes both horizontal & vertical movements that are measured at seismograph stations located across the globe. the vibrations of the earthquakes are measured at the seismograph stations using special instruments called seismographs & the graphical representation of these vibrations is called as seismograph.

~~Headers~~ Attendance

Earthquake :- Shaking of earth is known as earthquake in simple terms why it happens what exactly an earthquake

→ Earthquakes are caused by the release of an energy that generate waves which travel in all directions causing the shaking of an earth's surface

→ what exactly is this energy? , what waves? , what is shaking of an earth's surface

- Earth is not just one piece, it is made up of jigsaw puzzles of around 19-20 pieces which are called as tectonic plates, These plates are placed on a hot partially molten layer of earth's mantle. This is the reason y these pieces are continuously moving. These plates move around 1 to 10cm each year. but dont worry, not all these movements can be felt by us sometimes these movements are extremely strong and can be felt like a lot of vibrations & it can a destroy a city. thats called an earthquake / the earthquakes occurs in the lithosphere region of the earth. An earthquake generates underneath the earth and this released the energy across. The point where earthquakes occurs under the earth called hypocenter and the exact place above it at the surface of the earth is known as epicenter.

[The most horrifying earthquake recorded till date was of magnitude 9.5 out of 10 This happened in valdiva in chile 1960, Another one that happened in Japan was of magnitude of 9.0 which happened on march 11th in 2011. This earthquake caused massive & enormous damage and destruction & took nearly 16,000 people lives. Geologists use the device, that can sense the waves that created by the movement of tectonic plates, These waves are known as seismic waves & device called as seismograph. Earthquakes events are scaled according to magnitude of the shock & are known as Richter scale. This magnitude relates the energy released during the earthquake. magnitude is present 0-10 where 0 is the lowest.

0-2 → ~~minor~~ - Barely sensed

2-4 → → minor vibrations

4-4.9 → → small / light earthquake

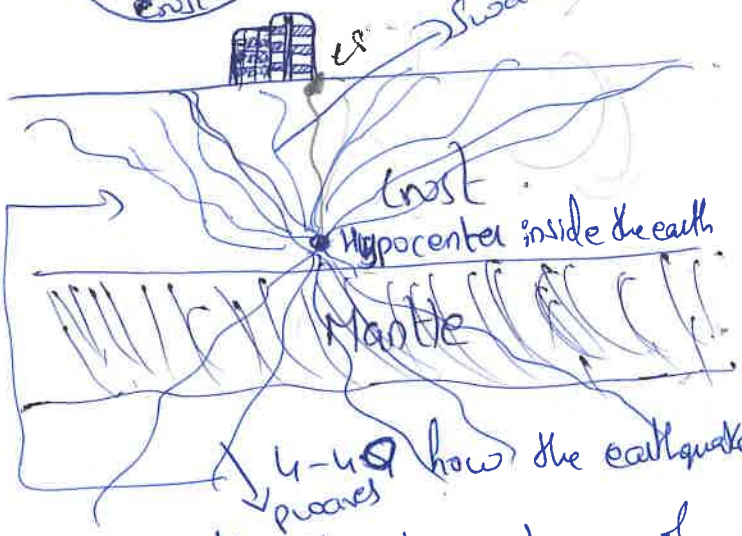
5-5.9 → moderate earthquake

6-6.9 → strong earthquake

>7 → major earthquake (destroy cities & continents)

These readings are measured

→ inner most layer or central level of earth



4-40 P waves how the earthquake occurs.

Inner Core :- Inner or central layer of earth, like a spherical ball inside
Radius :- 1250 km, Temp → 4500 - 5500°C.
pressure :- 300 - 360 giga pascal

outer core :- 2200 km thickness, Temp 4500 - 5500°C (same)

mantle :- semi solid state, thickness - 2900 km.
84% of earth's total volume.

Crust :- like an apple's skin, thickness 0 - 70 km
8 km under sea to 32 km under continents. And this is
of 1% of the earth's total mass.

During earthquake, two types of waves are formed

1. Body waves, surface waves :

Body waves are the waves that moves through the interior of the earth and through the body of the earth, and hence beneath, when these body waves more these waves come across the surface ~~waves~~ rocks & generates the surface waves

→ from this hypocenter point waves are released, these waves are called primary waves / p waves

→ p waves are seismic waves that shakes the ground back & forth in the same direction & the opp. direction as the direction of the wave is moving which is similar to the movement of these sound waves. this is how the p wave looks like. These p waves are 1st ly recorded on the seismograph, now after the fraction of seconds when these p waves hit the rocks closer to the surface gives rise to new set of waves called as s waves / secondary waves. these waves are towards the earth's crust & these are forms of vibrations that we feel. After p waves these s waves are recorded on the seismograph

These S waves hits the earth & starts the earth quake. the pt where the earthquake originates at its center called as epicenter. After the P & S waves comes the surface waves which are the most destructive waves as because the movement of the displacement of the rocks which leads to falling of structures & causing harm to life. 4-4.9 magnitude of earthquakes causes the damage to nearby houses but buildings are ok.

→ Earthquakes are extremely damaging the natural calamities.

1) Earthquake ↳, earth what?
2) release of energy that generates waves which travel in all directions.
3) what energy, what waves?
4) ↳ x just 1 piece, made of hot partially molten layer of earth mantle

⇒ Earthquake

→ due to adjustments of plates

→ not just 1 piece consists of jig-saw puzzles of around, 19-20 pieces (technicplates)

→ we have some boundaries to our houses, for our countries etc right

the planet earth is also divided into boundaries which are known as technic plates (major technic plate is pacific plate)

→ whole planet is divided into boundaries, when these boundaries or plates tried to adjust we get tumblings of earth.

diagrams

→ These plates are placed on hot partially molten layers of earths mantle, this is why these pieces are continuously moving (adjusting). These plates move around 1-10cm per year. all these can be felt by us. but if they are sometimes these movements are extremely strong

→ this occurs in the lithosphere region of the earth.

⇒ when plates adjustments are happening, energy gets released, comes out in the form of waves they are seismic waves

→ P, S, Surface waves

→ After adjustment has happened energy gets released in the form of wave.

the 1st wave is p wave.

→ also known as longitudinal waves.

→ s waves transverse waves travels through solids.

hypocenter / focus:- the pt where earthquakes occurs under the earth is known as hypocenter, is the pt where the adjustment of plates has occurred & energy released known as focus. & top to that pt known as epicenter.

The instrument consists of a stationary part & a mobile part The mobile part of the instrument moves along with the vibrations of the earthquake. the vibration recording device is isolated from the rest of the earth using the principle of inertia. The recording device is attached to a heavy mass suspended by a spring which records the vibrations on the paper attached to the earth.

Magnetic storms, catastrophic earth changes, meteorite impacts and impact from near earth objects.

Meteorite :- A piece of rock or metal that has fallen to the ground from outer space. If a asteroid hitting the earth, dust & smoke rising in the atmosphere prevents sunlight from reaching our world and causes the total temperature to drop. This event can lead to death of many living things beings. If an asteroid the size of an apartment hits earth, it has blow could possibly destroy a small city.

→ Meteorites land randomly over the earth though most fall in the water that cover over 70% of our planets surface & are never recovered.

→ Chelyabinsk oblast (Due to its high velocity & shallow angle of atmospheric entry, the object exploded in an airburst over, The explosion generated a bright flash, producing a hot cloud of dust & gas that penetrated to 26.2km.

Hiroshima nagasaki.

→ The object was undetected before its atmospheric entry

Solar flares disrupts

↓

Sudden flash of ~~brightness~~ increased brightness on the sun.

Also due to solar flares free electrons are released into the earth's atmosphere which react with N & O and form aurora (diff colours in the sky) ~~mostly~~

Ionosphere is a shell of electrons & electrically charged atoms & molecules that surrounds the earth, stretching from a height of about 50km to more than 1000km & exist primarily due to ultraviolet radiation from the sun.

1) national earthquake risk mitigation project :- ~~aimed~~ Strengthen the structural & non-structural & reducing vulnerability in the high risk districts prone to earthquakes.

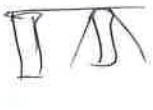
2. National building Code : 2016 published. (guidelines how to Construct buildings in earthquake prone areas.

base isolators, dampers, shear walls, bracings.

↓ between footwall & columns.

↓ reduces vibration levels.

3. Seismic retrofitting : for existing buildings we retrofit to resist earthquake prone buildings.



→ power substation.

→ If buildings are damaged we have to ~~make~~ prepare before

→ for weak structures, we have to retrofit in highly seismic zones.

post-disaster :- dont panic, maintenance of law & order, Evacuate people, Recovery of dead bodies & their disposal, medical care for the injured, Supply of food & drinking water, temporary shelters, Repairing lines of Communication & information.

→ Earthquake disaster risk index report (Sept-2019) (50 towns, 1 district)

Earthquake :- The movement of earth's crust resulting from the release of built up potential energy blw two block.

→ Cause

fault :- San-Andreas fault. occured blw pacific & the north American plates.

response.
NDRForce
IND
Atta Tsunami.

① Disaster management Act, 2005.
↓
NDMAuthority.
SDMA, DDMA.

disaster response fund & disaster mitigation fund.
at state & national levels.
head → PM with 9 more members.

→ national policy on disaster management - 2009.
2008 India flood Northern Bihar, western regions of Maharashtra, AP, Orissa

Effective management of disasters.

Siddiqui

Landslide :- A landslide is downward or outward movement of soil, rock or vegetation (soil) under the influence of gravity.

→ According to the geological survey of India (GSI) roughly 15% of India's landmass is highly vulnerable to landslides.

→ India's national disaster management Authority (NDMA) lists the Himalayan states, Arakan-yoma belt in the north east, the Meghalaya plateau, western Ghats & Nilgiri hills, as most landslide-prone areas. have been regarded

→ **Measures**:- In order to reduce the enormous destructive potential of landslides & to minimise the consequential losses, it is necessary that the hazard must 1st be recognised, the risk analysed & an appropriate strategy developed at the national level to mitigate its impact.

⇒ **Landslides** :- natural cracks & fissures present in hardrocks cause the breaking, fissures means cracks especially at the time of heavy rains water entering these cracks causes weathering of these rocks, wheathering means breaking down. (weight increased) these rocks slide on the slopy region & settle at the lower side. this is called collapse of rift or landslide.

Causes of landslide :- 9

natural disasters
1) Earthquake, Tsunami, floods, heavy rains, storms causes landslides.

2) unlimited cutting of trees causes soil erosion.

Soil erosion :- Soil erosion is a naturally occuring proces that affects all landforms. In agriculture, soil erosion refers to the wearing away of a fields topsoil by the natural physical forces of water & wind or through

It removes valuable top soil which is most productive part of the soil profile for agricultural purposes. which also causes landslides.

3) while building roads on mountains there is a lot of digging that makes the mountains weak & bcoz of that all the soils & muds comes out in the lower part

lets have a look.

→ Effects of landslides :-

1) Rivers get flooded & change their paths & roots.
2) Displacement of waterfalls, formation of artificial water reservoirs.
3) there is financial loss on a large scale as trees, buildings rocks on slopy area collapse on low lying land
4) landslides effects the traffic 4/Aug/2020 i.e this year itself, landslide occured on western express highway near Kandivali & Mallad which affected a lot of traffic.
5) landslide destroys the plant life.

Remember landslides can occur on every type of surface, sandy or rocky, it happens both on land & water. There are many reasons for landslides, some are man-made/natural. this effects can be little to severe devastation. The worlds biggest landslide occured on 1980 when mt st.helens the volcano in usa has erupted. its natural activity refer above human activity → mining, construction & vibrations from heavy machines may also cause landslides, deforestation is the most imp cause of landslides. the roots of trees hold soil in its places with out trees the stability of a slope is decreased greatly & with a large or even minute change the landslide can be caused.

process of erosion freeze thaw.

Causes of landslides.

1) water, slopes, nature of rocks, structure of rocks & disturbance of equilibrium.

→ Rotational Slide :- ~~that~~ in which the surface of rupture is curved concavely upward & the slide movement is roughly rotational

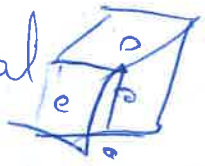
→ Translational Slide :- the landslide mass moves along a roughly planar surface with little rotation or backward tilting

→ Block slide :- in which moving mass consists of a single unit or a few closely related units that move downslope as a relatively coherent mass.

→ fall :- falls are abrupt movements of masses of geologic materials such as rocks & boulders that became detached from steep slopes or cliffs.

→ Separation occurs along discontinuities such as fractures, joints & ~~bedding~~ bedding planes & movements occur by free fall, bouncing & rolling

→ falls are strongly influenced by gravity, mechanical weathering, & the presence of interstitial water



→ Slope :- The slope of a landform is a major factor in determining whether a landslide is likely to occur - The steeper the slope, the larger the threat.

precipitation, vegetation, Soil

→ Different types of landslides :-

1) Rotational slump → very slow to moderate
2) Rockslide - very slow to very rapid
3) Debris slide - very slow to very rapid
4) Earth flow - very slow to fast
5) Creep - very slow
6) Debris Avalanche - moderate to very fast.

25/Sanya. 41/Shaun. 30/Bhagya.

→ Lateral spread, Topple, Rotational landslide, Creep, Translational landslide, Rockfall.

