**UNIT I**

Disasters are as old as human history but the dramatic increase and the damage caused by them in the recent past have become a cause of national and international concern. Over the past decade, the number of natural and manmade disasters has climbed inexorably. From 1994 to 1998, reported disasters average was 428 per year but from 1999 to 2003, this figure went up to an average of 707 disaster events per year showing an increase of about 60 per cent over the previous years. The biggest rise was in countries of low human development, which suffered an increase of 142 per cent.

1) What is disaster?

Ans:-A *disaster* is a serious disruption, occurring over a relatively short time, of the functioning of a community or a society involving widespread human, material, economic or environmental loss, and the impacts, which exceeds the ability of the affected community or society to cope using its own resources

. An event or act that has unfortunate consequences. Leading to Colossal Loss of Life, material, property and economy, environment of that area.

. A sudden accident or a natural catastrophe that causes great damage or loss of life. Severely disturbing the life of the society of that area

A calamitous event, especially one occurring suddenly and causing great loss of life, damage, or hardship, as a flood, airplane crash

a person or thing that is a complete failure. Is also called a disaster

Disaster is a French origin word DES-ASTRE. Is combination of two words? Des means. Bad and astre means star. i.e. Bad star or evil star In Ancient days the disasters were considered as the outcome or outburst of some unfavorable stars

What disasters do?

They pose serious threat to the normal life as well as the process of development. They strike with sudden violence tearing apart and destroying lives and structures and through apart the families

Not only the families, the society but also damage the national economy and cause hardship to a large section of the society

The impacts of the disasters are multidimensional affecting in many aspects as individual, families, domestic, social, economic and environmental

However the damage from a disaster depends on the impact, intensity and characteristics of the area and the vulnerability of that society

For example an earth quake becomes a disaster only when it causes the damage to the people and buildings.

|  |  |
| --- | --- |
| synonyms: | catastrophe, calamity, cataclysm, tragedy, act of God, holocaust;accident, mishap, misadventure, mischance; setback, reversal reverse of fortunecontretemps, stroke of ill luck, problem, difficulty, heavy blow, shock, buffet;adversity, trouble, misfortune, ruin, ruination, tribulation, woe, distress;technical casualty; |

2) What are environmental hazards?

Environmental hazards describe the results of problematic man-made interferences or involvement with the natural environment.

Environmental disasters are defined as man-made damages to the natural environment that result in disease and death of living beings; including, plants, animals and human beings. Environmental disasters can result from technical accidents, human, technological or mechanical failure or carelessness; they can be the consequence of long-term environmental pollution, such as, the greenhouse effect or the destruction of the ozone layer.

Different kinds of accidents can cause diverse harmful consequences on the prevailing environment

Eg. Nuclear disasters like Hiroshima, Nagasaki, and Chernobyl. Chemical disasters like Bhopal gas leak1984 Oil spills, mining disasters, Accidents in transportation.

3) What are environmental disasters?

All that is mentioned in the above answer,( INCLUDE THE ABOVE ANSWER) if they are affected causing abnormality in the surroundings, disturbing the ratio of the components in the prevailing atmospheric area. And the affected environment will take a long time to restore to its normalcy is called environmental disasters

1. Explain environmental stress?

Stress is a kind of pressure either on the body or on mind and your body's way of responding to any kind of demand. Anything that goes beyond the limits of tolerance or bearing capacity may be of an individual or the environment in a particular area. Stress may not be felt as long as within the limit of that body or mind

Whatever the act, incident, event either man made or natural that causes the disturbance to the existing environment, climate, and surroundings causing pressure can be termed as environmental stress. The act /event that causes stress is stressor

Environmental stress can be with you all day, from the moment you are awake until your bedtime: noisy neighbors, traffic snarls, glaring neon, dirty streets and cluttered buildings.

There's always something there, to fray your nerves.

Stressors that are found in our surroundings are called environmental stressors. Extreme temperatures are also environmental stressors and can lead to discomfort. Other common environmental stressors include:

* Noises
* Crowding
* Air quality
* Colors
* Tornadoes and other natural disasters
* War and other manmade disasters
* Light
* Insects

Any act or incident or substance whether natural or man induced causes imbalance in the existing composition of the bio diversity in the prevailing environment can be described as environmental stress) Examples are everywhere of environmental stress factors. Here are a few:

* Overcrowding we pack into overcrowded streets, homes and workplaces, in noisy and congested neighborhoods. Often there is insufficient open and green space in which to unwind and 'renew'

Poor air quality we breathe air contaminated with hidden pollutants at home, at work and in the traffic. Our respiratory, immune and other body systems labor at eliminating these foreign objects, which harm our health and reduce our resistance to stress

lack of privacy At home in cramped apartments and at work in our 'open plan' offices, we suffer from lack of privacy due to insufficient 'personal space'

Commuting stress We lose time, patience and good humor commuting between home and work in crowded and noisy trains and buses, or bumper-to-bumper in the car

Poor ergonomics. Many of us are constantly irritated with backaches and other 'structural' problems from badly designed chairs and beds

Distractions. we get frustrated and annoyed when thoughtless gossiping colleagues waste our time while we are trying to get something done

Noise Noisy TVs, radios, kids or lawnmowers can be distressing when you feel in need of some quiet time

Poor lighting Inadequate lights for reading or or working strain our eyes and drain our energy; poorly lit streets worry us walking home after dark

Clutter it is hard to concentrate, work or relax in cluttered and disorganized living and working spaces. Your mind, like a mirror, reflects on the inside that which is on the outside; a cluttered environment clutters the mind - objects distract us with their subconscious reminders of unfinished tasks or unpleasant associations

Different approaches?

Land scape approach: - methods and processes that are to be followed to achieve food security and climate change mitigation and adaptation goals without compromising environment. Combining the agriculture, forestry, tourism and other land uses in a synergic ways. Human wellbeing and their needs are place at the center of the land use decision making process Combines natural resource management with environmental and livelihood considerations

Ecosystem approach:- The ecosystem approach is a conceptual framework for resolving ecosystem issues. The idea is to protect and manage the environment through the use of scientific reasoning. Another point of the ecosystem approach is preserving the Earth and its inhabitants from potential harm or permanent damage to the planet itself

This is possible as the ecosystem approach incorporates humans, the economy, and ecology to the solution of any given problem. The ecosystem approach as using various methodologies for solving complex issues. The Convention on Biological Diversity has seen ecosystem-based management as a supporting topic/concept for the ecosystem approach for sustainable development.

Wherever ecosystems have been undermined, the ability to adapt and regenerate has been severely eroded. ). In many locations, environmental degradation such as land clearing, coastal erosion, overfishing, and coral mining has reduced the potential for economic recovery from the tsunami because of the loss of traditional income sources related to coastal ecosystems rich in biodiversity and ecological functions

ENVIRONMENTAL DISASATERS

In general any disaster that leads damage or disturbs the prevailing environment or eco system in a particular area is termed an environmental disaster. Especially it is referred to manmade or man induced disasters

The term, “technical disaster” defines the source of a disaster and the term; “environmental disaster” describes the results of problematic man-made interferences with the natural environment.

Environmental disasters are defined as man-made damages to the natural environment that result in disease and death of living beings; including, plants, animals and human beings. Environmental disasters can result from technical accidents, human, technological or mechanical failure or carelessness; they can be the consequence of long-term environmental pollution, such as, the greenhouse effect or the destruction of the ozone layer.

Different kinds of accidents can cause diverse harmful incidents:

Nuclear disasters result from failures of nuclear plants or the usage of atomic bombs, whether for testing or attacking. The worst nuclear disaster ever, was the catastrophe of [Chernobyl](http://www.chernobyl.info/index.php).

Chemical disasters occur due to accidents in factories, during transport, or they can be the side effects of mining, agricultural implementation, careless usage or military activities.

One of the worst chemical disasters was the incident in [Bhopal in India](http://www.amnesty.org/) in 1984, where a failure in appliances of a pesticide plant released enormous clouds of toxic MIC gas, sending them floating down the streets of the densely settled areas around factory and causing the death of thousands, and the spread of various diseases and contamination that are still spreading today.

Oil spills are usually the consequences of leakages in oil tankers on the ocean and have devastating effects onto oceanic life, primarily to birds that die from polluted feathers.

Mining disasters can occur either from mining tunnels collapsing, burying the miners working underneath the earth, or by the spillage of hazardous chemicals employed for dissolving the minerals to be extracted. An example is in the mining of gold, during which cyanide is used, and often carelessly spilled on farming land.

The collapse of architecture, buildings, bridges, or dams can also be followed by destructive consequences; e.g., the breaking of dams can release enormous amounts of water resulting in devastating flooding, or spillage of chemicals.

Accidents in transportation, whether by airplane, ship, train or motorized vehicle can have disastrous effects, e.g., by the involvement of large numbers of passengers, by spilling huge amounts of oil or chemicals, or by causing fire, collapse of buildings or blockage of passage ways.

Forest fires in arid areas can also be caused by human carelessness of e.g., by leaving behind pieces of broken glass – enough to incite a fire

Natural disasters like earth quakes and volcanic eruptions will also cause damage to the environment but it is believed that they originate from within the nature and therefore it will be neutralized naturally.

