Q What do you know about earthquake? Discuss whether it can be predicted or not. And what should be the response during an earthquake? How its rehabilitation is possible?

Earthquake

definition: "The sudden shaking or rolling of the earth's surface is called an earthquake."
Actually, earthquakes occur daily around the world (according to an estimate, about 8000 occur every year), but most of them are too mild to be noticeable.

Causes

Natural Causes

(i) Elastic Rebound Theory
It was presented in 1906, according to this theory: earth can gradually store elastic stress that is released suddenly during an earthquake.

(ii) Plate Tectonics
Crust of earth is not a uniform shell. It is made up of huge blocks that fit together. These huge blocks are called plate tectonics.

- Convergent boundaries: These occur when two plates come towards each other.
- Divergent boundaries: These boundaries occur where two plates slide apart from each other.
- Transform boundaries: These occur when two plates sliding (apart past) from (past) each other form a

transform plate boundary.

(iii) Volcanic activity: This causes earthquake as magma rises within a volcanic chamber. Magma, during this activity, pushes apart the plates.

(iv) Iso-static balance: Iso-static balance between the raised and depressed block of land is not always maintained. Erosion takes place on mountains results in deposition on seafloor. Continuous erosion puts pressure on the seafloor, which depress it into magma (Asthenosphere), which also in turn raises the erosion regions. This continuous lowering and rising of crust causes earthquake in the region.

Human Activies Causing Earthquakes

(i) Dams

large new reservoirs can trigger earthquakes. This is due to → change in stress because of the weight of water

→ increased ground water pore pressure decreasing the effective strength of the rock under reservoir

(ii) Underground Explosions

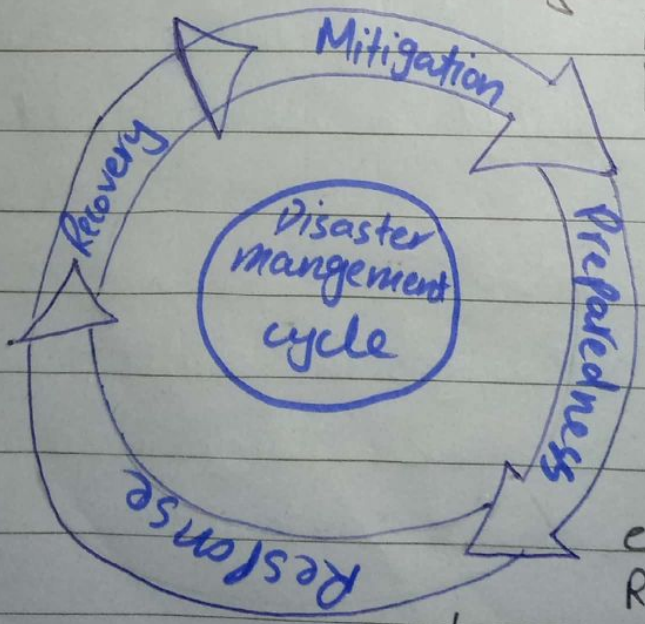
The pressure waveform from an underground explosion will propagate through ground and cause an earthquake.

* Injection of fluids into deep wells
* The detonation of large underground nuclear explosions

Date: / /20 Day:

Prediction of Earthquake

Earthquakes have very low predictability in short-term i.e. in most cases, there is no warning even a few minutes before earthquake. However, in most cases, a very high degree of predictability exists in long-term - in the sense if there is a certain area sitting on "fault" line" it can be said that over a long period of time, there is a high risk of earthquake. However, the exact time for its occurence cannot be predicted



Mitigation includes
- Risk assessment
- Risk zoning

Through risk assessment and risk zoning it becomes easy for Researchers to Predict an earthquake using Seismic Signal Detection and Analysis.

Date: / /20 Day:

Response during an Earthquake

It aims to provide "immediate emergency support" to a community to maintain health, safety and morale until a permanent solution can be put in place.

Emergency management system: This system prioritizes emergency preparedness by ensuring that emergency plan and response procedure are in place.

- Rescue teams must be trained and efficient so that rescue attempts are swift to save lives and resources.

Furthermore; in these situations:

→ Crisis maps must be followed.

→ Proper and timely steps must be taken for the evacuation of affected areas and shelters must be taken at safe places

Recovery from an Earth Quake (Rehabilitation)

This process may be short term or long term that depends on

→ Technical capacity

→ Financial capacity

Date: __/__/20 Day: _____

This phase includes "Reconstruction" of the infrastructures and in doing so following steps must be followed :-

* Research and Development: Allocate research and development budgets for science and technology related to earthquake and disaster management. Enhance capacity (technical and financial) by improving cooperation between government policies.

* Building Code: Develop national building code. Adopting and enforcing these code reduce disaster risks.
e.g : Use of Tuned Mass dampers in building that stores the energy released by seismic waves of earthquake and doesnot let this energy to be transferred to building, so building remains safe.

CSS 2020

Q How organic particulate matter enters the atmosphere?

→ defintion:

Organic particulate is complex mixture of liquid drops and solid particles. These pollutants include metal acids, organic chemical, dust, soil etc.

→ Types of Organic Particulate Matter

(i) Coarse material: Particles with size 2.5 Hm< Size < 10 Hm like

* Road dust
* Sea
* Spray
* Pollens
* Fly ash
* Plant and insect parts etc

(ii) Fine particles: Size/diameter < 2.5 Hm like

* Fuel burnt in automobiles
* Industrial combustion
* Burning coal for heat etc

→ How do they enter in Atmosphere?
Organic Particulate matter enters atmosphere

(i) As Nitrogen Oxides

Burning of coil, oil, natural gas, gasoline and burning of fuel in internal combustion engine produces Nitrogen Oxides (NO and NO_2).

$$N_2 + O_2 \longrightarrow 2NO$$

$$2NO + O_2 \longrightarrow 2NO_2$$

Residence time of NO and NO_2 are 2 and 4 days respectively.