→ The slip surface is usually bounded by a crack.

→ When the gravitational force acting on a slope exceeds its resisting force, slope failure (landslide) occurs.

→ The resisting force helping to maintain slope stability include the slope materials strength, cohesion & the amount of internal friction b/w grains & any ~~another~~ external support of the slope.

→ These factors collectively define a slope's shear strength.

opposing slope's shear strength is the force of gravity.

prevention of landslides :-

1. Slides in the impervious material are prevented by reducing slopes
2. Efforts should also be made, not to allow the additional water to enter into the material
3. We have To ~~check~~ the surface water to enter into the unstable ground, it ~~is directed~~ & made to run off as rapidly as possible away from that area.
4. In pervious materials, landslides may be prevented by increasing the internal friction of the mass by lowering the water content
5. The water may be removed by drain pipes, by drainage through tunnels or by pumping from wells.
6. In situations where slides may cause loss of life & property, the loose rock material is prevented from sliding by constructing retaining walls, concrete piers, or by use of piling.
7. At some places the unstable unconsolidated material may be consolidated by cement grouting, chemical means, & ~~electrical~~ treatment

→ Earthflows:- this is a variety of very rapid to extremely rapid earth material flow

→ Mudslides Debris flow:- A debris flow is a form of rapid mass movement in which a combination of loose soil, rock, organic matter, air & water mobilize as a slurry that flows down slope.

→ Debris flows are commonly caused by intense surface - water flow, due to heavy precipitation / rapid snowmelt.

→ Lateral spreads:- Are distinctive bcoz they usually occur on very gentle slopes or flat terrain.

→ Failure is usually triggered by rapid ground motion, such as that experienced during an earthquake, & also be artificially happens.

→ Creep:- creep is imperceptibly slow, steady, downward movement of slope - forming soil & rock.

→ Creep is indicated by curved tree trunks, bent fences / retaining walls.

→ Topple failure involves the forward rotation & movement of a mass of rock, ice, debris out of a slope at a pt & axis below the center of gravity of the displaced mass. It moves through a transport medium by free falling, rolling or bouncing on the surface.

→ They mainly occur by vibrations caused by movement of the earth, such as an earthquake, gunfire, rainy weather, & many more.

Causes :-

Natural Causes of landslides :- climate, Earthquakes, weathering, erosion, volcanoes, forest fires.

Human :- mining, clear cutting.

Effects :- 1. Leads to economic decline
2. Decimation of infrastructure.
3. loss of life.
4. Affects beauty of landscapes.
5. Impacts river ecosystems.

Types of avalanches :-

1. Loose snow avalanches.
2. Slab Avalanches.
3. powder snow Avalanches.
4. wet snow Avalanches.

→ slab avalanches form frequently in snow that has been deposited or redeposited by wind. They have the characteristic appearance of a block (slab) of snow cut out from its surroundings by fractures. Slab avalanches account for around 90% of avalanche-related fatalities

→ powder snow avalanches :- the largest avalanches form turbulent suspension currents known as powder snow avalanches or mixed avalanches. These consist of a powder cloud, which overlies a dense avalanche. They can exceed speeds of 300km/h, & masses of

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Malsammaguda,Dhulapally(Post via Kompally),5ecunderabad-500100

ONE DAY SEMINAR

On

DEMOLITION OF BUILDING

7th September 2015

Certificate

This is to certify that _____

attended the One Day Seminar Demolition of Building on 7th September 2015, Organized by Civil Engineering.

Principal

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Avalanches:- An Avalanche is a rapid flow of snow down a slope, It can be naturally triggered or a consequence of a human activity. It occurs in the mountains. An avalanche is a mix of water & snow. powerful avalanches: ice, rocks, trees.

Rockslides:- slides of rocks or debris, behaving in a similar way to snow, are also referred to as avalanches (rockslide)

⇒these moving masses can reach speeds of 80 miles (130 kilometers) / hour within about five seconds.

→ How an avalanche is formed:-

1. Temperature in the top layer of snow decreases / the layer of snow closest to the ground maintains its temperature, causing a temperature difference blw the upper & lower layers of snow.
2. Evaporation begins to occur in the lower layers disrupting the stability of the snow above.
3. the upper layers of snow lose grip and begin to slide, causing an avalanche.

→ If the avalanche moves fast enough some of the snow may mix with the air forming a powder snow avalanche, which is a type of gravity current.

- Avalanches are masses of snow, ice & rocks that fall rapidly down a mountainside.
- while avalanches are sudden, the warning signs are almost always numerous before they let loose.
- In 90% of avalanche incidents, the snow slides are triggered by the victim, Avalanches. Kill more than 150 people worldwide each year. Most are snowmobilers, skiers & snowboarders.

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On

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Wet snow avalanches :- In contrast to powder snow avalanches, wet snow avalanches are a low velocity suspension of snow & water, with the flow confined to the track surface. The low speed of travel is due to the friction blw the sliding surface of the track & the water saturated flow.

Danger loose snow ahead :- The weaker layer fractures & the slab above it breaks free & moves as one entity, sliding down the mountain, gaining momentum.

90% of avalanches occur on slopes of 30°. or more

Think of a cake :- The layers are the thicker slabs of snow. The frosting is unstable snow in blw it's a recipe for disaster.

→ Big avalanches in history :- world war I - ALPS
During world war I, an estimated 40,000 to 80,000 soldiers died as a result of avalanches during the mountain campaign in the Alps at the Austrian-italian front, many of which were caused by artillery fire.

→ The winter of Terror :- In the northern hemisphere winter of 1950-1951 approximately 649 avalanches were recorded in a 3-month period, throughout the Alps in Austria, France, Switzerland, Italy & Germany. This series of avalanches killed around 265 people & was termed the winter of Terror

→ The Galtur Avalanche :- The Austrian village of Galtur was hit by the avalanche in 1999. The village was thought to be in safe zone but the avalanche was exceptionally large & flowed into the village. 31 people died.

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Department of Civil Engineering

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This is to certify that Mr./Ms._____ has participated in seminar **"Non Destructive Testing"** on 16th March 2018 held at Malla Reddy Engineering College (Autonomous).

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factors influencing avalanches :- storminess, temperature, wind, slope steepness & orientation (the direction it faces), terrain, vegetation & general snowpack conditions are all factors that influence whether & how a slope avalanche.

→ different combinations of these factors create low, moderate, considerable & high avalanche hazards.

→ what to do in an avalanche :- If caught in an avalanche, try to get off the slab. In most instances this is not easy.

- skiers & snowboarders can head straight downhill to gather speed. then veer left or right out of the slide path. snowmobilers can punch the throttle to pass out of harm's way.
- no escape? Reach for a tree.
- no tree? swim hard. the human body is 3 times denser than avalanche debris & will sink quickly. As the slide slows, clear air space to breathe. then punch a hand skyward.
- once the avalanche stops, it settles like concrete. Bodily movement is nearly impossible. wait - & hope - for a rescue.
- statics show that 93% of avalanche victims survive if dug out within 15 minutes. then the survival rates drop fast.
- After 45 minutes, only 20-30% of victims are alive. After 2 hours very few people survive.

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ONE DAY SEMINAR

On

NANO CONCRETE

28th November 2015

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on 28th November 2015, Organized by Civil Engineering.

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Sedimentation :- Erosion is the transport by wind, water, & ice of soil might This sedimentation means, The sediment & rock fragments produced by the weathering of geological features. Sedimentation occurs when eroded material that is being transported by water, and settles out of the water column onto the surface, So that water flow becomes very slow.

Erosion :- Due of weathering, corrosion or abrasion of a material, the rocks are broken into sediments or small fragments/particles These fragments thus formed are relocated by water, wind, ice animals or humans. The topsoil, organic material & other valuable natural resources are removed by the process of erosion

→ this sediment particles move under the action of the force of gravity.

→ the sediment particles whatever it might be pebbles, sand, mudetc. are carried by wind, water & laid down near the banks or the shores. The large sediment particles are deposited near the shore whereas the smaller sediment particles settle away from the shore

→ the deeply buried sediments are under pressure due of the weight of overlying area layers, which causes the grains to pack tightly

→ this deposition of sediment may create a variety of serious problems.

1. Damage to agricultural land due of harmful materials in sediments reduce the fertility & productivity of soils
2. Sediments deposited in fertile plains hamper surface drainage.
3. Sediment deposition affects the quality of water & its sustainability for human consumption

5. Bcoz of this we loss imp or sensitive aquatic habitat. The sediment deposits in water bodies cover the gravel beds needed for habitat by the aquatic animals. These sediments clog the small spaces btw the gravel particles. So oxygenated water cannot flow freely into the spaces (refer 5 all more)

Preventive measures:-

Silt fences:- all in one

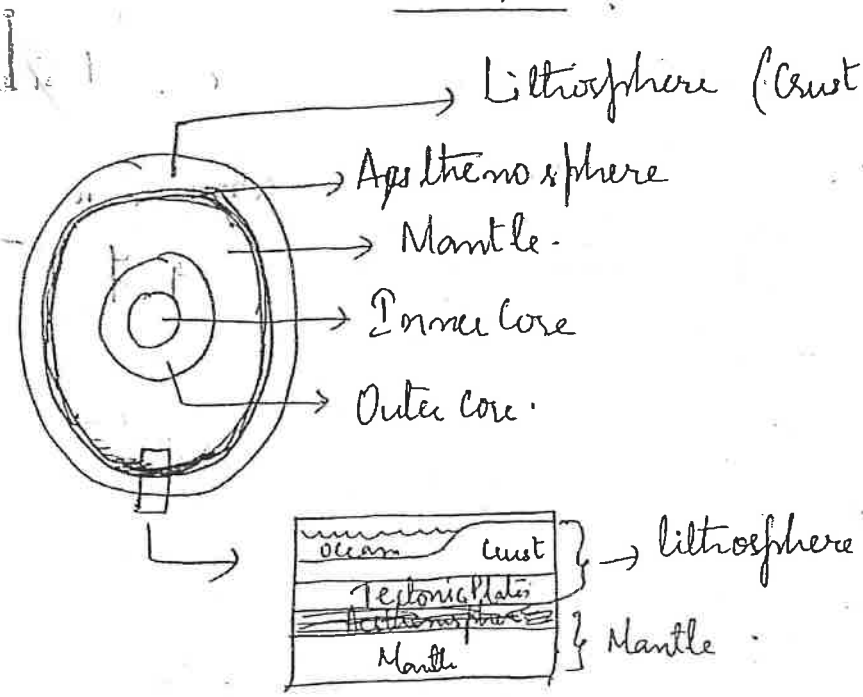
tree revetment → made by anchoring trees along a stream bank, It is an inexpensive, effective way of stopping stream bank erosion the trees greatly reduce the decreases the erosion & allows silt & sand to be deposited along the bank & within the tree branches.

→ Habitat is a place where an organism makes its home. It needs all the environmental conditions an organism needs to survive. main components of habitat are shelter, water, food & space.

→ Brush mattress are used to form an immediate, protective cover over the streambank. A thick mat of dormant cuttings is placed on the bank & held down with stakes

→ mulching: mulch is simply a protective layer of a material we spread on top of the soil. Mulches can either be organic such as grass clippings, straw bark chips, & similar materials or inorganic stones, brick chips, & plastic. Both organic & inorganic mulches have

Earth Quakes



Earth composed of 4 diff. layers.

(1) Crust : that we live on and is most widely studied and understood.

(2) Mantle : It is much hotter and has the ability to flow.

(3) Outer core and Inner core : are even hotter that if u would be squeezed into a ball smaller than marble ball if u go to the centre of the earth.

Tectonic plates :- are the pieces of earth's crust and uppermost mantle together referred as the lithosphere. The plates are around 100 km thick and consists of two principal types of material : Ocean crust (also called Sima from Silicon & Mg) and Continental Crust (Sial from Silicon & Al)

Distⁿ of Volcanoes :

Three zones (distributed well)

① The Circum Pacific belt [Pacific Ring of fires).

This zone sorrounds the basins of Pacific Ocean. Starts from South America, Central America, Mexico, Japan, Philippines, New Zealand, Hawaii islands.

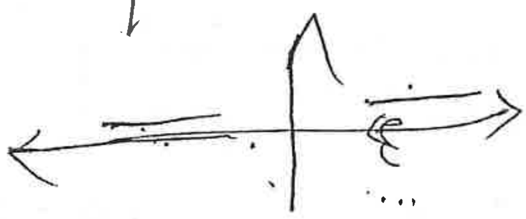
(2) Mid Continental belt :- Alpine mountain chains, Medi. sea, etc. Also called as Volcanic zones of Convergent continental plate margins.

(3) Mid Atlantic Belt => Zone is near the centre of Atlantic Ocean basin with Volcanoes in Iceland, Red sea, East Africa etc.

9

Phenomenons :

Along Divergent =>



Convergent → friction develops. → Crust destroyed gets resulting into formⁿ of magma.

Hot spot activity ↑ → Eg. Hawaii islands.

Mat. N. thin magma.

⇒ These Plates float on the molten aesthenosphere carrying with it the continents and ocean basins.

⇒ The movt. of plates is becoz of convection currents generated by radioactive decay of the Planet's core.

⇒ The edges of plates slide past one another and bump into each other and is referred as plate boundaries.

