

What is a Natural Disaster?

- “**Disaster** is an undesirable occurrence resulting from forces that are largely outside human control, strikes quickly with little or no warning, which causes or threatens serious disruption of life and property including death and injury to a large number of people, and requires therefore, mobilization of efforts in excess of that which are normally provided by statutory emergency services”.

Natural Hazards

- Natural Hazards are elements of circumstances in the Natural environment that have the potential to cause harm to people or property or both.
- These may be swift or permanent aspects of the respective environmental settings like currents in the oceans, steep slope and unstable structural features in the Himalayas or extreme climatic conditions in deserts or glaciated areas.
- As compared to natural hazards, natural disasters are relatively sudden and cause large scale, widespread death, loss of property and disturbance to social systems and life over which people have a little or no control.
- Thus, any event can be classed as disaster when the magnitude of destruction and damage caused by it is very high

- Generally, disasters are generalized experiences of people the world over, and no two disasters are similar and comparable to each other.
- Every disaster is unique in terms of the local socio-environmental factors that control it, the social response it generates, and the way each social group negotiates with it.
- The magnitude, intensity, frequency and damages caused by natural disasters have increased over the years.
- There is a growing concern among people the world over to deal with the threat created by these so that the loss of human life and property can be minimized.
- Significant changes have taken place in the pattern of natural disasters over the years.

Table 7.2 : Classification of Natural Disasters

<i>Atmospheric</i>	<i>Terrestrial</i>	<i>Aquatic</i>	<i>Biological</i>
Blizzards	Earthquakes	Floods	Plants and Animals as colonisers (Locusts, etc.).
Thunderstorms	Volcanic Eruptions	Tidal Waves	Insects infestation— fungal, bacterial and viral diseases such as bird flu, dengue, etc.
Lightning	Landslides	Ocean Currents	
Tornadoes	Avalanches	Storm Surge	
Tropical Cyclone	Subsidence	Tsunami	
Drought	Soil Erosion		
Hailstorm			
Frost, Heat Wave or <i>Loo</i> . Cold Waves, etc.			

Meaning types and effects of: Flood

Flood

- A **flood** is generally defined as the overflow of large amounts of water on the earth's surface, causing destruction. Floods can occur due to many reasons like as a result of strong rains, incoming waves from the ocean, or the failure of dams or levees.
- Floods can happen suddenly or gradually over a long period and can last up to many days or weeks or even longer, depending upon the type and extent of the flood. Out of all the natural disasters, floods are the most common, seen all over the country at certain times.

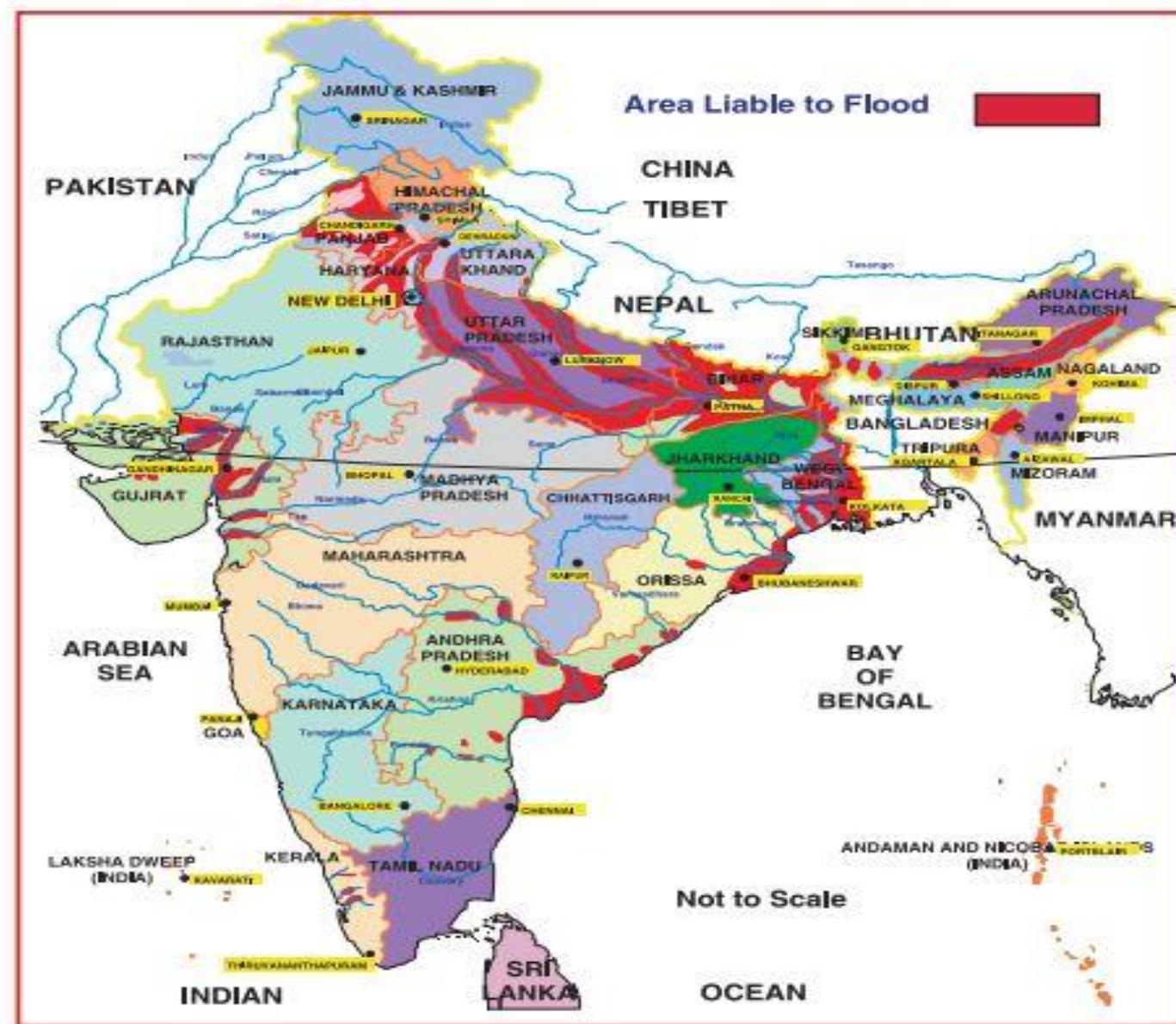
- Floods occur commonly when water in the form of surface run-off exceeds the carrying capacity of the river channels and streams and flows into the neighboring low-lying flood plains.
- At times, this even goes beyond the capacity of lakes and other inland water bodies in which they flow.
- Floods can also be caused due to a storm surge (in the coastal areas), high intensity rainfall for a considerably longer time period, melting of ice and snow, reduction in the infiltration rate and presence of eroded material in the water due to higher rate of soil erosion.
- Though floods occur frequently over wide geographical area having disastrous ramifications in many parts of the world, floods in the South, Southeast and East Asian countries, particularly in China, India and Bangladesh, are frequent and equally disastrous.

- Human beings play an important role in the genesis as well as spread of floods.
- Indiscriminate deforestation, unscientific agricultural practices, disturbances along the natural drainage channels and colonization of flood-plains and river-beds are some of the human activities that play an important role in increasing the intensity, magnitude and gravity of floods.



- Various states of India face heavy loss of lives and property due to recurrent floods.
- **Rashtriya Barh Ayog (National Flood Commission)** identified 40 million hectares of land as flood-prone in India. The Figure 7.6 shows the flood-affected areas in India.
- Assam, West Bengal and Bihar are among the high flood-prone states of India. Apart from these, most of the rivers in the northern states like Punjab and Uttar Pradesh, are also vulnerable to occasional floods.
- It has been noticed that states like Rajasthan, Gujarat, Haryana and Punjab are also getting inundated in recent decades due to flash floods.
- This is partly because of the pattern of the monsoon and partly because of blocking of most of the streams and river channels by human activities. Sometimes, Tamil Nadu experiences flooding during November -January due to the retreating monsoon

AREA LIABLE TO FLOODS



TYPES OF FLOODS

- 1. River flood** occurs when the water level of the sea rises above the top of the banks of the river.
- 2. A coastal flood** is an inundation of dry land areas along the coast of seawater.
- 3. Strome surge** is an abnormal increase in the water level in coastal areas.
- 4. Inland flooding** is flooding that does not occur in coastal areas or occurs inland.
- 5. A Flash flood** is a flood that begins after 3-6 hours of heavy rain.

Causes of Flood

- **Ice and Snow Melt** - Some mountains have ice caps on them. When this icecap melts in the summer season, it results in huge releases of water into the places that are usually dry.
- **Lack of Vegetation** - vegetation can interrupt the flow of water. If there will be no vegetation, there will be nothing to slow down the flow of water.
- **Broken Dams** - When heavy rain comes, the water level increases in the dams and ageing dams can break and can unleash overflows of water in the household.
- **Heavy Rains** - Whenever there is heavy rain and the drainage system is not proper, it may result in a flood or flood-like conditions.
- **Climate Change** - Climate changes occur mainly due to human practices. Due to deforestation, there will be more carbon dioxide in the atmosphere, which may lead to the melting of glaciers.
- **Emission of Greenhouse Gases** - The burning of fossil fuels can lead to the emission of greenhouse gases which increase the atmospheric temperature and hence there will be melting of the glaciers.

Effects of Flood

- A flood can harm wildlife.
- Flood carries contamination and can cause disease.
- A flood can trigger breeding events and migration.
- There may be a loss of goods and life in the flood.
- A flood can cause soil erosion.

Methods of Flood Management

- Some flood control techniques date back to ancient times. These techniques include building floodways, terracing hillsides to restrict flow downstream, and planting vegetation to hold surplus water (artificial channels to divert flood water).
- Levees, lakes, dams, reservoirs, and retention ponds are other methods for storing extra water during floods. Some other techniques to manage floods are
- **Construction of Dams-** Many dams and the reservoirs they are connected to have flood control and protection as one of their primary goals. In order to provide a specific amount of room for flood waters to fill, many large dams include flood-control reservations where the level of a reservoir must be kept below a particular elevation before the start of the rainy/summer melt season.
- **River Defences-** Rivers are frequently carefully controlled because they are prone to flooding in many nations. Levees, reservoirs, and weirs are utilised as defences to stop rivers from overflowing their banks and prevent flooding.
- **Floodplains and Groundwater Replenishment-** By redirecting extra water onto terrain that can soak it up, groundwater can be refilled. Through the use of the ground as a natural reservoir, this method can lessen the effects of future droughts.



2. Drought



Definition

- The term 'Drought' in simple words is the absence of water for a long period of time, at a place where it is considered abnormal as compared to its usual conditions.
- Drought is a situation when a region experiences very little or no rainfall over a long period resulting in massive loss of soil moisture and hydrological imbalances in that region.
- Drought can have a serious impact on health, agriculture, economies, energy and the environment.

- An estimated 55 million people globally are affected by droughts every year, and they are the most serious hazard to livestock and crops in nearly every part of the world.
- Drought threatens people's livelihoods, increases the risk of disease and death, and fuels mass migration. Water scarcity impacts 40% of the world's population, and as many as 700 million people are at-risk of being displaced as a result of drought by 2030.
- Rising temperatures caused by climate change are making already dry regions drier and wet regions wetter. In dry regions, this means that when temperatures rise, water evaporates more quickly, and thus increases the risk of drought or prolongs periods of drought.
- Between 80-90% of all documented disasters from natural hazards during the past 10 years have resulted from floods, droughts, tropical cyclones, heat waves and severe storms.

- Droughts affect people in several ways. Access to clean drinking water is essential for all life, and sources of water may decline during a drought.
- Water is also needed for crops to grow. When not enough precipitation falls to naturally water crops, they must be watered by irrigation.
- Irrigation is possible only when there is enough water in nearby rivers, lakes, or streams, or from groundwater.
- During a drought, these water sources are diminished and may even dry up, preventing crops from being irrigated and causing them to die off.

Causes of Drought

Natural causes

- Some droughts have occurred naturally, plaguing humankind throughout much of our history. Until recently, naturally occurring droughts were often natural phenomena triggered by cyclical weather patterns, such as the amount of moisture and heat in the air, land, and sea.