 Whereas manmade disasters leads o irreparable and too long a period of time to recover from the loss made to the natural environment like nuclear explosions, chemical weapons, oil spillage. Forest fires, soil erosion due to human activities, Plastic menace, biological waste, Industrial waste deforestation etc.

ENVIRONMENTAL STRESSERS

Or

 ENVIRONMENTAL STRESSERS also called Climatic stressors are associated with extremes of temperature, solar radiation, wind, moisture, and combinations of these factors. They act as stressors if their condition is either insufficient or excessive, in comparison with the needs and comfort zones of organisms or ecosystem processes

Wildfire is a disturbance that involves the combustion of much of the biomass of an ecosystem, affecting organisms by heat, physical damage, and toxic substances

Chemical stressors involve environments in which the availability of certain substances is too low to satisfy biological needs, or high enough to cause toxicity or another physiological detriment to organisms or to higher-level attributes of ecosystems

Physical stress is a disturbance in which an exposure to kinetic energy is intense enough to damage organisms and ecosystems (such as a volcanic blast, seismic sea wave, ice scouring, or anthropogenic explosion or trampling).

Biological stressors are associated with interactions occurring among organisms. They may be directly caused by such tropic interactions as herb ivory, predation, and parasitism.

They may also indirectly affect the intensity of physical or chemical stressors, as when competition affects the availability of nutrients, moisture, or space biological and ecological attributes are influenced by a wide range of environmental factors.

 Extreme environments are characterized by severe regimes of stressors, which result in relatively impoverished ecosystem development.

This may be a consequence of either natural or anthropogenic stressors. If a regime of environmental stress intensifies, the resulting responses include a degradation of the structure and function of affected ecosystems and of ecological integrity more generally.

 In contrast, a relaxation of environmental stress allows some degree of ecosystem recovery.

Effects of environmental influences may be exerted at any level of ecology: on individual organisms, populations, communities, echoscopes (landscapes or seascapes), and, ultimately, the biosphere in its entirety.

There are also influences on the functions of ecosystems, such as productivity and nutrient cycling. At any particular time or place, the relative importance of those influences can be beneficial, damaging, or inconsequential

Natural environ Within this context, however, there are many kinds of environmental stressors. mental stressors have always provided a context for life and ecosystems

Stressors of natural origin have always been part of the environmental context of organisms and ecosystems

however, anthropogenic stressors (those associated with human activities) are exerting an important influence. In fact, anthropogenic stressors are now more pronounced

Environmental stressors also affect ecosystems at the larger scales of populations, communities, and eco scapes,

Ecology may be simply defined as the study of the relationships of organisms and their environment. Within that context.

 Effects of environmental influences may be exerted at any level of ecology: on individual organisms, populations, communities, ecoscapes (landscapes or seascapes), and, ultimately, the biosphere in its entirety. There are also influences on the functions of ecosystems, such as productivity and nutrient cycling. At any particular time or place, the relative importance of those influences can be beneficial, damaging, or inconsequential

lIn summary, biological and ecological attributes are influenced by a wide range of environmental factors. However, the intent of this article is to examine environmental stressors, or influences that limit biological or ecosystem development or that cause changes that are regarded as being degrading or damaging,

 The range of stressors is marked by a manifestation of detrimental effects on organisms or ecosystem processes at relatively high or low strengths of exposure

 Environmental stressors also affect ecosystems at the larger scales of populations, communities, and eco-scopes

 Stressors of natural origin have always been part of the environmental context of organisms and ecosystems Increasingly, however, anthropogenic stressors (those associated with human activities) are exerting an important influence. In fact, anthropogenic stressors are now more pronounced than natural influences over vast tracts of “working” landscapes and seascapes that are being used to serve human economies, such as in agricultural and urbanized areas

. Stress is any physical or emotional state that causes bodily or mental tension. In the same way environmental stress can be defined as an undesirable transaction between the humans and the environment. Or any action/ event/ incident Constraints or pressure on the environment. Natural and/or human-directed causes can be the reasons.

An example of human causes is the generation of pollution. An example of natural events/cause is a drought.

Definition Everyday life is full of environmental stressors that cause minor irritations. If you use an alarm clock to wake up, the loud noise from your alarm is an environmental stressor. Extreme temperatures are also environmental stressors and can lead to discomfort. Other common environmental stressors include: Noise.

A situation in which you felt completely overwhelmed? Maybe you felt like you were unable to cope with what you were experiencing? If so, what you were feeling was stress. Stress occurs when an event or stimulus requires us to change in some way. Stress is our brain's way of saying, 'I know I have to change, but I don't have to like it!' Stress involves an imbalance between what is demanded of us and what we are able to cope with or respond to.

Stress varies based on the individual and situation. Most stress is temporary, although there are situations where stress can last for a long time. For example, people who work in sales and advertising generally find that there are high levels of stress associated with their careers. In these cases, stress must be managed. For example, a first-time parent may feel stress as a result of bringing a new baby home, but by the end of the first week, the parent has ideally learned how to cope with these demands and is no longer stressed. Stress can build over time if not managed properly, causing several health effects, including anxiety, headaches, sleeping problems, depression, and high blood pressure.

` Environmental Stressors

Stressors that are found in our surroundings (environment) are called environmental stressors. Everyday life is full of environmental stressors that cause minor irritations. Extreme temperatures may be hot or cold are also environmental stressors and can lead to discomfort. Other common environmental stressors include:

* Noises/ sound p[pollution
* Crowding /over population
* Air quality / air pollution
* Colors ,dark and gaudy colours
* Tornadoes and other natural disasters like volcanic eruptions
* War and other manmade disasters like nuclear explosions, chemical weapons
* Light
* Insects, forest fire epidemics

Recent research has linked extreme temperatures, crowding, and noise with increased levels of discomfort and aggression. Studies have also shown that crime rates are higher during those hot summer days. Different colors can raise or lower your stress levels. For example, green is often associated with life and growth and is known to reduce tension and anxiety. Exposure to light can improve your mood and decrease fatigue, while prolonged exposure to darkness can interfere with sleep patterns and lead to symptoms of depression.

Examples

Imagine that you are a clinician sitting in your air-conditioned office and writing client progress notes on a hot summer day. Your air conditioner stops working, so you call the repairman. He tells you that he will be there tomorrow, so you hang up and continue writing. The temperature in your office begins to rise, and you start sweating. The air in the room becomes stale, and there are no windows in your office, which increases your discomfort. Which will cause you stressed mentally and physically and the same way the environmental stresses will cause the equilibrium in the nurture disturbed

**UNIT II**

ENVIRONMENTAL HAZARDS AND DISASTERS

NATURAL HAZARDS AND DISASTERS MAN MADE HAZARDS AND DISASTRES

Natural disasters are the results of natural hazards. Manmade disasters are the result of manmade they are caused due to the forces/processes from. Hazards, i.e. threats having an element of human. within the earth or on and above the earth. Intention, negligence, error or failure in the Man . Made system.

1. FROM WITH IN THE EARTH (ENDOGENOUS) Nuclear disasters /accidents/radiation

Biological disasters /weapons

A) Earth quakes Chemical Disasters/accidents

B) Volcano eruptions Fire Accidents

c) Tsunamis Road/ Rail/Aviation/ Sea accidents/

 Terrorism

2) ON THE SURFACE OF THE EARTH (EXO GENOUS) Epidemics Human caused

 A) Cyclones I) Tornadoes Technological mishaps

 b) Floods J) Epidemics Stampede

 c) Soil erosion K) Blizzards Transport accidents

 D) Drought L) Lahars Oil spills

e) Cold waves m) Hurricanes

 f) Heat waves n) snow storms

 g) Avalanches’ o) Desertification

 H) Winds and storms

3) ABOVE THE SURFACE OF THE EARTH

Extra terrestrial

a) Tidal waves due to moon

 b) Impacts of Meteoroids and comets

 c) Solar radiation

 d) Climate change

What are endogenous hazards give examples

Processes that are caused by forces from within the Earth are called endogenous hazards or endogenous processes.

Endo is a prefix meaning "in, genus means generating, producing or yielding

There are three main endogenous processes: folding, faulting and volcanism “while Exo is a prefix meaning "out".

The earth is shaped by many different geological processes

The forces that cause these processes come from both above and beneath the earth surface

Processes that are caused by forces by from within the earth are endogenous

In other way exogenous forces come from on or above the earth‘s surface.

There are three main endogenous processes. Folding, faulting and volcanism

They take place mainly along the plate boundaries .These zones lay on the edges of the plates

*Endogen* is a geologic term describing internal processes of the earth, such as, the operation of plate tectonics. Tectonic *disasters* therefore, relate to the psame phenomena, referring to disasters that occur due to the tectonic activities of the continental plates, which (result) manifest themselves in earth quakes and volcanic eruptions

[Earthquake](http://en.wikipedia.org/wiki/Earthquake) is a perceptible vibration of the surface of the earth. The crust of the earth, the lithosphere, is a patchwork of continental plates that slowly and constantly move in diverse directions, shoving against one another.

When the tensions in the plates, deriving from the movement and shoving, exceed the strength of the crust, an earthquake occurs. These “tectonic” earthquakes are the most frequent and strongest, but they can also derive from volcanic eruptions or mining activities.