⇒ The gaps where the plates come together is called as faults.

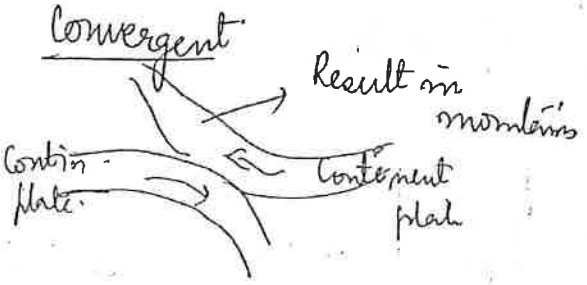
The edges of the plates interact with each other

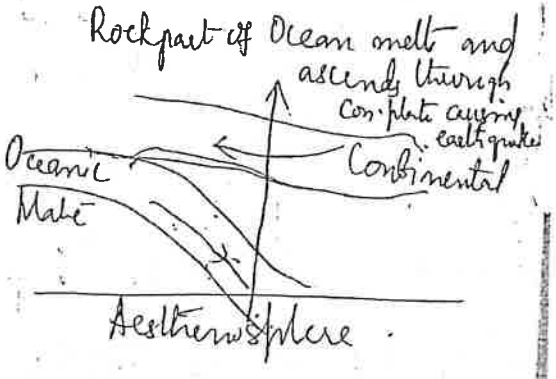
① Convergent Plate boundaries.

(2) Divergent

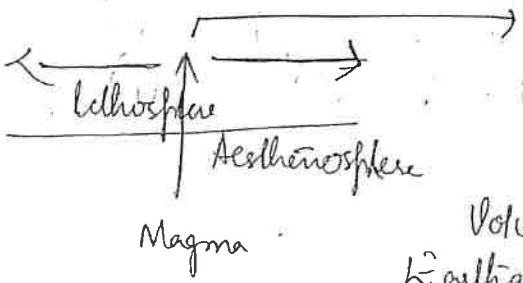
(3) Transform

Convergent





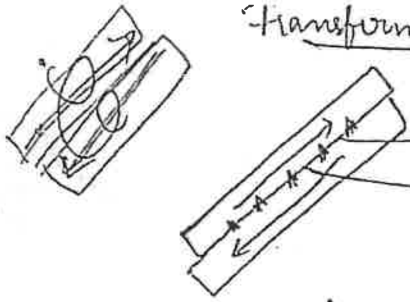
Divergent.



Molten rock mag rises to surface cools down and forms new parts of the crust.

Volcanoes are produced
Earthquakes are less common & less intense

Transform Plate boundary



→ Earthquakes within the crust.

→ Two plates may strike, slip and grind to each other creating intense pressure in the gaps or faults (transform plat faults). this pressure is released in the form of earthquakes.

Effects

⇒ Liquefaction : Transfor^n of solid state of soil into a liq. state, due to this strength of soil ↓ses ∴ it won't support foundations of buildings.

⇒ Damage to built Env like buildings, transp^n lines, str. etc.

⇒ Landslides : mud flows, rockfalls, avalanches etc.

Tsunami

⇒ Seiche ⇒ refers to mov. of water back & forth in an enclosed space causing damage to lake, cities near such water bodies (lake, reser. swimming pool

⇒ Ground shaking :- Structures to fall

⇒ Fire :- Damage to electrical lines etc

⇒ 2° hazards ⇒ Epidemics | outburst of diseases.
↳ Socio economic hazards.

Dist^n

(1) Circum-Pacific Earthquake zone
(2) Mediterranean & Trans-asiatic zone
(3) Arctic-Atlantic zone & Western part of Indian Ocean

Human Adjustment, Perception and Mitigation

=) Avoid constn of houses in earthquake prone areas

=) If constructed

=) Steel used should be flexible

=) Base of building =) Shock absorbing rubber blocks

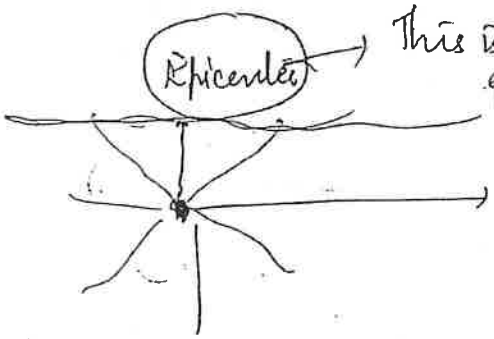
=) Fire proof materials should be used.

=) Gas pipes & Elec pipes =) automatically should shut down.

The gaps where the plates come together is called faults.

⇒ Sudden violent movement of the earth's surface due to movt. of tectonic plates is called earthquake.

It is caused due to release of energy which generates waves that travel in all the direction.



→ This is the first place to experience earth quake.

focus :- The origin of earthquake (Hypocenter)

All the earth quakes occur in lithosphere.

Two types of waves :

① Body waves : are generated due to release of energy at the focus and travels the internal body of earth giving tremors.

② Surface waves ⇒ when the body waves come into contact with surface rocks and generate new set of waves called surface waves.

Two types of body waves :

P and S waves → Secondary waves.

↳ P waves ⇒ first ones that gets recorded on the seismograph. Pressure wave is a pulse of energy which moves quickly through solid & liquid materials of the

earth. It ~~makes~~ forces the ground to move backward and frontward as it gets compressed and expanded.

waves :- Shear waves follows very slowly with swaying and rolling motion that moves perpendicular to the direction of the wave.

the growth (earth) to move back & forth.

urface waves (or L waves) :- Are the last to be detected on the seismograph.

→ Largely destructive.

Landslides

Sudden & quick movements of rock and soil down a steep slope.

- Natural hazards common in Himalayas, North-East India, Western Ghats etc.

⇒ Also known as Mud flows, Debris flows etc.

⇒ Often occurs in conjunction with earthquakes, floods & volcanoes.

⇒ Prolonged rainfall.

Causes :-

⇒ Geological weak material : Weak compo. & etc. of rock and soil

⇒ Erosion :- of slopes due to cutting down of veg^n, const^n of roads & other projects.

⇒ Human excavation.

⇒ Intense rainfall

⇒ Earthquake ⇒ Ground shaking can trigger many landslides

⇒ Vol. eruption :- Deposition of loose volcanic ash on hillslides followed by erosion & frequent rainfall.

Types of Landslides

(1) falls : Abrupt movt. of materials that have detached from slopes or cliffs, moving by bouncing & rolling.

(2) Flows : Mass movt such as debris flows, avalanches dē.

(3) Creep : Slow steady downslope movt. of soil indicated by curved tree trunks, bented poles eti.

(4) Debris flow : Rapid mass movt. in which loose soils, rocks & org. matter combine with water and form slurry that flows.

(5) Debris avalanche = Extremely rapid debris flow.

Mitig" measures

=) Avoid excessive explo" of natural resrs. which changes land topo.

=) Avoid Digging of channels on hilly slopes

=) Embankments should be const.

Heat wave

Prolonged period of excessively hot weather accompanied by high humidity ⇒ continuously
Daily max. temp. exceeds by 5°C for 5 consecutive day

Occurence

Heat waves form when high pressure strengthens and remain over a region for several days to several weeks. Common in summer. Under high pressure, the air starts sinking towards the surface. It acts as a cap for the atmosphere. This cap traps the Δ instead of lifting it; it builds up at the surface and we experience as Δ wave.

Impact

Hyperthermia [Δ stroke] ⇒ High temp & humidity
Heat edema ⇒ Swelling of hands, feet and ankles
Heat rash ⇒ Prickly Δ, rashes
Δ exhaustion ⇒ excessive dehydration
Power outages
Forest fires
Physical damage ⇒ Roads, waterlines to burst etc

Types of Cyclones :

Warm-core cyclones :- Cyclones warm at the centre and cold near the edg

Cold-core cyclones :- Cyclones are coldest at the centre than near the edg

Area of origin :

Tropical Cyclones : Between Tropic of Cancer and Capricorn

Temperate " => Cyclones that develop over temp zone in high latitude

Mitigation measures :

Afforestation :- Thick canopy can withstand strong winds, resist heavy rainfall and prevent soil erosion.

Trees prevent entry of cyclones on land thus acting as barrier

Public alert should be made

Cyclonic storms lead to flooding hence measures should be tak to prevent floods.

Cyclones :

↓

- is a region of low atmos. pressure surrounded by high atmos. pressure resulting in swirling atmos. dist. accompanied by powerful winds blowing in anticlockwise dir — in Northern hemisphere and clockwise dir. in Southern.

Typhoons => North west Pacific ocean

Hurricanes => North atlantic, North east Pacific, South Pacific.

Tropical cyclones => South west Pacific & North South east & west Indian Ocean.

Severe cyclonic storms => North Indian Ocean.

Willie-Willie — Australia

Tornado in South America.

Steps.

Step-1 => Sea temp rises above 26°C upto 60 m depth of the sea, thereby providing abundant water vapor.

Step-2 => Water vapour enters into the atmos. to a height of 7000 m, facilitates condensation into clouds & droplets, releases heat energy and indices drop in pressure. Cooler high altitude temp. cause formn of Cirrus nimbus clouds. Rising warm air surrounds the central low pressure area.

Stage (3). These clouds form long spiraling cloud bands.

(4) Dry air from higher altitude is slowly drawn into the centre of the storm causing a calm eye. Hurricane force winds circle in and around the eye.

) Storm system is pushed along its back by trade winds.

Structure of cloud

① eye => centre of the cyclone characterised by low pressure area. Generally no wind. The storm rotates around the eye.

② eye wall => bordering the area. It is a dense cloud of height 15 km from the eye. This wall contains violent winds, thunderstorms & heavy rainfall which are resp. for great devast".

Eye & Eye wall constitute Central Dense Overcast (CDO)

3) Rain shield / Spiral bands => These are the cloud bands surrounding eye wall and extends upto 1000 km from the eye of cyclone

) Cirrus Canopy :- As the moist air rises up in the eye wall along with inner spiral bands, clouds of cirrus canopy are formed in the upper atmosphere. They produce heavy showers & thunderstorm.

Impact :-

Collapse of buildings / homes
flooding of coastal areas
Road / Railtrack get blocked / damaged by flood water.
failure of power supply
Contam" of water with dead / rotting food
) Outbreak of epidemics
) Damage to communication systems
) Disrup" to shipping activities
) Soil erosion, Defolia" of forests.

Exogenous hazards

Natural
- Terrestrial / Planetary
  - Endogen. (Geological)
    - ⇒ Volcanoes
    - ⇒ Earthquakes
    - ⇒ Landslides
    - ⇒ Avalanches
  - Exogeno (Atmospheric hazards)
    - Cumulative
      - ⇒ Floods
      - ⇒ Drought
      - ⇒ Heat waves
      - ⇒ Cold "
    - Infrequent
      - ⇒ Cyclone
      - ⇒ Lightening
      - ⇒ Thunder storm
      - ⇒ Hail storm
- Extra terrestrial / Cosmic

Floods

⇒ Flowing of water due to their inadequate capacity of water retention following a heavy local rfptn., snow melting and other natural events such as storms, cyclones hurricanes and tsunamis

Causes of floods

⇒ Heavy rainfall
⇒ " snowfall (snow melting)
⇒ Storms, cyclones, tsunamis
⇒ Anthropogenic : deforest^{n}, poor dams, hydraulic str. failures etc.,

Types of floods

- Natural
  - ⇒ Riverine / Stream floods (Overflowing rivers)
  - ⇒ Estuarine floods
  - ⇒ Coastal floods (cyclones, hurricanes & tsunamis etc.)
- Catastrophic (landslides, breakages in dams, levees & other protective str.)

Damage due to floods:

⇒ Loss of life & property
⇒ Cultivable lands become silted with mud & sand effection prod^{n}.
⇒ Traffic congestion due to damage of roads, collapse of bridges, clogging of drainage.
⇒ Inadequacy of food grains ⇒ famine.
⇒ Outbreak of epidemics ⇒ Cholera, typhoid, dysentery,

Measures

=) Reservoirs for storing
=) Const^{n} of embankments & flood walls
=) Const^{n} of proper flow channels.
=) Improved drainage system
=) Wetland management
=) Removal & Dredging of water bodies.

Medical

River bank erosions prevent =) bamboo plantations
Afforest^{n}
Placing of sand bags.

Chemical disasters → man made disasters

① Minamata :-

② Bhopal gas tragedy.

=) ① Due to negligence / careless ness, accidents.

=) They may occur at any stage in the prod^{n} proces, storage, transport^{n}, use and disposal.

=) They occur in the form of explosions, fires spills, leaks.

=) ① Techno. failures

(3) Misuse of chemicals

(4) Accidents during storage / transport^{n}

(5) Improper waste menagement [uncontrolled dumping of waste].

(6) Sometimes (Natural disasters like Tsunamis, earthquakes, landslides etc.).

Nuclear Disaster

⇓

emissions of radioactive material through explosions of a nuclear bomb or in the oper^{n} of nuclear reactor.

=) Use of nuclear weapons in war :

During World war - II =) Nagasaki & Hiroshima

=) Accidental explosion of Nucl. weapons :- During loading & transp^{n}.

=) Accidents in Nuclear power projects.

=) Natural disasters (Tsunamis).