1. Altered weather patterns

- The distribution of rainfall can also be affected by how air circulates through the atmosphere. When there is an anomaly in surface temperatures, particularly over the sea, air circulation patterns are altered.

2. Global warming

- As the name suggests, the planet is warming at alarming rates and could cause droughts. Global warming is mainly associated with human activity, such as releasing greenhouse gases which cause a trapping effect, prompting the global temperatures to rise.
- With increased temperatures, water from rivers, streams, lakes, and other water bodies continue to evaporate. Coupled with other factors, this can lead to decreased rainfall and ultimately result in drought conditions.

4. Deforestation and soil degradation

- Trees and plants are essential as they release moisture into the atmosphere, resulting in clouds forming and rainfall falling, returning the moisture to the ground. Unfortunately, the human race is the best at destroying these natural resources .
- **When forests and vegetation disappear, less water is available to feed the water cycle , making entire regions more vulnerable to drought.** Meanwhile, deforestation and other poor land-use practices, like intensive farming , continue to diminish soil quality and reduce the land's ability to absorb and retain water.
- As a result, soil dries out faster, inducing agricultural droughts, and less groundwater is replenished, contributing to hydrological drought.

5. Climate change

- Rising temperatures have the effect of making wet regions wetter and dry regions drier. For wetter regions, warm air will absorb more water, leading to larger rain events, while in more arid regions, warmer temperatures mean water evaporates more quickly.

6. Fluctuating ocean and land temperatures

- Global weather patterns, including dry and wet conditions on land, are determined mainly by ocean temperatures, and even minor temperature changes can have profound consequences on climate systems.

Types of Drought



4 TYPES OF DROUGHT

AGRICULTURAL DROUGHT	SOCIOECONOMIC DROUGHT	HYDROLOGICAL DROUGHT	METEOROLOGICAL DROUGHT
<p><i>Agricultural Droughts</i> occur when there is not enough moisture in the soil to sustain the growth of crops.</p>	<p><i>Socioeconomic Droughts</i> occur when the water supply is too low to support human and environmental needs</p>	<p><i>Hydrological Droughts</i> occur when there is a lack of surface and subsurface water supply.</p>	<p><i>Meteorological Droughts</i> are region-specific; they occur when an area receives less rainfall than it normally should.</p>

Drought in India

- Drought-prone districts in India comprise nearly 1/6th of this country in terms of area. These areas receive an annual rainfall of around 60 cm or less.
- These situations can be attributed to human malpractices.
- In recent year drought conditions have become recurring due to reasons as climate change, overuse of water resource, pollution, urbanization, etc.
- Drought is declared by the respective State Governments taking into account rainfall situation, crop growth, etc.

Disastrous Effects of Drought

1. Hunger and famine (extreme scarcity of food)

- Droughts cause a shortage of water necessary for growing food crops, either through natural rainfall or irrigation from water reserves. This shortage undermines or destroys the food supply, leading to hunger and, in severe cases, famine.

2. Insufficient drinking water

- Droughts create water scarcity and endanger individuals with insufficient water to drink or use. The fundamental need for water to sustain life forces individuals to seek untreated sources, potentially causing sickness.
- The absence of clean water furthermore produces unsanitary public facilities and poor personal hygiene, leading to a broad spectrum of life-threatening diseases.

3. Wildfires and an effect on wildlife

- The low moisture and precipitation that often depict droughts can quickly create hazardous conditions in forests and across rangelands, setting the stage for wildfires that may cause injuries, deaths, extensive property damage, and shrunk food supplies.
- Additionally, wild animals and plants adapted to dry conditions may still suffer and die without adequate hydration, potentially leading to increased mortality and reduced reproduction.



4. Social conflicts and wars

- In times of drought, water scarcity may eventually lead to inadequate food supplies, leading to competition and potentially fatal conflicts among individuals fighting for survival.

5. Migration and relocation

- Faced with the other impacts of drought, many people and animals will flee a drought-stricken area in search of a new home with a better water supply and enough food.

6 Blackouts

- Hydroelectricity remains the primary source of power for many people worldwide. However, droughts can impede hydroelectricity generation by decreasing the amount of water available in reservoirs. This diminishes the amount of power available to consumers.

7. Economic effects

- Droughts frequently have a negative financial impact on families, businesses, governments, and individuals. Low yields lead to significant revenue loss, resulting in pay reductions and farm labor layoffs.
- Also, since droughts mean that hydropower plants operate at a reduced capacity, it may skyrocket electricity bills for businesses and enterprises that rely on this energy source.

Drought in India

- India has experienced 22 major droughts during the last 131 years. The 2002 drought, one of the severest in India, affected 56 per cent of its geographical area, the livelihoods of 300 million people and 150 million cattle in 18 states. The Government of India had to provide relief amounting to about US\$ 4500 million.

4. Earthquake



What is an Earthquake?

- An **earthquake** is the shaking of the surface of the Earth, resulting from the sudden release of energy in the Earth's lithosphere that creates seismic waves.
- Earthquake is the form of energy of wave motion transmitted through the surface layer of the earth.
- It may be due to faulting , folding, plate movement, volcaninc eruptions and anthropogenic factors like dams and reservoirs.
- Earthquake are by far the most unpredictable and highly distructive of all the natural disasters.
- Minor **earth tremors** caused by gentle waves of vibration within the earth's crust occur every few minutes while **Major earthquakes usually caused by movement along faults**, can be very disastrous particularly in densely populated areas.

- So far, there have been **sixty-two** earthquakes in India.
- The first recorded earthquake in India was on 6th June 1505 it occurred in Saldang, Karnali zone.
- And the most recent one happened in India as on 31st January 2018 and occurred in Kashmir, Pakistan, Afghanistan, and Tajikistan.
- An earthquake is measured on Richter's scale. A seismometer detects the vibrations caused by an earthquake.
- It plots these vibrations on a seismograph.
- The strength, or magnitude, of an earthquake, is measured using the Richter scale. Quakes measuring around 7 or 8 on the Richter scale can be destructive.

Causes of Earthquake

- Earthquakes are caused by sudden tectonic movements in the Earth's crust.
- The main cause is that when tectonic plates, one rides over the other, causing orogeny (mountain building), earthquakes. The largest fault surfaces on Earth are formed due to boundaries between moving plates.
- The stress increases when they stick, relative motion between the plates.
- This continues until the stress rises and breaks, suddenly allowing sliding over the locked portion of the fault, releasing the stored energy as shock waves.

Types of Earthquakes

Mainly, there are four types of earthquakes namely tectonic, volcanic, collapse and explosion.

- **Tectonic earthquake:** This occurs when due to geological forces on rocks and the adjoining plate's cause physical and chemical change and results in the breaking of the Earth's crust.
- **Volcanic earthquake:** Results from tectonic forces and occurs in conjunction with volcanic activity.
- **Collapse earthquake:** are generally small earthquakes that occur in underground caverns and mines caused by the seismic waves which are produced from the explosion of rock on the surface.
- **Explosion earthquake:** Occur due to the detonation of a nuclear or chemical device.

Effects of Earthquake

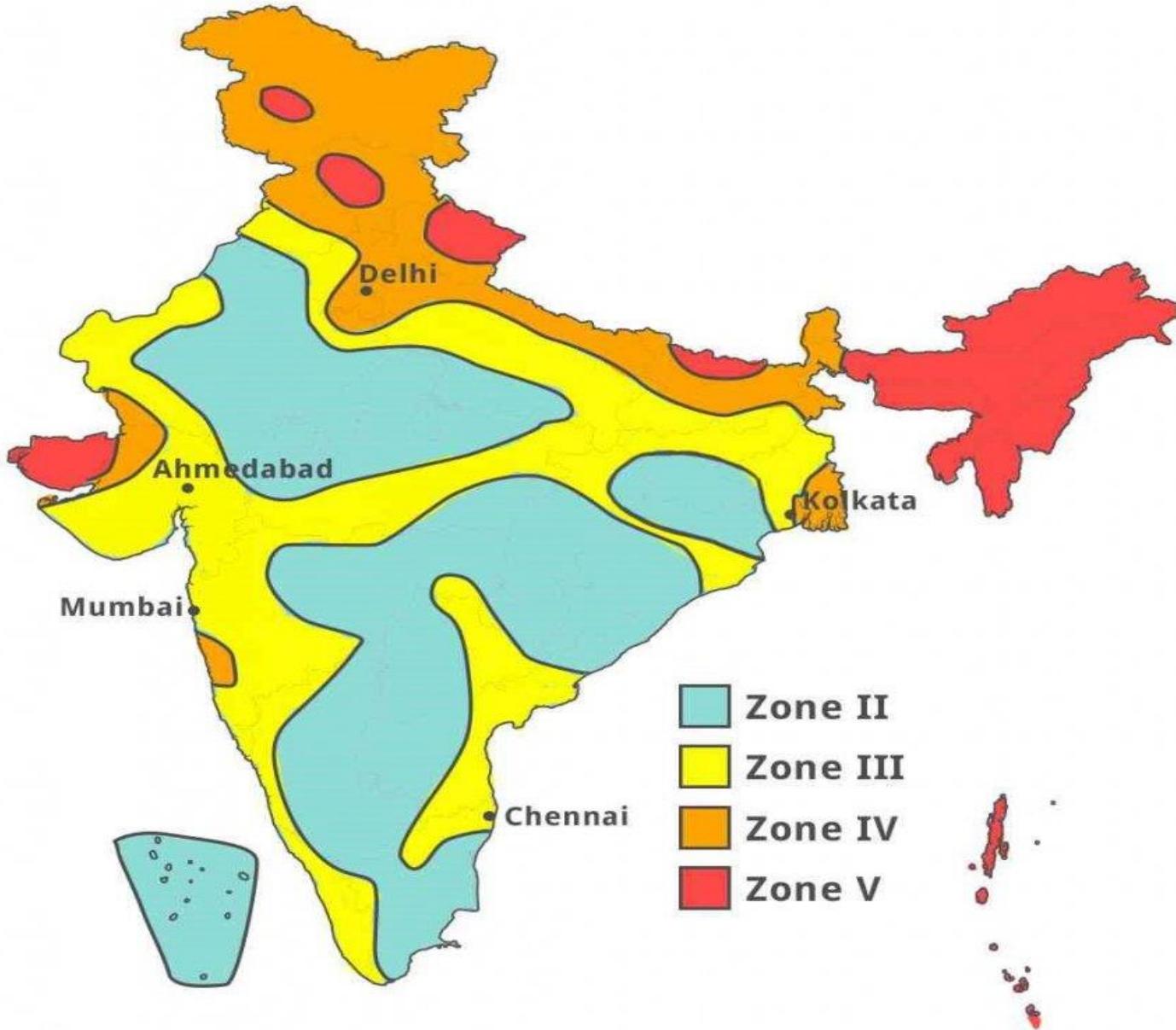
- The effects of an earthquake are terrible and devastating. Many building, hospitals, schools, etc are destroyed due to it.
- A lot of people get killed and injured. Many people lose their money and property.
- It affects the mental health and emotional health of people.
- The environmental effects of it are that including surface faulting, tectonic uplift and subsidence, tsunamis, soil liquefaction, ground resonance, landslides and ground failure, either directly linked to a quake source or provoked by the ground shaking.



- **Ground Shaking:** When an earthquake occurs, the release of energy creates seismic waves that cause the ground to shake. The intensity of the shaking can vary depending on factors such as the magnitude of the earthquake, the distance from the epicentre and the local geology. Areas closer to the epicentre usually experience more intense shaking, which can significantly damage structures and infrastructure.
- **Damage to Man-Made Structures:** One of the most noticeable effects of an earthquake is the damage it can cause to buildings, bridges, roads and other man-made structures. The shaking can lead to structural failure, collapse and extensive damage, especially if the buildings are not designed or constructed to withstand seismic activity. The severity of the damage depends on factors such as the quality of construction, adherence to building codes and proximity to the epicentre.
- **Fires and Hazardous Chemical Spills:** Earthquakes can trigger secondary hazards, such as fires and hazardous material spills. The violent shaking can rupture gas pipelines, damage electrical systems and disrupt infrastructure, leading to the ignition of fires. Additionally, earthquakes can cause the release of hazardous chemicals stored in industrial facilities, posing risks to human health and the environment. These secondary effects can further exacerbate the impact of an earthquake and complicate rescue and recovery efforts.

