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

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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 safety 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)

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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

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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

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

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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

i) 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

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

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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.

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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.

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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

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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, predation and also sometimes due to ind introduc -tion of exotic and non-native species.
(Tape worms)

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 a healthy ecosystem judicious use of

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

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sustainable use in an equival way mainly harm... dist...
are more effect on species and ecosystem diversity Caus... of
-ction, modification, fragmentation of habitat, exotic spec... e
harvesting and over exploitation as well as global climate c...
It is important in the fields of forestry, fisheries, harmin...
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 & restorati...

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

3. Perception Approach :- 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

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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.

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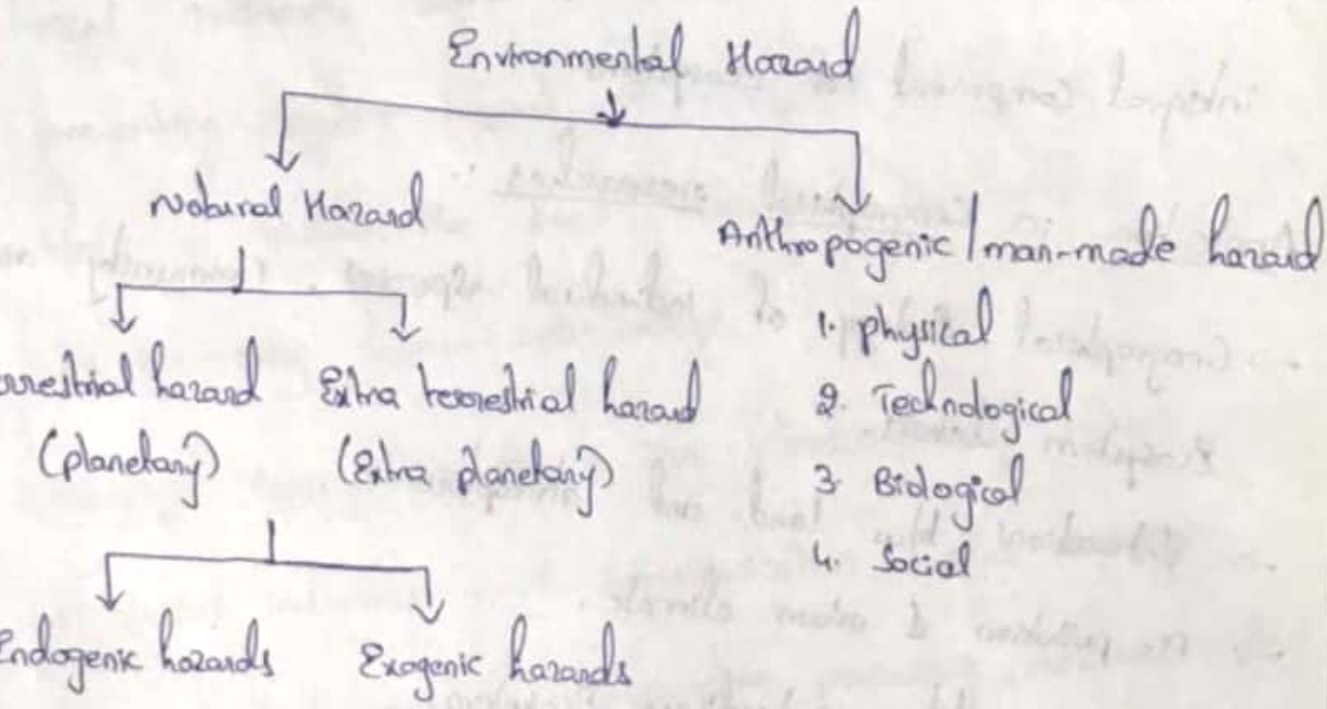
→ Globalization and world cities.
→ Global biogeochemistry.
→ Geomorphological proces
→ spatial analysis
→ species distribution & ecosystem modeling by remote sensing.
→ Historical geography of migration, modernity and new world resettlement.

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

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of Disaster :-

Based on origin disaster are.

- natural disaster
  - Major natural disasters
    - Eg:- flood, cyclone, draughts, 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.

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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 :-

:- 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

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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

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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.

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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

Classification of Hazards

Endogenous Hazards :-

Volcanoes :- 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

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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 oceans, 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 the a volcano is formed Eg:- Mount Etna.

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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 :-

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

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in west

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 pasific 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 :-

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

ii) shield volcanoes :- They are broad, sheild like d 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

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low 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 US.

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

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Earthquakes

Earthquakes are the most destructive natural hazards. They can occur at any time of the year, 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 & philipines plates. These plates float

on the molten aesthenosphere carrying withit 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 plate 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

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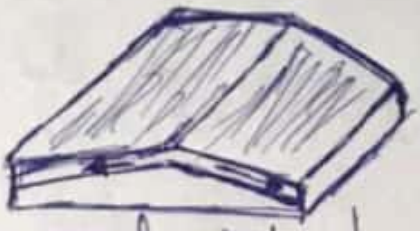
Convergent plate boundary.

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 eruptions. 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.

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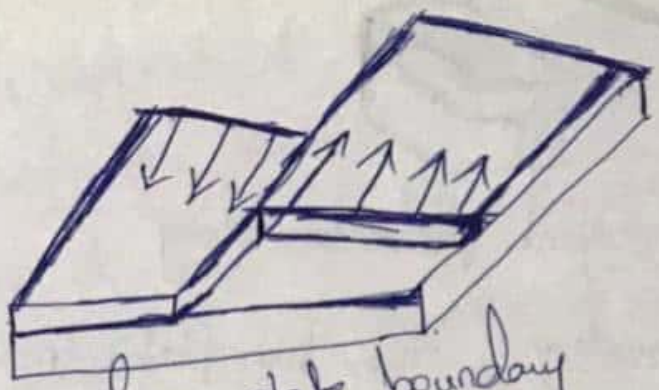

Transform plate boundary

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/hypocenter 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 generated waves which travel in all directions causing the shaking of an earth's surface. These waves are 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 :-

:) p waves are also known as primary waves.

:) these waves are formed, when after the adjustment happened,

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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.

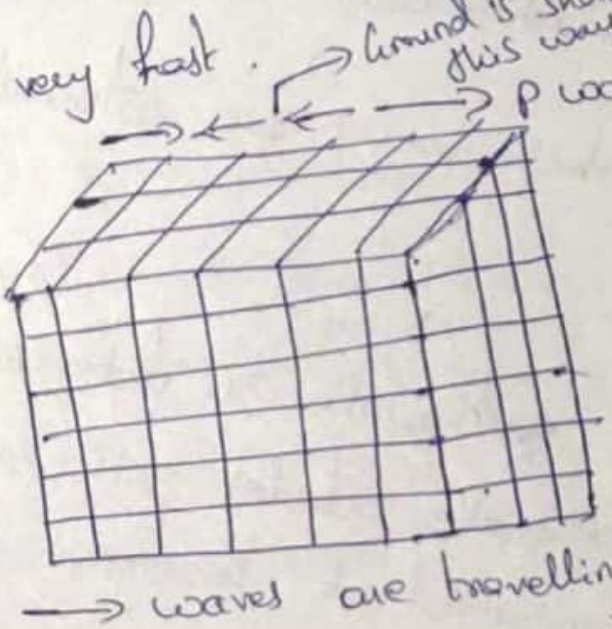
iv) p waves are also known as 'longitudinal waves which travels like push & pull motion.

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.

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

ii) these waves are second.

iii) moves with a side to side motion

iv) these are in transverse motion

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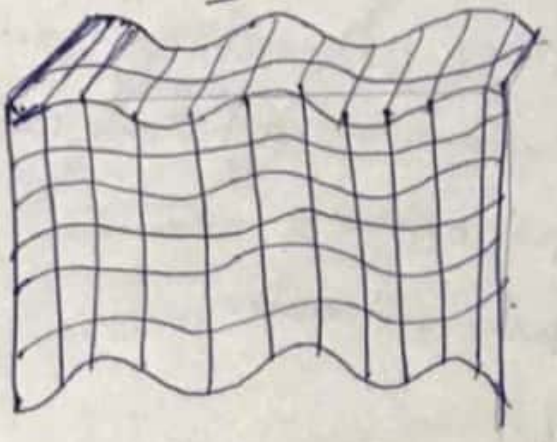
iv) It travels only through solids.

S waves.



3) Surface waves :-

i) Combination of P & S waves.

ii) Travels slow but they creates lots of damage.

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

P > S > Surface waves.

iv) Of waves 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.

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module 2

09/01/19

Volcanoes def: It is a rupture in the crust of a planetary mass object such as earth that allows hot lava, volcanic ash and gases.

Ethymdogy: the study of volcanoes is called ethymology.

volcano → Roman mythology.

volcanoes

- Convergent → At mid ocean
- Divergent → Subduction → ocean & crust.

Hotspots: It is an area in the mantle from which heat rises as a thermal plume from deep in earth.
Ex: Hawaiian Islands.

Volcanic features:
Conical mountain, spearing lava, poisonous gases.

fissure events: An flat linear crack through which lava emerges.

classifications

- Active
  - → frequent eruption
  - → erupt regularly
  - → life span – month to several million years
  - → dozen of times.
- Extint
  - Ex: 1) mount yasur, Tanna island
  - 2) mount Etna → Sicily, Italy
- Domant

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Extint:
→ No longer has lava supply.
→ many hawaiian islands.
→ Eg: Netherlands, Zoidual (Mt Kudal), Kenya, peru.

Dormant:
→ Inactive
→ eg: yelloco stone.
→ Repose / recharge
→ 700Ka toba of around: (Kilo acres)
→ reservoirs.
→ pinatoba

Ex: 1) mount Fuji
2) Kilimanjaro
3) Hood

Types: ① shield volcanoes — many islands are formed. form plate like structures. (shield)
less viscous.
② Lava domes — high viscous (prevents lava to flow very far)
③ cryptodomes — forms a balloon.
④ volcanic cones (Cinder).
⑤ Strato volcanoes — at a time many erupts. made of cinders, ash, lava
⑥ Super volcanoes — sulphur & ash released.
⑦ submarine volcanoes — yellow stone national park.
⑧ subglacial volcanoes — British Columbia.
⑨ mud volcanoes — mud is erupted in form of silica.