Population Explosion [Biological Disaster]

↓

Caused due to natural outbreak of epidemics or intentional use of biological agents in wartime ↓ (bioterrorism).

Biological weapons are called as poor man's bomb

Favourable conditions for rise in population.

=) Food in surplus

=) Good personal health

↓

Exponential rise in popul^n =) at an alarming rate

Impacts Population explosion.

=) & Utiliz^n of more resources.

=) More poll^n / more waste

=) More transp^n & industries with ↑ed poll^n.

=) ↑ed Green house gases

↓

Depletion of Ozone

Meteorite ↑ glowing fragments of earth rock : A piece of rock or metal that has fallen to the earth's surface from outerspace as a meteor.

Asteroids => Less than one meter
=> It forms craters on earth surface which generates temp. exceeding 2,370°c,
=> Large no. of injuries, deaths & property damage. => greater than one meter
=> are minor planets especially those of the inner Solar system

The larger ones are called Planetoids.
Asteroids composed of mineral & rock.
Comets = composed of dust & ice.

Asteroids & Comets are NEO [Near earth objects] which are very close to the earths.

=> Meteorites as remnants of asteroids and comets.

Chicxulub [చిక్సులుబ్] crater

↑ Asteroid impact on the coast of Mexico

=) Massive earthquakes
=) Widespread Wild fires
=) Large amt. of dust
=) Sunlight blocking / Continuous darkness
=) ↓se in photosynthesis
=) Acidification of waters
=) In Oceans / seas, evap^{n} of water, sometimes can result into tsunami also.

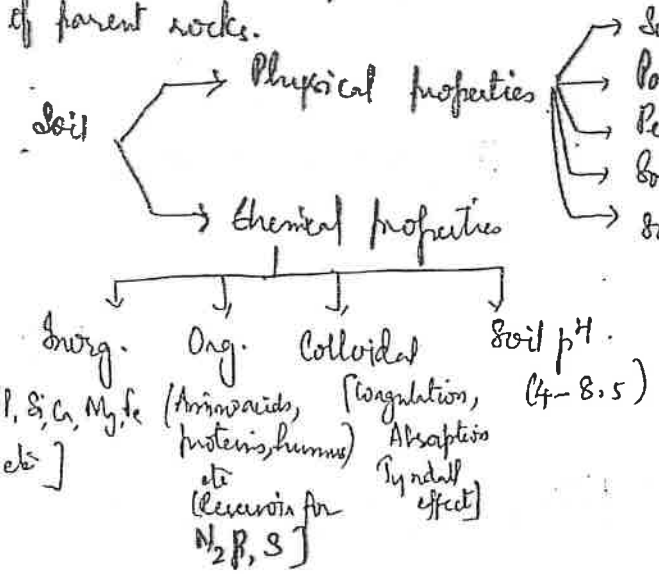
(2) Magnetic storms => Geomagnetic storm.

temporary disturbance of the Earth's magnetosphere caused by a Solar wind shock wave and cloud of magnetic field that interacts with the Earth's magnetic field.

=) Disrup^{n} in commun^{n} & navig^{n} systems
=) Damage to commun^{n} satellite
=) Power outages
=) Corrosion in pipelines
=) Radiation ↑ for astronauts

Soil Erosion.

Loose superficial layer of the earth's crust is called soil formed by disintegration of parent rocks.



Causes of Soil Erosion:

=) Soil erosion by water
=) " " wind
=) " Defor^{n}
=) " by Drought
=) Salinization of soils
=) Compaction
=) Intensive farming
=) Org. & Nutrient depletion [Burning of trees, excessive fertilizer & irrig^{n}]
=) Chemical contami^{n}
=) Slip / landslides

Sedimentation

Natural physical process occuring in aq. areas & land based areas.

Sediments may originate from many sources such as stream banks, building lots, Const^{n} sites, farms, Agricult. fields etc.

Conserv^{n} of land resources:

=) Afforestation.
=) Strip cropping: Planting of crops in the form of strips.
=) ↑ing fertility of soil by growing leguminous plants.
=) Crop rot^{n}
=) Promoting the growth of MOs like earthworms.
=) Chemical fertilizers should be discouraged
=) Control of grazing

Imp. aspects of Sed^{n}:

i. Erosion (by wind / water)
ii. Entrainment (by water).
(Picking & mov. of particles on a slope from bed & banks of stream].
iii. Transp^{n} :- Movt. of sediment particles due to gravity [esp. on hills, slopes etc.
iv. Compaction: Deeply buried sediments are undercompressed because of the wt. of overlying layers which make the grains to pack tightly.
v. Cement^{n}: Involves the sticking of the sediment particles together with the help of cementing materials such as calcite ($CaCO_3$) silica Iron oxides etc.

Effects of sediment pollution

Damage to Agri. land since the harmful materials in sediments reduce the fertility & productivity of soil.

Disturb surface drainage.

Deposit^n in stream channels lowers the carrying capacity of water bodies thereby increasing the risk of overflows.

Quality of water ↓ses and affects its suitability for human consumption.

Loss of aq. flora & fauna.
(water turbid → No sunlight, No Oxygen → Plants & animals die].

↓se in fishery resources.

Loss of recreation activities.

Contaminants found in sediments can bioaccumulate in humans.

Corrective measures

Mulching :- Org. material added to soil surface to prevent surface compaction.

Silt fences :- are constructed at the const^n site. They act like dams, trap the sediment and allow water to leave the site.

Berms :- Narrow earthen ridges built across the roads to allow runoff to drain into veg. areas.

Storm inlet traps.

Tree revetment ⇒ trees are anchored along the banks of a stream

Heat wave

↳ daily max. temp. exceeding by 5°c for continuously 5 days.

Prolonged period of excessive hot weather

Common in summer [in high pressure areas]

Effects;

Δ stroke

Adults & children / overweight one at free risk for Δ related illness.

Heat rashes (prickly Δ)

Heat exhaustion.

Power outages

Forest fires

Physical damage to roads & highways.

Air pollution

Water evap^n high ⇒ Scarcity of water

Crop failure → famine

Can trigger chemical accidents

Cold wave

⇒ Weather phenomenon caused by cooling of the air &

⇒ Involves rapid fall in temp within a 24 h period.

Impacts:

⇒ Death of life

⇒ Waterlines (pipelines get freezed).

⇒ Indoor plumbing ruptures

⇒ Disturbance of gen^n of electricity

⇒ Metals become brittle at low temp.

⇒ Failure of transp. system as the ori freezed.

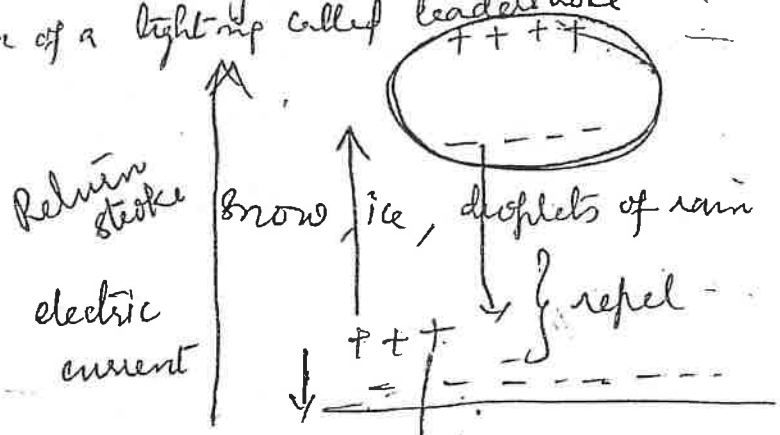
⇒ Fire outbreaks become more hazard with no water.

Lightening

Leader stroke :) Difference in charges causes the flow of electric charge in the form of a light-up called leader stroke :-

Return stroke

(ground to cloud).



Types of lightening

=) i) Lightening within the cloud.

ii) cloud to cloud : Ligh. occurs when the difference of charges is high enough between the adj. clouds -

iii) cloud to ground lightening : Electrical energy is released in the form of light & Δ. Δ causes air to expand become very hot which expands causing an explosion and making the sound of thunder.

Impacts :- Nitrogen fixation (+ve impact)

$N_2 + O_2$ ⟶ N_2O oxide gas ⟶ rains soil.

=) Cause of mortality

=) Skin lesions.

=) Forest fires

=) Electrocution of humans

Hailstorms

⇒ Hail is a form of solid ppt^{n}.

⇒ Consists of balls or irregular lumps of ice each of which is called a hailstone.

⇒ Hail forms in strong thunderstorm clouds, with high liquid water content, and a good portion of the cloud layer is below freezing 0°C (32°F).

⇒ Hail begins as water droplets. As the droplets rise and the temp. goes below freezing, they become supercooled water and will freeze.

⇒ Storm with windspeeds as high as 110 miles per hr (180 km/h) blows the forming hailstones up the cloud.

Impacts :-

⇒ Serious damage to automobiles, aircraft, sky lights

⇒ Farmers crops etc.

⇒ Hail damage to roofs often seen as leaks or cracks.

⇒ Canada's most expensive hazards.

Cyclones

are powerful and violent wind storms in which the air moves very fast in a circular direction.

Tropical cyclones forms only over warm ocean waters near the equator (temp. > 27°C).

Warm, moist air over the ocean rises upwards from near the surface.

As the air moves up and away from the ocean surface, it leaves less air near the surface, causing an area of low air pressure below.

Air from surrounding area, with high pressure rushes into the low pressure area. This new cool air becomes warm and moist and rises too and then the cycle continues.

As the warm, moist air rises and cools the water in the air forms clouds. The whole system of clouds & winds spins and grows.

This system rotates faster & faster, and eye forms in the centre.

It is very clear and calm in the eye with very low air pressure.

Str. of cyclone.

eye => Low pressure region, centre of tropical cyclone with diameter of 10–100 km.

wall => Bordering the eye. Wall of dense cloud of ht. 15 km

↓

the walls contain violent winds, thunder storms, heavy rainfall & responsible for great devastation.

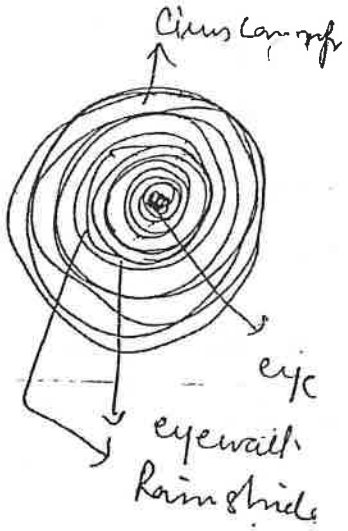
rain / spiral bands.

Cloud bands surrounding eye wall.

Cirus Canopy: clouds of cirrus canopy are formed in the upper atmosphere. They produce heavy showers & thunderstorms with strong, gusty winds.

Cyclones are one of the nature's responses when there is a meeting between hot and cold air currents

=) Characterised by high wind speeds from 60KMPH to 280 KMPH with more in super cyclones.



Depending on its location & strength it is called by diff. names.

Hurricane =) Occurs in atlantic Ocean & Northeastern Pacific Ocean.

Typhoon =) North western " "

Tropical cyclones =) Indian Ocean.

Willy-willies =) Australia.

Anticlockwise =) North hemisphere

Clockwise - Southern

Bhola cyclone =) Bangladesh.

Hurricane Sandy
Khatrina
Hud Hud.

Types
- Warm core cyclones =) Warm in the centre & cold near the edges.
- Cold core cyclones =) coldest at the centre than edges

Drought :

is a condition that arises because of very little pptⁿ | rainfall for prolonged periods..

⇒ climate change [elnino effect, war)

⇒ Over farming, excessive irrigⁿ, deforⁿ, erosion etc.

1) Due to late arrival of rains.

2) Balance between water supply and demand is disturbed.

3) change in water quality (contaminⁿ of usable water)

Types of drought

1) Meteorological drought : is brought when there is less rainfall than average for a longer time.

(2) Agricultural drought :- This condition occurs where becoz of poorly planned agri. system making the soil devoid of moisture and erosion.

↳ ~~is not sufficient to support the prodⁿ of crops.~~

3) Hydrological drought :- This type of drought occurs when the water levels in aquifers, lakes & reservoirs fall below the av. levels.

Eco. impacts :

⇒ Agricultural prodⁿ goes down

⇒ Feed for live stock becomes very expensive.

⇒ Income from timber prodⁿ ↓

⇒ Indust. utilizing more water for prodⁿ incur great losses.

⇒ fishing & tourism industry ↓.

⇒ Fishery prodⁿ ↓

⇒ Hydroelectric power ↓

⇒ Transpⁿ industry suffers losses ↓

⇒ Increased food prices

Env. impacts

=) Loss of wetlands, lakes / Veg^n
=) Greater mortality of fish & Wild life habitat
=) Diseases in animals
=) Endangered species
=) Migration of animals, loss of natural sp.
=) Soil erosion ↑ses loss of biol. productivity of landscape.
=) Loss of biodiversity / extinction of species.

Social impacts

=) Increased poverty
=) Migration of people [Rural to urbans].
=) Loss of human life & suicidal tendencies
=) Red^n in recreational activities

Drought Control measures

=) Rainwater harvesting
=) Crop rot^n
=) Cloud Seeding => Artificial tech. to simulate ppt^n & form of

↓

method involves spreading of SI aerosols into the upper part of clouds. Water droplets attach to silver iodide aerosols & freeze.

