FACULTY OF ENGINEERING AND TECHNOLOGY

Lecture-35

Natural disaster-part 3

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Sea level rise

- The global **sea level rise** began around the start of the 20th century.
- Data gathered from satellite radar measurements reveal an accelerating rise of 7.5 cm (3.0 in) from 1993 to 2017, demonstrating trend of roughly 30 cm (12 in) per century.
- This acceleration is due mostly to human-caused global warming, which is driving thermal expansion of seawater and the melting of land-based ice sheets and glaciers.
- Between 1993 and 2018, thermal expansion of the oceans contributed 42% to sea level rise; the melting of temperate glaciers, 21%; Greenland, 15%; and Antarctica, 8%.
- Climate scientists expect the rate to further accelerate during the 21st century.
- In 2007, the Intergovernmental Panel on Climate Change (IPCC) projected a high end estimate of 60 cm (2 ft) sea level rise through 2099, but their 2014 report raised the high-end estimate to about 90 cm (3 ft).
- The three main reasons warming causes global sea level to rise are:
  - Oceans expansion,
  - Increase melting of ice sheets, and
  - Melting of glaciers at higher altitudes

Sources: https://en.wikipedia.org/wiki/Sea_level_rise

- Sea level rise since the start of the 20th century has been dominated by retreat of glaciers and expansion of the ocean, but the contributions of the two large ice sheets (Greenland and Antarctica) are expected to increase in the 21st century.
- The ice sheets store most of the land ice (~99.5%), with a sea-level equivalent of 7.4 m (24 ft) for Greenland and 58.3 m (191 ft) for Antarctica.
- The sea level will not rise uniformly everywhere on Earth, and it will even drop slightly in some locations, such as the Arctic.
- Sea level rises can affect human populations considerably in coastal and island regions. Widespread coastal flooding is expected with several degrees of warming sustained for millennia.
- Further effects are higher storm-surges and more dangerous tsunamis, displacement of populations, loss and degradation of agricultural land and damage in cities.
- Natural environments like marine ecosystems are also affected, with fish, birds and plants losing parts of their habitat.

Earthquake

- Earthquakes are by far the most unpredictable and highly destructive of all the natural disasters.
- Earthquakes that are of tectonic origin have proved to be the most devastating and their area of influence is also quite large.
- These earthquakes result from a series of earth movements brought about by a sudden release of energy during the tectonic activities in the earth's crust.
- As compared to earthquakes arises from tectonic movement, the earthquakes associated with volcanic eruption, rock fall, landslides, subsidence, particularly in the mining areas, impounding of dams and reservoirs, etc. have limited area of influence and the scale of damage.
- Movement of tectonic plates sometimes result in accumulation of excessive energy that results in building up of stress, which ultimately leads to the breaking up of the lock between two plates and the sudden release of energy causes earthquakes.
- Some of the most vulnerable states in India are Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, and the Darjeeling and subdivision of West Bengal and all the seven states of the northeast.
- The damage caused by earthquake depend on its magnitude that is measure with the help of instrument called Richter scale.

Sources: https://ncert.nic.in/ncerts/l/kegy107.pdf

Consequences of earthquakes

- The idea of an earthquake is often associated with fear and horror due to the scale, magnitude and suddenness at which it spreads disasters on the surface of the earth without discrimination.
- It becomes a calamity when it strikes the areas of high density of population.
- It damages and destroys the settlements, infrastructure, transport and communication network, industries and other developmental activities and promote chances of theft of expensive materials.
- It renders large number of people homeless, which puts an extra-pressure and stress, particularly on the weak economy of the developing countries.
- Earthquakes also have some serious and far-reaching environmental consequences. Surface seismic waves produce fissures on the upper layers of the earth's crust through which water and other volatile materials gush out, inundating the neighboring areas.
- Earthquakes are also responsible for landslides and often these cause obstructions in the flow of rivers and channels resulting in the formation of reservoirs. Sometimes, rivers also change their course causing floods and other calamities in the affected areas.

Landslides

- Landslide is the rapid sliding of large mass of bedrocks.
- Disasters due to landslides, are in general, far less hazardous than earthquakes, volcanic eruptions, tsunamis and cyclones but their impact on the natural environment and national economy is severe.
- Unlike other disasters that are sudden, unpredictable and are largely controlled by macro- or regional-factors, landslides are largely controlled by highly localized factors.
- Hence, gathering information and monitoring the possibilities of landslide is not only difficult but also immensely cost-intensive.
- It is always difficult to define in a precise statement and generalize the occurrence and behavior of a landslide.
- However, on the basis of past experiences, frequency and certain causal relationships with the controlling factors like geology, geomorphic agents, slope, land-use, vegetation cover and human activities, India has been divided into a number of zones.

- Very high vulnerability zone: Highly unstable, relatively young mountainous areas in the Himalayas and Andaman and Nicobar, high rainfall regions with steep slopes in the Western Ghats and Nilgiris, the north-eastern regions, along with areas that experience frequent ground-shaking due to earthquakes, etc. and areas of intense human activities.
- High vulnerability zone: Areas that have almost similar conditions to those included in the very high vulnerability zone are also included in this category. The only difference between these two is the combination, intensity and frequency of the controlling factors. All the Himalayan states and the states from the north-eastern regions except the plains of Assam are included in the high vulnerability zones.
- Moderate to low vulnerability zone: Areas that receive less precipitation such as Trans-Himalayan areas of Ladakh and Spiti (Himachal Pradesh), undulated yet stable relief and low precipitation areas in the Aravali, rain shadow areas in the Western and Eastern Ghats and Deccan plateau also experience occasional landslides.
- **Consequences of Landslides-** Landslides have relatively small and localized area of direct influence, but roadblock, destruction of railway lines and channel blocking due to rock-falls have far-reaching consequences. Diversion of river courses due to landslides can also lead to flood and loss of life and property. It also makes spatial interaction difficult, risky as well as a costly affair, which, in turn, adversely affects the developmental activities in these areas.

Volcanic eruption

Volcano

- A **volcano** is a rupture in the crust of a planetary-mass object, such as Earth, that allows hot lava, volcanic ash, and gases to escape from a magma chamber below the surface.
- On Earth, volcanoes are most often found where tectonic plates are diverging or converging, and most are found underwater.
- Volcanoes can also form where there is stretching and thinning of the crust's plates.

Sources: https://en.wikipedia.org/wiki/Volcano


THANK YOU :)