Lava composition:
① → Magma: high composition:
→ high % of → 63% silica called felsis
→ highly viscous Eg: Strato volcano.
② Intermideate / Composition:
→ 52-63% silica ~~tectonic~~ tectonic plate
→ < 52%-45% → mafic → Basalt.
→ less viscous
→ eg: mild ocean etc.

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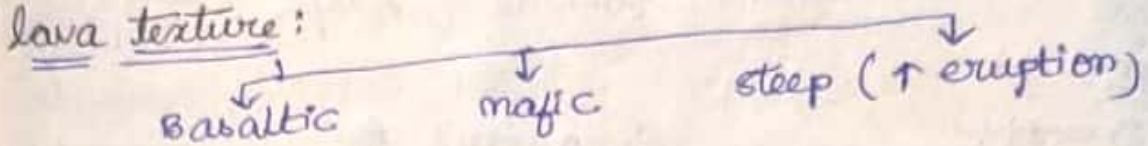
⑤ continental flood Basalts:

→ ≤ 45% silica → ultramafic.

lava texture:



→ smooth
→ ropey
→ high temperature.
→ chemical make up.
→ fluiding.

Technical Effect of volcanoes:

1. High Co_2 emission's.
2. pose to human being.
3. Earthquakes.
4. Hot Springs.
5. fumaroles.
6. mud pots
7. Geysers.
8. ~~High~~ Sulphur dioxide (SO_2) emissions.
9. Sulphuric acid, H_2SO_4 and HCl.
10. Hydrogen floride gases, trace gases are evolved.
11. carbonmonoxide and halloca carbons come out.
12. organic compounds, volta volatile, metal ions, water
13. It spreads nearly about 10-20 miles on the surface
14. Radiations.
15. Send back into the space.

Warnings Sessions:

1. volcanoic Alert Institutions gives Signals
2. volcano warning schemes of US.

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Occurance: → Earthquake, floods, volcanoes.
→ prolonged rainfall
→ River blocks → dam/embankment bursting

Def:

Damages (or) Distruction.
- → landslides → damage.
- → landslide vulnerability → loss of life.
- → landslide & Risk → social, economic, disruption.
- → landslide evaluation → environmental degradation.

Causes:
→ Geological weak material
→ Erosion
→ Intensive rainfall
→ Human excavation
→ Earthquake
→ Volcanic eruption.

Impacts
1) Direct costs: Repair, damage of property
2) Indirect costs:
- → adverse effect on water quality
- → loss of productivity
- → Reduced land value
- → loss of human & animal

Types:
- Falls → → free falls, → bouncing, → rolling
- Flows → → debris flow
- Creep → → steep down slope movements
- debris
- debris flow
- debris avalanches
- Lahar → → lava mud flow
- Slides
- Topple → block of rock
- lateral spread

Control measures:
→ Avoid settlement at slopes.
→ Assesment of ground for construction
→ Natural vegetation promotion
→ No Constructions beyond the limitations.

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Magnetic storms: - disturbance of magnetic fields near earth
→ Distruption of communication, navigation problems, corrosion of pipe lines, radiation poisoning damage to micro chips, in human home computers;
→ Signal problems to electric gadgets.

* Population explosion, * Urbanization.

Population explosion: Effects:

* land problems.
* food scarcity, water scarcity
* Fel unemployement.
→ pollution Increases.
→ Environmental & ecological consequences
→ Illeteracy → Consumption of power

Urbanization:

→ Cost increases on agricultural products.
→ land scarcity.
→ Insufficient fuel
→ pollution
→ Increase in emission of CO_2
→ traffic problems
→ ground water table reduction
→ Sanitation problems
→ Fresh water expensive.
→ River water contamination.

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Floods: def:

Exogenous: disturbances happening on the earth

→ It

Floods: Def: flood is a state of high water level along river (or) coast that lead to inundation of land which is not usually submerged.

→ It happens in hours without warning.

→ It breaches embankments, spill overs.

Types of floods:

1. Flash floods: Due to high powr down of rain (or) due to high runoff.

2. Riverine:
   - → slow runoff ex: srisilam flood
   - → fast (or) sudden runoff.
   - → Dam fluves
   - → ~~estuarine~~. estuarines
   - → coastal floods.

3. Urban flood: Drainages leakages
   - → Damaged by work men to tunnels (or) pipe lines

Causes:

→ Heavy rainfall
→ Siltation of river beds
→ Blockages in drainis.
→ landslides block the floor.
→ Construction of dams and reserviours.

Effects:

primary effects	Secondary effects	Teritiary effects
→ physical damage.	→ water supply contamination	→ economic loss
→ Structure	→ Diseases	→ Tourism effect
→ Bridge, building	→ failure of crops and food supplies	→ Re-building costs
→ Sewage system	→ Trees falldocon (or) blockages due to trees	→ food shortage
→ Road way, Canals	→ Transportation damage	→ prices increase

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Control measures:
→ public awareness & education
→ drought monitors.
→ water supply conservation techniques.
→ Expansion of Irrigation
→ land use
→ livelihood planning.
→ Drought planning
→ Dams construction
→ clouds seeding
→ Desalination of waters
→ water harvesting techniques
→ Recycle of waters.

Cyclones: cyclone is a region of low atmosphere surrounded by high temperature, pressure resulting in whirling atmospheric disturbances accompanied by powerful winds blowing in anti-clockwise direction in northern hemisphere and clockwise direction in Southern hemisphere.

Types of cyclones:
1. Typhoons. → NW - pacific
2. Hurracains → NE - pacific region, North atlantic, South pacific.
3. Tropical cyclones → NW - pacific., NE - Indian ocean.
4. Severe cyclonic storm → North Indian ocean, willie - willie Australia.
5. Tornado - In North america.

Effects of cyclone:- → rain causing flooding
→ extremely strong winds
→ damage to property and buildings
→ destroy crops, → Deaths due to drowning
→ infrastructure destroyed.

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Drought: An extended period of months (or) years when a region suffers deficiency in water supply both in surface as well as in ground water leads to droughts. Every year 7% of cultivated lands are proned to droughts. Imbalance of water supply leads to droughts.

→ It is a block set. We can see the area of major parts of Rajasthan, Gujarath (frequent), Orissa, Rayalaseema, Telangana, Chattisgarh, Jharkhand, Maharashtra, Karnataka, W.B, T.N, Bihar, Haryana & U.P. (Expensive droughts)

Characteristics:

→ Dry period
→ Improper distribution of drains
→ Less storage of water.
→ Abrasions in climate

Causes:

→ Population
→ overgrazing
→ Deforestation
→ Soil erosion
→ excessive use of S.W & G.W.

→ loss of biodiversity.

Types of droughts

- Metrological droughts
- Agricultural droughts
- Socio-Economic
- Hydrological droughts

Effects:

→ less moisture holding capacity
→ absence of Irrigational facilities
→ Shortage of or fodder for cattel.
→ Hunger problems.
→ malnutrition
→ social unrest.

25% — deficiency (less drought)
26-50% — moderate
50% above — severe droughts

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Distribution factor of India:

* R.J. ie. 40 million hectares of land is prone to floods. Areas near rivers are more prone
→ mostly Ganga basin, Bhramaputra, Punjab, Tapthi, mahanadhi, Narmadha, Godavari, Krishna.

Flood warning:
→ Satellite data.
→ RS, and GIS
→ CWC - center for monitoring.
→ Flood control department
→ Irrigation department.

Flood reduction:
→ mapping of flood prone areas
→ land use control.
→ construction of engineering structures.

Flood control:
→ Decreasing runoff by vegetation
→ Flood diversions. (dams, canals)./forests.
→ Flood proofing houses.
→ Flood management.
→ planning for flood in 5 year plans
→ Flood protection schemes.
→ construction of storage reservioirs.
→ Flood proofing structures.

Landslides: → mass moment of hill slope (exogeneous)
→ downward
→ outward

Slope composed of →
- Rocks ✓
- Soils ✓
- Artificial hill ✓
- Combinations ✓

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Sedimentations:

[29/1/19]

Def: It is a tendency for particles in suspension to settle down in the fluid in which they are entrained and come to rest against a barrier. the forces can be gravitational, centrifugal acceleration (or) electromagnetism. In geology it is used as a polar opposite of erosion (or) terminal end of sediment transport.

Causes:
- → Siltation
- → settling of suspended particles
- → Erosion particles.
- → Decomposed particles.

Effects:
- → due to sedimentation, Complete burried, leading to suffocation of correls, sea green beds, magrus.
- → decrease of amount of available sunlight which may intern limit the production of algae & micro flight.
- → Increase water temperature & reduce growth of natural vegetation.
- → Damage of fish by (irritating) fish ability abitates as gravel, burried egg with fine particles.
- → Reduction of DO (Dissolved oxygen)
- → Reduction of predators, bentic micro invertibrates
- → Increased risk of flooding
- → many topic organic chemicals, heavy metals & nutrients are deposited.

Control measures:
- → minimize distoubed area.
- → phase constructions.
- → create sediment traps (or) ditches.
- → Stabilize soil.
- → Slope protection.
- → Storm outlet protections
- → Controlling the parameters
- → De-watering & sediment traps.

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Q.1/1/19

Tsunamis:

→ Japanese → harbour wave / tidal wave, also known as seismic sea wave.

→ is a series of waves in water body, caused by displacement of large volume of water → generally in oceans.

Causes:

→ earthquakes
→ volcanoes
→ under water explosions.
→ glacier calving.
→ Meteroite impacts.
→ other (nuclear test).
→ Meteotsunamic
↳ Rapid changes in barometric pressures.

height of a wave →
- Amplitude
- Inundation
- flow depth
- max. water level.

→ predictions →
- Geologist.
- oceanographer
- seismologist.

→ mitigations:
- Engineering structures
- flood gates
- vegetation cover.

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Effects:

→ Hyperthermia
→ Heat rashes
→ Heat cramps.
→ Heat exhaustions.
→ mortality.
→ cold fires
→ physical damage
→ Internal disturbances
→ Crop failures.

Control measures:

→ Vegetation
→ Rehabilitation centers
→ Public health centers
→ Rehydration methods.