=) Desali^n of water
=) Efforts by the Government =)

Improved wet lands
" Water shed developed programmes.
Afforest^n.

Avalanches.

Also called as snowslide ⇒ a rapid flow of snow down a sloping surface.

Causes: Mechanical failure in the snowpack.

⇒ Weather conditions: Temp., wind and heavy snowfall during storms.

⇒ Snowfall: Continuous snow fall exerts pressure on the existing snowpack causing the snow to break-off and fall down.

⇒ Temp: Rise in temp. ~~Rise~~ weakens the upper layers.

⇒ ~~Other~~: Earthquakes

⇒ Landslides

⇒ ~~Other~~. Artificial triggers of avalanches (skiers, etc.). Skie resorts, mountain towns, roads & railways. ⇒ Glacier movts.

Destⁿ./ Impacts.

Mitigⁿ measures ⇒ Snow melt

Rigid-fence like str. (Snow fence) ⇒ may be constructed of steel, wood or prestressed concrete.

Early warning symptoms

Tsunami

. tidal wave / seismic sea wave

is a large ocean wave caused by sudden movement on the ocean floor, which has the capacity to displace a large quantity of water from the ocean on to the land.

This sudden movt. can be because of an earthquake / a powerful volcanic eruption or an underwater landslide.

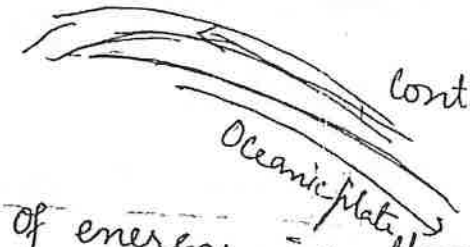
The impact of a large Meteorite could also cause Tsunami

ithquakes occuring in subduction zone where an Oceanic plate is orced to subduct under an continental plate.

The friction between the two plates is

rmous resulting ~~Eab~~ the oceanic plate

descend into the mantle.



this process results into accumulation of energy in the

riding plate over a long period of time - decades or even ce

s.

namis have a very long wavelength (often 100s of KM long)

. normal ocean wave have .. of 30 or 40 m.

ves travel at a speed of 800 KM / hr.

Impacts :-

⇒ Loss of property

Flooding of Coastal areas.

Rail / Road Transp^{n} damaged.

Power grid failures.

Contam^{n} of water from dead

Outbreak of diseases.

Damage to Communication system.

Disruption to international shipping activities

Defoliation, Soil erosion

Miti^{n} measures

⇒ Trees prevent entry of cyclones to land.

⇒ Heavy Plant^{n} in coastal areas.

⇒ Early warning signals.

⇒ Avoid settlements in coastal areas near to the sea.

⇒ Const^{n} of cyclone shelters etc.

K

(iii) Mag. storms :- Also called as Geomagnetic storms => It is mag. disturbance caused by solar flares.

=> Damaging communi^n links in Navig^n.

=> Radio Disturbance in transmission signals => Satellite signals => Radio, telephone, TV, internet.

=> Auroras => Charged particles (solar flares) interaction with magnetosphere. This interaction sends e^-s to earths atmosphere. There e^-s make O_2 and N_2 to glow at poles called Auroras.

=> Power outages

=> Satellite, chip damage.

=> Rad^n poisoning to humans.

Predisaster

(i) Prepared-ness Phase
- Hazard zone mapping
- Haz. forecasting warning & pred^n
- Dis. preparedness plans => EOP
- Land use zoning.
- Preparedness through Infor^m^n, Edu^n & Comm^n (IEC).

(ii) Mitig^n phase

EOP => Emergency Oper^n plans => Document

(1) Base Plan
(2) Emergency Support functions
(3) Hazard specific Annexes => Cold winds, fires etc
(4) Situational Annexes => Additional guidance
(5) Appendices => Checklists, maps, resource lists

Extra Planetary Hazards

also called as Super hazards ⇒ caused by collision of celestial bodies and the resultant falling of debris on the earth surface.

⇒ Near Earth objects [NEOs] ⇒ Asteroids & Comets which orbit close to earth and may strike our planet someday.

LINEAR.

⇓

Lincoln Near earth asteroid Research Team.

2) NEAT ⇒ Near Earth Asteroid Tracking Team in Hawaii.

3) LONEOS ⇒ Lowell Observatory Near Earth Object Search

> 1000 NEAs greater than 1km in diameter

> million NEAs " " 40m.

Meteorite Impact :- Remnants of Asteroids & Comets [dust like things].

when they pass through the atmosphere because of the Δ that is generated due to friction through passage, they melt and or vaporise resulting in the formation of shooting stars.

Effects:

① Massive earthquakes

② Widespread wildfires.

③ Blocking of solar radiation due to huge amt. of dust that is released.

④ Disturbance in the photosynthesis ⇒ Ecolo. imbalance

⑤ Acidific^{n} of waters due to form^{n} of N oxides.

⑥ When fall in Oceans / Seas, huge evaporat^{n} resulting in form^{n} of steamy clouds.

Tsunami

- Series of huge seismic waves caused by disturbance that displaces a large volume of water from its equi. position. This disturbance is caused due when oceanic plate hits a continental plate and generates pressure. The heavier oceanic plates will be submerged by the continental plate to cause one earth quake. The seismic waves will displace large vol. of water.

Avalanche :- Ex

flowing of dry powdery snow over a hill / mountain Extreme weather conditions.

like heavy snow fall.

↓

pressure on the existing snowpack, break off and fall down the slope.

temp ⇒ slight ↑ in temp.

weakens the upper layer which eventually triggers the avalance.

Wind = wind blows the powdery snow and carried.

El-Nino effect :- 3-10 yrs.

warming of Pacific Ocean on a large scale on the eastern side of galapagos Island. The temp. is raised by several degrees above normal. Species cannot tolerate the warming will be killed thus causing loss of marine biodiversity.

Problems :

- P^3 syndromes – Population, poverty, poll^n coexist.
- Use of natural resources leading to depletion, disappearance of grasslands, wetlands etc.
- Poor ag. practices ⇒ removal of fertile soil.
- Poll^n.
- Over expl^n of water resources resulting into depletion.
- Increased urbaniz^n ⇒ Converting agri lands — real estate and industries
- Increase in illiteracy.
- Migration of people from rural to urban, so people are less involved in facing decaying agricu. prod^n.
- Hunger & malnutrition –
- Political unrest leading chaos and comm. riots –

Measures

Decreasing birth rates by awareness programs – slogans like family planning programmes ⇒ educating people –

Decentralizing the resources ⇒ Mig^n of people will be prevented from rural to urban.

Regularizations of encroachments of lakes & agri. lan

Stabili^n ⇒ Birth rate equals death rate. Also called a zero prod^n growth [ZPG]. Aims at focusing ⇒ Def^n of resources, ing of humankind, deg^n of env. etc.

d wave :- weather phenomenon caused by cooling of the air

rapid fall in temp. within a 24 hr period.

Impacts

1) death or injury of life.

2). Water lines (pipelines get freezed.

3) Indoor plumbing ruptures due to water freezing

4) Generation of hydroelectricity is disturbed.

5). Some metals become brittle at low temps.

6) Failure of the transportation system as the oil gets freezed

7) Fire outbreaks become more hazards no water.

El-Nino effects the Global climate.

=) Gives rise to thunderstorms.
=) Less rain during summers in Indian sub-continent.
=) More rains in South America.
Drought ⇒ forest fires

II) Urbanization : Process of migr.ⁿ of P.ⁿ from rural to urban areas resulting incr.ⁿ in popuⁿ ~~from~~ in the cities. III

Includes change in Occupⁿ ⇒ from Agr. to business.

" " mannerisms, mental attitudes, beliefs.

Reasons.

⇒ Eco. growth. Incr. eco. opportu. social dev.

⇒ Deteriⁿ in quali & quant. of ag. lands.

⇒ Poor market infrastruc.

⇒ Short. finance supp. insti [Small scale invest].

⇒ Better access to jobs, edⁿ, clean water, electricity, attract. business ionco., better living standards.

⇒ Greater femal labor particiⁿ.

Demerits.

Increased use of transpⁿ ⇒ pollⁿ.

Poverty increases.

Utilizⁿ of resources.

A

Desertification :-

(1) Increased demand for ecosystem services.

(2) Unsustainable use of Natural resources

(3) Mining activities & Industrial

(4) Impro. agri. practices

(5) Overgrazing

(6) Deforestation

(7) Forest fires

(8) Unsustainable water manag.

Droughts

- **Meteorological** → as rainfall
- **Agricult.** → when the soil moisture is not sufficient to support.
- **Hydrologic.** → when the water levels in the aquifer, lakes, reser. fall below the avg. level. Gener. occurs when human water consmp. is high.

Impacts of drought

Economic impacts
Agribusiness
Fisheries / Livestock
Tree supply
Timber prodn
Tourism
Water for industries

Env. impacts
1. Degn of soil
2. Soil erosion
3. Stress on endang. species
4. Migration, loss of native species
5. Loss of biodiversity
6. Death of fish & wild life.

Social impacts
1. No food ⇒ leads to famine.
2. High rise in food prices.
3. Less Ag. prodn leading to depression and suicidal attempts.
4. Migrn of people in search of jobs, leading to breakdown

Drought control measures
Rain water harvesting
Crop Rotation
Cloud seeding
Desalination of sea water
Reducing / Treating contamin water and reusing it.

Soil erosion :

↓

Loose superficial layer of the earth's crust (latin : Solum) .

↓

Weathering of rocks by Physical / chemical / biological agents

Properties

→ Physical

→ Chemical -

E

Physical

1) Soil Density : 2.65 g/ml ⇒ varies depending on the degree of weathering

2) Porosity :- Spaces between the soil particles < Microspaces / Macrospaces.

↓ Degree Percentage of soil volume occupied by space ...

3) Permeability :- Rate at which water permeates through soil .

Loose soil ⇒ Large no. of macropores → high permeability .

4). Soil temp :- Solar radⁿ, decomp. org. matter, heat from interior earth constitute soil temp -

5) Soil water :- Soil with holding capacity of water for use by the plants.

6). Soil Atmos :- O_2, CO_2 & N_2 → gases found in soil. Moisture + CO_2 are more in soil air .

Chemical Properties

1) Soil pH .

2) Inorganic elements ⇒ Ca, Mg, Na, B, Mn Cu, Fe K

3) Organic ⇒ AAs. proteins, purines, pyrimidines, humus, fats, oils etc ⇒ reservoir for essent. like nitrogen, P & S to plants

(7). Colloidal properties :- As soil is made of crystalloids and colloids they exhibit certain properties like, absorption, adsorption, coagn, tyndall effect, brownian movement etc.

Soil erosion

- Normal / Geologic erosion
- Accelerated erosion

Agents

- Climatic
  - ① Water + ② Wind
    - i) Sheet erosion
    - ii) Rill "
    - iii) Gully "
    - iv) Riparian / Stream bank
- Biotic
  - i) Overgrazing
  - ii) Deforestn
  - iii) Mining

(6) Gravity :- On hill slopes.

(7) Compaction :- Compaction of soil by cattle, sheep or heavy machinery will decrease the porosity of soil.

(8) Desertification.

(9) Salinizn ⇒ Seawater / Ind. water ⇒ Low quality of water

(10) Burning of trees, excessive applⁿ of fertilizers

(11) Chemical contⁿ

(12) Landslides ⇒ tendency to washed by wind / water

Other factors :-

1) Deforestn.

2) Natural factors like floods, Drought / severe storms / tornadoes etc.

3) Human induced

i) Intensive farming. Unmanaged

ii) Constn of buildings etc.

iii) Constn of roads.

Acid^n of soil

Control : –

1) Strip cropping
Proper irrigation
Proper agricult. practices
) Develop. of strong veg. cover.
) Land reclamation during mining activities.
) Rot^n of crops.
) Control of grazing.

Sedimentation < water / land.
↓
Natural physical process
...owing stream banks carry
building lots
Const^n sites
lawns & streets
Agri. fields etc.

Aspects in sedim^n process

1. Erosion
2. Entrainment
↓
picking & movement of sediment particles along slope / banks of stream
3. Transport^n
↓
under the force of grav... of the sediment moves by diff. process like rollin... sliding, in suspens... etc

To accomplish this process the force exerted by water should be more than the resis force exerted by tant the sediment particle.

Deposition.
...les, sand, mud and salts) carried by ...d, water or ice
↓
at the end of glacier.
...dust.

5. Compaction & Cementation
↓
Deeply buried sediments are under pressure ⇒ grains to pack tightly
This is compaction.

↓
involves the sticki... of the sediment particles with cementing mineral like calcite & sili...

Impacts :

Sedimentⁿ

Damage to Agricult. land

Damage to surface drainage

Affects quality of water => consumpⁿ of water

Decreases ~~flood~~ carrying capacity of water.

Loss of aquatic habitat, No sun light, turbid water.

Decrease in fishery resources.

Loss of recreational activities

Bioaccumulation.

Loss of hydroelectric power generation.

Loss of irrigⁿ

Corrective measures :

Mulching => Org-material is applied to the soil surface to conserve soil moisture, ---..

↓

Mulches → Organic mulches => leaves, woodchips, bean hulls, Crushed corncobs etc.