- **Landslides and Avalanches:** In areas with steep slopes or unstable terrain, earthquakes can trigger landslides and avalanches.
- The shaking can destabilize slopes, causing rocks, soil and debris to slide downhill.
- Landslides can damage structures, block roads and even bury entire communities, leading to additional casualties and hindering rescue and relief operations access.
- **Tsunamis:** Underwater earthquakes can generate tsunamis, particularly those occurring along tectonic plate boundaries.
- These massive ocean waves can travel long distances, reaching coastal areas and causing devastating flooding.
- Tsunamis pose a significant threat to coastal communities and can result in widespread destruction and loss of life.

Seismic zones in India







ITK Photo



Biggest Earthquakes in India

- The devastating Bhuj earthquake of 2001 took place on January 26, 2001, near the Pakistani border in the Indian state of Gujarat.
- The largest earthquake in India, measuring 8.6 on the Richter scale, struck the India-China region on August 15, 1950. 530 people perished as a result of the shifting of tectonic plates at a depth of 30 km.

National Centre for Seismology (NCS)

- The National Centre for Seismology (NCS) is the nodal agency of the Government of India for monitoring earthquake activity in the country.

National Disaster Management Authority (NDMA)

- NDMA is engaged with conducting regular awareness campaigns every year through print, electronic as well as social media from time to time to sensitize programs on prevention and preparedness for building safety from earthquakes.

Building Materials and Technology Promotion Council (BMTPC)

- BMTPC is mandated to promote resource-efficient, climate-resilient, disaster-resistant construction practices including emerging building materials and construction technologies for field-level applications.
- BMTPC is also one of the resource institutions to provide S & T support in the area of innovative building materials & construction technologies and disaster mitigation & management.

5. Landslides

2010 SURVEY OF SLOPES
Conducted by Mhada's Slum Improvement Board and the BMC. It revealed:

Families
1L families lived on hill slopes in Mumbai
22,483 families were in dangerous or vulnerable zones
10,381 families were in dangerous zones, but protected by retaining walls
1,357 slum families had been moved from such zones, as per the survey report

Zones: 327 dangerous zones were present on hill slopes in the city and its suburbs
278 in the suburbs — 49 in the city



300 LANDSLIDE-PRONE HILLS IDENTIFIED IN MUMBAI



2021 SITUATION

Zones: 291 landslide-prone zones present across the city, according to BMC officials

Areas: Largely eastern and western suburbs | Areas include Ghatkopar, Bhandup, Asalpa, Kurla, Sakinaka, Jogeshwari, Dindoshi and Malad

Several thousands live in dangerous zones, say activists and experts

Smaller settlements are spread across hills even in the island city



DEATHS
300 people living on hill slopes in Mumbai have died in the last two decades
50 people have died this year due to rain-related incidents, most due to landslides and house collapses

Families
1.5L families live on slopes

RECOMMENDATIONS OF 2005 COMMITTEE

- The fact-finding Chitale committee on the 2005 flooding had prepared a comprehensive report recommending resettlement of people living in landslide-prone areas
- While the BMC claims that it has issued notices for evacuation in most cases, the opposition alleges that the BMC does not make enough efforts to actually move people to safer locations
- RTI activist Anil Galgali said slums on hill slopes are spread across 25 assembly constituencies and are captive vote banks

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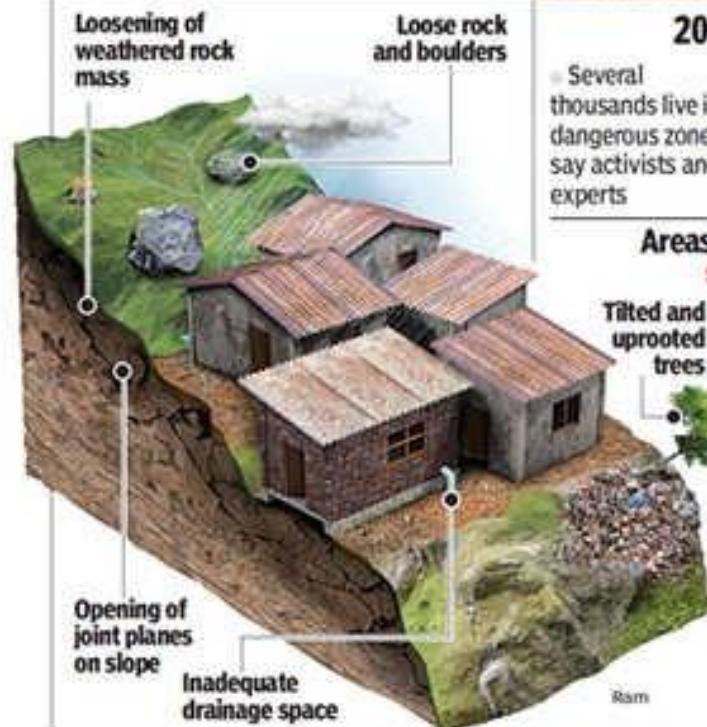
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10 DEAD, 13 RESCUED

in yet another landslide in Kinnaur



Kinnaur: A major landslide in Himachal Pradesh's Kinnaur district, second within a month, on Wednesday claimed the lives of ten people, while thirteen have been injured. Several are feared buried under the debris. Vehicles, including a bus carrying over 40 passengers, got buried under debris. Rescue operations were on till last reports came in.



Boulders cascaded onto the Shimla-Solan highway on Wednesday, trapping them

10 killed, 60 trapped in Himachal landslide; bus buried under debris

DANISH KHANNA
S. MURARAJ DE KHANNA
MADRASSA
SHIMLA, HARYANA
AUGUST 11

43 LEAVES last year, now Sunday's blinding blue monsoon smothered a year-old girl, seven killed and 60 others buried, crushed under debris after survival techniques, including a bus, were going 24-passenger, were left by a landslide on a highway near Nagarkot in Himachal's Kullu district on Wednesday.

officials said.

Speaking to The Indian Express, officials cited pyrometeorological surveys of Large-Scale Landslides, done the monsoon season, showed 12,465 pits and one on NH-21 from Kullu to Solan. At least 10 pits were active blocking the state highway road between Mandi-Pali and Amritsar Golosiengh, have been recorded and taken in a Socio-Economic Survey.

Himachal Road Transport Corporation (HRTC) Regional Manager, Amritsar Chaudhary, said 24 people had boarded the

agency's Bus on Wednesday. "We lost the landslide two passengers, the driver, conductor and four others passengers. Bus stopped over to check the boulders blocking the road. All of them, except for a woman who sustained serious injuries, including a vehicle. The rest were thrown with the bus," he said.

Eleven of HRTC's along with 10 others on the state Dharamkot-Ropar-Patiala (SDRP) and National Highway Transport Trust (NHPT) were injured.

CONTINUED ON PAGE 2

ભારે વરસાદના કારણે ભેખડો ધસતાં ૪૦થી વધુ મકાનોનો સર્જાયો

રાયગઢના ઈશાળવાડીમાં ભૂસખલન

૧૬ નાં મોત: ૧૦૦થી વધુ દટાયા

(પ્રતિનિધિ દાર્યા)

મુંબઈ, તા. ૨૦

મહારાષ્ટ્રમાં મૂશળપાર વરસાદના રેડ એલર્ટ દરમિયાન અતિશય ભારે વરસાદ વખતે જઈ રહે મુંબઈથી આશરે ૮૦ કિલો દૂર આવેલાં રાયગઢ વિલલાના ખાલાપુર તાલુકાના ઈશાળવાડી ભાતે ખાતુ મોટાપાંથે ભૂસખલન થતાં અસમતણ જરૂરીન પર રહેતા આદિવાસીઓનાં ૪૦ કાચાંપાકાં મકાનોનો કાટમાળ હેઠળ ખાતમો બોલી જતાં આશરે ૧૨૦ લોકો દટાયા

હતા. તેમાંથી ૧૬ મૂતરેછો જ્ઞાતી સાંજ સુધી મળી આવ્ય હતા. બચાવ કાર્યકર્તાઓને આશંકા છે કે મૃત્યુઆંક હજુ વર્ષ થકે છે. બીજુ તરફ વરસાદને કારણે કેટલાક વિદ્યાર્થીઓનું નજીકની આશ્રમ શાળામાં તથા કેટલાય ખેતમજૂરો નજીકન ખેતરોમાં જતા રહ્યા હોવાની પણ ચંકા છે. કાટમાળ હેઠળ ખરેખર કેટલા લોકો દટાયા છે તેનો કોઈ અંદાજ પ્રાપ્ય નથે ન હતો.

આદિવાસી વસ્તી ધરાવતાં ગામમાં બુધવારની રાતે દુર્ઘટના ૨૦-૨૦ ફૂટના કાટમાળ અને કાદવમાં રેસ્ક્યુ ઓપરેશન

કુંગરાણ અને વરસાદના કારણે ભારે જલપણણા બની જયેલા કેવી જેવા રસ્તાનો પર જેસીબી કે અન્ય કોઈ આપુનિક સાધનો કે સાદી મોટર પણ લઈ જઈ શકાય તેમ નહીં હોવાયી અને સતત ચાલુ વરસાદને કારણે બચાવ કામગીરી

ભારે મુશ્કેલ જની હતી. નેશનલ ડિઝાસ્ટર રિસ્યોન્સ કોર્સ તથા મુંબઈ મહાનગરપાલિકા, યાંથે ડિઝાસ્ટર સેલ અને નવી મુંબઈથી દોડી આવેલી કાયર ક્રિગેડ સંસ્કૃત અન્ય એજન્સીઓના જવાનો તથા સ્વાનિક ટ્રેકસ્ટના જૂથ દારા

દિવસભર બચાવ કામગીરી ચાલી હતી પરંતુ સાંજે અંધારુ એઈ જતાં અટકાવવું પડી હતી. આ બનાવને પગલે ભારે શોકનું પાતાવરણ સર્જિયુ છે. મુખ્યમંત્રીના સહિતના સંઘાંથે પ્રથમનો તથા ઉચ્ચ (અનુસંધાન ૧ ઉમે ધારે)

Landslides

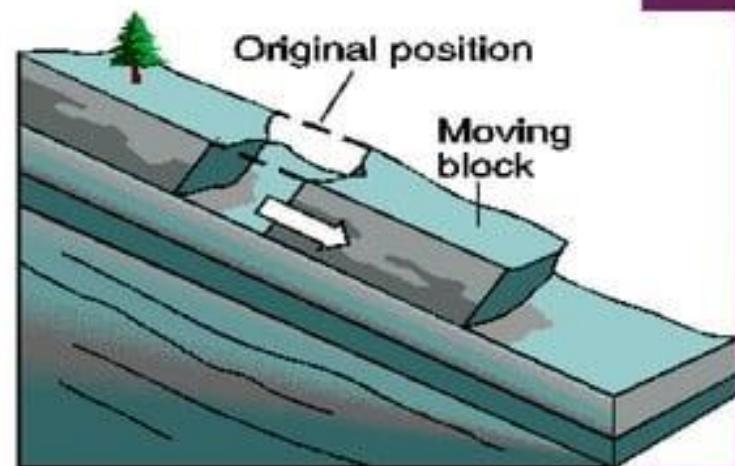
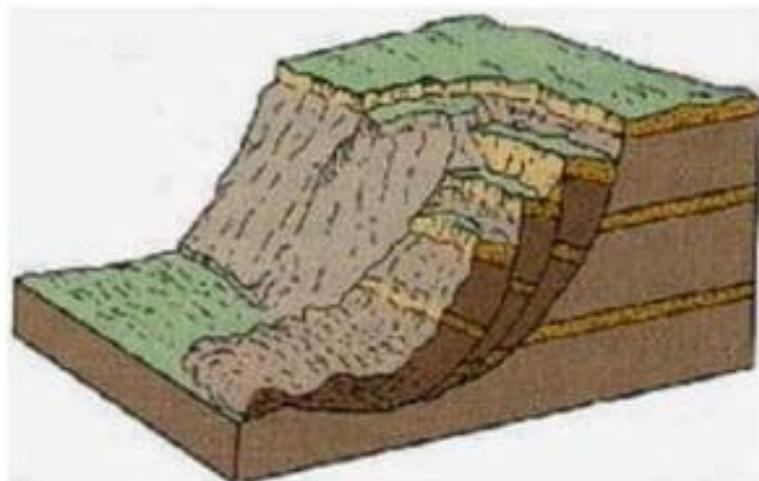
- Landslides are more widespread than any other geological event, and can occur anywhere in the world.
- They occur when large masses of soil, rocks or debris move down a slope due to a natural phenomenon or human activity.
- Mudslides or debris flows are also a common type of fast-moving landslide.
- Landslides can accompany heavy rains or follow droughts, earthquakes or volcanic eruptions. Areas most vulnerable to landslides include: steep terrain, including areas at the bottom of canyons; land previously burned by wildfires; land that has been modified due to human activity, such as deforestation or construction; channels along a stream or river; any area where surface runoff is directed or land is heavily saturated.