Cold waves: A cold wave is a weather phenomena that is distinguished by cooling of the air, a cold wave is a rapid falling temperature within 24 hrs period

Effects:

1. Agriculture
2. Industries
3. Commercial
4. Social activities
5. Deaths of injury
6. Hypothemea (or) Starvation.
7. Cold flue phenomonea. phenumonia,
8. Pipeline blockages
9. Plumbing rapture.
10. property damage
11. High consumption park. power
12. Denser oxygen

occurance:

→ mostly in cold regions.

Control measures:

1. Internal plumbing
2. Energy conservations.
3. Shelters
4. food and fouder, shortage recovery.
5. proper dressing.
6. use of insulating materials in the interiors.

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Avlanche: Snow It is a Snow Slide is a rapid flow of Snow down a sloping surface, they are triggered in the starting zone from a mechanism of failure of activities by Snow pod(or) Snow pond. 28/1/19

forms of Avlanches:
→ Snow
→ Slides of rocks
→ debris

Causes (Homework)
1) Heavy snowfall
2) wind direction
3) Earthquake
4) deforestration
5) Steeper slopes
6) High temp.

Types:
→ Slabwise → frequent Snow has been deposited by white spread
→ powder
→ wet Snow.

preventions:
→ Skip resorts / proper settlements.

Mitigation:
→ Snow nets ✓
→ Gas wires for heating ✓
→ Snow fences. ✓
→ constructions with steel, Wood, prestressed Concrete.
→ Early warning Systems.
→ Alarming Systems.
→ survival, reuse, recovery mechanisms.

Heat wave: It is a prolonged period of excessively hot weather which may be accompanied by high humidity the temperatures that the people from a hotter climate is called heat wave

occurance: Heat wave with high pressure in Summer for several weeks.
→ Equator sides
→ because of global warming
→ dryness of deforestration.

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Causes:

1) produced in thunderstorms when a liquid and ice particles go on beyond freezing level gets collide.

2. Charge of electrodes built up on higher clouds
3. A large amount of energy has been stored in releasing in time.
4. Conversion of heat to light energy.

Thunder: thunder is created when the light passes through the air. Air is superheated. It expands and it explodes to dissipate energy. This creates suction in air.

Effects:

1. Direct strike
2. fatal deaths
3. Contact injuries
4. Ground strike (potential differences).
5. Blast injuries
6. Heavy damage to plants.

Control:

1. lightening rods, electric charge dissipators.

Hailstorms: Solid precipitation consists of balls (or) irregular lumps of ice. As water (or) ice 5-200mm accumulation (or) 0.2 to 7.9 in dia). produced by cumulonimbi. Effects.

Effects: Automobiles get damaged, Aircrafts, glass roofs, crops, cracks, damage of walls, etc.

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Nuclear disaster:

30/1/19

Def: It is described as the disasters due to an extra ordinary emission of radioactive minerals (or) radiations.

causes:

→ Use of nuclear weapons #
→ Accidential explosion
→ Accidential nuclear power plant. projects

Types:

→ Nuclear accidents ← Easy handlle
difficult handle
catastrophic.
→ Terrorist attack / Dirty Bombs
→ Nuclear / Radio active metals

Effects:

→ Temperory Re location
→ permanent Re-location
→ Re settlement
→ Radiation
→ Genetic Disorder
→ Ecosystem degradation.
→ Contamination
→ Death / Injury

protection:

→ urgent action
- → Entry Control & sheltering
- → Excavation
- → Thyroid blockage
- → contamination monitoring
- → medical aid
- → food control
- → others

→ forecasting

Biological disasters:

Def: the disasters caused by micro-organisms present in universe.

Causes:

1) Natural out breaks → Epidemics
2) Use of biological agents by Terrorists

Types:

1) Bacteria
2) Viral
3) Toxins

modes of delivery:

1. Aerosols
2. Animals
3. food & water contamination.
4. person to person

Impacts:

→ health issues
→ loss of life
→ threats to life

prevention:

→ deterrence
→ prevention
→ surveillance & assessment
→ laboratory investigation
→ Medical management
→ dissemination.

chemical disasters:

Def: ..

causes:

Industrial hazards
→ commercial breaks
→ Human error
→ earthquakes
→ land slides

Impacts:

→ Accidents during storage process transportation
→ mass poisoning
→ Toxicity in environment
→ Contamination.
→ loss of life, injury, disabilities
→ Genetic disorder
→ diseases.

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characteristics

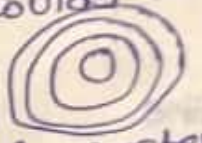
Stages of cyclone:

Stage-1: Warm sea temperature increases of 26°. to 60m. to provide water vapour.

Stage-2: High relative humidity — (degree of air saturated by water vapour in atmosphere)

→ This facilitates condensation of water vapour into droplets and clouds in cooler, higher altitudes. High temperature causes condensation, formation of clouds and raising higher warmer air causes surroundings to move to the central low pressure.

Stage-3: This atmospheric in stability encourages the clouds conventions. and cyclonic wind circulation spirals results in coulds in bands.



Stage-4: At high altitude, winds carry away cyclonic air system, dry air from higher slowly drawn into the center of storm causing an calm eye results in release of heat energy and induces the drop in pressure.

characteristics:

1. Stormy winds, exceptional winds, surge winds (cone shaped).

floods effects

control measures:

1. coastal belt plantation, Hazard mappings land use control engineering structures, early warnings

2.1. Gigantic lightening electro static discharges formed from clouds. (or) discharged blo. clouds & ground.

2. It is a natural phenomenon of earth.

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Soil erosion: erosion is a process by which soil and rock are removed from the earth's surface by natural processes such as wind or water and then transported and deposited on other locations.

Types:

→ Rainfall ← Sheet erosion
Grill erosion
Gully erosion.

→ River and stream erosion
→ Coastal erosion
→ glacier's erosion
→ floods.
→ wind erosion.
→ Gravitational erosion. ie. landslides.

factors affecting or causes:

- Natural
  - → precipitation & wind speed
  - → soil structures & components
  - → vegetation cover
  - → Topography
- human activities
  - → agricultural practices
  - → deforestration
  - → urbanisation (Roads & others)
  - → climate change

global effects
→ land degradation
→ sedimentation

control measures:

→ Terracing
→ wind breakers.

Terracing
cultivation on the elevated areas
Bench

→ Traditional plantations.
→ Contour farming's
→ Bench terracing
→ Gully control.
→ check dams.

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Extraplanetory hazards/disasters:

→ caused by celestial bodies results in falling of debris on earth's surface.

Ex: magnetic storms, catastrophic → involving sudden change, earth changes, meteoroid impacts, meteoride. Impacts from near earth impac objects (NEOS) → may strike our planet, (or) may still come near our planet.

NEOS: — Near earth objects

→ NEAT — Near earth Asteroid tracking.

→ survey by "LINEAR". team and US-airforce, NASA.

→ Space watch survey at university of Arizone. with NASA support.

→ LONEOS: Lowell observatory near earth object search supported by NASA.

→ these collisions (or) near impacts may result in global ecological catatoop. till now no collision impacts only near impacts are predicted.

Metreoride — Stony, 2' stone metreoride, Iron, Stony Iron
- It is a dust in space
- these are small asteroide pieces.
- Made of rocks and metals.

Impacts:

→ Massive earthquakes.

→ wide spread wild fires

→ Blocking of solar radiations due to large quantities of dust in the atmosphere.

→ continuous darkness.

→ decrease in temperature all over the world. generating global winter like conditions.

→ decrease in photosynthesis crop failures.

→ Acidification of water due to the release of high amounts of nitrogen oxides.

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- Landslides :- Landslide zonation map gives inform^{n} of the stretches, slope stability / instability.

Search & rescue :-

Warning & forecasting system :-

GIS can improve the quality & power of analysis of natural hazards assessments, guide dev. activities and assist planners in the selection of mitig^{n} measures, implem^{n} of emergency preparedness & response actions.

RS as a tool can very effectively contribute towards identif^{n} of haz. areas, monitor the planet for its changes on a real time basis and give early warning to many impending disasters.

Commun^{n} satellites have become vital for providing emergency comman^{n} & timely relief measures.

⇒ Awareness & training etc.

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Droughts

- **Meteorological** → Less rainfall
- **Agricult.** → when the soil moisture is not sufficient to support.
- **Hydrologic.** → when the water levels in the aquifer, lakes, rivers fall below the avg. level. Gene. occurs when human water consump. is high.

Impacts of drought

Economic impacts
1. Agribusiness
2. Fisheries / Livestock
3. Power supply
4. Timber prodn
5. Tourism
6. 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 displaced

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

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Soil erosion.

↓

Loose superficial layer of the earth's crust [latin : Solum].

↓

Weathering of rocks by Physical / chemical / biological agents

Properties

- Physical
- Chemical

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, pyrimidines, humus, fats, acids etc ⇒ reservoir for essent. like nitrogen, P & S to plants.

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(7). Colloidal properties :- As soil is made up 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
- Biotic
  - i) Overgrazing
  - ii) Deforn
  - iii) Mining

- i) Sheet erosion
- ii) Rill "
- iii) Gully "
- iv) Riparian / Stream bank

Other factors :-

(3). Deforestn.

(4) Natural factors like floods, Drought, Severe storms, tornadoes etc.

(5) Human induced

i) Intensive farming. Unmanaged
ii) Constn of buildings etc.
iii) Constn of roads.

(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 be washed by wind / water

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Acidⁿ of soil

Control :-

1. Strip cropping
2. Proper irigation
3. Proper agricult. practices
4. Develop. of strong veg. cover.
5. Land reclamation during mining activities.
6. Rotⁿ of crops.
7. Control of grazing.

Sedimentation ← water, land

↓

Natural physical process

i. flowing stream banks carry
ii. building lots
iii. Constⁿ sites
iv. lawns & streets
v. Agri. fields etc.

Aspects in sedimⁿ process

1. Erosion
2. Entrainment
3. Transportⁿ

Entrainment ⇓ picking & movement of sediment particles on slope / banks of stream

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

Transportⁿ ⇓ under the force of gravity if the sediment moves by diff. process like rolling, sliding, in suspension etc.

4) Depositions.

[pebbles, sand, mud and salts] carried by wind, water or ice

↓ desert fine dust.

↓ at the end of glacier.