Earthquakes and volcanic eruptions can also trigger other disasters such as, tsunamis,

 exogenous hazards

Exo means is a prefix to the meaning of out or external

Exogenous processes come from forces on or above the Earth's surface.exo genous also include the extra terrestrial hazards

Exo genus forces are the results of actions of other bodies in the space

Eg; Moon causes tides in the earth’s oceans ant other large water bodies

Impacts from the comets and meteors can cause the change the surface o0f the earth .They create crates i.e., holes which can be as big as one KM radius

Radiation fropm the sun can cause “AURAE” which are actually lights that can be seen at nights

There are o0ther exogenou8s hazards that are not the result actions other bodies

They are Soil Erosion that is caused by the action of wind, water, human activities animals, digging torrential rainfall causing floods heavy, snow fall , hail storm, avalanches, winds, cyclones Drought

Climate changes resulting in sea level raising and oceans becoming warmer.

Longer and more inmtense drought resulting threat to crops and vegetation, wild life fresh water supplies

in all our planet is at risk from the change of climate change.it is posing a threat to the places. Species and people their livelihood and all th4e living stock on the planet

Remedial measures /preventive measures

To address this crisis adequately we must immediately reduce the carbon pollution which is cause for Global worming

Human activities are the main reason for the Global warming

NATURAL HAZARDS;

Natural Hazards are geographical events or incidents that occur naturally. There are three routes/ways from these natural events occur. First from within the earth, such as Earth quakes, volcanoes and Tsunamis .The second is from the surface such as floods. Forest fires the third from the above the earth i.e. heavy rains leading to floods cyclones and tropical cyclones, snow storms, avalanches, droughts leading to famine; these are all called Natural hazards.

NATURAL DISASTERS

All these natural hazards, or any one of them if occurs and that leads to significant loss of human life, property or the environment can be termed as disasters, provided that the loss cannot be overcome or cop up by the affected community with in its own sources.

India is one of the most vulnerable countries to the natural disasters in the world, because of the geographical location and the origin of the sub continent. The past records of such events prove this fact.

Some facts

1) 85% of population of India is vulnerable to Natural hazard

2)68% of p[population is vulnerable to Draught

3) 57% is vulnerable to Earth quakes and

4) 12% is vulnerable to floods every year

What is drought?

Drought is a condition that results/arises from little or no precipitation/ rain for an extended or prolonged period of time.

1. What is desertification?

 It is a state or condition resulting from continuous degradation of land, eco . System due to poor rain fall, harsh climate and human activities like over . . Using /mis- using and deforestation .i.e. cutting down of trees

1. What is land slide?

It Is a sudden and quick movement of rock and soil/mud from higher areas to steep down slope areas. It may be natural phenomena or due to human act5ivitiesa (for example keadarnath flood and land slide in which there was am massive land slide caused thousands of people perished

1. What is Elnino?

It is a state or situation where in abnormal warming of surface water of the Pacific Ocean on a large scale at eastern side GALAPOGAS ISLAND for every 3 to 4 years. This results disturbance to the movement of monsoon towards the Indian sub continent, leading to lack of rains.

1. What is volcano?

It is an opening from the inside of the earth crust through which molten lava volcano gases and fragments of rocks are ejected.

1. What is cyclone?

 A *cyclone* is a large scale air mass that rotates around a strong center of low atmospheric pressure. They are usually characterized by inward spiraling winds that rotate counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.

1. What is an eye?

The low pressure area or zone with in the cyclone around which the spinning storm rotates is called an eye. This area with in the storm is calm comparing to the spinning surrounding area called the’ “Arms “

What is hurricane?

It is also a cyclone /storm that occurs in the areas of Atlantic ocean and North east pacific ocean are called hurricanes.

Mankind has frequently created catastrophes that devastate the environment and resulted the loss of life, material property and the environment. So many blunders intentional or accidental have lead the disasters. The loss of life resulting from war, terrorism or transportation disaster, this list includes the incidents that have had the most affect on people and the environment.

Wars:-World War II, Iran Iraq war, invasion of Kuwait, gulf war 1991

Oil spillage while on transportation and sabotage

Industrial pollution and accidents in 1952 this pollution took a tragic turn. in The winter, the weather was cold and residents burned more coal in their fireplaces to alleviate the chill. The smoke laced with sulfur dioxide, nitrogen oxides and soot, and left London encased in a black cloud of near total darkness and killed over 12,000 people.

Nuclear accidents spillage and radiation The Nuclear Power Plant Explosion in Chernobyl, Russia on April 26th 1986,

Gas leakages:- December 2, 1984, the Union Carbide pesticide plant in Bhopal, India

The Nuclear Power Plant Explosion in Chernobyl, RussiaOn April 26th 1986,

 the Chernobyl Plant in the Ukrainian Soviet Socialist Republic had a major meltdown which resulted in the atmospheric release of radioactive material four hundred times more radioactive than Hiroshima. Since the accident there have been countless children with birth defects, a sickening increase of cancer sufferers and many other health issues as well. It is estimated that the disaster could result in nearly 100,000 fatal cancers, and the area won’t be safe for any activity, including farming for up to 200 years.

The Gulf War oil spill is the largest oil spill in history making it one of the 10 worst man-made disasters of all time. In 1991, following the invasion of Kuwait, Hussein sent men in to blow up the Kuwait oil wells. They managed to set over 600 ablaze and these burned for over seven months. The oil spill that resulted from the fires caused considerable environmental damage.

 The Aral Sea was one of the four largest lakes at one point in time. However, in the 1960’s, the Soviet Union diverted the waters from the rivers that fed the lake to irrigation projects. The sea has now shrunk by 90 percent and the salt and sandstorms that the devastation created kill plant life and have negative consequences for hundreds of miles around.

 On July 10, 1976 in Meda, Italy, a reactor in the ICMESA chemical company exploded. This led to a toxic cloud of dioxin being released into the atmosphere. Dioxin is one of the most toxic chemicals known to man. While no one died as a direct result of the accident, many children were affected by the serious skin disease chloracne from the accident.

 In the 1940’s a strange smell enveloped the area around the Love Canal near Niagara Falls. Residents also began to notice an odd seepage leaking into their yards and people began to fall ill. In addition, many women began to have miscarriages and give birth to babies with birth defects. Upon inspection, it was discovered that there was over 21,000 tons of toxic industrial waste buried below the surface of the town by a local company.

 n the night of December 2, 1984, the Union Carbide pesticide plant in Bhopal, India began to leak methyl isocyanate gas and other poisonous toxins into the atmosphere. Over 500,000 were exposed and there were up to 15,000 deaths at that time. In addition, more than 20,000 people have died since the accident from gas-related diseases. In Harrisburg, PA on March 28, 1979, the Three Mile Island nuclear reactor experienced a partial core meltdown. While little radiation was released from the accident thanks to a working containment system, this accident became the rallying call for fears about the nuclear power industry. Livestock deaths, premature deaths and birth defects have been attributed to the nuclear melt-down.

Man can have a devastating effect on the environment and the 10 worst man-made disasters of all time have had a negative effect on the environment for decades afterwards. Frequently these disasters are related to poor industrial oversight within developing countries. However, even with regulation a catastrophe can strike.

 Al-Mishraq fire on June 24, 2003. This fire at an Iraqi sulfur plant burned for about a month releasing sulfur dioxide into the atmosphere. Sulfur dioxide can kill people by causing respiratory problems and also creates acid rain which destroys crops.

Deforestation

Over using ofchemicals and chemical accidents

**UNIT III**

ENDOGENOUS HAZARDS

Processes that are caused by forces from within the Earth are called endogenous hazards or endogenous processes.

 Endo is a prefix meaning "in, genus means generating, producing or yielding

There are three main endogenous processes: folding, faulting and volcanism “while Exo is a prefix meaning "out".

The earth is shaped by many different geological processes

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 [Earthquake](http://en.wikipedia.org/wiki/Earthquake) is a perceptible vibration of the surface of the earth. The crust of the earth, the lithosphere, is a patchwork of continental plates that slowly and constantly move in diverse directions, shoving against one another.

 When the tensions in the plates, deriving from the movement and shoving, exceed the strength of the crust, an earthquake occurs. These “tectonic” earthquakes are the most frequent and strongest, but they can also derive from volcanic eruptions or mining activities.

Earthquakes and volcanic eruptions can also trigger other disasters such as, tsunamis,

VOLCANOES POSITIVE EFFECTS

7) What is a volcano? A volcano is an opening on the surface of a planet or moon that allows material warmer/hotter than its surroundings to escape from its interior.

. *Volcano* is a rupture in the crust of a planetary-mass object, such as Earth, that allows hot lava.... reach the surface, a *volcano* is formed. Typical *examples* of this kind of *volcano* are Mount Etna and the *volcanoes* in the Pacific Ring of Fire

## A *volcano* is a vent or chimney which transfers molten rock known as magma from depth to the Earth's surface The word '*volcano*' comes from the little island of Vulcano in the Mediterranean Sea off Sicily. Centuries ago, the people living in this area believed that Vulcano was the chimney of the forge of Vulcan - the blacksmith of the Roman gods. tymology. The word volcano is derived from the name of Vulcano, a volcanic island in the Aeolian Islands of Italy whose name in turn comes from Vulcan, the god of fire in Roman mythology. The study of volcanoes is called volcanology, sometimes spelled vulcanology.