- Landslides can cause high mortality and injuries from rapidly flowing water and debris. The most common cause of death in a landslide is trauma or suffocation by entrapment.
- Broken power, water, gas or sewage pipes can also result in injury or illness in the population affected, such as water-borne diseases. People affected by landslides can also have short- and long-term mental health effects due to loss of family, property, livestock or crops.
- Landslides can also greatly impact the health system and essential services, such as water, electricity or communication lines.
- **Economic Impacts:** Landslides can have significant economic impacts. They can disrupt transportation systems, causing delays and increased transportation costs. They can also damage buildings and infrastructure, leading to costly repairs.
- **Social Impacts:** Landslides can have significant social impacts. They can displace communities, leading to social disruption and psychological stress. Landslides can also disrupt access to healthcare and education, leading to long-term social consequences.

Causes of Landslides:

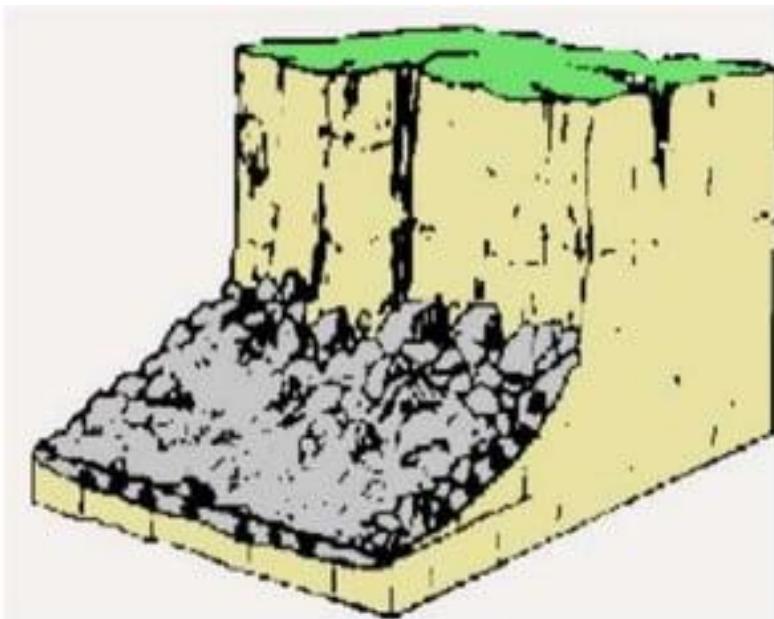
- **Heavy Rainfall:** Heavy rainfall can saturate the soil and cause it to become unstable, leading to landslides. This is particularly common in areas with poor drainage systems.
- **Geological Factors:** Geological factors such as steep slopes, unstable rock formations, and weak soil structures can also contribute to landslides.
- **Human Activities:** Human activities such as construction, mining, and deforestation can weaken the soil and cause landslides. Excavation of slopes can also destabilize the soil and trigger landslides.
- **Earthquakes:** Earthquakes can cause landslides by shaking the ground and destabilizing slopes.

Types of landslide



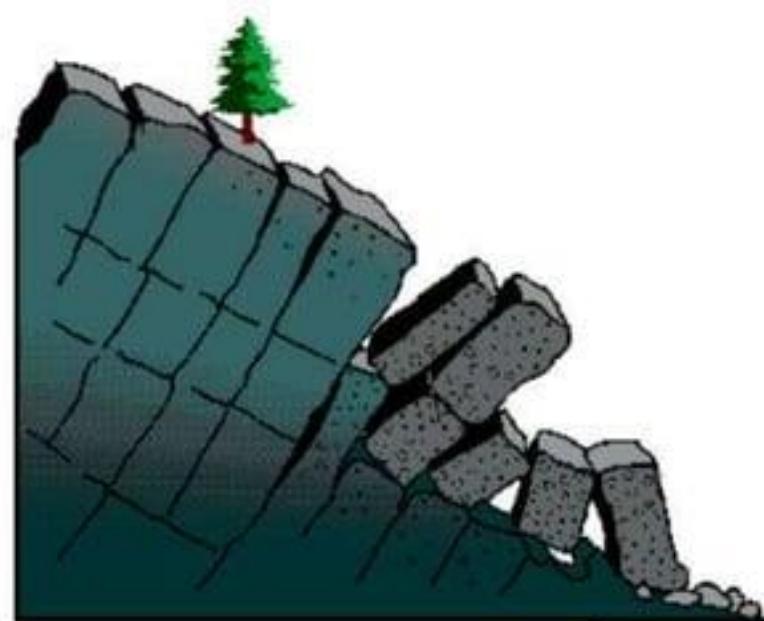
a) **Rotational slides** move along a surface of rupture that is curved and concave.

b) **Translational slides** occurs when the failure surface is approximately flat or slightly undulated

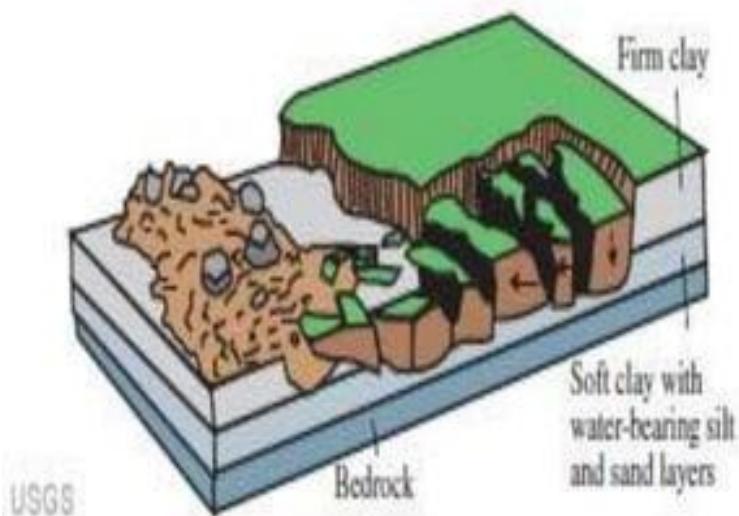


c) **Rock Fall:**

Free falling of detached bodies of bedrock (boulders) from a cliff or steep slope

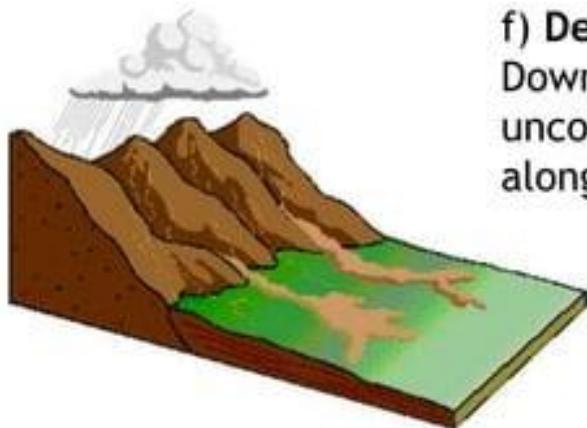


d) **Rock toppling** occurs when one or more rock units rotate about their base and Collapse.



USGS

e) **Lateral spreading** occurs when the soil mass spreads laterally and this spreading comes with tensional cracks in the soil mass.



f) **Debris Flow:**
Down slope movement of collapsed, unconsolidated material typically along a stream channel.

Natural Causes of Landslides

- Long-term climatic changes can significantly impact soil stability. A general reduction in precipitation leads to lowering of water table and reduction in overall weight of soil mass, reduced solution of materials and less powerful freeze-thaw activity. A significant increase in precipitation or ground saturation would dramatically increase the level of ground water. When sloped areas are completely saturated with water, landslides can occur. If there is absence of mechanical root support, the soils start to run off.

1. Earthquakes

- Seismic activities have, for a long time, contributed to landslides across the globe. Any moment tectonic plates move, the soil covering them also moves along. When earthquakes strike areas with steep slopes, on numerous occasion, the soil slips leading to landslides. In addition, ashen debris flows instigated by earthquakes could also cause mass soil movement.

2. Weathering

- Weathering is the natural procedure of rock deterioration that leads to weak, landslide-susceptive materials. Weathering is brought about by the chemical action of water, air, plants and bacteria. When the rocks are weak enough, they slip away causing landslides.

3. Erosion

- Erosion caused by sporadic running water such as streams, rivers, wind, currents, ice and waves wipes out latent and lateral slope support enabling landslides to occur easily.

4. Volcanoes

- Volcanic eruptions can trigger landslides. If an eruption occurs in a wet condition, the soil will start to move downhill instigating a landslide.

5. Forest fires

- Forest fires instigate soil erosion and bring about floods, which might lead to landslides

6. Gravity

- Steeper slopes coupled with gravitational force can trigger a massive landslide.

Human causes of landslides

1. Deforestation

- Human interference is one of the major causes of landslides in India. Deforestation is one such phenomenon which may trigger landslide. For example, the Himalayan region has become more vulnerable to landslides due to the indiscriminate cutting of trees.
- Removal of trees reduces the binding properties of soil and rocks. This enables the water to seep into the sub-surface, making the topsoil vulnerable.

2. Shifting Cultivation

- Shifting cultivation is common in hilly regions and Northeast areas. Every year, residents burn the forests for cultivation purposes. However, this deteriorates the quality of topsoil, causing erosion during heavy rainfall. This makes such regions more vulnerable to landslides.

3. Heavy Rainfall and Earthquakes

- Above 40% of the Kumaon Himalayan region are vulnerable to landslides due to earthquakes. Additionally, heavy rainfall often causes landslides.

4. Mining

- Human activities like mining or quarrying remove the vegetation cover and soil gravel. This lowers the groundwater retention capacity. Also, it increases the risk of flooding. Therefore, landslides occur due to loose debris or excess floods during an earthquake and heavy rainfall, respectively.

5. Urbanisation

- Increasing population pressure in few regions of India is alarming. For example, Dharamshala is prone to landslides. It is one of the fastest developing cities in the Himalayan region. Here, intensive urbanization activities such as establishing commercial housing projects and road construction reduce the vegetation cover. This leads to an increasing frequency of landslides in this region.

Effects of Landslides

Lead to economic decline

- Landslides have been verified to result in destruction of property. If the landslide is significant, it could drain the economy of the region or country. After a landslide, the area affected normally undergoes rehabilitation. This rehabilitation involves massive capital outlay.

Decimation of infrastructure

- The force flow of mud, debris, and rocks as a result of a landslide can cause serious damage to property. Infrastructure such as roads, railways, leisure destinations, buildings and communication systems can be decimated by a single landslide.

Loss of life

- Communities living at the foot of hills and mountains are at a greater risk of death by landslides. A substantial landslide carries along huge rocks, heavy debris and heavy soil with it. This kind of landslide has the capacity to kill lots of people on impact.

Affects beauty of landscapes

- The erosion left behind by landslides leaves behind rugged landscapes that are unsightly. The pile of soil, rock and debris downhill can cover land utilized by the community for agricultural or social purposes.

Impacts river ecosystems

- The soil, debris, and rock sliding downhill can find way into rivers and block their natural flow. Many river habitats like fish can die due to interference of natural flow of water. Communities depending on the river water for household activities and irrigation will suffer if flow of water is blocked.

2014 Malin landslide

2014 Malin landslide

- On 30 July 2014, a landslide occurred in the village of Malin in the Ambegaon taluka of the Pune district in Maharashtra, India. The landslide, which hit early in the morning while residents were asleep, was believed to have been caused by a burst of heavy rainfall, and killed at least 151 people.