5) Compactions & Cementation

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

↓ involves the sticking of the sediment particles with cementing minerals like calcite & silica

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Impacts : Sediment"

⇒ 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 "irrig"

Corrective measures :

① Mulching ⇒ Org. material is applied to the soil surface to conserve soil moisture, ——

Mulches
- Organic mulches ⇒ leaves, woodchips, beanhulls, Crushed corncobs etc
- Inorg. mulches ⇒ debris, stone, gravel, pebbles etc

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

3) Berms ⇒ Narrow, earthern ridges built across roads to allow runoff to drain into vegetated areas.

4) Geotextile Roll
5) Brush Mattress
6) Tree revetment

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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.

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Pesticides

Pests :- Disease causing organ. called Pests.

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

E.g. fungicides, herbicides, insecticides etc.

classfn 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

1) Protectant fungicides
protect plants from fungal infections

(12) Selectivi pesticides
control of certain species

(13) Nonselective :-
Wide range of pest species

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

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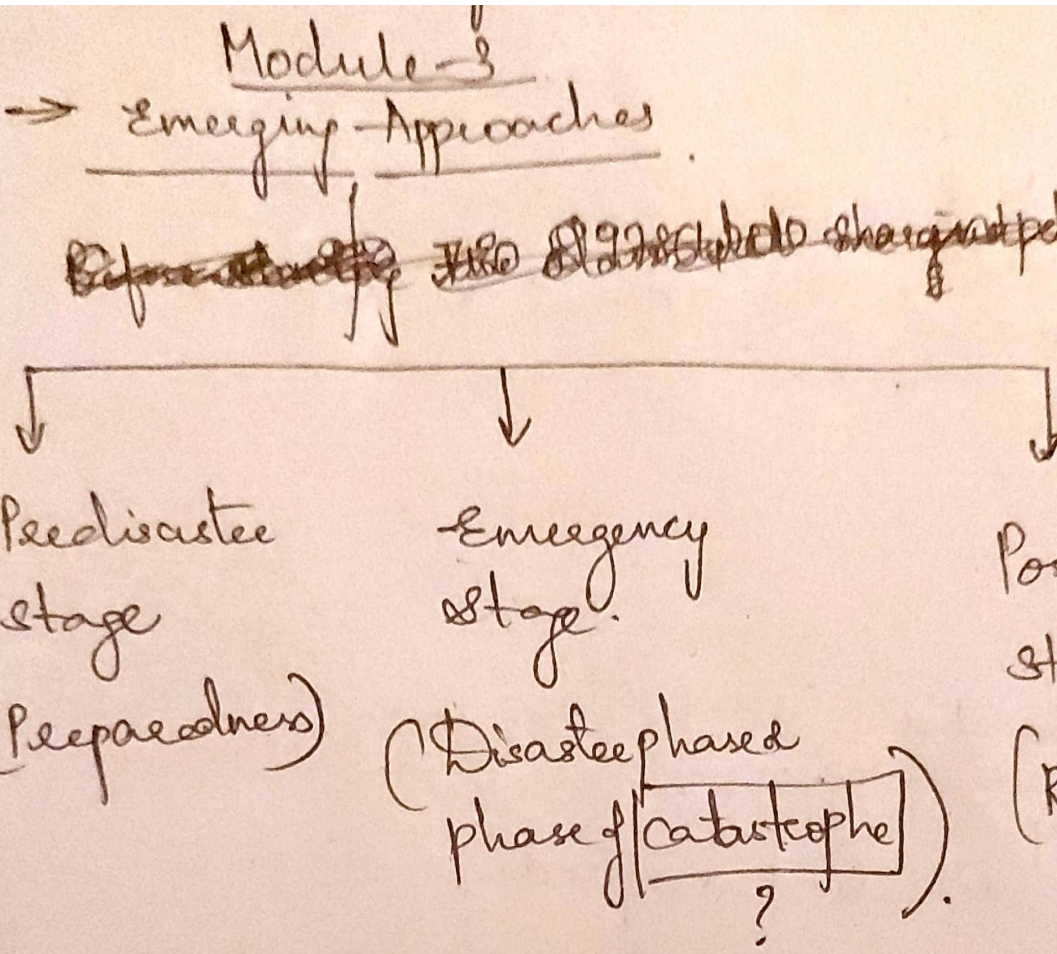
Module-3

→ Emerging Approaches



Predisastee stage (Preparedness)

Emeergency stage. (Disastee phased phase of catastrophe ?).

Post Disastee stage. (Rehab / Reconeey stage).

Educatiy ourselves on disastees is a proces of learning which creates an oneall perspective about the knowledge and awareness of impendiy disastees

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→ It is one way where this education is sensitizing the society about various types of disasters, ~~develop~~ have a good vision about what might happen, and there by developing the skills & expertise to mitigate its occurence.

→ Generally public must have this awareness & knowledge about the Hazards through information ~~and~~ education & communication to prepare the for disastee mitigation.

→ Nodio

NDM (National Disaster Management Act).

Do the Disaster Management act 2005, (23 Dec 2005) was passed by Rajyasabha → Upper house of parliament of India on 28th Nov & by Lokasabha → lower of house. On 12th Dec 2005. It received the assent of the president of India on 9th Jan 2006.

NDM ——→ Has 11 Chapters, 79 sections.

The Act extends to whole of India.

and it provides for Eff. Management of disasters and matters connected with Incidents.

~~The significance of NDM act 2005, for planning & implementation of disaster plans.~~ To prevent or mitigate people from disaster affected areas, to respond & recover from disaster events.

NDMA is responsible for framing policies, laying down guidelines & best practices for co-ordinating with the state Disaster Management Authorities to ensure there is a holistic & distributed approach to disaster management. PM heads this with 9 other members.

Coming to Pre Disaster stage, it ~~dot~~ has 2 phases.

~~includes~~,

→ Preparedness phase (Phase of being ready).

→ Mitigation phase (Preventy Phase).

Preparedness phase

On this phase, the planning to respond immediately anticipating that the disaster would happen, it includes

Here ~~the~~ awareness about emergency activities or teainy in various methods of safely vacatiy the disaster-stricken areas & first aid measures.

→ Such awareness peograms must also steaythen the technical & Managerial capacity of goneenments, organistion & communities to minimize the mortality & property loss & enhance disaster response operations.

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→ Installation of disaster warning systems, emergency communication system, emergency personnel/contact lists, plenty of food reserves, equipment, water, medicines & other necessities must be maintained.

Aspects of Preparedness

→ Hazard zone mapping.

→ Hazard forecasting, warning & prediction.

→ Disaster preparedness plan.

→ Preparedness through information, Education, Communication.

HZM :- The map or plan which highlights areas that are affected by or are vulnerable to particular Hazard. Hazard maps can prevent serious damages & deaths.

HFWSP :- Climatological records which can be used to detect periodicities or long term trends in hazard events. These can be used to anticipate future events by extrapolation

Disaster Preparedness plan :-

~~what are the potential threats to operations~~

like disaster supply kits

locate safe places in your home for each type of disaster,

Evacuation routes from home to nearest of safe centres.

first aid training.

Educating the family members how to shut off various utilities like (water, gas, electricity).

~~Mitigation~~ Preparedness

→ Know the correct & current info, Educate the

→ Communicate to the nearest safe centres, and spread awareness to people in and around Community.

Mitigation Phase

→ This is the second aspect of pre-disaster stage, In this stage, the people may begin to think about measures needed to minimize this kind of disasters in future.

→ For Ex:- an Eq would have damaged improperly constructed houses or a tsunami

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that have washed away the houses in coastal line

→ In such situations, people ~~begin to~~ should build more stronger building which can sustain the impact of Earthquake & encourage in the development of green belt by planting more trees along coast line to reduce tsunamis waves on the land.

Measures

→ Construction of disaster resistant houses

→ Decreasing population pressure in hazard sensitive zones

→ Land-use control.

→ High standard of Engineering design of built structures.

→ Promotion of fire resistant structures.

→ Relocation of existing settlements or infrastructure

1) Const :- It includes ~~the~~ regular shapes of buildings and proper design standards to resist ~~eg.~~ disaster

2) Population pressure ~~means~~ like having less numb

of people in those zones Only those who are absolutely necessary.

3) More greenery, ~~used~~ reduce global warming, the land not ~~cultivated~~ used more for any construction, irrigation of heavy activities as such.

4). As we already gone through this point following certain standards recommended for design of Eq resistant Buildys.

5). fire resistant structures when the structures doesent catch fire and it resists during fire accidents.

6). Relocating people & existing buildys to the less affected zones, ~~such that there are~~

Guidelines ~~Measures essential~~ for effective disaster mitigation includes :-

→ Early warning symptoms.

→ Land use zoning

→ Building codes

→ Incentives.

→ Provision of assets at subsidized rates.

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→ Increase of public awareness.

3) Early warning :- like the nature gives u certain warning before in hand, the experts in the weather might predict some signs not to go for fishing today, these are the early warnings.

4) Land use zoning :- The land or area shouldnt be used access this no person can enter,

so generally it is an urban planning method in which govt divides certain lands into areas called zones. ~~Zoning classifications include~~ The red coloured zones are avoided, green yellow are fine like that

5) Building codes → Buildg codes deal exclusively with structure itself. governg design, construction alteration & maintenance of structure for safety & welfare of buildg occupants.

6) Incentives :- payments or compensations given to the govt of that state or from state to

local people who have lost their assets because of disastees.

- Provision of assets :- Giving assets at a lesser cost than its actual cost, Considering to setup a new project of existing unit,

Role of Technology.

→ Mapping includes which areas are more affected and needs protection, to help and ~~access to~~ mapping the zones into safe, unsafe areas.

→ Aerial photography & Remote sensing :- Capture pictures & record information without making any physical contact but onsite observation, acquiring from satellites

→ Communication :- Speakers, warning boards, Red colour plates, Radio, TV, Internets.

→ Info Management -- Infrastructure that is used to collect, manage, preserve, store & deliver information.
Info to Right people at Right time

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disastees

→ ICUS (International Council for scientific unions)

→ WFEO (World federation of Engineering Organisation)

→ NDRF (National Disastee Response force)

→ NDMA (National Disastee Mangement Authority)

→ NIDM (National Institute of Disaster Mange

→ ISDR (International strategy for Disaster Reduction).