Differentiate Magma and lava Magma erupting from a *volcano* is called “lava” and is the material which builds up the cone surrounding the vent. ("Lava" when it's on the surface, molten rock and other materials with in the earth is called "magma" when it's underground. When the pressure builds up inside due to geographical processes it erupts and causes volcano eruption Volcanoes on the environment provide nutrients to the surrounding soil. Volcanic ash often contains minerals that are beneficial to plants, and if it is very fine ash it is able to break down quickly and get mixed into the soil.

 This creates very fertile soil which is good for planting of different vegetables and other plants.

Some of the countries like Indonesia, Philippines, Japan, Italy, and etc people live in close proximity to volcanoes and make use of the rich soils on volcanic flanks.

 Volcanic gases are the source of all the water (and most of the atmosphere) that we have today.

 Volcanoes have done wonderful things for the Earth. They helped cool off the earth removing heat from its interior. Volcanic emissions have produced the atmosphere and the water of the oceans.

 Volcanoes make islands and add to the continents.

 Volcanic deposits are also used as building materials volcanic ash, and perlite are mined in the west. Pumice and volcanic ash are used as abrasives, mostly in hand soaps and household cleaners.

 The finest grades of volcanic ash are used to finish silverware, polish metal parts before electroplating, and for woodworking.

 In ancient Rome lime and volcanic ash were mixed to make cement. In modern times pumice and volcanic ash have been used to make cement for major construction projects (dams) in California and Oklahoma

Places close to the volcanic activities tend to have higher potential energy for geothermal energy which can be which can be an advantage to the towns and cities nearby for electricity and other usages

Different types of erupting provide extraordinary scenery and beautiful and natural that they attract tourists from all over the world to that are bringing some economic value to that area.

For scientists also it could be a place for their experiments. Volcanoes create new island and add land to the continents.

Provide habitat to pioneer species .Create economic mineral deposits and create beautiful land scrape

El Salvador has about 20 Volcanoes is known as larger Pacific Ring of Fore known for frequent Techtronic plate’s movements and earth activities

The waters of the oceans and gases in the atmosphere are believed to have been derived from the cooling of he magma

Volcanic ash contains the components that can stimulate biological producing in hte marine and aqua onus environment

HAZARDOUS EFFECTS OF VOLCANOES

Volcanoes are natural hazards caused due to geographical a activities inside th earth. They are endogenous hazards

When eruptions occur near human dwqeliings /settlements the lava and hot gases and volcanic ash may spill over and destroy lives and property in a large scale

Lot of biomass may be combusted .Eg ;chapparastic volcano in El Salvador on 29/12/20`3 people living two miles away were affected and evacuated

The volcanic ash discharge ged to a very high in to the stratosphere can clause negative effects on the Ozone layer due to the presence of reactive elements group called halogens which needs electrons to become stable .So they absorb these electrons from the Ozone layer. Eg. Pinatubo volcano in 1991Phgilippines ejected to height of 34 Kilometers

Land scapes, natural vegetation sceneries can be destroyed

Ash, mud can mix with rain and melting snow can form LAHARS (mud flow) can flow at a fast paean cover entire sloppy areas .

When volcano erupts in a snoe bound area mey cause flash flood sand in undate all the low lying area

Destroy old habitat and crops Displace populations Kill people and other animal Disrupt commerce.

Generate tsunamis and cause severe adverse impacts on the environments due to volcanic eruptions

The CO2 emitted from the volcanoes adds to the natural green house effect

The sulphor dioxide present in volcano may cause many environmental problems due to they convert in to H2SO4 In the atmosphere and this may cause acid rains.

The ash emitted in large quantity may cover the total vegetation all around the affected area leading to death of animals because of poisonous nature of ash on the plants and crops

 Volcanism can change the composition of the gas in the atmosphere

Can cause increase the temperature of atmosphere?

In all the volcanism has been and is one of the factories that can influence the earth climate

EXOGENOUS HAZARDS AND DISASTERS

Exo means is a prefix to the meaning of out or external

 Exogenous processes come from forces on or above the Earth's surface.exo genous also include the extra terrestrial hazards

Exo genus forces are the results of actions of other bodies in the space

Eg; Moon causes tides in the earth’s oceans ant other large water bodies

Impacts from the comets and meteors can cause the change the surface o0f the earth .They create crates i.e., holes which can be as big as one KM radius

Radiation fropm the sun can cause “AURAE” which are actually lights that can be seen at nights

There are o0ther exogenou8s hazards that are not the result actions other bodies

They are Soil Erosion that is caused by the action of wind, water, human activities animals, digging torrentioalrainfall causing floods heavy,snow fall , hail nstorm avalanches winds cyclones

Drought

Climate changes resulting in sea level raising and oceans becoming warmer.

Longer and more inmtense drought resulting threat to crops and vegetation, wild life fresh water supplies

 in all our planet is at risk from the change of climate change.it is posing a threat to the places. Species and people their livelihood and all th4e living stock on the planet

Remedial measures /preventive measures

T address this crisis adequately we must immediately reduce the carbon pollution which is cause for Global worming

Human activities are the main reas0n for the Global warming

Classification of Natural *Hazards*. A physical event, phenomenon or activity that has the potentially to cause the loss of life or injury, property damage, social and economic disruption or environmental degradation e.g. earthquake, flood, drought, tsunami, cyclone etc

. Volcanoes can evolve at the collision lines of the continental plates, oceanic trenches, on mid-ocean ridges and at so called hot spots – irregular formations in the crust underneath the continental plates. Volcanic eruption material can be solid, liquid or gaseous.

 Volcanoes that erupt extremely hot, pure, liquid lava. As it flows with great speed (60 km/h), it leaves a large area covered with a huge flat shield

.

A Lehar is a gigantic mudflow caused by a volcanic outburst, consisting of mixture of erupted material, loose soil and water, that can be extremely dangerous, covering large areas with a height of some meters and a possible breadth of more than a hundred meters, running with a speed of up to 100 km/h.

 The most popular form of volcanoes is shield volcanoes that erupt extremely hot, pure, liquid lava. As it flows with great speed (60 km/h), it leaves a large area covered with a huge flat shield.

 Stratovolcanoes erupt all kinds of volcanic material. The magma of stratovolcanoes derives from upper layers of the mantle, from the bottom of the crust, and from an upper layer of the interior and contains more gas, therefore different kinds of volcanic material erupt in phases of explosions of solid material, ashes, lava and gases. Volcanism describes geological activities that are connected with the rising of magma from the mantle of the earth up to the surface. Volcanoes can evolve at the collision lines of the continental plates, oceanic trenches, on mid-ocean ridges and at so called hot spots – irregular formations in the crust underneath the continental plates. Volcanic eruption material can be solid, liquid or gaseous.

 A [glacial outburst flood](http://en.wikipedia.org/wiki/Glacial_lake_outburst_flood) occurs when a volcano covered by a glacier erupts, melts the ice and releases a tremendous flood wave. volcanic winters, glacial lake outburst floods (Icelandic: “Jökulhlaup”) or Lahars. Volcanism describes geological activities that are connected with the rising of magma from the mantle of the earth up to the surface

HEAT WAVES

♣ It is a prolonged period of excessive heat, often accompanied by excessive humidity.

♣ The weather is noticeably warmer than normal for the time of year and climate.

 ♣ Develop slowly and kills (& injure many more) animals and people nationwide in average year…more than any other disaster

 ♣ It is also termed as “Silent disaster”

 As temperature rises people animals and plants suffer from heat stress

 Apart from death more and more people are admitted with suffering sunstroke , severe. Dehydration, with vomiting and high fever.

 The condition becomes more severe in May and June in India. What causes heat wave?

 A heat wave is caused by a system of higher atmospheric pressure.

 In a high pressure system, air from upper levels of the atmosphere descends and rotates outward.

 As it comes down, it becomes compressed, which increases temperature and dries it out.

 The outward flow also makes it difficult for other systems to enter the area. Effects- Human beings

 Thousands of people suffer from heat stress where their bodies absorb more heat than they can expel.

 Depletion of salt and electrolyte in the body may cause heat cramp. } Thousands of deaths from hypothermia.

Elevated ozone concentration irritates the mucous membrane and causes illness of the respiratory system.

}Heat can cause heatstroke, sunstroke or circulatory collapse.

 }The most common human response to extreme heat is dehydration

 } A heat wave is a danger because heat and sunlight may over heat the human body.

 Heat stress -livestock ¬

Animals can suffer the effects of heat stress as well. ¬

When there is not enough shade or water for animals, they may change their behavior. ¬

Animals will look for shelter from the heat under trees or near bushes, start sweating and panting, drooling, drink more water and have a reduced appetite for food. Agriculture and crop

} Dry and hot weather causes no precipitation. This can result in dryness or even drought.

 } Plants are no longer growing and, in the worst case, they completely wither. }

 Under such conditions agriculture suffers enormous damage and harvest loss.

 } Severe heat waves could damage crop results in crop failure.