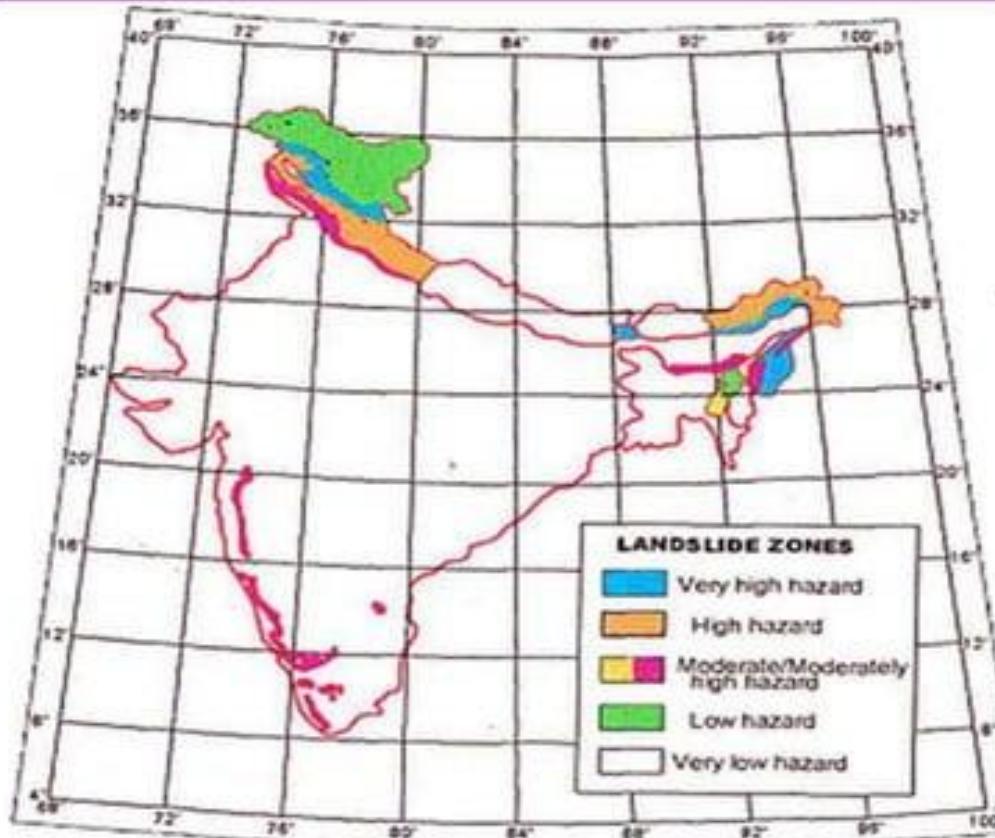
2000 Mumbai landslide

- The 2000 Mumbai landslide was a landslide that occurred in Ghatkopar, a suburban neighbourhood located in Mumbai, India on 12 July 2000.
- Seventy-eight people, including twenty-seven men, fifteen women, and fifteen children, were killed, while seven more were injured.

Malpa landslide

- The **Malpa landslide** was one of the worst landslides in India. On 18 August 1998 at 3.00 a.m., massive landslide wiped away the entire village of Malpa in the Pithoragarh district of Uttarakhand, then in Uttar Pradesh in Kali Valley of Higher Kumaon division of the Himalayas. The rockfall started on 16 August bringing down huge rocks which initially killed three mules. A total of 221 people died, including 60 Hindu pilgrims travelling to Tibet as part of "Kailash Manas Sarovar Yatra".

MAJOR LANDSLIDE ZONE IN INDIA



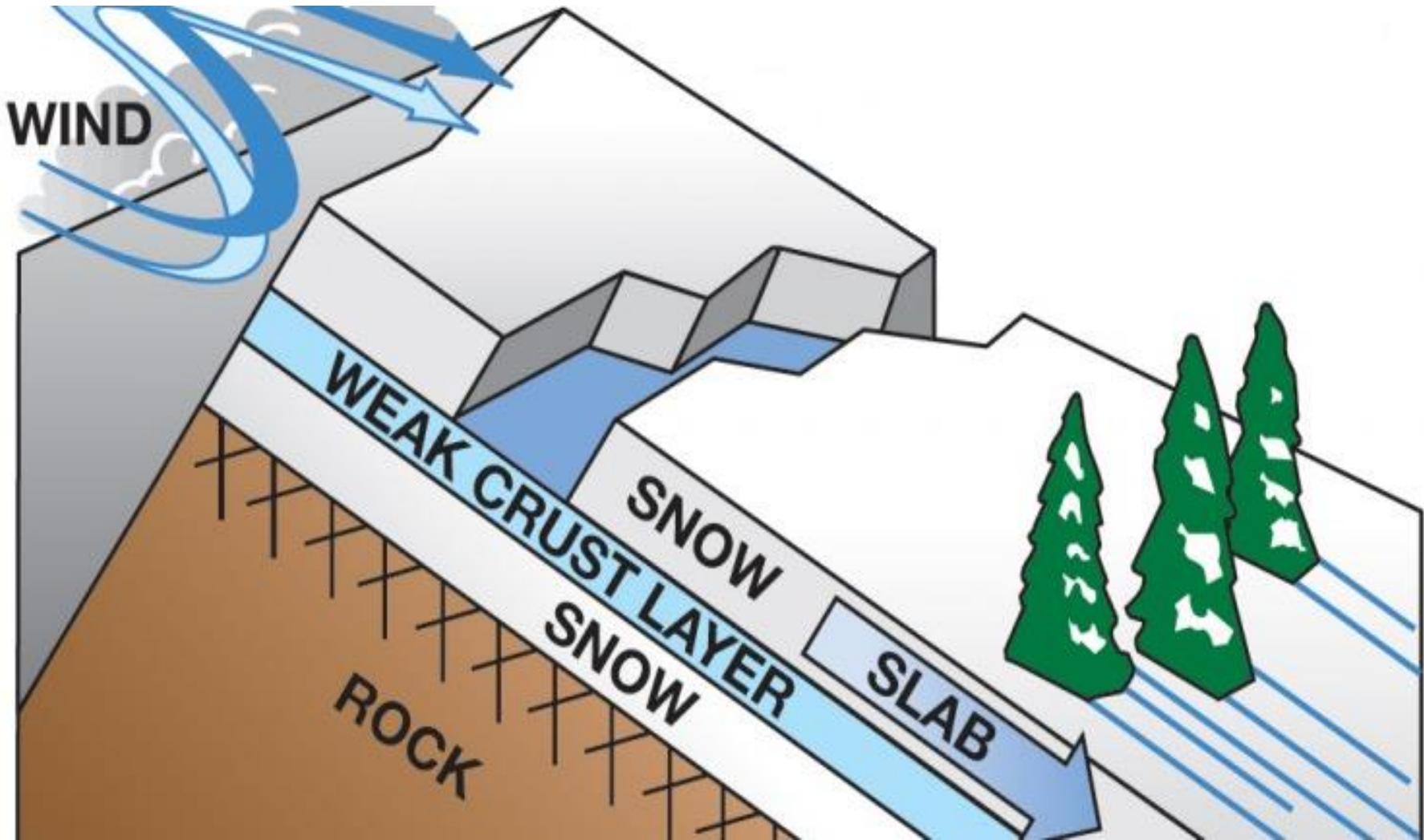
Landslide Hazard Zones in India

Source: <http://www.gsi.gov.in/Indslide/lhs.htm>

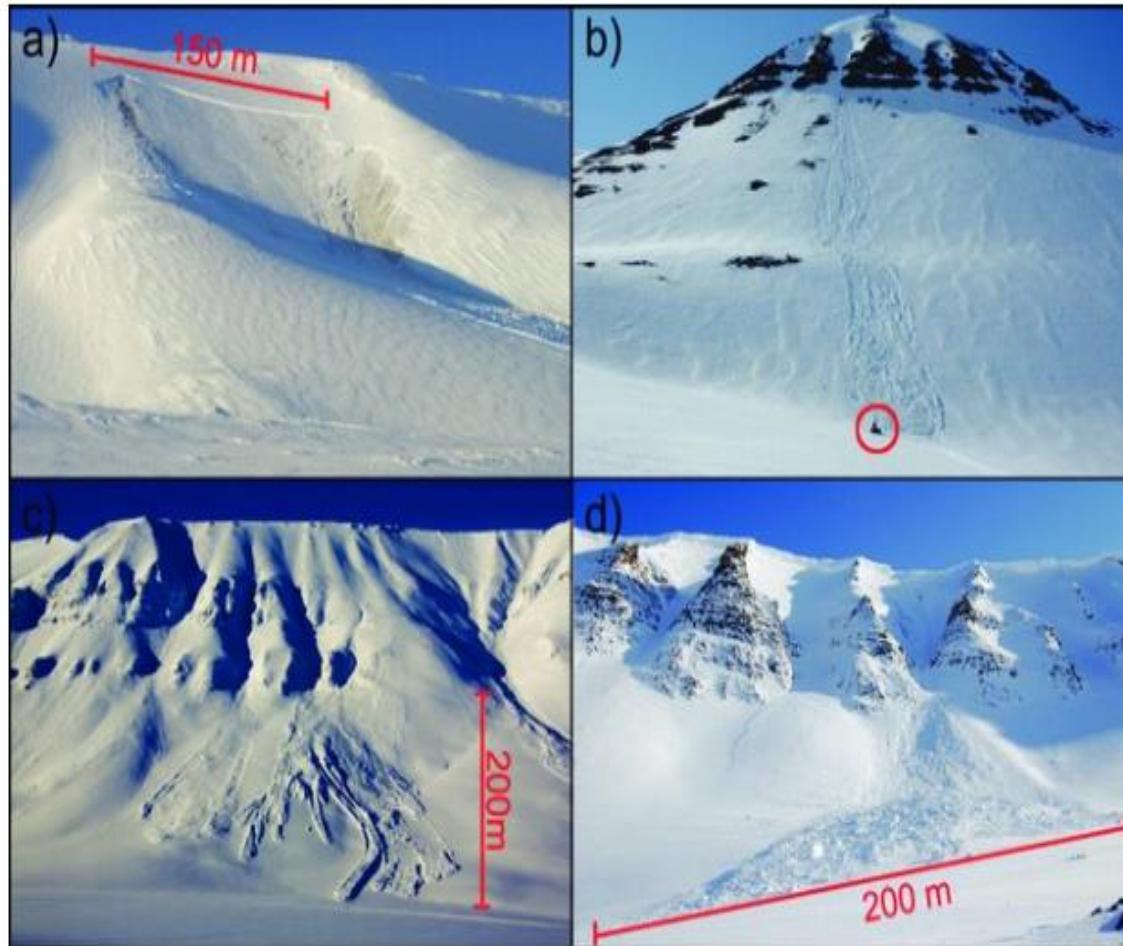


6. Avalanche

- A large mass of snow, ice, etc., detached from a mountain slope and sliding or falling suddenly downward.
- The amount of snow in an avalanche will vary based on many things, but it can be such a huge amount that it can bury the bottom of a slope in dozens of feet of snow.



Types of Avalanches



Caption

Figure 3: Types of avalanches. a) Slab avalanche on Nordenskiöldtoppen, artificially triggered by a snowmobile on 15 March 2009. b) Loose snow avalanche on Karl Bay Fjellet in Todalen, naturally released on 26 April 2008. Snowmobile in red circle for scale. c) Slush avalanche on Karl Bay Fjellet in Todalen, naturally released on 18 March 2011. d) Cornice fall avalanche on Gruvefjellet at Larsbreen, naturally released on 2 April 2010. Place names are given in Figure 4 and Figure 5.

This figure was uploaded by Markus Eckerstorfer

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1. Loose Snow Avalanches

- First of these are the Loose Snow Avalanches. They are common on steep slopes and are seen after a fresh snowfall. Since the snow does not have time to settle down fully or has been made loose by sunlight, the snowpack is not very solid. Such avalanches have a single point of origin, from where they widen as they travel down the slope.

2. Slab Avalanches

- Loose Snow Avalanches, in turn, could cause a Slab Avalanche, which is characterized by the fall of a large block of ice down the slopes.