Mulches → Inorg. mulches => debris, stone, gravel, pebbles etc

Silt fences :- constructed along the constⁿ site. Trap sediment and allows water to leave.

Berms => Narrow, earthern ridges built across roads to allow runoff to drain into vegetated areas.

Geotextile Roll

Brush Mattress

Tree revetment

Sedimentation problems

⇒ Reduce the fertility of soils → ↓ in productivity

⇒ Hamper the surface drainage by clogging it

⇒ Lowers the flood carrying capacity of stream channels.

⇒ Affects the quality of water [turbid water]

Covers the gravel bed required by aquatic animals and thus they will be killed because of suffocation.

Decrease in fishery resources, Mangrove resources.

Loss of recreational activities like boating, fishing, swimming etc.

Pollutants in sediments bioaccumulate in fishes.

Economical disturbances ⇒ Loss of hydroelectric power gen^{n}.

⇒ " " Irrig^{n} / agri. prod^{n}.

⇒ ↑se in maintenance costs of drainage stream canal system.

⇒ ↑se in dredging costs.

⇒ Loss of tourism.

Pesticides

Pests :- Disease causing organ. called Pests.

Pesticides =) subst. which prevents or destroys or reduces pests :

E.g. fungicides, herbicides, insecticides etc.

Classⁿ of pests

I (a) Broad Spectrum pesticides.

(b) Narrow Spectr. pesticides

II Based on target pests.

Algicide – Algae
Aricide – Birds.
Bactericide
fungicide
Herbicide
Insecticide
Miticide – Mites
Molluscicide – Snails.
Nematicide – Nematodes
Piscicide – Fish
Rodenticide – Rodents

III Chemical structure

Organic
↓
Have carbon in their structure
E.g. Captan, Pyrethrin Glycophosate.

Inorg.
↓
derived from mineral ores extracted from earth
E.g. $CuSO_4$, $FeSO_4$, Cu, Sulphur

IV Mode of action :-

(1) Contact pesticides =) pests are direct contact Killed

(2) Systemic / Translocated.
Absorbed by plants / animals and move to other tissues

(3) Foliar pesticides
Applied to foliage parts of plant (leaves, stem, branches)

(4) Soil Applied pes.
Applied to soil, plant absorb through roots

(5) fumigants :- Toxic gas enters into cracks & crevices of plant.

(6) Preplant Herbicides :- Applied before seeding or Transplanting

(7) Preemergent Her.
↓
Aff. to soil before emergence of crop.

(8) Post emergent
↓
After the weed has formed

(9) Translocated pest.
Applied to plant, absorbed by plant and move to other parts

(10) Eradicant fungicides
effective on fungi

(11) Protectant fungicides
protect plants from fungal infections

(12) Selectivi pesticides
control of certain species

(13) Nonselective :-
Wide range of pest species

Uttarakhand flash floods [2013]

that had swept the state, resulting in massive destruction, loss of life and left thousands of tourists stranded.

Case study what steps to be taken for DM,

How to restore a destination back to normalcy?

~~How to tackle marketing~~

Tourism destination

Amarnath => Terrorism effect
Sabarimalai => Stampede
Uttarakhand => Natural disaster

} They create a negative image on the safety, security or desirability of tourist destinations

Under such circumstances, it poses challenges for the concerned authorities and local communities to examine various disaster management strategies.

Case Study :-

At the peak of Monsoon season, northern state of Uttarakhand was facing floods due to cloud burst that swept away many inhabitats & tourists as ↓

that hit the famous Char Dham pilgrim ⇓

is discontinued for 3 years for repair & restor"

National Institute of Disaster Management (NIDM) in its first reports on Uttarakhand floods has blamed "climatic conditions combined with haphazard human intervention" in the hills for the disaster -

Major tourist and pilgrim destinations
↓
Uttarakhand to beat the Δ
↑
to be the destⁿ

→ These things lead to an uncountable rise in the no. of people travelling to Uttarakhand.

⇒ Rising tourism attracted land sharks, they erected multistoried hotels, flouting all environmental norms.

⇒ Thousands of resorts & hotels have mushroomed in this eco-sensitive zone for the last few years.
Eg. Kedarnath valley has 100s of such hotels that were vulnerable to these natural calamities.
So when flash floods struck the valley, many of these hotels got swept away and so did the people staying in them.

⇒ The rampant illegal constⁿ of buildings by locals also contributed to problems and made the situation more worse.

⇒ Above all, the traffic in the hills ↑ed hugely, hills are delicate and unstable, so it takes little to set off landslides.

⇒ Checking Authority ⇒ faults in State Disaster Management Authority which was formed in 2007.

⇒ No meeting ever was conducted nor were

any ... programmes framed

=) No actionable programmes were prepared to face any sudden crisis.

=) One good example of Mismanagement by Uttarakhand Government :- the state govt. did not take any measures for their rehabilitation till date.

=) Govt. has sanctioned a absurd no. of hydro-electric power projects that actually overlap with each other.

All these only goes to show the state's / nations' lack of competency, lack of planning & absences of political accountability.

=) Main factors

(1) Unregulated tourist flow
(2) Absence of an early warning mechanism.
(3) Communication system was inadequate.
(4) Lack of trained medical staff at hospitals
(5) Finally the state had no action plans in case of a disaster struck.

Module - III

Approaches and Measures in Disaster Management

Stages of Disaster Management :-

It is also called Disaster Risk Management. Sum total of all activities, programmes & measures which can be taken up before, during and after a disaster with the purpose to avoid a disaster, reduce its impact or recover from its losses.

(i) Pre-disaster stage (ii) Emergency stage (Disaster phase / phase of catastrophe (iii) Post-disaster stage (Recovery / Rehabilitation phase)

(i) Pre-disaster stage :- This includes 1. Preparedness phase
2. Mitigation phase.

① Preparedness phase (phase of Readiness)

This phase involves planning to respond immediately in anticipation of a disaster. It includes awarness about Emergency Exercises and first-aid measures. This awarenes programs strengthen the technical and managerial capacity of governments, organization and communities to minimize the morality & property loss and enhance disaster response operations.

phase of Readiness

a. Hazard zone mapping - Regions vulnerable to natural disaster must be mapped accurately with RS & GIS.

b. Hazard forecasting, warning & prediction - Inter-linked with Each other. Landslides, floods as they occur during

rainy season, we can predict.

c. Disaster preparedness plan - preparedness plan for reducing the impacts of disaster placing sand bags near the levees to raise the height, barriers around buildings, stockpiling of essential commodities like food, batteries, candles and water etc.

An Important component of disaster planning is the Basic Emergency operations plan [EOP]. :- A document contain a detailed description of the duties / roles / Responsibilities, of agencies / people involved in it. Also referred as

(i) contingency plan (ii) Continuity of operation plans

(iii) Emergency response plans (iv) counter-disaster plans etc.

The fundamental elements of EOP includes

1. Base plan - Main body of the document that contain description of structure and process.

(i) Introductory Material - document, signature, title & records etc

(ii) Purpose - It contains clear & concise explanation about the plan.

(iii) Situation & Assumption - Scope of plan, Reasons for need of document, Map, useful facts etc.

(iv) Concept of operations:- explanation about the manner.

(v) organization and Assignment of Responsibities - explains organizational structure and charts.

2. Emergency Support functions - Co-ordinate (workers) will be trained.

Hazard specific Annexes - like fire hazards, specific plan.

4. Situational Annexes - Additional guidance.

5. Appendices - It contains check lists, maps, resource list etc.

d. Land-use zoning :- Identification of Hazard prone areas which are not for residential but for agriculture or some other purposes.

e. Preparedness through Information, Education and communication (IEC) - general public must have awareness about the knowledge of hazards.

(2) Mitigation phase (Risk diminution phase) - It is second phase of pre-disaster stage.

⇒ construction of disaster resistant houses
⇒ Less population in disaster prone areas.
⇒ Land use control
⇒ Utilization of Resources
⇒ Fire resistant studies etc.

Mitigation planning & Guidelines

⇒ planning :- Action taken to identify the disaster risk areas and bring down the long term risk to life & property.

i) organize Resources - like water, land
Public should be made aware.

(ii) Risk - Assessment :- Intensity of Impact should assess - like how much on life & property b on people, how much commercial, residential zone are present etc.

(iii) Develop Mitigation plan - by involving all the experts.

(iv) Implement plan & monitor progress - Like periodic evaluations must be conducted to monitor.

Guide lines :- To increase public awareness in facing the Catastrophic damages.

(i) Early warning Symptoms - Major role in mitigation disasters. Detection of signals, analysis of damages and then passing the important information to concerned people.

(ii) Land use zoning - Identification of hazard prone areas. should not used for residential or industrial purposes.

(iii) Building codes - to improve the quality of new construction etc to resist damages. involving builders, architects & public.

(iv) Incentives - funds for building good structures / certain Modifications required.

(v) Provision of Assets at Subsidized Rates - Community cyclone shelters at cheaper rates. water harvesting in drought prone areas etc.

1) Increase public awareness - To Educate the people about how to respond & cope when hazard occur.

* Role of IT in Disaster Management :-

Disaster Management needs drastic improvements sources to decrease damage & save the - life of people.

→ To achieve this main object, DM has to face challenges for data collection, data management & translation integration. & communication.

→ Considerable emphasis is now being placed on R&D activities in the area of IT. for Disaster preparedness and prevention.

→ In some major disaster role of electronic communication has provided the most effective and in some cases perhaps the only means of communication with the outside world.

→ Internet :- facilitates the opportunites to enhanse the capabilities of addressing hazards awareness & risks management & practices.

→ Internet sites provides more information about the growing no. of organization & professional disciplines addressing them.

→ Provides a platform for rapid & global dissemination of disaster information.

→ Many meteorological services are experimenting with internet for real time dissemination of wealth observation forcast

satellite and other data.

GIS & Remote Sensing : ; Support all aspects of D.M are essential as effective preparedness communication and training tool for D.M.

Disaster planning can be very powerful when modeling is in corporated risks into GIS.

→ Modeling allows diaster managers to view the scope of a disaster where the damage will be high & what responses are required.

Applications of GIS & RS :

→ Drought : Early warnings of drought conditions which helps in planning the strategies to organise relief work.

GIS helps => in modeling all the water bodies points and helps in rejuninating.

Satellite data may be used to target ground water sities for taking of well desiging programmers.

Earthquakes : GIS & RS => for prepaing seismic hazards maps.

Continuous Sheet...

Floods : Satellite data can be effectively used for mapping & monitering the flood inundated areas, flood damage assessment, protection works etc...

Land slides :- Landslide zonation map gives information of the stretches, slope stability / instability.

Warning & forecasting System :-

GIS can improve the quality & power of analysis of natural hazards assessement, guide der actiration and assit planners in the selection of mitigration measures implementation of emergency preparedness & response action.

RS as a tool can very effectively contribute towards identification of hazard areas, monitor the planet for its changes on a real time vasis and give early warning to many impending diasters.

Communication satellites :- have become vital for providing emergency communication & timely relief measures.

⇒ Awareness & training etc.

Role of Technology in DM

Tech^{gy} is used to manage natural disaster issues

(i) Mapping - disaster response maps include topographic maps, land-use maps, hazard maps, geologic maps, vegetation maps, population distribution maps, Seismic maps, hurricane tracking maps etc.

(ii) Aerial photography & Remote Sensing - used to highlight the type of disaster & devastation caused. Balloon photogrammetry system is used for low altitude aerial mapping.

Remote Sensing is called Earth observation, refers to collect data about the biosphere, lithosphere, hydrosphere and atmosphere of the Earth.

(iii) communication - for co-ordination, control, assessment, reporting and monitoring the disasters.

communication includes SMS, messages, Mobiles, Media, wireless, radio, T.V etc.

(iv) Information management - latest technology.

Emergency stage:-

Emergency stage at which the crisis occurs. This phase results in great damage to life, property, environment & health.

The affected people are in a state of profound shock.

It includes providing assistance to the affected population with transport, food & shelter & temporary Repairs to damaged infrastructure. i.e Assistance to the affected people to meet the basic needs.

(iii) Post - Disaster stage (Rehabilitation)

It focuses at restoring normalcy in the lives of people. includes temporary shelters, repair of damaged infrastructure, educating people about health & safety, post trauma counselling programs etc.

Provision of Immediate Relief Measures to Disaster Affected People :-

It involves dealing with avoiding risks and preparing, Supporting and rebuilding Society when material or human made disaster occurs.

Disaster relief :-

(i) Reconstruction of homes damaged / destroyed -

By the Government, NGO's, Material assistant should be done at subsidized rates.

(ii) Military Assistance -

If the situation is beyond its control, then immediate military assistance could be sought for carrying out the relief opens.

(iii) Medical care -

Specialised medical care has to be provided to help the affected population sometimes preventive medicine may also be provided to prevent the outbreak of epidemics.

(iv) Corpse disposal -

Disposal of dead bodies.

Prediction of Hazards and Disasters

⇒ Good prediction and warning Save lives. It also reduces damage and Economic losses.

Methods to predict Natural disasters

a. Fractal Method:- A fractical is a mathematical formula of a pattern that repeat over a wide range of size and time scales.

Prof. Benoit Mandelbrot, prof. of Yale University, considered as father of fractals.