} As plants start die from the effect of heat wave, the threat of bush fire increases. Psychological and sociological effects

} Power outages } Wildfires } Physical damage ♣ roads and highways to buckle and melt ♣ water lines to burst ♣ power transformers to detonate, causing fires

 in 2006 Europe, Paris, Germany, Denmark. North America, Canada 40°C 46-48°C --- -

2014 HEAT WAVE IN INDIA 2014 Heat index Heat disorders Heat disorders Symptoms First aid Sun burn Skin redness and pain , possible swelling blisters fever , head ache Take a shower using soap . If blisters occur apply dry sterile dressing and get medical attention Heat cramps Painful spasms usually in legs and abdominal muscles, Heavy sweating Firm pressure on a cramping muscles or gentle massage to relive spasms. Give sips of water if nausea occurs discontinue Heat disorder Symptoms First aid Heat exhaustion Heavy sweating , weakness , skin cold pale, weak pulse ,fatigue , vomiting Get victim to lie down in a cool place .Loosen clothing apply cool wet clothing . Give sips of water. If vomiting occurs discontinue. get medical attention Heat stroke (Sun stroke) High body temperature , hot dry skin , Rapid strong pulse , victim will likely not sweat Severe medical emergency . get the victim to a hospital immediately . Remove clothing .use fan/air conditioners. DO NOT GIVE FLUIDS Tips for hot weather safety ¬if a heat wave is predicted or happening - slow down. Avoid strenuous activity. ¬Stay indoors as much as possible. ¬If air conditioning is not available, stay on the lowest floor, out of the sunshine. ¬Remember electric fans do not cool air, but they do help sweat evaporate which cools your body. Wear light weight, light colored clothing. Light colors will reflect away some of the sun's energy.

COLD WAVES

A cold wave is an influx of unusually cold air into middle or lower latitudes. } Cold waves affect much larger areas than blizzards, ice storms, and other winter hazards. } Meteorologists measure cold waves by the departure from the normal temperature.

FORMATION OF COLDWAVES

A cold wave develops when cold air masses over large areas are brought in. } The cold air masses transport only little moisture. Precipitation occurs as snow or sleet due to temperatures below freezing point. } Cold waves can also be accompanied by strong wind. Such a phenomenon is called winter storm. } Cold polar or Arctic air masses are relatively shallow, extending one to several km above the surface.

Effect on persons and economic activity ¬ Exposure to extreme and especially unexpected cold can lead to hypothermia and frostbite. Which require medical attention due to the hazards of tissue damage and organ failure. ¬ They can cause death and injury to livestock and wildlife. ¬ Exposure to cold mandates greater caloric intake for all animals, including humans. ¬ If a cold wave is accompanied by heavy and persistent snow, grazing animals may be unable to reach needed food and die of hypothermia or starvation. ¬ They often necessitate the purchase of foodstuffs at considerable cost to farmers to feed livestock. Such cold waves have caused famines.

At times as deadly to plants as drought, cold waves can leave a land in danger of later brush and forest fires that consume dead biomass. } Water mains may break and water supplies may become unreliable, making fire fighting more difficult. } People can stock up on food, water, and other necessities before a cold wave. } Some may even choose to migrate to places of milder climates, at least during the winter.

Effects of cold wave on other sectors } Deaths caused by cold weather in comparison to hot weather is true as a result of the after effects of these temperatures } Demand for electrical power and fuels rises dramatically during such times } some metals may become brittle at low temperatures. } Motor vehicles may fail as antifreeze fails and motor oil gels, resulting even in the failure of the transportation system. } Fires become even more of a hazard during extreme cold.

 True freezing injury of tissues. } Onset signaled by sudden blanching of the skin of nose, ears, cheeks, toes, followed by tingling. } Frostbite has declared itself when these areas are painless. } Intense coldness followed by

Frostbite Treatment 30 } RAPID re-warming at temperature slightly above body temperature is the single most effective treatment. } Re-warm until the skin is pliable. } NO dry heat -- stoves or campfires. } No re-warming with exercise or rubbing. } Do not re-warm in the field if there is a risk of re-freezing. } Protection from further injury, pad all affected areas. } Loosely wrap with gauze and elevate. } Remove wet and constrictive clothing.

Snow Blindness 31 Cause } Light reflection off snow. Signs and Symptoms } Red, itchy eyes. } Sensitivity to light. Treatment } Stay indoors. } Rest eyes. } Bandage eyes

Hypothermia Number One Killer } Loss of 4 0 F or more body temperature. } Wet body contributes. Cause } Continued Exposure. }

 Depleted energy supply. Symptoms. Shivering. Slow and Shallow Breathing. Slow Speech

Hypothermia 34 Treatment } End exposure. } Warm beverages. } Keep victim in warm, dry clothes. } Gradually re-warm.

Chilblain 35 Cause } Repeated, chronic exposure of bare skin ( 32 ºF- 60 ºF). Sign/Symptoms } Appear as swollen, tender, papules. } Complaint of burning or prickly sensation. } Redness. Treatment } Passive warming at room temperature. } No rubbing. } Protect from trauma and secondary infection.

Trench/Immersion Foot 36 } Cause ♦Wet conditions, low temperature. ♦Prolonged contact with moisture at tempetarures between 32º-50ºF } Signs / Symptoms } Numbness and pain. } Swelling, tingling, itching. } Pale waxy skin. } Blistering. − Treatment − Elevate, wrap in loose dressing. − Passive re-warming at room temp. − No massages or rubbing.

Cold Weather Injury Prevention Tips 37 } Principles of Care Need to maintain body heat } Frequent sock changes }In WW1, the Brits decreased trench foot cases from 29,000 in 1915 to 443 in 1917 by sock changes. } Cover head and neck, 80% of heat loss. } Use synthetic fibers, natural fibers retain moisture and have poor wicking ability

Modification of Risk Factors }Adequate nutrition: 3000-4000 cal/day. }Adequate hydration and rest. }Adequate clothing: loose, layered, windproof and changed often. }Previous cold weather exposure and experience.

Dressing for the C O L D 39 } Keep Clothing -Clean Dirt and grease block up the air spaces in your clothing and reduce the insulation value. } Avoid-Overheating Sweat can freeze on outer layers. Stay dry, moisture will decrease the insulating ability of your clothing. } Wear Clothing in -Layers Loose clothing allows air spaces to help trap warm air without restricting blood circulation. Good blood circulation helps to prevent frostbite.

Cold Weather Survival Kit 40 } Waterproof matches and fire starter (eg . Candle, magnesium match, lighter). } Signaling devices (eg . Mirror and whistle). } Knife. } Pressure bandage, cold-climate lip balm, sunglasses. } Compass. } Water container (metal for use in fire). } Small amount of concentrated food } Foil survival blanket.

FOG }

 Fog is a collection of liquid water droplets or ice crystals suspended in the air at or near the Earth's surface. Fog can be considered a type of low-lying cloud, and is heavily influenced by nearby bodies of water, topography, wind conditions, and even human activities. In turn, fog has affected many human activities, such as shipping and transport, warfare, and culture.

Fog forms when the difference between air temperature and dew point is generally less than 2.5 °C or 4 °F. Fog begins to form when water vapor condenses into tiny liquid water droplets suspended in the air Water vapor normally begins to condense on condensation nuclei such as dust, ice, and salt in order to form clouds

 Fog normally occurs at a relative humidity near 100% the sudden formation of fog is known as "flash fog". Fog commonly produces precipitation in the form of drizzle or very light snow

Types θRadiation fog formed by the cooling of land after sunset by thermal radiation in calm conditions with clear sky The cool ground produces condensation in the nearby air by heat conduction. Most common in autumn and early winter

 GROUND FOG. Fog that obscures less than 60% of the sky and does not extend to the base of any overhead clouds.

 PRECIPITATION FOG. Forms as precipitation falls into drier air below the cloud, the liquid droplets evaporate into water vapor. The water vapor cools and at the dew point it condenses and fog forms.

ADVECTION FOG. Occurs when moist air passes over a cool surface by advection (wind) and is cooled

Hail fog. Occurs in the vicinity of significant hail accumulations due to decreased temperature and increased moisture leading to saturation in a very shallow layer near the surface.

Freezing conditions. Freezing fog occurs when liquid fog droplets freeze to surfaces, forming white soft or hard rime }

 Frozen fog ice fog kind of fog where the droplets have frozen into extremely tiny crystals of ice in midair. Generally this requires temperatures at or below −35 °C , common

Topographical influences. Up-slope fog or hill fog. Forms when winds blow air up a slope (called orographic lift), adiabatically cooling it as it rises, and causing the moisture in it to condense. This often causes freezing fog on mountaintops, where the cloud ceiling would not otherwise be low enough.

VALLEY FOG forms in mountain valleys, often during winter. It is essentially a radiation fog confined by local topography, and can last for several days in calm conditions. In California's Central Valley, valley fog is often referred to as Tule fog

Aviation accidents and incidents } Maritime accidents } Railway accidents } Road accidents } crashes

Heavy fog causes a collision of boats on the St. Lawrence River in Canada that kills 1,073 people on this day in 1914. Caused by a horrible series of blunders, this was one of the worst maritime disasters in history

Causes of Accidents in Mist/Fog } Reduced visibility as road users struggle to see with any clarity. Failure by drivers to change their driving habits for the inclement conditions. Insufficient following distances as cars tend to follow each other a little too close. Some drivers tend to drive too fast believing they can escape the fog sooner if they go faster.