3. Wet Snow Avalanches

- These are quite dangerous as they travel slowly due to friction, which collects debris from the path fairly easily. The avalanche comprises of water and snow at the beginning, but an understanding of avalanches has shown us that it can pick up speed with ease.

4. Icefall Avalanches

- When glaciers flow over a cliff, they form the ice equivalent of a waterfall or an icefall. Especially in big mountains, icefall avalanches can be large and travel long distances. Despite this, icefall avalanches kill few people compared to dry slabs that people trigger themselves.



5. Cornice Fall Avalanches

- Similar to icefall avalanches, the weight of a falling cornice often triggers an avalanche on the slope below, or the cornice breaks into hundreds of pieces and forms its own avalanche—or both.

6. Glide Avalanches

- Glide occurs when the entire snowpack slowly slides as a unit on the ground, similar to a glacier. Glide occurs because meltwater lubricates the ground and allows the overlying snowpack to slowly “glide” downhill.







7. Slush Avalanches

- It is a rapid mass-movement of water-saturated snow, have primarily been reported from uninhabited arctic and mountainous areas.



Major causes

- **Snowstorm and Wind Direction:** Heavy snowstorms are more likely to cause Avalanches. Wind normally blows from one side of the slope of mountain to another side.
- **Heavy snowfall:** Heavy snowfall is the first, since it deposits snow in unstable areas and puts pressure on the snow-pack. Precipitation during the summer months is the leading cause of wet snow avalanches
- **Human Activity:** Humans have contributed to the start of many avalanches in recent years. Winter sports that require steep slopes often put pressure on the snow-pack which it cannot deal.

Human activities



- **Vibration or Movement:** The use of All Terrain Vehicles and Snowmobiles creates vibrations within the snow that it cannot withstand. Coupled with the gravitational pull, it is one of the quickest ways to cause an avalanche.
- **Layers of Snow:** There are conditions where snow is already on the mountains and has turned into ice. Then, fresh snow falls on top which can easily slide down.
- **Steep Slopes:** Layers of snow build up and slide down the mountain.
- **Warm Temperature:** Warm temperatures that can last several hours a day can weaken some of the upper layers of snow and cause it to slide down.

Steep Slopes



Effects of Avalanches

As such, there is little damage to the overall ecological system due to avalanches.

They are a part of nature and have been happening for thousands of years.

However, they are a major natural hazard for the local human population.

1. Damage to Life and Property

- A large number of casualties take place after avalanches hit heavily populated areas. Infrastructure is damaged, and the blockage caused impacts the livelihood of many. People who enjoy skiing, snowboarding and snowmobiling are at a greater risk of losing their lives. A powerful avalanche can even destroy buildings, and power supplies can be cut off.

2. Death or Injury

- The biggest way in which avalanches affect people is by causing death or injury. The force from an avalanche can easily break and crush bones, causing serious injury. Asphyxiation is the most common cause of death, followed by death from injury and lastly, by hypothermia—people buried in the avalanche if found within 15 minutes have more than a 90 percent survival rate. The rate drops to around 30 percent if found after 35 minutes.

3. Flash floods

- When an avalanche occurs, it brings down all the debris with it and can cause havoc in low lying areas. Flash floods are seen to happen after avalanches, which is a long term problem many villagers and townspeople have to deal with. They can also change weather patterns and cause crop failure in farms present in the lower fields.



Property and Transportation

- Avalanches can completely destroy whatever is on its pathways such as houses, cabins and shacks. This force can also cause major damage to ski resorts as well as ski lift towers near or on the mountain. Avalanches also can cause roads and railroad lines to close. A large amount of snow can cover entire mountain passes and travel routes with cars and trains traveling on these routes.

Utilities and Communication

- Avalanches can affect humans by damaging utilities and communication. The power from these snow waves can completely destroy pipelines carrying gas or oil, thus causing leaks and spillage. Broken power lines can cause a disruption in electricity and cause thousands of people to go without power. Communication fields, such as telephone and cable lines, could go silent, causing a panic and a delay in response time and rescue.

Economic Impact

- An avalanche can block anything in its path and even restrict the normal movement of traffic. Various ski resorts depend on tourists to run their business successfully. Ski resorts and other businesses are forced to close until the avalanche decreases, and weather conditions become suitable.

Crop Failure

- If the snow from an avalanche accumulates on farmland located at the lower altitudes, it can completely destroy the crop, causing crop failure and heavy economic losses for the farm.

What to Do if Caught in an Avalanche?

- As per the experts, people caught in an avalanche should try to “swim” to the top of the moving snow to stay close to the surface. Once the avalanche stops, do your best to dig around you to create a space for air, so you can breathe easier.
- Then, try to figure out which way is up and dig in that direction to reach the surface and signal rescuers.

The Sikkim police officials have noted that tourists were only permitted to go up till the 13 mile mark, however the former went up to the 15 mile mark where they got trapped in the avalanche



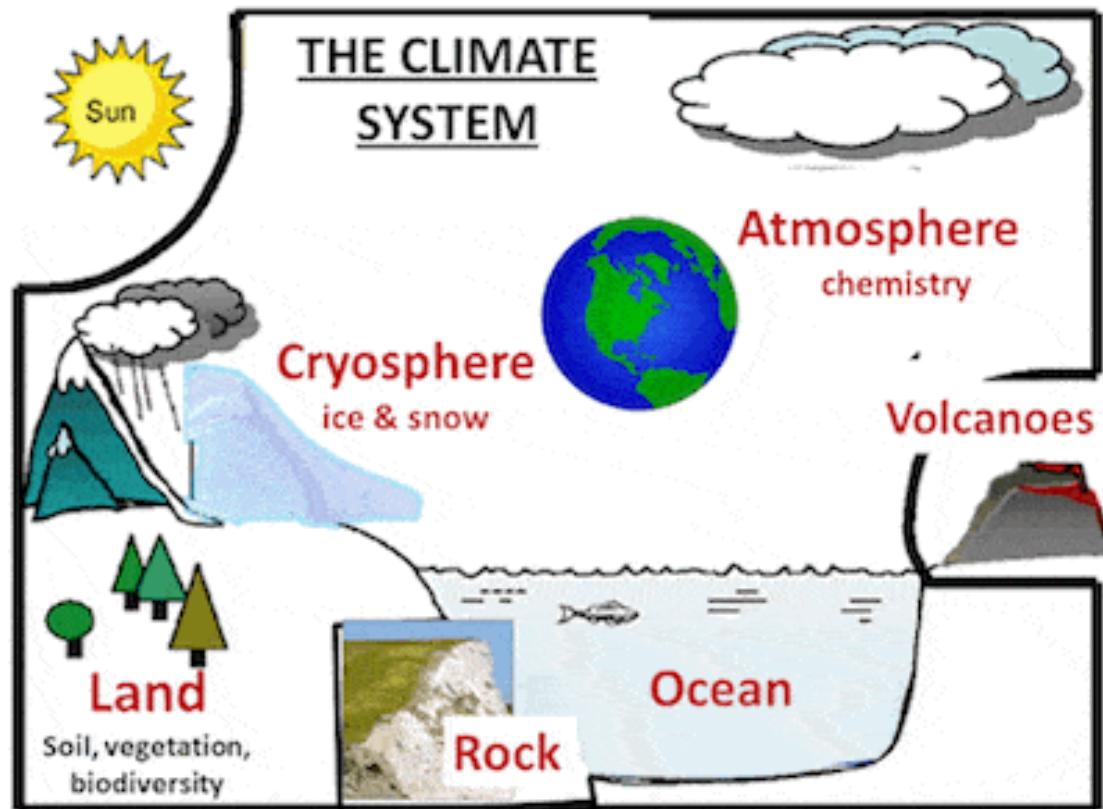
Rescue team members search for survivors after an avalanche in the northeastern state of Sikkim, India, April 4, 2023 (REUTERS)



9. Climate change

What is Climate Change?

- Climate change refers to a significant, long-term changes in the global climate.



- Climate is not the same as weather, but the two phenomena are closely related. While weather refers to short-term conditions that can change quickly, climate determines the long-term character of a given place, for instance, whether it is temperate or tropical.
- The relationship between weather and climate is crucial: the former is subordinate to the latter. Climate determines temperatures, weather diversity, the traits of winters, rainfall totals, as well as the nature of meteorological phenomena such as the severity of storms.
- These shifts may be natural, but since the 1800s, human activities have been the main driver of climate change, primarily due to the burning of fossil fuels (like coal, oil, and gas) increasing heat-trapping greenhouse gas levels in the Earth's atmosphere.
- **Increasing greenhouse gas emissions from human activity act like a blanket wrapped around the earth, trapping the sun's heat and raising temperatures.** Examples of greenhouse gas emissions that are causing climate change include carbon dioxide and methane.

Causes of climate change

Generating power

- Generating electricity and heat by burning fossil fuels causes a large chunk of global emissions. Most electricity is still generated by burning coal, oil, or gas, which produces carbon dioxide and nitrous oxide – powerful greenhouse gases that blanket the Earth and trap the sun's heat. Globally, a bit more than a quarter of electricity comes from wind, solar and other renewable sources which, as opposed to fossil fuels, emit little to no greenhouse gases or pollutants into the air.

Manufacturing goods

- Manufacturing and industry produce emissions, mostly from burning fossil fuels to produce energy for making things like cement, iron, steel, electronics, plastics, clothes, and other goods. Mining and other industrial processes also release gases, as does the construction industry. Machines used in the manufacturing process often run on coal, oil, or gas; and some materials, like plastics, are made from chemicals sourced from fossil fuels. The manufacturing industry is one of the largest contributors to greenhouse gas emissions worldwide.

Cutting down forests

- Cutting down forests to create farms or pastures, or for other reasons, causes emissions, since trees, when they are cut, release the carbon they have been storing. Each year approximately 12 million hectares of forest are destroyed. Since forests absorb carbon dioxide, destroying them also limits nature's ability to keep emissions out of the atmosphere. Deforestation, together with agriculture and other land use changes, is responsible for roughly a quarter of global greenhouse gas emissions.

Using transportation

- Most cars, trucks, ships, and planes run on fossil fuels. That makes transportation a major contributor of greenhouse gases, especially carbon-dioxide emissions. Road vehicles account for the largest part, due to the combustion of petroleum-based products, like gasoline, in internal combustion engines. But emissions from ships and planes continue to grow. Transport accounts for nearly one quarter of global energy-related carbon-dioxide emissions. And trends point to a significant increase in energy use for transport over the coming years.

Producing food

- Producing food causes emissions of carbon dioxide, methane, and other greenhouse gases in various ways, including through deforestation and clearing of land for agriculture and grazing, digestion by cows and sheep, the production and use of fertilizers and manure for growing crops, and the use of energy to run farm equipment or fishing boats, usually with fossil fuels. All this makes food production a major contributor to climate change. And greenhouse gas emissions also come from packaging and distributing food.

Powering buildings

- Globally, residential and commercial buildings consume over half of all electricity. As they continue to draw on coal, oil, and natural gas for heating and cooling, they emit significant quantities of greenhouse gas emissions. Growing energy demand for heating and cooling, with rising air-conditioner ownership, as well as increased electricity consumption for lighting, appliances, and connected devices, has contributed to a rise in energy-related carbon-dioxide emissions from buildings in recent years.

Consuming too much

- Your home and use of power, how you move around, what you eat and how much you throw away all contribute to greenhouse gas emissions. So does the consumption of goods such as clothing, electronics, and plastics. A large chunk of global greenhouse gas emissions are linked to private households. Our lifestyles have a profound impact on our planet. The wealthiest bear the greatest responsibility: the richest 1 per cent of the global population combined account for more greenhouse gas emissions than the poorest 50 per cent.

Effects of climate change

Hotter temperatures

- According to NOAA's 2021 Annual Climate Report the combined land and ocean temperature has increased at an average rate of 0.14 degrees Fahrenheit (0.08 degrees Celsius) per decade since 1880; however, the average rate of increase since 1981 has been more than twice as fast: 0.32 °F (0.18 °C) per decade. Higher temperatures increase heat-related illnesses and make working outdoors more difficult. Wildfires start more easily and spread more rapidly when conditions are hotter. Temperatures in the Arctic have warmed at least twice as fast as the global average.