Eg. They measure past Events like hurricane and apply practise Mathematics to predict future hurricane Events.

b. Dilatancy Model for prediction -

Based on rock observation when rocks are stressed they begin to Expand & loose their magnetization with the result there is formation of microcracks & fractures.

=> change in Seismic velocity

-> " " Electrical resistivity

=> uplifting of Topography

c. Scientific Methods of predicting hazards -

weather monitoring and forecasting network

Meteorological & Satelite system => To predict hurricane

Argo => Measuring Tsunami

Anemometer -> windspread

Seismograph => Earthquate

d. Animal behaviour -

Erratic behaviour of elephants before the occurrence of earthquake, laying of eggs by the crocodiles on river banks at higher grounds indicates impounding floods in Kenya. and Rushing of buffaloes, goats towards hills during Tsunami were observed.

- Measures of adjustment to Natural hazards :-

Activities of human that tend to reduce/minimize any negative impacts of an extreme event.

(i) Reducing loss by Affecting the cause of disaster -

Eg :- floods, afforestations, river dredging, Risk of climate change with global warming.

(ii) Construction of physical structures - like dams across the rivers, to control floods.

Afforestation => forests act as buffering area against strong winds or flash floods.

Hazard resistation buildings.

(iii) Non-structural measures - warning symptoms, increase in Public awareness to protect themselves from Extreme events.

(iv) Insurance measures - Recovery from losses.

Disaster Management Module - IV

An Integrated approach for disaster ~~fo~~ Mitigation – Institutions Involved.

(a) Meteorological observatory :- (WMO) world Meteorological organization is a specialized department of UNO with headquarters in Geneva, Switzerland.

WMO provides information on meteorology [weather and climate], hydrology & geophysical Sciences [Such as Seismology, Volcanology] etc.

Objectives :-

→ protection of life and property

→ protection of environment and contribute to Sustainable development.

→ Increase Socio-Economic well being of people.

→ Training, research and technology.

WMO has Six regional association called as Regional Specialized Meteorological centers (RSMC)

Regional centre 1 :- Fiji Meteorological Service (Nadi, Fiji)

2 :- IMD, Delhi, India.

3 :- Honolulu central pacific Hurricane Center (Honolulu, Hawaii, USA)

4. National weather Services (National Hurricane Center, Florida, USA)

5 :- Japan Meterological Agency, Tokyo

6 :- Meteo - France

Six Tropical cyclone warning Centers.

1. Bureau of Meteorology, Australia
2. Bureau of Meteorology, Darwin
3. Bureau of Meteorology, Brisbane
4. National weather Service, New Guinea.
5. Meteorological Service, New Zealand
6. Meteorology and Geophysical Agency of Indonesia, Jakartha.

members of WMO assemble one in 4 yrs. with the following objectives.

(1) Execute the programme discussed in the meeting
(2) Approval of long term plans.
(3) Assessment of max. expenses for the financial period.
(4) plans of each member organization and co-ordinate the Activities.
(5) Electing President & Vice - president for Each Organisation.

Indian Meteorological Department :-

→ It is one of the departments of Ministry of Earth Sciences with headquarters in Delhi.

→ IMD has well Established International network with WMO.

→ It has six Regional Meteorological centres located at Mumbai, Chennai, New Delhi, Kolkata, Nagpur, & Guwahati.

Each of the Meteorological Regional Centres have the following units.

→ Forecasting offices
→ Flood Meteorological offices
→ cyclone warning centres
→ Meteorological radar stations. Etc.

Other Divisions of IMD.

→ Agriculture Meteorology
→ Civil Aviation.
→ climatology
→ Hydrometeorology. Etc.

(b) Seismological Observatory :- It is one of the disciplined of IMD located at New Delhi.

Activities :- 1) Monitoring of Seismicity
2) Research in Seismic activities.
3) Responding to Queries pertains to Seismicity
(4) Development and Manufacture of Seismological Instruments.
(5) Exchange data with National and International Agencies.
(6) Provides Seismic data during constructions like dams, Towers, Skyscrapers etc.

(7) providing of micro earthquakes.

(8) There are 212 Seismological observations monitors Maintenance done by IMD. out of these 24 have been upgraded with broadband digital seismographs. The Seismological observatories form network with Central Receiving Station (CRS) and National Seismological Database Centre (NSDC).

(C) Volcanological observatory :-

→ It is an Institution which is responsible for research activities and continuous monitoring of volcanic activity.

→ It includes study of Geophysical changes, ground movements, volcanic gas chemistry, hydrologic conditions etc.

→ The world organization of volcano observatories (WOVO) listed 100 research ~~lab~~ observatories all over the world.

→ It is Responsible for Identifying of volcanic fields and issue warnings for the Safety and public through the government Agencies.

(d) Hydrology Laboratory :-

The Hydrometeorological division of Indian Meteorological division at New Delhi has an Important role for providing technical assistance

to central / state organizations in the field of flood forecasting, storm forecasting, glaciological studies and hydrometeorological studies.

Main Activities :-

→ Monitoring Rainfall pattern
Department of forestry, Department of Agriculture, Irrigation like coffee & Tea plantations.

→ providing assistance & advice on meteorological aspects central water commission, Ministry of Agriculture, Ministry of water Resources, flood controlling Authorities.

Main units :-

(i) Storm Analysis Unit :- Depending on rainfall pattern, probability of storms for construction of Railway / Road bridge.

(ii) Flood meteorological unit :- Provides flood warnings, heavy Rainfall warnings, prepares guidelines for flood early warning systems.

(iii) Storm Design unit :- Construction of hydraulic structures, irrigation projects, dams, etc on various rivers.

(iv) water Balance Unit :- water budgeting, conservation Principles etc.

(v) Glaciology Unit :- To understand the accumulation of snow in Himalayan rivers, using GIS & RS for this. glaciological Expeditions are also involved in this.

(e) Industrial Safety Inspectorate :-

It is concerned with maintenance of good health among industrial workers, monitoring the Environment at workplace; investigating Sources of Pollution, climate change issues, sustainability issues etc.

Industrial Safety Inspectors Types :-

(i) environment protection Technicians.
- → climate change
- → Land use regulations.
- → water conservation & Management
- → Source of pollution
- → Analysis / Tests
- → Monitoring equipment etc.

(ii) Health physics Technicians
- → Safety of workplace in Industries that use radio active material / people exposed to nuclear power, Scientific research, hospitals etc.
- → spectrometers / Gamma Counters.

(iii) Industrial Hygiene Technicians
- → Responsible for inspection of work place environment Equipment.
- → occupational health hazards like noise, dust vapors, quarry dust, chemicals etc.

(iv) Mine Examiners :-
- → Inspection of workplace Environment in underground mines, Especially methane another noxious gases.

) Institution of Urban & Regional planners :-

It Provides financial & Professional advice for the purpose of developement, Especially developing Countries.

→ To Sustainable mangement of resources & Environment issues.

Town and country planning organization [TCPO] Sub-ordinate office under Ministry of Urban development, Govt. of India.

Main Activities :-

→ Town planning
→ Construction of Roads
→ Buildings, Bridges.
→ planning for Eco- & Social development
→ water Supply for domestic / Industrial / commercial purpose.
→ Health care facilities
→ Maintenance of population Statics tics.
→ Regulation of Land use for residential / commercial.
→ Providing amenities like street lights, Parking lots, busstops, foot paths, Parks, playgrounds & gardens etc.

(9) Chambers of Architects :-

The Indian Institute of Architects (1917) Comprises Professionals of more than 15,000 members.

Practice of architecture for the Safety & welfare humanity & Environment.

It also collaborates with various International agencies like International Union of Architects [IUA], Commonwealth Association of Architects [CAA], South Asian Association for Regional Cooperation of Architects (SAARCH).

A professional Architect should consider the following points.

→ Understand the anatomy of disasters and their Effects on life & Property & environment.
→ Understand the strategies of govt. for disaster mitigation.
→ Provide disaster resistant design ideas.
→ High standards of quality control for building a project.
→ updated knowledge of cement research activities at Disaster Management Centres & by NGO's.

(b) Engineering Council :-

Professional Engineers who contribute to nation' development by reducing the risk of damage to construction structures during disasters.

A civil Engineer may be involved in the following roles :-

→ Policy makers & planners
→ Structural Engineer
→ Geotechnical Engineer
→ Environmental / Sanitary Engineer
→ Construction manager
→ Project manager
→ Consultant
→ Hydrological / Irrigation Engineer
→ Site supervisor
→ Transportation Engineer Etc.

(1) National Standards committee :-

National Disaster Risk Management programme (NDRMP) has been constituted by the Ministry of Home affairs to provide assistance to various states at the state, district, block / taluka and village levels.

National Centre for Disaster Management (NCDM) Under the Ministry of Agriculture and cooperation at the Indian Institute of Public Administration, New Delhi, coordinates the national, state and district level administration and other concerned role players in tracking natural disasters.

Integrated planning - Contingency Management preparedness :-

(a) Education on disasters.

Preparedness :- It is the level of readiness to respond to any emergency situation. May be done through programmes that strengthen the government organizations and communities in managing the disasters.

→ Develop plans to save lives
→ minimize disaster ~~response~~ ~~operations~~ damage.
→ Enhance disaster ~~damage~~. respons operations.

(a) Education on Disasters :-

There are many ways to Educate and make people aware of disaster & Risk reductions are

→ Develop Educational materials & incorporate in curr
frame work.
→ provide handbooks to the public
→ Distribute posters and stickers
→ print Articles in news paper.
→ use celebrities to give information about disaster.

(b) Community Involvement :-

→ Communities participation
→ Partnership
→ Empowerment
→ ownership and capacity building.
→ Effective participation.

(c) The Adjustments of Human Population to Natural Hazards :-

→ It refers to "human activities intended to reduce or minimize any negative impacts of an Extreme Event".

(i) Reducing Loss by Affecting the cause of a Disaster
(ii) Modify the physical proces of Hazards
(iii) Implementation of Non-structural Measures
(iv) Reducing the Impact of Hazard by Adjusting to losses.
(a) Insurance Measures
(b) compensations.

Role of Media :-

→ To Inform the people about the occurence of disasters.
→ To Advice people about rescue actions to be taken
→ To encourage people to participate in rescue activities

→ To publicize the necessity for assistance grants.
→ To improve communication links among the disaster affected people.

Monitoring Management – Discuss the following organizations:

[a] (i) International Council for Scientific Unions [ICSU]:-

It is also called as International council for Science is an International Non-governmental organizations.

Main objectives:-

→ To address the challenges caused by Natural Disasters.
→ To promote science for the welfare of mankind & Society.
→ Encourages the interaction of Scientists from various world and participate in Scientific activities.

(ii) Scientific Committee on problems of the Environment [SCOPE]

It consists of Scientists & experts to deal with Global environment issues.

→ Design & practice proces to lower the rate of consumption of non-renewable resources.
→ Ensure sustainable supply of renewable & non-renewable resources.

SCOPE has been grouped into 3 clusters:-

cluster 1:- Managing Societal & Natural Resources [MSNR]

It includes Scientific research projects in the area of * Sustainable biosphere project (SBP)

* Urban waste Management
* Material flow Analysis
* Sound Agriculture practices
* Ecosystems restoration etc.

Cluster 2:- Ecosystem processes and Biodiversity [EP&B]:-

* Importance of biological diversity.
* Interaction of human with Ecosystems
* Bio Geochemical cycles.
* Nutrient fluxes.
* Energy flow etc.
* Molecular biology.

Cluster 3:- Health & Environment [H&E]

* Contains projects that develop methods for analysis
* Chemical Risk to human
* Bioaccumulation
* Vector borne diseases etc.

(iii) International Geosphere- Biosphere programme [IGBP] :-

It is an international non-governmental organization mainly to global change.

* To study the physical, chemical & biological interactions involved in the Earth's Surface proces.
* Changes in the Earth's dynamics.
* Role of humans in bringing about the changes.

[] World Federation of Engineering Organizations [WFED]

It is an International Non Government Organizations Supported by UNESCO [United Nations Educational, Scientific and cultural organizations].

Aim :- To Encourage the developement and application of Engineering technology for the welfare of mankind.

→ Application of Engineer.

→ Importance of Engineering branches.

→ Through proper of Application of Engineers Know, achieving Sustainable development

→ Serve mankind by bringing awareness due to man-made & Natural disasters.

[C] National Academy of Sciences:-

It is a private, non-profit Society of Scientists and intellectuals involved in Scientific & Engg. Research.

They offers advice on matter pertaining to Science, technology and medicine.

[E] Geographical Information System (GIS):-

GIS is used in the creation of real world Models based on digital data.

⇒ Identification of location where people are trapped & need medical / Emergency Service.

⇒ warn people and shift to Safer areas.

⇒ financial.

[F] International Association of Seismology & physics of the Interior [IASPEI] :-

It is one of the Semi-autonomous associations of International Union of Geodesy & Geophysics (IUGG) which is a non-governmental, Scientific organization.

Main objectives :-

→ To promote study of geophysical processes of causing Earthquakes, tsunamis etc.

⇒ To propagation of Scientific development promotion.

⇒ To encourage research & development in specific geographic regions.