Safe Driving Advice and Recommendations ¬ Switch on low beams as well as front & rear fog lamps ¬Keep your wind shields and mirrors clean. ¬Use wash-wipe and defoggers liberally ¬Drive slower than the speed limit if necessary Switch off fog lamps when fog lightens. Switch them on again when you enter zones with dense fog ¬Do not brake sharply unless it is unavoidable

 Watch out for sudden lane-cutting by smaller poorly lit vehicles & 2-wheelers } Use the horn liberally to warn others of your presence Turn on hazard indicators when parked in areas where there is heavy traffic flow ne

**UNIT IV**

CYCLONES

The cyclone is very power full and violent wind storms in which the wind moves very fast in a circular direction around a strong g low pressure area.

The wind moves in anticlockwise direction in northern hemisphere and clockwise direction in southern hemisphere

The cyclones are called with different names at different areas basing on the place they are originating eg. In chine se4a and Pacific Ocean they are called Typhoons

 In Caribbean Sea and Atlantic sea are called Hurricanes’

In Guinn ea, West Africa and south of US they are called Tornadoes

In Australia they are called as Willy willies

And Indian Oceana called as Cyclones /tropical cyclones

There are two types of cyclones. In general they are

 WARM CORE CYCLONES AND COLD CORE CYCLONES

 As the name indicates they are warm at the center and cold at their ends or at peripheries.

Cold core cyclones they are cold at their center and wormer at the ends.

The cyclones that originate between the tropic of cancer and the tropic of Capricorn i.e tropical regions are called tropical cyclones

Temperate cyclones the cyclones that occur over temperate zones and high latitudes regions are called temperate cyclones They are also called as mid latitude cyclones they are also called frontal cyclones’ or extra tropical cyclones

What is low pressure? Where the wind speed is less than 31 kmph

What is deep depression? Where the surface wind speed vary from 31 and 49

What is deep depression? Where the surface wind speed vbary 49 to 61 kmph

Cyclonic storm here the wind speed is vary from 61 to 88 kmphs

 Severe cyclonic storms here the wind speed is between 88 to 117 kimph

Ver severe cyclonic storms Then wind speed is between 112 to 220 kmph

Super cyclone where ie the speed of the surface is more than 220

 FORMATION OF CLOUDS At the equator region the sunrays will fall directly on the earth resulting the air near the equator warms to above 26.5 Degrees. This leads to formation of water vapor which will rise swiftly and as a consequence that area will become low pressure area .as The water vapor keep rising starts cooling and condenses to form clouds along with the rerelease of lot of heat and this heat again warms up the surrounding area /air and the air becomes lighter and rise further in to atmosphere. Due to earth rotation and spinning, the clouds also rotate and spin

When the water on the oceans and seas gains about 27C temperature throughout the depth of 40 meters a favorable condition arises for the formation of tropical cyclones.

SOIL EROSION

There are many but mainly four most common soil erosion preventive measures. They are 1) Vegetation 2) Geo textiles 3) Mulching 4) Retaining walls

1. the best natural way to prevent erosion is through planting vegetation, plants through their root system establish to hold the soil in its place and prevent erosion
2. Geo textiles they are permeable fabrics used in association with the soil have he ability to separate /filter /reinforce or protect or drain the water. It is typically made from poly propylene or polyester.
3. Mulching. I t is process by which the soil is retained along with the moisture and regulate the temperature. It also suppresses the weeds growth and for aesthetics. They are applied around the trees, paths, and flower beds on the soil surface. It is a sheet of various materials covering the surface of the soil.
4. Retaining walls. One od the most effective and simplest way is to prevent soil erosion is by constructing terracing and retaining walls
5. Check dams: Short concrete walls built across the streams and canals to counter check the erosion by reducing the velocity of water flow.
6. Brio- engineering method can be permanent solution to sediment control that involves using vegetation to promote sedimentation control. The roots, Stems and leaves prevent sedimentation by reducing the velocity of water flow
7. Vegetative cover. This will provide a good root system to reinforce the soil and holds it in its place

What is buffer zone?

The maintaining of at least 50 feet space between a stream /canal and the land disturbance activity is called a buffer zone. These areas act as a filler steps to keep sediment out of streams and keep streams banks stable. In addition these areas provide excellent food, cover and travel ways for wild life

Maintaining and inspection are essential for a successful controlling of erosion that leads to sedimentation.

What is vegetative cover?

A good root system re enforces the soil and holds it in place there by reducing the erosion effects of wind, rain, gravity and surface water flow. Temporary ior permanent vegetation should be planted on all bare lands immediately after land disturbing activities. Erosion control fabrics will provide surface protection until the vegetation becomes stabilized What is sediment control?

Sediment control is mechanism or practice or a device designed to keep eroded soil on a construction site so that it does not wash off and cause water pollution in nearby lakes, Riveras, streams, rivulets or even seas

Sediment preventing measures ar usually employed with erosion control methods

:The techniques designed to prevent the erosion automaticallaay reduse the need for sediment controls –

 Sedimentation

The process of settling down of heavier insoluble particles from mixture is called sedimentation. Decantation:- the process of transferring the clear liquid without disturbing the sediments is called Decantation.

Erosion and Sedimentation. Erosion in the context of soil and watershed conservation is the detachment and movement of soil particles by natural forces, primarily water and wind. More broadly, erosion is the process of wearing away rocks, geologic, and soil material via water, wind, or ice (e.g., glaciers). A sedimentation tank allows suspended particles to settle out of water or wastewater as it flows slowly through the tank, thereby providing some degree of purification. A layer of accumulated solids, called sludge, forms at the bottom of the tank and is periodically removed

What are3 the Common sediment controls ?

1. Check dams .2silt busters 3. Sand bags barriers4.sediment basins 5. Sediment traps 6.silt fence7.storm drain inlet protection 8.straw bale barrier9turbility curtain
2. BMP. Best Management Practices.

UNITIII

 Earthquake? Earthquake also called quakes/tremors/temblors a violent tremor in the earth’s crust, sending out a series of shock waves in all directions from its place of origin called epicenter. For instance, if you throw stone in a pond of still water, series of concentric waves are produced on the surface of water, these waves spread out in all directions from the point where the stone strikes the water similarly, any sudden disturbances in the earth’s crust may produce vibrations in the crust which travel in all directions from point of disturbances. Earthquakes constitute one of the worst natural hazards which often turn into disaster causing widespread destruction and loss to human life. Earthquake risk or Seismic risk = hazard x exposure x vulnerability x location.

 Causes of Earthquake Earthquakes are caused by sudden release of energy in rocks. Tectonic Plates in the form of rocks are moving very slowly and earthquake occurs when moving plates grind and scrape, collide against each other. The point at which an earthquake originates is the focus or hypocenter and the point on the earth’s surface; directly above this is epicenter. The study of earthquake is called seismology.

 Tectonic Plates There are 7 large and 12 small such plates which are in continuous motion. These plates move along three distinctive types of boundaries, called as: convergent boundaries : where plates push each other and one plate slides down the other one( subduction). Divergent boundaries: where plates pull away from each other. Transformed boundaries: where plates slide past each other. Earthquake occurs due to several causes such as volcanic eruption, etc. but the plate tectonic theory is the most convincing and widely accepted.

 Strength of earthquake, the intensity and strength of an earthquake is measured on Richter scale, the scale invented by Charles Richter California, USA in 1935, which categories earthquake on the basis of energy released.

The amount of energy released during different categories of Richter scale earthquake as follows: Intensity of earthquake (Richter scale Energy release (amount of TNT) Tri Nitro Toluene 1.0 170 grams 2.0 6 kilograms 3.0 179 kilograms 4.0 5 metric tons 5.0 179 metric tons 6.0 5643 metric tons 7.0 1,79,100 metric tons 7.5 One megaton 8.0 5,64,300 metric tons

 Depending upon the frequency and intensity of the earthquakes, the whole country can be divided into three broad seismological zones Himalayan zone The area most prone to earthquake in India is the Fold Mountains ranges of the Himalayan zone. The states of Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Bihar, the Bihar- Nepal border and north eastern states. The earthquakes in these zones are primarily due to plate tectonics. The region along the Himalayas where two plates meet is highly earthquake prone and hence known as the zone of maximum intensity

 the indo-gangetic zone to the south of the Himalayan zone and running parallel it is the indo-gangetic zone. Most of the earthquakes striking this zone are of moderate intensity of 6 to 6.5 on Richter scale. Therefore this zone is called the zone of comparative intensity. The earthquakes along the foothill are of medium to high intensity. However, the earthquakes of this zone are more harmful due to high density of population in this area.

The peninsular zone the peninsular India has presumably remained a stable landmass and only few earthquakes have been experienced in this region. This region is, therefore, called the zone of minimum intensity. But the sever earthquakes of Konya (1967), Latur (1993) and Jabalpur (1997) have raised doubts about the seismic stability of this landmass.