More severe storms

- Destructive storms have become more intense and more frequent in many regions. As temperatures rise, more moisture evaporates, which exacerbates extreme rainfall and flooding, causing more destructive storms. The frequency and extent of tropical storms is also affected by the warming ocean. Cyclones, hurricanes, and typhoons feed on warm waters at the ocean surface. Such storms often destroy homes and communities, causing deaths and huge economic losses.

Increased drought

- Climate change is changing water availability, making it scarcer in more regions. Global warming exacerbates water shortages in already water-stressed regions and is leading to an increased risk of agricultural droughts affecting crops, and ecological droughts increasing the vulnerability of ecosystems. Droughts can also stir destructive sand and dust storms that can move billions of tons of sand across continents. Deserts are expanding, reducing land for growing food. Many people now face the threat of not having enough water on a regular basis.

A warming, rising ocean

- The ocean soaks up most of the heat from global warming. The rate at which the ocean is warming strongly increased over the past two decades, across all depths of the ocean. As the ocean warms, its volume increases since water expands as it gets warmer. Melting ice sheets also cause sea levels to rise, threatening coastal and island communities. In addition, the ocean absorbs carbon dioxide, keeping it from the atmosphere. But more carbon dioxide makes the ocean more acidic, which endangers marine life and coral reefs.

Loss of species

- Climate change poses risks to the survival of species on land and in the ocean. These risks increase as temperatures climb. Exacerbated by climate change, the world is losing species at a rate 1,000 times greater than at any other time in recorded human history. One million species are at risk of becoming extinct within the next few decades. Forest fires, extreme weather, and invasive pests and diseases are among many threats related to climate change. Some species will be able to relocate and survive, but others will not.

Not enough food

- Changes in the climate and increases in extreme weather events are among the reasons behind a global rise in hunger and poor nutrition. Fisheries, crops, and livestock may be destroyed or become less productive. With the ocean becoming more acidic, marine resources that feed billions of people are at risk. Changes in snow and ice cover in many Arctic regions have disrupted food supplies from herding, hunting, and fishing. Heat stress can diminish water and grasslands for grazing, causing declining crop yields and affecting livestock.

More health risks

- Climate change is the single biggest health threat facing humanity. Climate impacts are already harming health, through air pollution, disease, extreme weather events, forced displacement, pressures on mental health, and increased hunger and poor nutrition in places where people cannot grow or find sufficient food. Every year, environmental factors take the lives of around 13 million people. Changing weather patterns are expanding diseases, and extreme weather events increase deaths and make it difficult for health care systems to keep up.

Poverty and displacement

- Climate change increases the factors that put and keep people in poverty. Floods may sweep away urban slums, destroying homes and livelihoods. Heat can make it difficult to work in outdoor jobs. Water scarcity may affect crops. Over the past decade (2010–2019), weather-related events displaced an estimated 23.1 million people on average each year, leaving many more vulnerable to poverty. Most refugees come from countries that are most vulnerable and least ready to adapt to the impacts of climate change.



Wild fire in Greece





Flood in North east India



An aerial view of the icebergs near Kulusuk Island, off the southeastern coastline of Greenland, a region that is exhibiting an accelerated rate of ice loss



The **2020–2023 Horn of Africa drought** is an ongoing drought that hit the countries of Somalia, Ethiopia, and Kenya. The rainy season of 2022 was recorded to be the driest in over 40 years, with an estimated 43,000 in Somalia dying in 2022.

As of 2023, the region is now in its 5th failed rainy season and a 6th failed season is predicted.





Flood in Venice due to high tide





10. Global warming

Global warming

- Solar energy in the form of radiation reaches the earth, where two thirds of it is absorbed by the planet's surface.
- The rest is reflected back into the atmosphere where greenhouse gases operate.
- These gases reflect the energy back to earth where it again converts to heat – this process keeps the planet habitable.
- This phenomenon is called the greenhouse effect.
- Naturally, with the increasing amount of greenhouse gases in the atmosphere, this effect intensifies, leading to global temperature rise. Excessive temperature rise due to human activity is called global warming.

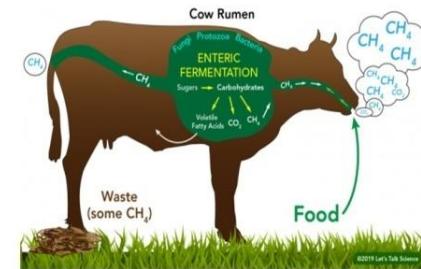
Definition

- Global warming is the long-term heating of Earth's surface observed since the pre-industrial period (between 1850 and 1900) due to human activities, primarily fossil fuel burning, which increases heat-trapping greenhouse gas levels in Earth's atmosphere.

- The average temperature of the planet has increased by 0.8° Celsius (33.4° Fahrenheit) compared to the end of the 19th century. Each of the last three decades has been warmer than all previous decades since the beginning of the statistical surveys in 1850.
- At the pace of current CO₂ emissions, scientists expect an increase of between 1.5° and 5.3°C (34.7° to 41.5°F) in average temperature by 2100. If no action is taken, it would have harmful consequences to humanity and the biosphere.

What Causes Global Warming?

teachoo



Industrialisation

More fossil fuel burnt
like Coal, Petroleum

Increase in Carbon dioxide
and Methane

Deforestation

Cutting of trees

Less trees in
Environment

Less Carbon dioxide
converted into Oxygen

More Carbon Dioxide
in Environment

Increase in Cattle Production

Higher Animal Waste Created

Increase in Methane

*Increase in Gases like Carbon dioxide and Methane
These gas trap heat of sun (causes **Green house Effect**)*

Greenhouse gases

- Greenhouse gases occur naturally in the atmosphere. They let the sun's rays pass through, while absorbing the thermal energy radiated by the earth's surface, keeping our planet warm. Without enough of these gases, the earth would be as cold as Mars. Conversely, with an extremely high concentration, the earth would become too hot, much like Venus.
- The main greenhouse gases in the earth's atmosphere are water vapour (H_2O), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and ozone (O_3). Human activity has led to increases in concentration of all of the greenhouse gases, with the exception of water vapour.

Causes Of Global Warming

Gas:	Source:	Use:	Way It Increases Global Warming:
Water Vapour	Oceans, lakes, rivers, reservoirs. Humans have little impact upon levels.	Absorbs limited outgoing radiation.	Water vapour and clouds are responsible for nearly 98% of the natural greenhouse effect.
Carbon Dioxide	Burning of fossil fuels, and forests, breathing animals, less produced by southern hemisphere (less land).	Absorption of long wave radiation.	Approximately 50%.
Methane (CH_4)	Much from break down of organic matter by bacteria (rice paddy fields) cows, swamps marshes.	As above.	Approximately 18%.

Deforestation

- It is estimated that humans have cut down about half of all of the world's forests. Most of the current deforestation is linked to burning and cutting down tropical rainforests – primarily for agriculture or grazing, for the production of charcoal and, secondarily, for logging wood as a material. Although tropical rainforests cover only about six percent of the Earth's surface, they have a significant impact on the global climate.
- Tropical forests have the highest photosynthetic productivity as well as the ability to cool the earth's surface of all forests on Earth, helping to mitigate global warming. They are also centres of global biodiversity as they host a large proportion of the world's animal and plant species.

Natural phenomena

- Natural forces that contribute to climate change include the intensity of sunlight, volcanic eruptions, and changes in the concentration of naturally-occurring greenhouse gases.
- According to NASA, these natural phenomena are still relevant today, but their impact compared to human influence is too small or too slow for natural causes to constitute a major cause of the rapid warming observed in recent decades. Without human activity, the climate would have remained virtually unchanged for the last 100 years.

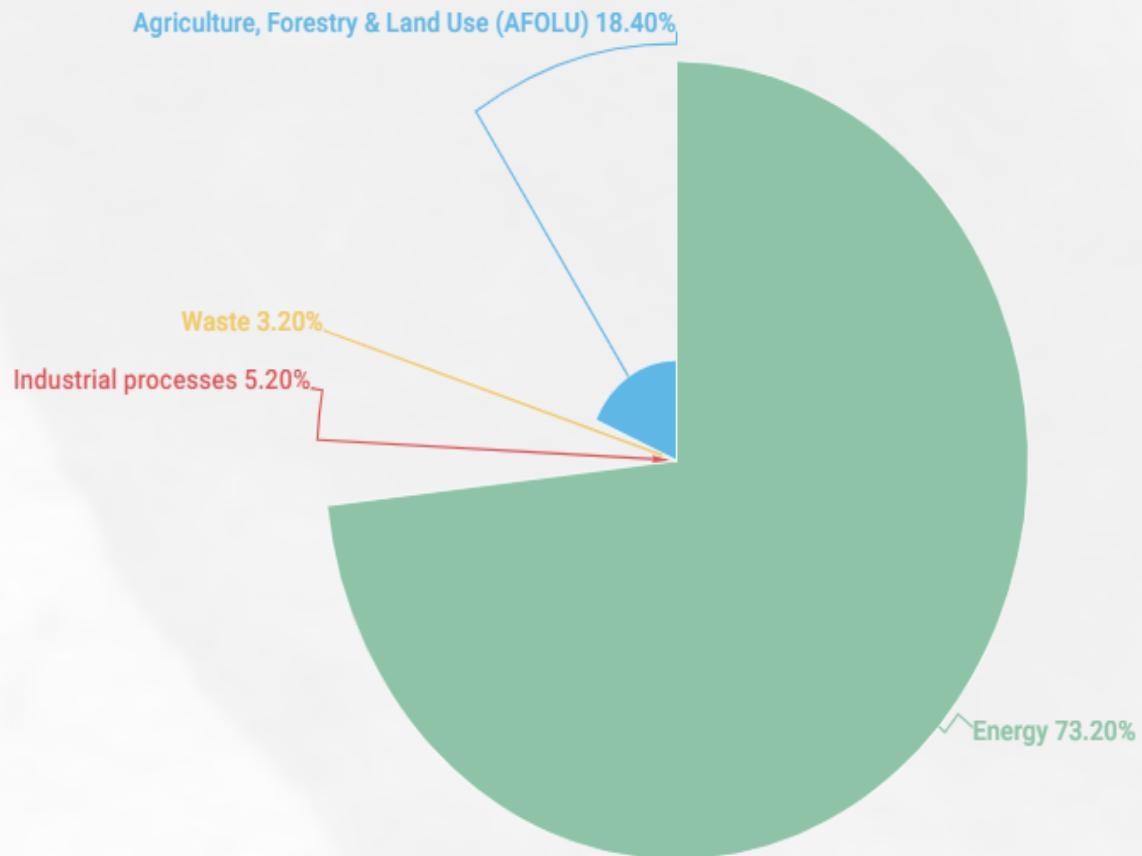
EMISSIONS BY SECTOR



Share of global greenhouse gas emissions, sector (%)

The largest emitter of greenhouse gas is the energy sector. Other significant sources of greenhouse gases include transportation, industry (especially construction and mining), and agriculture.

Different human activities produce different greenhouse gases. For instance, agriculture produces methane most notably, while the burning of fossil fuels releases carbon dioxide especially.