Emergency stage

The Emergency stage (disaster phase or the phase of catastrophe) is the stage at which the crisis. This phase results in great damage to life, property, environment and health of living beings. The affect people are in a stage of profound shock.

→ All efforts are put forth to minimize the problems created by a disaster. These include providing

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assistance to the affected population with transport, food to shelter and temporary repairs to damaged infrastructures.

→ Thus, the main objective of the response phase to meet the basics needs of population affected with disaster until some sustainable arrangement is made for them.

→ The six critical areas of Emergency management includes:

Communication :- Its important to communicate with responders first and others in the community to utilize the need during an emergency.

Resources & Assets :- ~~The need patients on site must~~

Safety & security :- Safety & security of every individual is prioritised & organised. The patients are shifted to safe places and medical treatments are taken care of.

Staff responsibilities :- Making sure that, there is a documention which will be useful to stay organised, as well as for insurance & compliance record keeping purpose after the fact.

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~~Organisation in~~

Utilities management:- Utilities are big part of job. power, ~~medical~~ First-aid kits, food packets etc.

patient clinical & suppet activities :-

Ambulance services, Medical equipments, Oxygen supplies; patients in the event of an emergency. Organise them to make sure all the bases are covered.

Post-Disaster stage This stage focuses at restoring normalcy in the lines of people and the infrastructure that include temporary shelters, reconstruction of damaged infrastructure, proper information to the public, educating people about the health and safety, post trauma counselling programs by training volunteers to counsel every victim of disaster as they need intensive mental support to facilitate recovery.

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Natural Disaster Reduction & Management

Disaster risk reduction is a systematic approach to identifying, assessing & reducing the risks of disaster. It aims to reduce socio-economic vulnerabilities to disaster as well as dealing with the environmental & other hazards that ds. trigger them.

Natural Disaster reduction :- Its basic objective was to decrease the loss of life, property destruction & social & economic disruption caused by natural disasters, such as Eq, tsunamis, floods, landslides, volcanic Eruptions, droughts, locust

Role of Technology in DM

=) IT can play an imp. role by means of GIS based monitoring & prediction systems as well as internet based tools.

=) The IDRN [India Disaster Response Network] is a nation wide electronic inventory of essential and specialist resources for disaster response, covering specialist equipment, spec. manpower resources and critical supplies.

=) Spectrometry kits, bio-aerosol detectors, radiation leak detectors etc. will ensure safety to both victims and disaster personnel.

=) In terms of Disaster mitigation and preparedness as well as vulnerability assessment, tech. can play an equally imp-role by constructing earthquake resistant buildings in areas with high seismic activity.

=) Effective and reliable commun^{n} is vital for disaster red^{n}.

=) Communication tech., skills & media are essential for various imp. roles they perform in DM.

i, To link scientists, Disaster mitig^{n} official & the public.

=) To educate the public about disaster preparedness.

=) To check approaching hazards

=) To alert authorities

=) To warn only the people most likely to be affected

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=) To assess damage

=) To collect informations, supplies and other resources

=) To coordinate resource & relief activities

=) To account for missing people

=) To motivate public, political & institutional responses

Applic^{n} of IT

=) Remote Sensing
=) Satellite Communication
=) GIS

} can help in planning & implement^{n} of DM.

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Applic^{n} of IT

=) Remote Sensing
=) Satellite Communication } can help in planning & implement^{n} of DM.
=) GIS

=) Electronic communication has place an imp. role in some of the critical phases of some major disasters and in some instances perhaps the only means of comman^{n} with the outside world.

The IT tools :

① Internet :- provides a useful flat form for disaster mitig^{n} comman^{ns}.

=) It facilitates the opportunities to enhance the capabilities of addressing hazard awareness and risk manag. practices before, during & following emergency events

=) Internet sites are providing an increasing array of inform^{n} related to various hazards.

=) They also provide more inform^{n} about the growing

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Intⁿl. decade for Natural Disast. red^{n} [IDNDR]

4th Dec 1987

Reason.

UN => 1990 as the IDNDR => rising levels loss of life & property due to occurence of natural disas.

=) To strengthen the ability of each country, so as to mitigate the effects of natural disasters.

=) Establish early Warning systems, disaster resist str.

=) Applic^{n} of scien. & tech. knowledge in reducing the effects of disasters.

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Provision of immediate relief measures to disaster affected people :

It involves dealing with avoiding risks and preparing, supporting and rebuilding society when natural or human made disasters occur.

Disaster relief =)

i) Reconstn of homes damaged / destroyed.

↓

by the govt., NGOs.

Material assist. should be done at subsidized rates.

ii) Military Assist.

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

iii) Medical care :

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

iv) Corpse disposal :

Disposal of dead bodies.

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Salvage :

↓

major effort is needed to salvage destroyed str. & property. Communications, roads, bridges, electricity have to be repaired and restored for normaliz^{n} of activities.

Outside assistance : During disaster situations consid. relief flows from outside. Proper exposing of situations can provide more funds which can be utilized for disaster affected people.

Social Rehabilit^{n} :

i) Disabled persons =) Wheelchairs, supportive devices etc.

ii) Children =) Orphaned children

[child helplines, day centres etc].

iii) Old persons =) pensions

iv) Women =) "

Disposal of debris :

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iv. Women => "

Disposal of debris :

Damage assessment => Town planning & dev. plans.

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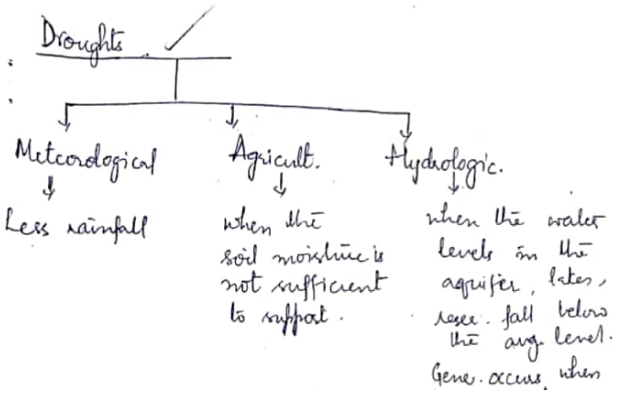

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Env. Legislations in India.

NDMA, 2005, National Disaster Manag. Act.

=) Enacted by the Parliament with consent of President on Jan. 9th, 2006.

Aim: Effective manag. of disasters

→ defines 'Disaster Manag.' as continuous & integral process of planning, organizing, co-ordinating & implementing measures which are necessary for reducing the impact of any disaster.

Salient features

=) Prevention of danger / threat of any disaster.
=) Mitigation measures.
=) Capacity building.
=) Preparedness to deal with any disaster.
=) Prompt response.
=) Assessing severity / magnitude.

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=) Evacuation, rescue & relief measures.
=) Rehabili^{n} & Reconst^{n}.

⇒ Act empowers the Central Government to set up NDMA, National Disaster Manag. Authority with PM as chairperson, State Dis. Manag. Auth (SDMA) with CMs " " and District " " " (DDMA) with collectors / district magistrates / deputy commissioners as chairperson.

=) It also empowers Central Govt. to constitute NDRF (National Disaster Response Force) to provide efficient response.

Institutions & National Centres for National Disaster Red^{n}

⇒ Central Disaster Manag. Authority :- Apex body set by GOI for implementing DM plans to prevent & mitigate
=) National Centre for DM (NCDM) ⇒ To provide training to govt. officials on DM and co-ordinate research activities on DM
⇒ Centre for DM =)
=) National Information Centre for Earthquake Engg., IIT Kharagpur.
=) Disaster Mana. Institute, Bhopal.
⇒ " Mitig^{n} " , Ahmedabad
⇒) Env. Protn Training & Research Institute (EPTRI), Hyd.
=) Gujarat State Dis. Manag. Authority (GSDMA).
=) National Inst. of Dis. Man... (NIDM)

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=) Assessing severity / magnitude.

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Prediction of hazards & disasters

Methods to predict.

① Fractal method :- Mathematical model / statistical methods :
↓
Predict hurricanes, floods, earthquakes, volcanic eruptions, wild fires, landslides etc.

2) Dilatancy theory : ^ Earthquake based on rock samples.
occurence of
stress on rocks => micro-cracks / fractures.

3) Scientific method :
=> Advanced meteorological system / Satellite system to predict tornadoes / cyclones.

=> INCOIS => Indian national Centre for Ocean Information Services
↓ water level tracking systems => to measure the speed currents -> floods + tsunamis -

=> Heavy rainfall / rainfall will generally followed by Avalanch Landslides / mud flows etc.

4) Animal behaviour :- Behaviour pattern of animals.
i) Erratic behaviour of animals like elephants => occurence of earthquake
ii) Rushing of buffaloes towards hills => ahead of earthquake & tsunami

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Measures of adjustment to Natural hazards.

=) Reducing loss by knowing the cause of calamity:

Reduce flood flows by afforest, river dredging,

Global warming =) limit Greenhouse gases etc.

=) Modify physical process of hazards:

Dams are built to control floods.

Levees, embankments parallel to river flows.

Str. modifns in buildings =)

=) Implⁿ of Non-str. measures

include early warning systems, passing infoⁿ to people, awareness in people to protect themselves.

=) Reducing the impact by adjusting to losses

Redefining compensation, insurances

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Org^ns involved in research and mitigation measures

Unit-IV

1) Internat. Council for Scientific Unions [ICSU]

also called as Intern. Council of for Science is an NGO

=) to address the challenges caused by Natural Disasters.
=) to promote science for the welfare of mankind & society.
=) Encourages interaction of scientists from various worlds and participate in Scientific activities.

2) Scientific Committee on the problems of Environment [SCOPE].
consists of scientists & experts to deal with
=) Global environ issues.
=) Design & practice process to lower the rate of consump.? of non-renewable resources.
=) ensure sustainable supply of renew. & non-renew. resources.

Three clusters :-

1). Managing Societal & Natural Resources [MSNR] => includes scientific research projects in the area of => Sust. biosphere project, Urban Waste Mana., Material flow analysis, Sound Agri. Process., Ecosys. restorations etc.

2). Ecosystem Processes & Biodiversity [EP&B] => Impf. of biodiversity, interaction of humans with ecosystems, Biogeochemical cycles, Nutrient fluxes, Energy flows etc., Molecular biology.