 1993 Latur (maharashtra) 6.3 Large areas of Maharashtra rocked. 10,000 people lost lives May 22, 1997 Jabalpur (Maharashtra) 6.0 40 person killed and over 100 injured March 29, 1999 Nandprayag 6.8 widespread destruction in chamoli , rudraprayag and other areas. Massive loss of human life Jan. 26 2001 Bhuj (gujrat) 7.8 Tremors left by India and its neighboring countries. Over 1 lakh people killed. Huge loss to property and infrastructure Oct. 8, 2005 Muzzaffarabad in Pakistan occupied Kashmir 7.4 Heavy damage to life and property. Death toll about one lakh in Pakistan and nearly 2000 in India

Hazardous Effects of Earthquake -1) Loss of life and property -2) Damage to infrastructure 3)- Topographical changes -4) Damage to transport system i.e. roads, railways, highways, airports, marine. -5) Chances of fire short-circuit. -6) Chances of Floods –7)Dams and Embankments can develop cracks -8) Chances of outburst of epidemic – 9)Water pipes, sewers are disrupted – 10)Communications such as telephone wires are damaged. -11) Economic activities like agriculture, industry, trade and transport are severely affected.

 Earthquake Prediction - Unusual animal behavior - Changes in water level - Temperature change - Large scale fluctuations of oil flow from oil wells - Foreshocks or minor shocks before major earthquake - Changes in seismic wave velocity.

 Earthquake safety rules If you are in a house don’t use lift for getting down from building be prepared to move with your family If you are in shop, school, office or theater Don’t run for an exit. Stampede could prove fatal take cover under a desk/table move to corner or side walls move away from window glass do not go near electric points and cable. Keep away from weak portion of the building and false ceiling

 If you are in high rise building - take protection under a desk/table - don’t rush for exits - stay in the building until the shaking stops - don’t use elevator If you are outside - avoid high buildings, walls, power lines and other objects that could fall and create block - don’t run through streets - If possible, move on to an open area away from hazard including trees. If you are in vehicle - stop in a safe and open place - remain inside vehicle - close windows, doors and vents

After an Earthquake keep calm, switch on the transistor radio and obey instructions Keep away from beaches and low banks of river. A huge wave may sweep in Expect aftershocks Turn off the water, gas and electricity Do not smoke, light match or use a cigarette lighter Do not turn on switches there may be gas leak or short circuit Use a torch If there is any fire, try to put it out or call fire brigade Immediately clean up any inflammable products that may spilled

 If you aware of people have been buried, tell the rescue team. Do not rush and try not to worsen the situation. Avoid places where there are loose electric wires and do not come in contact with any metal object Do not drink water from open containers without having examined it. Eat something. You will better and more capable of helping other Do not re enter badly damaged buildings and do not go near damage structures Do not walk around the streets to see what is happening. Keep the streets clear so rescue vehicles can access the roads easily.

 /// Case study: Bhuj Earthquake 26 th January 2001///

Introduction to Gujarat, state, in western India, bordered on the northeast by Rajasthan state, on the east by Madhya Pradesh state, on the southeast by Maharashtra state, on the south and southwest by the Arabian Sea, and on the northwest by Pakistan The state covers an area of 196,024 sq km (The capital is Gandhinagar, on the outskirts of Ahmadabad, the former capital and largest city in the state. The known history of Gujarat dates from about 250 BC. During the 4th and 5th centuries AD, it formed a part of the Gupta Empire; it derived its name from the Gurjaras, who ruled the area during the 8th and 9th centuries

 26 January 2001 08 hrs.46 min. 42.9 sec. IST Latitude 23.40° N Longitude 70.28° E 7.7 25 kemps. The Nation’s 52 nd Republic Day, a devastating earthquake occurred in the Kutch district of the state of Gujarat. The earthquake was felt as far away as Delhi in the north, Kolkata in the east and Chennai in the south.    Bhuj town and the village Bhachau, 60 km east of Bhuj, were the worst affected and many other areas of Gujarat including its state headquarters Ahmedabad, were badly affected Bhuj Earthquake 26 th January. 2001

* The earthquake devastated the Bhuj and nearby regions of Gujarat causing extensive loss of life and property.

 Damage assessment there were more than 20,000 deaths and 167,000 people injured four districts of Gujarat lay in ruin and altogether, 21 districts were affected around 300,000 families and at least 3 million children aged 14 and under were affected. Around 600,000 people were left homeless. In the city of Bhuj, more than 3,000 inhabitants of the city lost their lives; the main hospital was crushed and close to 90% of the buildings was destroyed. There was significant damage to infrastructure with facilities such as hospitals, schools, electric power and water systems, bridges and roads damaged or destroyed. 40 to 50 high-rise buildings crumbled.

 Resource Details Railways Damage to track between Viramgam to Gandhidam; Gandhidham to Bhuj; Viramgam to Okha; and Palanpur to Gandhidam. Heavy damage to various station buildings, station cabins, bridges, residential quarters and signalling systems. Rail links as far as Bhuj have been restored. Roads 650 kilometres of national highways damaged, 100 kilometers severely. National highways are now traffic-worthy. Bridges many minor and major bridges damaged including the Syurajbari Bridge at Bachau. Most main road bridges have been repaired and are capable of accepting limited weight traffic. Ports Berths 1-5 at Kandla Port suffered major structural damage.

 Telecommunications 147 exchanges, 82,000 lines and optical fiber systems damaged. All exchanges and at least 40,000 lines have been restored. Power 45 sub-stations and power supply to 50% of feeders in Kutch damaged. Power supply to nine towns &amp; 925 villages affected. All substations and 225 feeders have been restored and there is now power to all villages in Kutch. Water supply to 18 towns and 1340 villages damaged or destroyed. Piped water restored to 9 towns and 480 villages. Tube wells are gradually being restored. Fuel Jamnager refinery shutdown 26 January by power failure. Crude oil and product pipelines were shut down for checking. Product pipelines for nine days.

 Availability of product not affected as alternative arrangements have been made. Schools Kutch District had 1359 primary schools with 5168 schoolrooms. Of these, 992 schools and 4179 classrooms were destroyed. There were 38 secondary schools of which six were destroyed, 14 suffered heavy damage and 12 were partially damaged. Of 128 non-government schools, nine were destroyed, 11 suffered heavy damage and 99 were partially damaged.

 Local response the response within India was immediate. The national and state governments quickly provided assistance in many forms including cash, medical supplies, communications teams, shelters, and food, clothing, transport and relief workers. There were more than 185 non-government organizations (NGOs), mostly Indian charities, which undertook earthquake-related activities

International response Search and Rescue teams soon arrived from Switzerland, United Kingdom, Russia and Turkey to find and rescue survivors buried under debris. Relief teams and supplies soon followed from 38 countries as well as United Nations agencies and many international NGOs such as the Red Cross.

 The short term rescue and relief operation were being undertaken, medium term and long term recovery aspects were analyzed. Rehabilitation schemes Government of Gujarat tired to, known as packages, were formulated. The world bank and Asian development bank sanction loans in less than three months after the earthquake. Relief

 Several state governments came forward to participate in, the reconstruction work in different villages. The UN system, multilateral and bilateral agencies, NGOs and the corporate sector participated in the relief and reconstruction work. Government of Gujarat provided assistance in the form of materials and cash to about 218,000 families. NGOs supplemented the efforts by providing shelter to about 7000 families.

Reconstruction A public private partnership program was started to help in reconstruction, which was undertaken by GSDMA. A number of NGOs like FICCI-CARE venture, manav sadhana, rashtriya swabhiman, jai prakash industries, etc. came forward to help. About 65 NGOs were active in kutch alone who adopted 211 villages and constructed 32,297 houses at the cost of Rs. 185.80 crores. Gujarat earthquake emergency reconstruction project (GEERP) was started by GSDMA, with financial help from World Bank, Asian development bank, govt of India and other donor agencies.

 Architects, engineers and masons were trained in construction of disaster resistant houses . The technical support was made available to the owners who were provided loan to reconstruct the houses. The houses were registered in the joint names of husband and wife. More than 2 lac houses have been constructed under this program; all houses India has witnessed some of the most devastating earthquakes during the last century likethe one in Kangra (1905), Bihar-Nepal (1934) and in Assam (1950). In the recent past,earthquakes have caused havoc inUttarkashi (1991), Latur (1993), Jabalpur (1997),Chamoli (1999) and in Bhuj (2001).

On 26th January 2001, India experienced one of the worst earthquakes in recent times.Measuring 6.9 on the Richter scale, the earthquake caused incalculable damage not just toits epicenter, Bhuj but also to other towns of the district of Kutch and to about 500villages out of the total of 900 villages. The reported damageto property in Gujarat wasabout Rs.21, 000crore and the number of human lives lost were about 14,000. Of these,more than 500 deaths were reported from Ahmedabad, situated at a distance of about 350

kms from Bhuj. In the same city, close to 150 multi-storied buildings crumbled down.Cities far away from the epicenter, like Surat, too reported damage to property.