[9] Various U.N Agencies :-

United Nations (U.N) General Assembly has formed a UN Disaster Management Team [UN-DMT] consists of a core group with FAO (Food & Agriculture organization), ILO (International labour organization), UNDP (United Nations Development programme), UNESCO (United Nations Educational Scientific and cultural organization), UNFPA (United Nations Population Fund), UNHCR (United Nation High commission for Refuges), UNICEF (United Nation children's Fund), WFP (world Food programme), WHO (world Health orgai^n), UNAIDS (UN programme on HIV/AIDS).

UNCRD - United Nations Centre for Regional Development:
Established in 1971, an autonomous of UN group.

Main objectives:-

→ To Encourage Training and Research in Sustainable development
→ To Provided regional development & planning.
→ To promote Scientific research

(ii) IDNDR- International decade for National Disaster Reduction:-

→ Main Aim is to rising levels of loss of life and property
→ To reduce losses resulting from disaster as a wealth of Scientific and Engineering knowledge.
→ To reduce property damage and Social, Economic disruption.

(iii) WHO - World Health Organization.

→ To provide technical assistance in health development.
→ Reduce the problem of communicable and emerging diseases
→ To ~~provide~~ promote preventive & curative health care.
→ To Foster maternal & child health care.

(iv) UNESCO :- United Nations Educational Scientific and Cultural organization.

→ capacity building in disaster prone Nations.
→ Encourage research on National Natural disaster & hazard.
→ To Encourage education & Public awareness in dealing with disasters.
→ Coordination of early warning systems.
→ develope and antipoverty programme to reduce the impacts of disasters.

(v) UNICEF :- United Nations Children's Fund.

→ Health related initiatives

→ Children and women Mat& Nutrition

→ Care for orphans, immunization programme & other health Initiatives.

(vi) UNEP - United Nation Environment Programme.

→ Collaborate with other agencies.

→ Early warning of environmental hazard

→ Sustainable use of Natural Resources

Disaster Management in India — Module - 5

A Regional Survey of Land Subsidence:-

Or
Ground subsidence → It's a Geological process of sinking of Land.

Causes for land subsidence:-

→ Excessive withdrawl of ground water (bore wells)
→ Mining Activities
→ Oil & gas Exploration
→ Low cellar / buildings
→ Sky Scrapers ⇒ weight increases ⇒ High population
→ Earthquakes
→ Cutting of trees will make the soil very loose.

Effects of Ground Subsidence:-

⇒ Destruction of buildings, loss of life & property
⇒ Damage to Underground drainage system ⇒ mixes with Ground-water and deteriorates the quality of Groundwater.
⇒ Damages storm water drains.
→ Damages Underground Cables.
⇒ Destruction of roads, Railway tracks etc.
⇒ flow of Seawater into fresh water into lowland area.

Remedies:-

⇒ Minimize the withdrawl of GW.
⇒ Supply additional amount of Surface water.
⇒ Roof top Rainwater harvesting.
⇒ Land reclamation [mining activities are finished].

=> Go for alternate energy resources to prevent excessive exploration of oil / Natural gas.

Coastal Disaster :-

Coastal Ecosystem in India should be considered as a precious natural resource as it forms an important Economic asset for the country.

Coastal systems: Importances :-

=> Source of sea food, Coastal agriculture

=> Oceans one of the ways of transporting cargo using ships. [container ships, tankers, chemicals, crude oil ships etc].

=> Mining => Oceans are good source of diamonds, gold, Silver, manganese etc.

=> Tourism & recreational opportunities. (Sailing, Scuba diving)

=> Climate buffer: Oceans can store and circulate water, heat Δ & CO_2.

=> They act as sinks of solid waste material.

Risk reduction :-

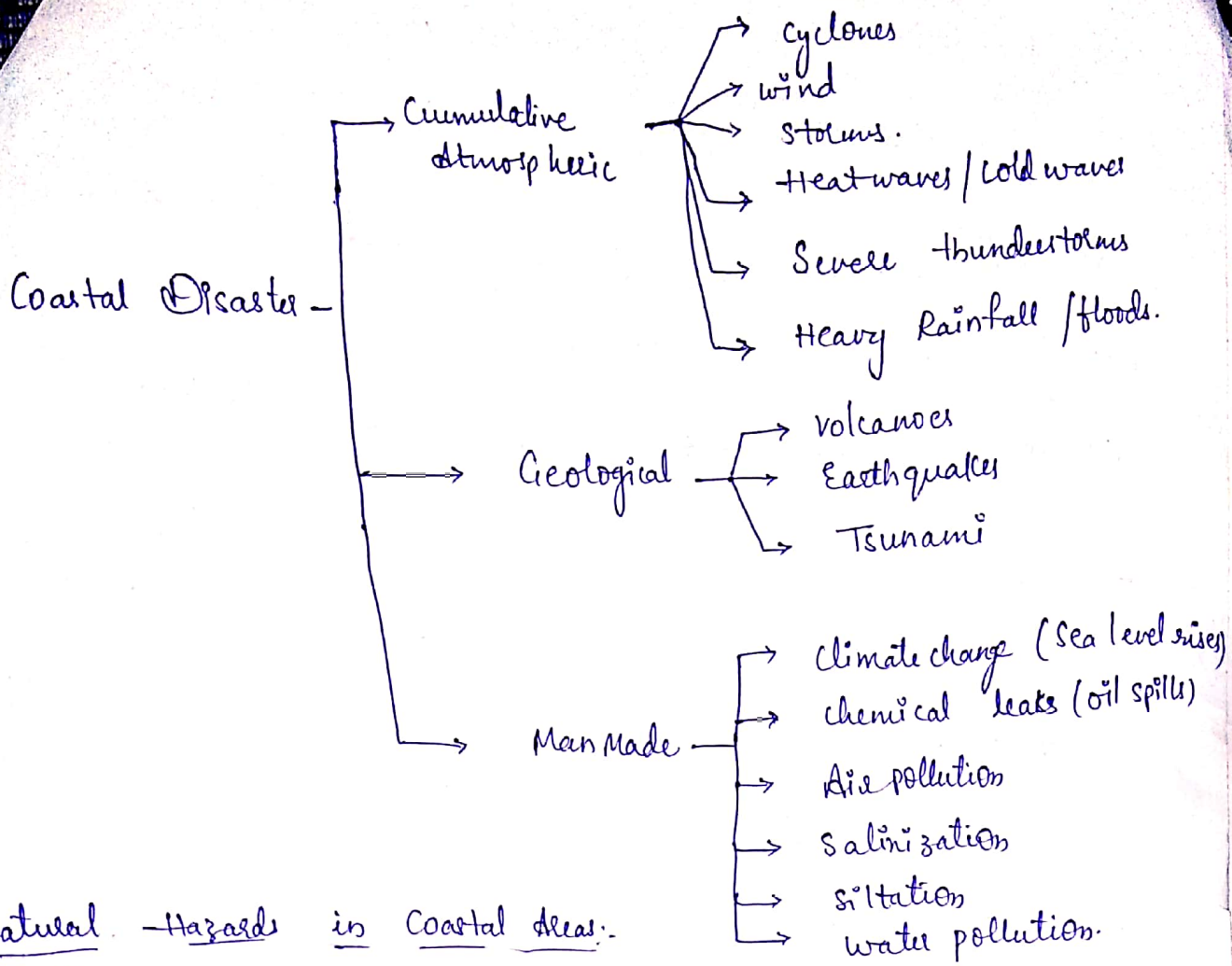
=> Efficient monitoring & Survillance system.

=> Accurate early warning systems

=> Evolving predisaster hazard, vulnerability & risk-assessment inventories.

=> Evolving post disaster mangement & mitigation

=> Public awareness.



Natural Hazards in Coastal Areas:-

→ Severe waves
→ Storm Surges
→ Tsunamis
→ cyclones
→ Coastal Earthquakes.

Disaster in the hills:-

⇒ Earthquakes, landslides, forest fires, Avalanches, flash floods etc.

Ecological planning for Sustainability & Sustainable development in India :-

⇒ Sustainable developement to meet the needs of present & future generation.

⇒ protection of environment [air, water & soil]

⇒ protection of resources [forests, resources like minerals coal etc].

⇒ ethical relationship between humans & Environment.

⇒ participation of citizens.

Sustainable development a remedy to Disasters:-

⇒ Afforestation programmes

⇒ special laws & regulation pertaining to deforestation i.e [forest Act], desertification, contamination of water, digging of borewells, construction of powerplants.

→ Air pollution prevention in Industries decreases Global warming.

⇒ Can prevent Drought & famine.

Measures to Sustainable development :-

⇒ Large Scale afforestation programme

⇒ Investment in agriculture development.

⇒ plantation on barrier mountain, hill sides, beaches

⇒ special law & regulations for different areas ⇒ land Management, minerals, water & soil, wild life, forests etc.

⇒ Ecological protection of grass lands ⇒ preventing of over grazing, ~~and~~ rotation of crops.

prevention of desertification

⇒ Prevention of lake encroachments

⇒ Designing eco friendly railway lines.

Role of Panchayats in DM :-

Panchayat Raj system was set up during early years of Independence.

Aim:- Democratic decentralization, Rural Self Govt., Social-Economic deviation of rural parts of India.

Three important levels for effective Governance:-

(i) Gram panchayat

(ii) Block Mandal Parishad

(iii) Zilla Parishad.

(i) Gram panchayat :-

⇒ It is the lowest tier of the panchayat Raj system at village level.

⇒ Convene meetings to warn the people of disaster

⇒ Arrange for temporary shelters for safety of villages, shelters equipped with provision to provide food & water to villagers & live stock.

⇒ Provision for evacuation of people after the final warning

⇒ Equip rescue volunteers and task forces to rescue disaster victims.

(ii) Block Mandal Parishad :-

* Middle tier / intermediate level of Panchayath Raj system Administered by Mandal parishad development officers.

⇒ Functions a link between zilla panchayats & Gram-panchayats.

⇒ Oversee the preparedness of Gram panchayats in case of an Eventuality.

⇒ Repair of damaged roads, drainage & Canals prior to the occurence of disaster.

⇒ Arrange for rescue material before the occurrence of a disaster.

⇒ Implementation of safety measures in disaster prone areas.

⇒ Supply of adequate amount of food & medicines

⇒ arrange of Emergency communication system to disaster victims.

⇒ Implementation of rehabilitation programmes.

⇒ Identify the victim for payment of compensation.

(iii) Role of Zilla parishad :-

Highest tier / Apex body of the System administered by chief Executive officers.

⇒ Convene meetings with heads of Sectoral department to take preventive measures prior to onset of a disaster.

⇒ Arrange for transportation & temperature relief measures.

⇒ Monitor the rescue efforts in disaster affected area.

prepare a checklist of a items necessary for rescue operations.

⇒ Arrange for CMG (Crisis Manage Group] to assist both levels in containing the disaster.

⇒ provide compensation to the disaster victims.

* Environmental Policies & Programmes Legislations in India:-

Environmental legislations in India:-

⇒ National disaster Management Act, 2005 was enacted by the parliament with consent of president on Jan 9th 2006.

⇒ The Main Aim/ objective is effective management of disasters.

⇒ It is defined as "Disaster Management" as a continuous cycle and integrated proces of planning, organizing, co-ordinating and implementing measures which are necessary for reducing the impacts of any disaster.

Salient features:-

⇒ Prevention of danger / threat of any disaster

⇒ Mitigation measures

⇒ Capacity building

⇒ Preparedness to deal with any disaster

⇒ Prompt response

⇒ Assering Severity/ magnitude.

⇒ Evacuation, rescue & relief measures

⇒ Rehabilitation & Reconstruction.

⇒ Act Empowers the Central government to set up (NMDA) National Disaster Management Authority with PM as chairperson, state disaster Management Authority (SDMA) with CM as chairperson and District Disaster Management Authority (DDMA) with collectors / district magistrates / deputy Commissioner as chairperson.

⇒ It also Empowers Central Government to constitute NDRF (National Disaster Response fund) to provide efficient respons. & National Disaster Mitigation fund (NDMF)

* Institutions & National Centres for Natural Disaster Reduction :-

⇒ Central Disaster Management Authority :- Apex body set by Government of India for implementing DM plans to prevent & mitigate.

⇒ National Centre for DM (NCDM) :- To provide training to government officials on DM and co-ordinate research activities on DM.

⇒ Centre for DM. :- To coordinate dM activities, develop training modules on DM, Preparedness Etc.

⇒ National information centre of Earthquake Engineering - IIT Kanpur. :- To collect information on Earthquake Engg.

⇒ Disaster Management Institute, Bhopal :- Set up in year 1987, Provides training & guidance to manage Natural disasters like Earthquakes, floods, drought, famine & cyclones.

Disaster Mitigation Institute, Ahmedabad :- To Assist & strengthening the decision making process.

=> Environment protection Training and Research Institute [EPTRI) :-

Established by the Government of A.P with aid of GOI. Aim to Safeguard life & property from disasters by providing & Consultancy Services in Risk Assessment and Safety control.

=> Gujarat state Disaster Management Authority (GSDMA) :-

Established by Govt. of Gujarat at Gandhinagar on 8th Feb 2001.

Aim: To Provide relief and rehabilitation to the disaster affected people.

To Reduce impact of Natural disasters.

=> National Institute of Disaster Management (NIDM) :-

It is continued under the Ministry of Home affairs. NIDM Provide Support to 36 Disaster Management Centres, Six of them are developed as Centres of Excellence in flood risk Management, Earthquake risk management, Cyclone, drought, landslides risk managements etc.