3) Health & Environ. [H&E] => contains projects that develop methods for analysing chemical risk to human, Bioaccumulation, Vector borne diseases

Integrated Planning – Contingency management Preparedness:

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

⇒ Develop plans to save lives
⇒ minimize disaster damage
⇒ enhance disaster response operations.

i) Education on Disasters
ii) Community involvement in Disaster Management
iii) Role of media in DM.

iv) Measures of adjustment:- [To reduce the loss of hazards]

(1) Reducing loss by affecting the cause of disaster
(2) Modify the physical process of hazards.
(3) Implement of Nonstructural Measures → early warning systems, Accumulation of basic amenities. Providing temp. relief shelter etc
4) Reducing the impact by adjusting to losses.
i) Compensation measures].

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- World Meteorological Organization [WMO]
  - ↓ spec. dept of UNO with headquarters in Geneva, Switzerland.

Provides inform^{n} on meteorology [weather and climate], hydrology & geophysical sciences [such as seismology & volcanology etc.].

Objectives :-

(1) Prot^{n} of life & property
(2) " " envis. and contribute to sust. dev.
(3) Increase socio-eco. well being of people
(4) Training, research and technology.

WMO has six regional assoc^{n}. called as Regional Specialised Meteorological Centres [RSMC)

Reg: I => Fiji Meteorological Service, [Nadi, fiji]
2 => IMD, Delhi, India
3 => Honolulu Central Pacific Hurricane centre [Hon., Hawaii, USA]
4 => Nat. weather Services, Nat. Hu. Centre, Florida USA.
5 => Japan Meteor. Agency Tokyo.
6 => Meteo-France

Six tropical cyclone warning centers.

(1) Bureau Of Meteorology, Australia
(2) " " , Darwin.
(3) " " , Brisbane
(4) Nat-weather service, New Zealand New Guinea
(5) Meteor. service, New Zealand
(6) Meteorology and Geophysical Agency of Indonesia Jakarta

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Assemble once in four yrs. with the follo. objectives =

Members

(1) Execute the programmes discussed in the meeting

(2) Approval of long term plans.

(3) Assessment of mac. expenses for the fin. period.

(4) Plans of each member organ^n and co-ordinate the activities.

(5) Electing President & Vice-President for each organ.

IMD => is one of the departments of Ministry of Earth Sciences.

↳ with headqrater in Delhi.

↳ has well established Intern. network with WMO.

↳ Six Reg'. Met. Centres Located at => Mumbai, Chennai, New Delhi, Kolkata, Nagpur and Guwahati.

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① Intern. Geosphere - Biosphere Programme [IGBP]
global
NGO — Climate change.

=) Study the physical, chemical & biological interactions involved in the earth's process.

=) changes in the earth's dynamics.

=) Role of humans in bringing about the changes.

② World federation of Engin. Organiz^{n} [WFEO
||
Inter. NGO supported by UNESCO [United Nations Educational, Scientific and Cultural Organ^{n}]

Aim: To encourage the dev. & appl^{n} of Engineering tech. for the welfare of mankind.

=) Appl^{n} of Enginee.

=) Impor. of "

=) Through proper of Appl^{n} of eng. knowl., achieving sust. dev.

=) Serve mankind by bringing awareness due to man-made & natural disastrs.

③ National Academy of Sciences:

is a private	NGO of Scientists & intellectuals involved in Scientific & Eng. research.

They offers advice on matters pertaing to Science, Nat. Research Council [NRC] tech.; medicine.

④ GIS ⇒ Creⁿ of real world models based on digital data.

=) Identⁿ of locations where people are trapped & need medi/emergen service

=) Warn people and shift to safer areas.

=) Financial.

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Hydrology labor.

⇓

- Provides Tech. assist. to Central/State Orgn. in the field of flood forecasting,
- Storm forecasts, glaciological studies and hydrometeorological stds.

Main activities:

① Monitoring Rainfall pattern :-
M. of Forestry, Dept. of Agriculture, Irrig. Inst. coffee & Tea planters

② Providing assist. & advice on meteoro. aspects :- Central Water Commission, Min of Agri, Min. of Water Resources, Flood controlling authorities.

Units :-

i Storm analysis unit : Depending on rainfall pattern, probability of storms for constn of railway/road bridges etc

ii Flood metcon. unit :- provides flood warnings, heavy rainfall warnings, prepares guidelines

iii Storm design unit : Constn of hydraulic structures, irrign projects, dams, etc on various rivers

iv Water Balance Unit : Water budgeting, Conservn principles etc.

v Glaciology Unit : to understand the accumn of snow in Himalayan rivers
Uses GIS & RS for this, Glaciological expeditions are also involved in this.

Instn of Urban and Regional Planners.

Town and Country Planning Orgn [TCPO]

→ Provide financial & professional advice for the purpose of dev. especially sust. dev
= sust. manag of resources and envi. issues

→ Subordinate office under MoUrban Dev, Govt :- => Town planning
=) Constn of roads
=) Building, bridges
=) Planning for eco. & social dev.
=) Water supply for domestic | industrial commercial purpose
=) Health care facilities
=) Main. of popn statistics
=) Regul n of land use for resi | commercial
=) Providing amenities like street lights parking lots, bus stops, foot paths, parks, playgrounds, gardens etc.

Chambers of Architects :

Indian Institute of Architects (1917)

comprises professionals of more than 15,00

→ Safety & welfare of humanity & environ

→ Collaborates [International Agencies like Intl. Union of Architects [IUA], Commonwealth Assoc. of Architects [CAA], South Asian Assoc. for Regional Cooperation of Architects [SAARC]

A prof. architect should consider the following points :-

① Understand the anatomy of disaster and their effects on life & property & envi

(2) Understand the strategies of govt. for disaster mitig"

=) Provide Disaster resistant design ideas.

=) High standards of quality control for a building a project.

=) Updating knowl. of current research activities at Disaster Management Centres & by NGOs.

Engineering Council :- prof. engineers who contribute to nations dev. by reducing the risk of damage to const" structures during a disaster. He may be employed in the follo. roles as:

i) Policy makers & planners.
ii) Str. engineer
iii) Geotechnical engineer
iv) Env. / Sanitary engineer.
v) Const" manager
vi) Project manager
vii) Consultant
viii) Hydrological / Irrigation engr.
ix) Site supervisors.
x) Transp" engineer
xi) Site engineer

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Internat. Assoc. of Seismology & Physics of Earth's Interior [IASPEI]

↓ wave
Seismic propagation, Ground motions, shaking, earthquakes.

Propag^{n} of Scientific development ⇒ encourage research & development.
promotion in specific geographic regions.

UN agencies in DM.

UN General Assembly has formed a UN Disaster Manag. Team [UNDMT]
↓
Coregroups with representatives of FAO, UNESCO, WHO, WFP, UNAIDS.
UNFRA UNPF [United nations popul^{n} & fund].

WHO ⇒ i Techn. assis. in health dev.
ii Reduce the problem of communicable & emerging disease.
iii Promote preventive & curative health care
Maternal & child healthcare.

UNGESCO ⇒ Capacity building in disaster prone nation.
Encourage research on nat. dis. & hazard
" ed^{n} & public awareness in dealing with disas.
Coordin^{n} of early warn systems;
Dev. & antipoverty progs

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UNICEF :- United Nat. children edu^n fund.

1)

i) Health ii) Mal nutrition - [women & children].

iii) Care for orphans, immun^n program & other health initiat..

UNEP :- Un. nation. envir. programme.

1)

i) Collaborate with other agencies ⇒ Env.

ii) Early warning of env. hazard.

iii) Sust. use of Nat. resources.

: Seismological Observatory.

- Monitoring of Seismicity
(2) Records in Seismic activi
(3) Responding to Queries relating to Seismicity
(4) Dev. and manuf of Seism. instrum
(5) Exchanges Data with Nat. & Inter. agencies.

→ 212 scis. observatories

" monitor & maintenance done by

IMD 24 => upgraded with digital broad band seismographs

Central Recving Station (CRS) and National Seism. Database Centre [NSDC).

(6) Provides seismic data during const" like dams, Towers, Skyscrapers etc.

(7) Instrn dvn :- Manuf & Dev. of seismo. instruments

(8) Monitoring of Microearthquakes.

IMD => Units like.

(1) Flood met. units
(2) Cyclo warning centre
(4) Space satellites
(5) Met. units => on Indian satel-
(6) " " on " " many ships
(7) Ozone and rad" obsern.
Radar stns

Divisions

(1) Instrum.
(2) Civil Arr"
(3) Climate
(4) Agri mete
(5) Hydro mete
(6) Satellite
(7) Mete. Telecom
(8) Training & Research Divn

Collaborates: Mete, hydro, climate, geoph observat.

(1) National Inst. of Ocean Tech
(2) Indian Space Research Org

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Volcanology Institute/Observatory

Responsible for research activities and contin. monitor. of volcanic activities
It includes study of Geophysical changes, ground movts, vol. gas chemistry, hydrolo. conditions etc.
HOVO [World Org" of Volcano Observatories] listed 100 research labor. all over the world.
Responsible for identifying volca. prone zones and issue warnings for the safety of public through gov. agencies.

Industrial Safety Inspectorates

Concerned with maintenance of good health and indus. workers, monitor the environ at work place, issues, causes of env. poll", climate change issues, sustain. issues etc

Indust. safety inspectors [Types].

(a) Env. Prot. Technicians.
- i) Climate change.
- ii) Land use regul"s.
- iii) Water conser" & management.
- iv) Sources of poll".
- v) Analysis / Tests
- vi) Moni. equipments etc.

b) Health Physics Technicians :-
- i) Safety of workplace in indus. that use radioactive material / people exposed to nuclear power, scientific research, hospitals etc
  Spectrometers / Gamma counters

c) Indus. Hygiene Technicians. - i) Responsible for inspection of work place envr., equipment
- ii) Occupational health hazards like noise, dust, vapors, gases, dust, smoke, chemicals etc.

d) Mine examiners :- Inspection of workplace envr in underground mines, especially methane and other noxious gases.

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⇒ To strengthen the ability of each country, so as to mitigate the effects of natural disasters.

⇒ Establish early Warning systems, disaster resist. stes.

⇒ Applic^{n} of scien. & tech. knowledge in reducing the effects of disasters.