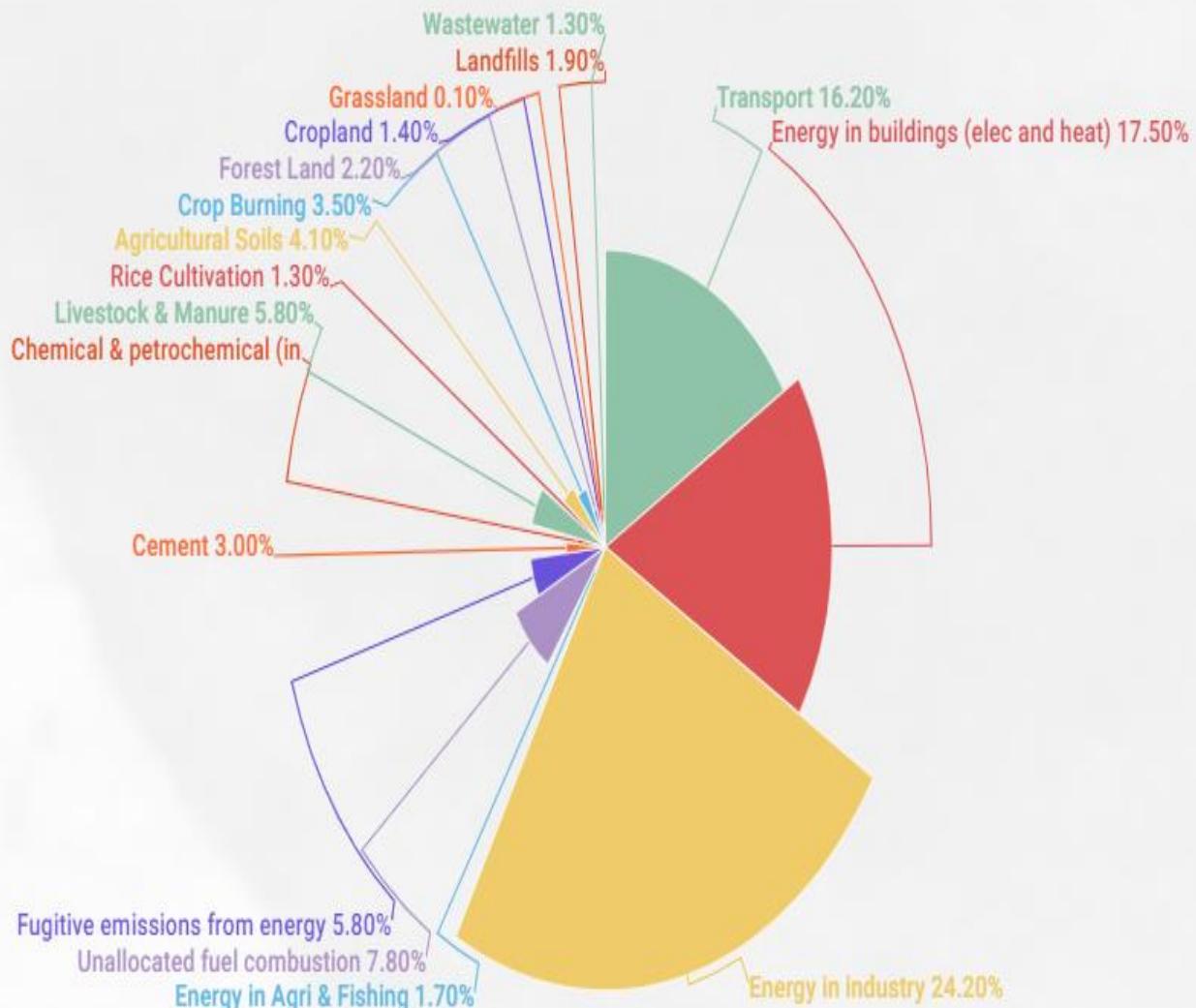


EMISSIONS BY SECTOR

Share of global greenhouse gas emissions, sub-sector (%)

The largest emitter of greenhouse gas is the energy sector. Other significant sources of greenhouse gases include transportation, industry (especially construction and mining), and agriculture.

Different human activities produce different greenhouse gases. For instance, agriculture produces methane most notably, while the burning of fossil fuels releases carbon dioxide especially.

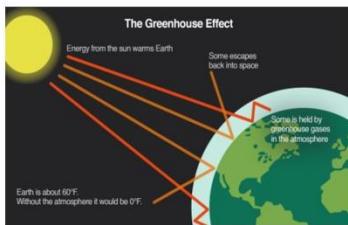


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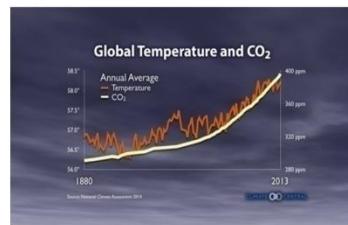
FOSSIL FUELS

- The massive use of fossil fuels is obviously the first source of global warming, as burning coal, oil and gas produces carbon dioxide - the most important greenhouse gas in the atmosphere - as well as nitrous oxide.

What is Effect of Global Warming?



*Increase in Green House Gases
(Carbon Dioxide/
Methane)*



*Increase in
Global Temperature*



Melting of Glaciers



Cities Submerged in Water



Water levels Rise

On biodiversity

- The increase of temperatures and the climate upheavals disturb the ecosystems, modify the conditions and cycles of plant reproduction. The scarcity of resources and climate change are changing life habits and migratory cycles of animals.
- Global warming therefore impacts biodiversity. It is the balance of biodiversity that is modified and threatened. According to the IPCC (Intergovernmental Panel on Climate Change), a 1.5°C (34.7°F) average rise might put 20-30% of species at risk of extinction. If the planet warms by more than 2°C , most ecosystems will struggle.

On oceans

- Because of global warming, permafrost and ice are melting massively at the poles, increasing the sea level at a rate never known before. In a century, the increase reached 18 cm (including 6 cm in the last 20 years). The worst case scenario is a rise of up to 1m by 2100.
- The acidification of the oceans is also of great concern. In fact, the large amount of CO₂ captured by the oceans makes them more acidic, arousing serious questions about the adaptability of seashells or coral reefs.

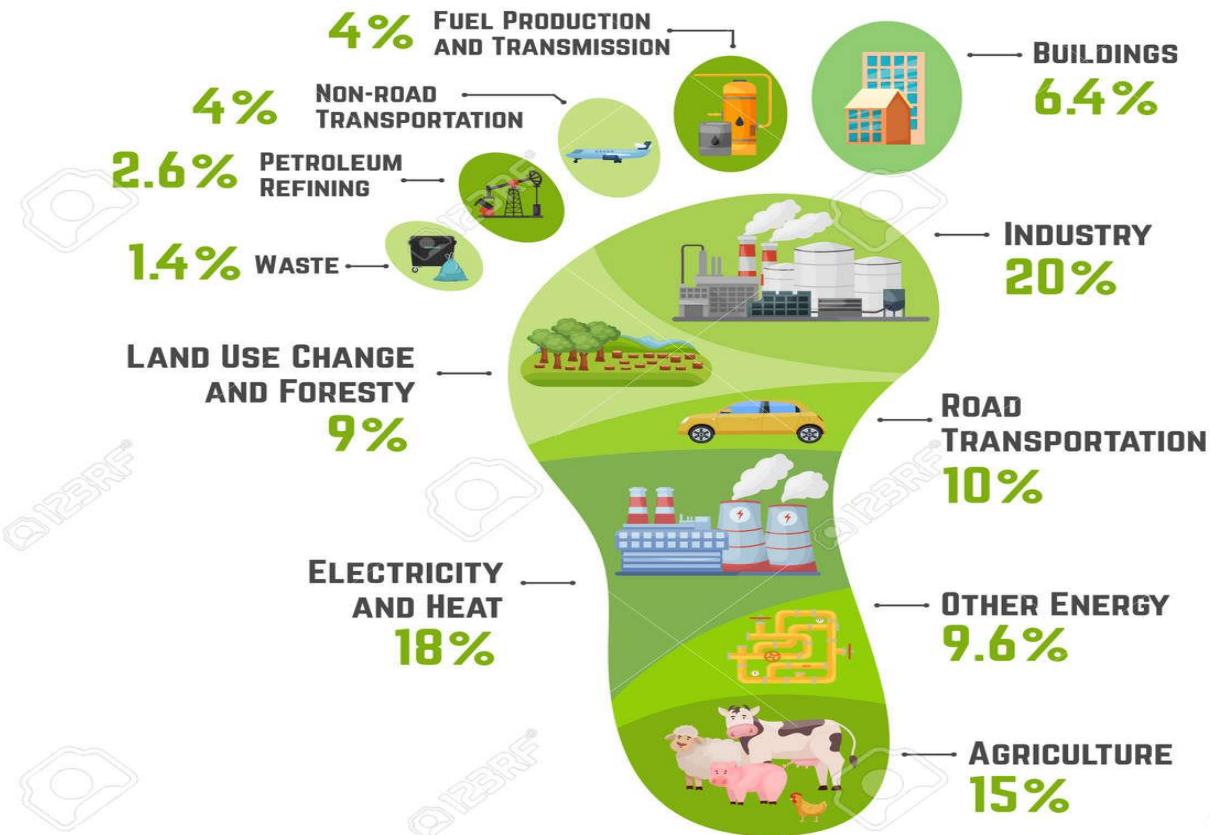
On humans

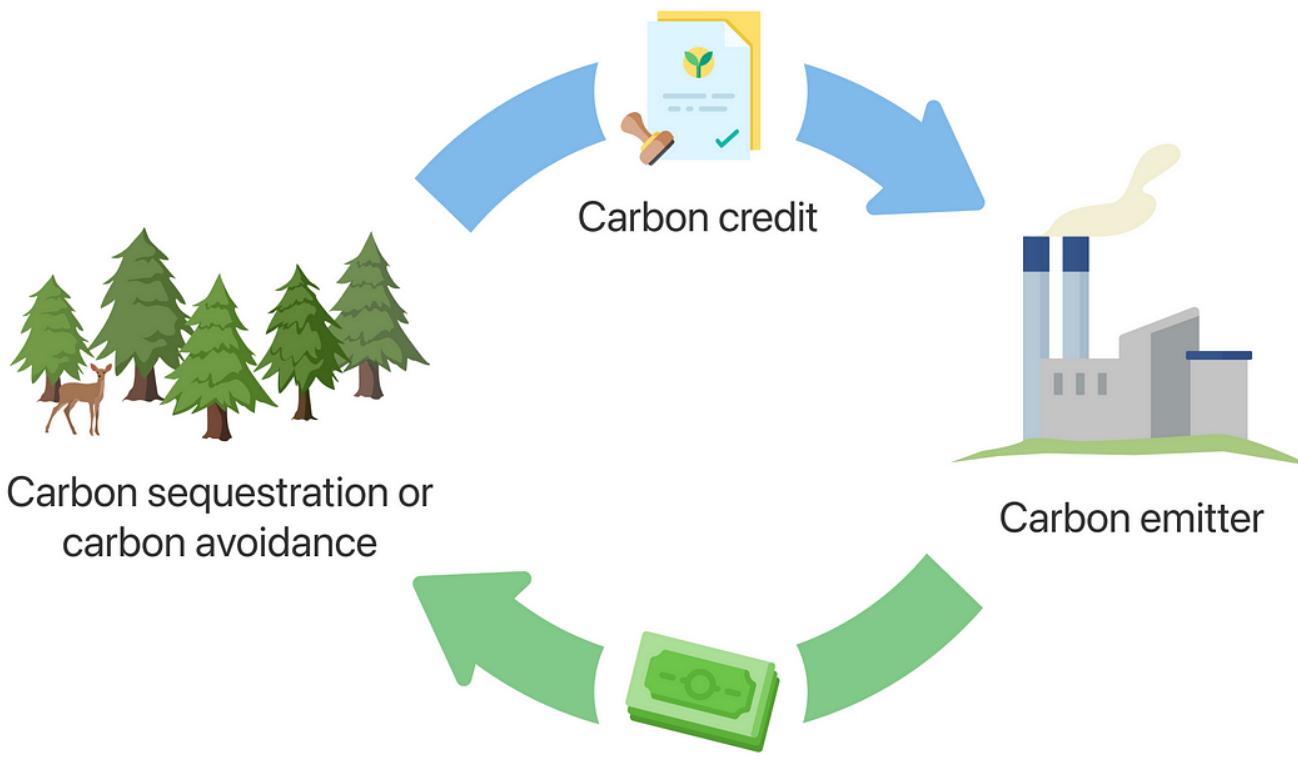
- Human beings are not secure by these upheavals. Climate change is affecting the global economy. It is already shaking up social, health and geopolitical balances in many parts of the world. The scarcity of resources like food and energy gives rise to new conflicts.
- Rising sea levels and floods are causing population migration. Small island states are in the front line. The estimated number of climate refugees by 2050 is 250 million people.

On the weather

- For decades now, meteorologists and climatologists around the world have been watching the effects of global warming on the weather phenomena. And the impact is huge: more droughts and heatwaves, more precipitations, more natural disasters like floods, hurricanes, storms and wildfires, frost-free season, etc.

CARBON FOOTPRINT





Internet users account for
3.7%
of the global CO₂ emissions-
equivalent to the amount
produced by the entire
global **Airline Industry**

These figures are expected to double by 2025