MEASURES FOR EARTHQUAKE RISK REDUCTION

For better understanding of all the possibilities of earthquake risk reduction, it isimportant to classify themin terms of the role that each one of them could play.Therefore, in the pre-earthquake phase, preparedness, mitigation and prevention areconcepts to work on. Post-disaster, immediate rescue and relief measures includingtemporary sheltering soon after an earthquake until about 3 months later and re-

construction and re-habilitation measures for a period of about six months to three yearsneed to follow.Toencapsulate, the most effective measures of risk reduction are pre-disaster mitigation,preparedness and preventive measures to reduce vulnerability and expeditious, effectiveescueand relief actions immediately after the occurrence of the earthquake.Depending upon the calamity and its consequences, strategies can also be divided intolong term (five to fifteen years), medium term (one to five years) and short term (to betaken up immediately in high risk areas). Since it has been realized that earthquakes don'tkill people but faulty constructed buildings do, the task of reducing vulnerability ofstructures and buildings will be the key to earthquake risk reduction. Also, pre-disaster

preparedness through a post-earthquake response plan, including training of theconcerned personnel in various roles, is considered essential for immediate and effectiveresponse after an earthquake occurrence. The major action points are highlighted in thefollowing paragraphs.

SOIL EROSION

Soil erosion is defined as wearing away or washing away or carried away of the top layer of soil. It is a natural phenomenon. Soil erosion is a serious environmental and public health issue. It is the action of surface processes that remove the surface soil, Rock, or dissolved materials from one location to another location

The rate of natural erosion controlled by the action of geographic drivers/ forces such as rain fall , bed rock wear in rivers, coastal erosion by the sea tidal waves, Glacial plucking ,abrasion , ground water processes and mass movement processes in steep land scape like landslides.

While the Soil erosion is natural process human activities have increased by 10 to 40 times globally

Top layer of the soil is very important because it contains most organics nutrients and rich minerals and other useful materials for cultivation, therefore it is fertile part of the soil and hence the farmers wants to protect for the cultivation

The main causes for the soil erosion are.

1)Surface water flow.2)Torrential rains: When the rain drops fall directly on to the surface soil loosens the boding of soil particles allowing the small soil particles /fragments to dethatch from each other and carried away by the water flow.

Surface water runoff; when the rain fall continues, water collects on the surface ground and starat5s flo0wing to lower areas is known as water runoff and thus surface water runoff carries the detached soil material from that place and deposits somewhere else

Each year, about 10 million ha of cropland are lost due to soil erosion, thus reducing the cropland available for food production.

 This is a serious problem because more than 99% of the world's food comes from the land. It is therefore of great importance to understand the mechanisms of soil erosion and to be able to predict its effects to preserve human food availability and the natural environment.

The factors driving soil erosion. Erosion occurs when the soil is left exposed to rain drops and wind which can both easily dislodge surface soil particles.

Following factors influence soil erosion:

• Soil texture: a finer the texture facilitates more erosion.

• Vegetative cover: its presence protects the topsoil by dissipation of rain drop and wind energy.

•Land topography: marginal and sloping lands exhibit higher erosion rates.

 • Other local factors: the topsoil physical properties are influenced by factors such as human activities; high water energy streams banks, landslides, or earthquakes.

The world soil erosion rates are much higher than natural soil renewal, leading to a reduction of agriculture productivity and natural biodiversity.

The soil erosion notably exerts the following detrimental effects: • An increased soil water runoff and therefore, decreased water availability for plant and fruit growths. • The removal of organic matter and essential plant nutrients. • The reduction of soil depth and thus, of plant root space. On the whole 80% of world current agricultural lands suffer moderate to severe erosion and that erosion has been responsible of the loss of 30% of world arable land in the past 40 years. The author underlines that this has led to a reduction of food production but also of the biodiversity of plants, animals, and microbes. In conclusion stimulation of research to develop effective soil and water conservation methods, and for their rapid implementation in agricultural and natural ecosystems. This study summarizes the key factors and challenges related to soil erosion. Its results are of great help to understand better the mechanisms of soil erosion and to develop more sustainable agricultural techniques limiting its detrimental effects.

**UNIT V**

PRE-DISASTER PREVENTIVE MEASURES

Long-term measures

• Re-framing buildings' codes, guidelines, manuals and byelaws and their strict Implementation.Tougher legislation for highly seismic areas.

• Incorporating earthquake resistant features in all buildings at high-risk areas.

• Making all public utilities like water supply systems, communication networks, Electricity lines etc.Earthquake-proof. Creating alternative arrangements to reduce Damages to infrastructure facilities

.•Constructing earthquake-resistant community buildings and buildings (used to gather large groups duringor after an earthquake) like schools, dharamshalas, hospitals, prayer halls, etc., especially in seismic zonesof moderate to higher intensities.

• Supporting R&D in various aspects of disaster mitigation, preparedness andPrevention and post-disaster management.

• Evolving educational curricula in architecture and engineering institutions and technical training in polytechnics and schools to include disaster related topics

.

Medium term measures

• Retrofitting of weak structures in highly seismic zones.

• Preparation of disaster related literature in local languages with dos and don'ts for Construction.

• Getting communities involved in the process of disaster mitigation through Education and awareness

.• Networking of local NGOs working in the area of disaster management.

POST-DISASTER PREVENTIVE MEASURES

• Maintenance of law and order, prevention of trespassing, looting etc.

• Evacuation of people.

• Recovery of dead bodies and their disposal.

• Medical care for the injured.

• Supply of food and drinking water.

• Temporary shelters like tents, metal sheds etc.

• Repairing lines of communication and information.

• Restoring transport routes.

* • Quick assessment of destruction and demarcation of destroyed areas, according to

the grade of damage.

• Cordoning off severely damaged structures that are liable to collapse during aftershocks.

 Disaster management aims to reduce, or avoid, the potential losses from hazards, assure prompt and appropriate assistance to victims of disaster, and achieve ...

Definition of disaster management: Planned steps taken to minimize the effects of a disaster, and to be able to proceed to business continuity stage.

Co-ordination between various agencies involved in rescue and relief work is extremely Important to avoid gaps (both in communication and field work) and duplication of effort. Pre-disaster preparation can be conceptualized on the basis of an exercise on hypothetical earthquake occurrence and well-thought out estimates of magnitude of work involved etc. The following efforts will be useful for preparedness:

• Train communities in high-risk areas in post-disaster search, rescue and relief.

• Practice an extensive programme of mass drills in high-risk areas for earthquake damage reduction.

• Train local NGOs and strengthen their capacity and capabilities.

• Inculcate basic know-how amongst school kids on earthquake dos and don’ts salong with safety drills.

• Train field personnel in the science and art of carrying out post disaster damage surveys, for (a) urgent relief purposes and (b) for repair, reconstruction and retrofitting purposes.

During emergencies, affected people need to be involved in the relief activities so as to create a feeling of self-reliance. Also, the sooner they are integrated, the shorter will the period of relief will be.

Post-disaster work would involve:

• Detailed survey of buildings for assessment of damage and repair/ reconstruction and seismic strengthening or demolition.•

* Selection of sites for new settlements, if required.

• Execution of the reconstruction programme.

• Review of the existing seismic zoning maps and risk maps.

• Review of seismic codes and norms of construction.

• Training of personnel, engineers, architects, builders and masons. Seismic Hazard Mitigation in India

The seismic hazard mitigation programmed in India can be linked to the efforts of RDOldham, then Director of Geological Survey of India. He carried out detailed study and published a monograph on the great Assam earthquake of 1897. This probably the Beginning of the efforts towards mitigation of earthquakes disasters in India. In this connection the first seismological observatory in the country was established in 1898 at Calcutta. Today, India Meteorological Department (IMD), which is the nodal agency for earthquake information, maintains a network of 45 national observatories and 13 special purpose observations (figure 1). In addition, there are number of institutions/organizations (NGRI, BARC) and universities / academic institutions (IIT,Roorkee) that also carry out earthquake monitoring and research. Table 1 depicts the distribution of seismological observatories in India under various organizations. During

the last few years, earthquake studies have acquired momentum, especially after recent earthquake of Latur. Ever since, seismic hazard assessment and risk analysis, updating the seismic Zonation maps, etc. have gained higher priority in seismological research. Abrief description of seismic hazard Zonation map and various building codes available for Earthquake resistant design is given in the following paragraphs.

Seismic Hazard Map of India

Seismic Zonation map of the country is a guide to seismic hazard status and itssusceptibility to earthquakes. According to Bureau of Indian Standards (BIS), entirecountry has been divided into four seismic zones (Fig 2) Zone II being the region oflowest activity and Zone V is seismically most active, whereearthquakes of magnitude8.0 or more could occur. Table 2 shows the area of the country and probable intensities ineach zone as per this map.

Zone V is the most vulnerable to earthquakes, where some of the country's mostpowerful shocks haveoccurred. This region includes the Andaman & Nicobar Islands,entire region of North-eastern India, parts of north-western Bihar, eastern sections ofUttaranchal, the Kangra Valley in Himachal Pradesh, area near Srinagar in Jammu &Kashmir and the Rann of Kutch in Gujarat. Earthquakes with magnitudes in excess of 7.0have occurred in these areas, and have had intensities higher than IX. Much of India liesin Zone III, where a maximum intensity of VII can be expected. A large section of south-central India lies in Zone II along with a section stretching from eastern Rajasthan into northern Madhya Pradesh. Some areas of Orissa, Jharkhand and Chhatisgarh also lay in Zone II, Latur earthquake of magnitude 6.4 occurred in this zone. After this earthquake the seismic zone map of India has been revised into its present form.