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IGBP => International Geosphere - Biosphere Programme.

Inter. NGO => Phenomenons of global changes.

=> To study physical, chemical & bio. inter. involved in earth's processes.

=> Understand the role of humans in bringing changes on earth.

WFEO => World Fed^{n} of Eng. Org^{n}.

↓

Inter. NGO set up in 1968, supported by UNESCO. (Part)

(United Nations Educational, Scientific & Cultural Org^{n}s.

↳ This supports several prof. orgn^{s} involved in the development & applicns of eng. techniques for the welfare of mankind.

=> Facilitates exchange of knowledge among member nations of the world.

=> Encourages sustainable dev.

=> " Poverty abatement across all nations of the world.

National Academy of Sciences

Private, & Non-profit Org^{n} which is involved in Scientific research for the advancement of mankind.

NRC [National Research Council] of Nat. Acad. of Sciences consists of nations top Scientists, Engineers and other experts who offer advice on matter pertaining to Eng., Science, Tech- & medicine.

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IASPEI => International Assoc. of Seismology and Physics of Earth's Interior.
↳ Intern. NGO.
=> Promote the study of Geophys. processes of earth causing EQs., tsunamis etc.
=> Understand the propag^n of seismic waves & predict the disaster in advance.
=> Encourage inter^n of scientists from diff. countr for advance ment of research in seismology.

UNCRD => United Nations Centre for Regional Development
↳ Autonomous sp. agency of UNO., to promote SD, economic & social develop. esp. in developing countries
=> Encourage train & research in " "
=> Provide advice on reg. dev. & planning.
=> Promote scien. research.

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Unit-5

Env. Legns in India

NDMA, 2005 → National Disaster Management Authority [NDMA]

Objective : effective manag. of disasters
- ⇒ Prevention of danger
- ⇒ Mitigation measures.
- ⇒ Preparedness to deal with any disaster.
- ⇒ Evacuation, rescue & relief
- ⇒ Rehabilitation & reconstn.

State DMA [SDMA]
District " [DDMA]

Act also has provision for National Disaster Response fund [NDRF] & National Disaster Mitign fund (NDMf)

Instns / National Centres for Natural Disaster Redn

(1) Central Disaster Management Authority ⇒ Apex body set by GOI for implementing dis. mang. plans.

(2) National Centre for Disas. Manat. [NCDM] ⇒ Institute set up Ind. Insti of Public Adm. to provide training govt. officials.

(3) Centre for Dis. management ⇒ Institute has been set by Yashwant Rao Chavan Academy of Dev. Adm.

(4) National Inform Centre of Earthquake Eng. : Dept IIT Kanpur
Research, Publications

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(5.) Disaster Manag. Institute, Bhopal.

(6.) " " " , Ahmedabad.

(7.) EPTRI, Emn. Prot^n Training & Research Institute
// Tech. collabo^n with- Swedish Inter. Dev. Agency.

(8.) GSDMA = Gujarat State Disaster Mana. authority

(9.) NIDM = National Inst. of Dis. Mana. was constituted under MoHA [Ministry of Home Affairs].

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Imp. of Coastal Ecosystem

=) Source of food [Sea food]
=) Transp^n
=) Fertile land
=) Oil & gas explor^n
=) Mining [Ocean => diamonds, corals, etc.]
=) Climate buffer
=) Tourism

Natural Hazards

=) Severe waves
=) Storm surges (as 10 feet)
=) Tsunamis
=) Cyclones
=) Coastal Earthquakes.

Disasters in Hills

=) Earthquakes.
=) Landslides.
=) forest fires
=) cloud burst

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Ground subsidence

=) GW expln.

=) Underground mining operations.

=) Oil / gas drilling.

problems :-

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① World Fed^{n} of Eng. Orgni^{n} [WFEO]

⇓

Supports- Nation & Internat. org. spread over 90 countries

⇒ imp. to eng. internationally.

⇒ pract. appl^{ns} in engi.

⇒ Exchange of eng. knowled. among diff nations.

⇒ Encourage sust. devt. & poverty abatement.

⇒ Awareness abt. prevent^{n} & red^{n}.

② Internat. Assoc. of Seismology & Physics of Earth's Interior [IASPEI]

⇒ Geological interactions.

③ UNCRD [United Nations Centre for Regional Development]

⇒ Training & Research in SD in developing countries

⇒ Provide advise on regional devt. & planning.

⇒ Promote Scientific research.

④ Internat. Decade for Natural Disaster Red^{n} [IDNDR]

UN adopt on 11th Dec 1987, has declared 1990's as Intl. Decade of Natural Disaster Red^{n} [IDNDR]

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⇒ WHO

⇒ UNESCO [United Nations Educational, Scientific & Cultural Organi]

⇒ UNICEF ⇒ U.N. " Children's fund.

⇒ UNEP ⇒ U.N. " Env. Programme.

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WMO ⇒ General Switzerland

↳ specialised dept. of UNO.

Obj ⇒ Prot" of life
.. property
.. env.

Contributing to SD.

Eco. & social well being of people.

Encouraging co-opern with other countries in improving network, exchanging data related meteo. climat., hydrolo & geophysical obsern.

Training & research, technology transfer.

Six regional assocn ⇒ [Reg. Specialized Met. Centres] (RSMC)

1 ⇒ Fiji Met. Servia, Fiji
2, IMD, Delhi
3, Honolulu Central Paci. Hurri. Centre, USA
4 National Weather & Hurri Services, Florida USA
5 Japan Met. Agency, Tokyo
6. Meteo - France.

Six tropical Cyclone Centres.

⇒ Execute programmes
⇒ financial decisions
⇒ Activities in member orgn.
⇒ Approval of long term plans.

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Provision of immediate relief measures to disaster affected people :

=) Objectives :-

① Protn, preservn & survival of max. no of disaster victims.

② Provide basic needs

(3) Medical, Rehabilitn,

(4) Repair damaged infrastructure.

NLO	SLO
National	State level.
District &	Local level org.

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Measures [SD]

⇒ Large scale affor^n programme

⇒ Investment in agr. dev

⇒ Plantations on barren mountains, hillsides, beaches

⇒ Sp. laws & regul^ns for diff. areas ⇒ land management, minerals, water & soil, wildlife, forests.

⇒ Eco. prot^n of grasslands ⇒ preventing of overgrazing, encouraging rot^n of crops.

⇒ Prevent^n of desertif^n

" " Lake encroachments

⇒ Energy <

⇒ Designing eco friendly railway lines.

Role of Panchayats in mitig^n of disasters

⇒ Gram Panchayat ⇒ lowest tier

Role : **Sarpanch**

⇒ Convene meetings & warn people.

⇒ Arrange for tempor. shelters making sure for food & water & also livestock.

⇒ Provision for evacu^n of disabled, elderly & children and also live stock.

⇒ Equip rescue volunteers & task forces along with Relief-teams

⇒ Strategic positioning of village volunteers.

⇒ Veterinary workers to prevent epidemics.

Panchayati Raj System ⇒ socioeco. dev. of rural parts of India

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Block Mandal Parishad / middle tier or intermediate level

Administered by Mandal Parishad Dev. Officers.

functions as a link between Zilla parishad and Gram Panchayat.

=) Checks the preparedness of Gram panchayat

=) Arranges for ready rescue material =

=) Repairs damaged roads, canals by skilled proffes. => prior to disaster.

=) Co-ordinates with military & NGOs.

=) Helps Gram panchayat in identifying disaster victims for compensation.

=) Rehabilit" efforts - [provides assistance].

Zilla Parishad : Highest tier / apex body.

↳ Admn - => Chief Executive Officers:

=) Convene meetings with Mandal Parishad dev. officers to take preventive measures prior to onset of disaster.

=) Task forces / NGOs.

=) Arrange for Crisis Management Group [CMG]

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Indus. Safety Inspectorate

||

① Env. Pollⁿ Technicians ⟹ Env. Protⁿ

② Health Physics Technicians ⇒ Workplace safety ⇒ rad^ns, biofuels

③ Indus. Hygiene ⇒ Safety of workplace env., Equipments maintenance for Safety of workers

④ Mine examiners

||

Underground mines for methane & noxious gases.

Chambers of Architects →

Indian inst. of Architects, 1917.

||

Distinguished professionals

⇒ Impt. role in country's dev. through practice of architecture for the safety and welfare of humanity.

⇒ Govt. skills for dis. mgmt^n.

⇒ Post disaster recons^n & retrofitting of buildings.

⇒ Maintain high stds. of quality control.

⇒ Updating of current research activities -

Engineering Council ⇒ Prof. engineers.

||

reducing the risk damage to const^n structures during disasters

⇒ Rescue ops^n.

⇒ Recon^n and retrofit of buildings.

⇒ Policy makers

⇒ Planners

⇒ Str. Eng.

⇒ GT eng.

⇒ Trans. Eng.

⇒ Hydrology | Irrign^n eng.

Env. engg

Marine "

Const^n managers.

Site Engg^n.

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ICSU Inter. Council for Scientif. Union

→ Encourage Science for welfare of mankind

=) Intiacation of Scientists all over the world.

=) Encour. scientif. comm to partic. in Scientific activities

SCOPE : Scientific comm. on the problems of Env.

↳ Scientists & experts on Global env. issues., design of proces & policies that lower the depn of non-renew. sources

Envme asst. supply of ren. resources

Units ⇒ 3

1 =) Managing Societal & Natural Resources (MSNR).

① . Waste management-
Sound agri. practices.

2 =) Ecosystem Processes & Biodiversity [EP & B]

③ . Health & Environment. [H & E]

Internat. Geosphere - Biosphere Programme [IGBP]

=) Study the physical, chemi, biolo. interactions involved in dynamics of earth's process.

=) Role of humans in bringing the changes.

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Extra Planetary Hazards

⇓

also called as Superhazards ⇒ 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.

① 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 △ 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.

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

=> Damaging communⁿ cables in Navigⁿ.

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

=> Auroras => Charged particles (solar flares) interactions 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.
=> Radⁿ poisoning to humans.

- Preparedness

i) Preparedness Phase
- Hazard zone mapping
- Haz. forecasting warning & predⁿ
- Dis. preparedness plan => EOP
- Land use zoning
- Preparedness through Informⁿ, Eduⁿ & Commⁿ (IEC).

ii) Mitigⁿ phase

EOP => Emergency Opeⁿ 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

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Inst^{ns} & National Centres for Natural Disaster Red^{n}.