In atmosphere it is converted into HNO_3 as

$$NO_2 + H_2O \longrightarrow HNO_3$$

which form acid rain.

Effects of Nitrogen oxides

(i) coughing
(ii) Difficulty in breathing
(iii) Asthama

(ii) As Sulphur Oxides

Burning of coal, petroleum, crude oil produce

$$S + O_2 \longrightarrow SO_2$$

$$2SO_2 + O_2 \longrightarrow 2SO_3$$

Effects

- Dangerous for people having asthma
- irritation
- suffocation
- Acid rain

(iii) Tropospheric Ozone

Combustion of fule produce nitrogen oxides

$$\text{Nitrogen Oxides} + \underset{\text{Volatile Organic Compounds}}{\text{VOCs}} \xrightarrow{\text{sun light}} \text{Ozone}$$

Solutions

(i) Government should impose restrictions on industries for reducing carbon pools.

(ii) Government should reduce prices of public transportation. So, people can prefer walking or public transportation to private vehicles. This will reduce no. of vehicles and ultimately reduce carbon pool.

(iii) Government should take steps to prohibit the excessive use of combustible materials like coal.

(iv) An alternative power source should be used in power plants, to reduce emissions. These alternatives are: geothermal, solar, wind energy and water energy:

(v) Replacing old appliances that can produce oxides of nitrogen should be replaced with environment friendly appliances.

CamScanner

Q: What challenges Pakistan is facing due to use of Pesticides and what measures Pakistan should take to face these challenges?

Pesticides

Pesticides are toxic substances that are used to kill animals, insects, plants or weeds hazardous for crops.

Challenges faced by Pakistan

Pesticides are Synthetic Organic Compounds and generally toxic. They are also known as Carcinogens.

Water Pollution

Pesticides reach water bodies in four ways:

a) They percolate
b) They leache
c) They run off through fields
d) Deliberate dumping and polluting of water bodies

Aquatic marine bodies are accumulated by Chlorinated Hydrocarbons.

Air Pollution

- Industries producing pesticides produce Green House Gases adding to pollution and global warming.

- Over 95-98% of sprayed pesticides reach a destination other than targeted species when suspended particles are taken away by the wind. This has led to a sharp decline in global insect population.

Soil Pollution

The waste from pesticides producing industries is dumped in landfills. This reduce biodiversity in field soil

Ecological damage

- Pesticides reduce pollination
- Destroys habitats
- Kills non-target species
- Reduces biodiversity

Impacts on Human Health

Pesticides contaminate the soil, air, water and ultimately have consequences for entire food chain. Pesticides are harmful for human health in following ways:

→ Pesticides cause cancers, tumors and lesions on fish and animals.
→ Reproductive inhibition or failure
→ Suppression of immune system
→ Disruption of endocrine (hormonal) system
→ Cellular and DNA damage
→ (Tetra) Teratogenic effects
→ Poor fish health
→ Intergenerational effects
→ Psychological effects e.g. egg shell thinning

Adverse impact of Pesticides is on Climate of Pakistan:

→ Global boiling: Industrial wastes contaminate environment of whole region and is having adverse impacts on the climate of Pakistan.

Other impacts on the climate of Pakistan are :-

- Dense fog in winters
- Smog
- Extreme hot weather in Summers
- Flood
- Drought
- Famine
- Acid Rain

All these climatic conditions have impacts on

* Agriculture
* Tourism
* Economy

of Pakistan.

Measures that Pakistan's Govt should take to control the Use of Pesticides

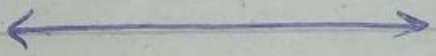
(i) Proper Solid Waste Management
(ii) Sanitary landfills
(iii) Incineration of Industrial Waste
(iv) Pyrolysis of Solid waste
(v) Proper Waste Collection System
(vi) Proper Infrastructure of Industries

(vii) Implementation of Sustainable Development Goals (SDGs)

(viii) Public Awareness

(ix) Trap-Crop Cultivation

(x) Push-Pull Technique



Q: How plastics are polluting environment and what measures Pakistan should take to control the use of plastics?

→ definition: Plastics are long-chain polymers.

→ Challenges to Environment

* Water pollution:
Plastics or the wastes/residues of plastics reach water bodies in 4 ways:

(a) They percdate
(b) They leache
(c) They run off through fields
(d) Deliberate dumping and polluting of water bodies

→ Air pollution:-

- Industries producing plastics produce Green House Gases thus adding to pollution and global warming.

→ Soil Pollution:

The waste from plastics producing industries is dumped in landfills that reduce biodiversity in field.

Adeverse impacts of Plastics on Climate

- Global Warming which has now become global boiling.
- Dense fog
- Smog
- Extreme hot weather
- Famine
- Flood

that affect agriculture, tourism and economy of Pakistan.

Solutions / Measures that Pakistan must take

(i) Banning the use of non-biodegradable plastics

biodegradable

(ii) Replacing plastics by Hemp plastics

(iii) Use of genetic engineering of bacteria and fungus to digest plastics

(iv) Use of thermoplastics

(v) Sanitary landfills

(vi) Pyrolysis of solid waste

(vii) Proper waste collection System

(viii) Proper Infrastructure of Industries

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