(1) CDMA ⇒ . Central Disaster ⇒ GOI
↳ Apex body.

(2) NCDM ⇒ National Centre for Dis. Man ⇒ Indian Instt of Public Admn
↳ Training to Govt. Officials on Dis. Mit^{n}.

(3) Centre for Disaster Management :-
↳ Yashwant Rao Charan Academy of Dev. Admn^{n}.

(4) National Information Centre of Earthquake Engineering [IIT Kan
↳ Sponsored by HUDCO, Dept. of Atomic Energy, AICTE, Min. of A

(5) Disaster Manag. Institute, Bhopal : [1987].
Welfare of people.

(6) Disaster Mitig^{n} Institute, Ahmedabad

(7) EPTRI ⇒ Technical Collaboration with Swedish Intern^{n} Devt. Agenc

(8) Gujarat State Dis. Man. Authority [GSDMA]
↳ 8th Feb. 2001

9. NIDM :- Min. of Home affairs [GOI].

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Karakoram

Disaster Management -

Civil Engineering.

Himalayas are the cause of many such disasters

1934 — Nepal - Bihar Earth quake measuring 8.7 on Richter Scale killing 8,100 people.

2001 ⇒ Gujarat Earth Quake [Bhuj].

↓

- An eye opener for Indian Govt.
- Established Gujarat State Disaster Management Authority.
- most damaging earthquake. Killing 20,000 people.

& destroying nearly 348,000 homes.

↓

Damage range = 1.3 $ billion

7.9 scale

⇒ 40% homes in Bhuj have destroyed,

↓

poor const^n & ignorance of building norms.

Wisdom of design & const^n practices of engineered buildings came under criticism, triggering what comprehensive understanding of what needs to be done in this regard.

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triggering what comprehensive understanding of what needs to be done in this regard.

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Majority of damage is due to :

i) Improper city planning
ii) Failure of stru. design.
iii) Poor infrastructural facilities
iv) Ignorance of building norms.
v) Low quality substitutes of building materials

⇒ Structural Engineer
⇒ Geotech "
⇒ Marine "
⇒ Surveyor
⇒ City planner
⇒ Constm. manager
⇒ Hydraulic engineer → provide inform^n about bridges / dam const^n & also suggest flow control measures.

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⇒ Disaster
⇒ Hazard
⇒ Env. haz
⇒ Env. disaster

Types of disasters.

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Coastal Disasters

Coastal Ecosystems : [Economy]

⇒ Source of sea food.. , Coastal Agriculture.

⇒ Oceans ⇒ 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.

⇒ Climate buffer : Oceans can store and circulate water, Δ & CO_2.

⇒ They act as Sinks of solid waste material

Disasters :

Storms, flooding, erosion, Cyclones, Tsunamis etc.
Earthquakes (coastal)

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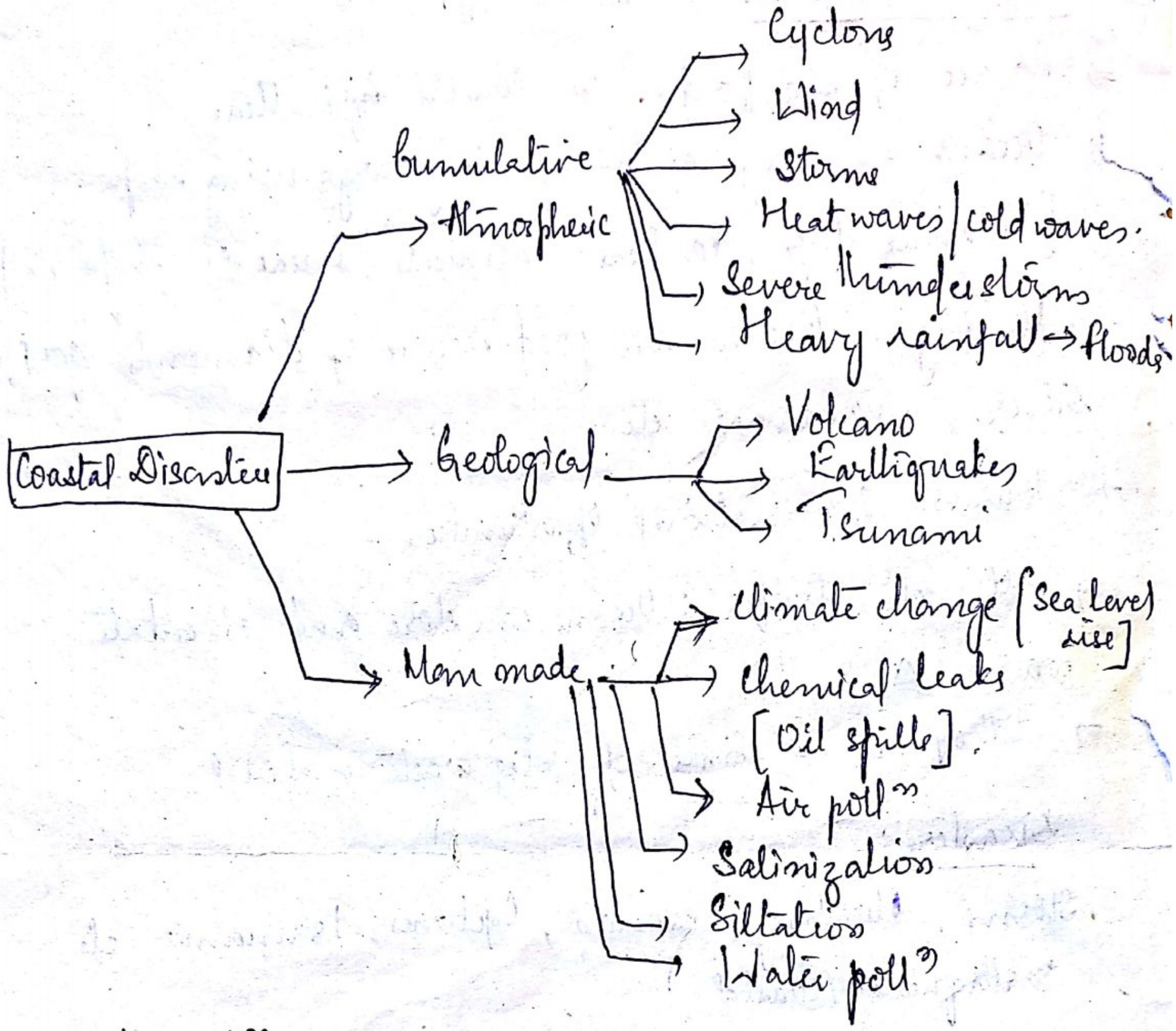

Risk redⁿ

(1) Efficient monitoring & surveillance system.

(2) Accurate early warning systems.

(3) Evolving predisaster hazard, vulnerability & risk-assessment inventories.

(4) Evolving post disaster manag. & mitigⁿ strategy

(5) Public awareness.

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Role of Panchayats in DM

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

Aim: Democratic decentralization
Rural Self Govt.
Social-economic dev. of rural parts of India.

⇒ Gram

Three imp. levels for effective Governance:

i) Gram Panchayat
ii) Block Mandal Parishad
iii) Zilla Parishad

→ Gram panchayat: It is the lowest tier of the Panchayat Raj System at Village level.

⇒ Convene meetings to warn the people of disasters

⇒ Arrange for temporary shelters for safety of villagers, shelters equipped with- provision to provide food & water to villagers & livestock.

⇒ Provision for evacuation of people after the final warning.

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

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ii) Block Mandal Parishad

Middle tier / intermediate level of Panchayat 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 reserve material before the occurence of a disaster

⇒ Implementation of safety measures in disaster prone areas.

⇒ Supply of adequate amt. of food & medicines.

⇒ Arrange of emergency communication system to disaster victims

⇒ Implem. of rehabilitation programmes.

⇒ Identify the victims for payment of compensation.

iii) Role of Zilla Parishad.

Highest tier / Apex body of the System administered by Chief Executive Officer.

⇒ Convene meetings with heads of sectoral depts. to take preventive measures prior to onset of a disaster.

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⇒ Arrange for transp^n & temp. relief measures

⇒ Monitor the rescue efforts in Disaster affected areas

⇒ Prepare a checklist of items necessary for rescue opers.

⇒ Arrange for CMG (Crisis Manag. Group) to assist both levels in combating the disaster.

⇒ Provide compensation to the disaster victims.

Env. Legislations in India.

NDMA, 2005; National Disaster Manag. Act.

⇒ Enacted by the Parliament with consent of President on Jan. 9th, 2006.

Aim: Effective manag. of disasters.

↳ defines Disaster Manag. as continuous & integral process of planning, organizing, coordinating & implementing measures which are necessary for reducing the impact of any disaster.

Salient features

⇒ Prevention of danger / threat of any disaster.

⇒ Mitigation measures.

⇒ Capacity building

⇒ Preparedness to deal with any disaster

⇒ Prompt response.

⇒ Assessing severity / magnitude.

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=) Evacuation, rescue & relief measures.

=) Rehabilitⁿ & Reconstⁿ.

⇒ Act empowers the Central Government to set up NDMA, National Disaster Manag. Authority with PM as Chairperson, State Dis. Manag. Auths (SDMA) with CMs " " and District " " " (DDMA) with collectors / district magistrates / deputy commissioners as chairperson.

=) It also empowers Central Govt. to constitute NDRF (National Disaster Response Force) to provide efficient response. ~~on~~

Institutions & National Centres for Natural Disaster Redⁿ

⇒ Central Disaster Manag. Authority :- Apex body set by GOI for implementig DM plans to prevent & mitigate

=) National Centre for DM (NCDM) => To provide training to govt. officials on DM and co-ordinate research activities on DM

⇒ Centre for DM =)

=) National Information Centre for Earthquake Engg., IIT Kharagpur.

=) Disaster Manag. Institute, Bhopal.

⇒ " Mtigⁿ ", Ahmedabad

=) Env. Protⁿ Training & Research Institute (EPTRI), Hyd.

=) Gujarat State Dis. Manag. Authority (GSDMA).

=) National Inst. Of Dis. Manag. (NIDM).

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