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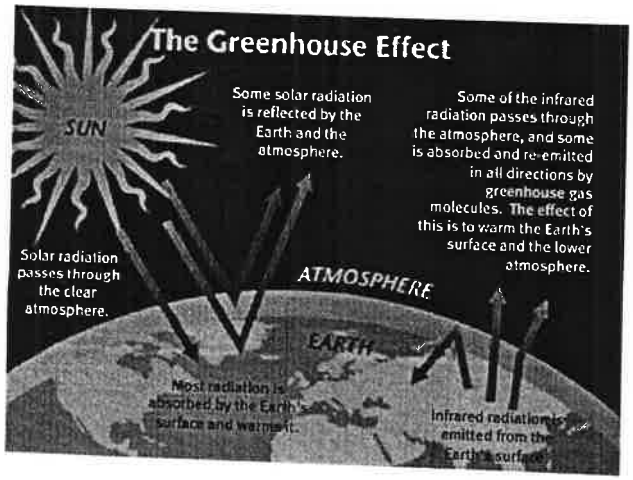
GREENHOUSE EFFECT

By

Y.L.Padme

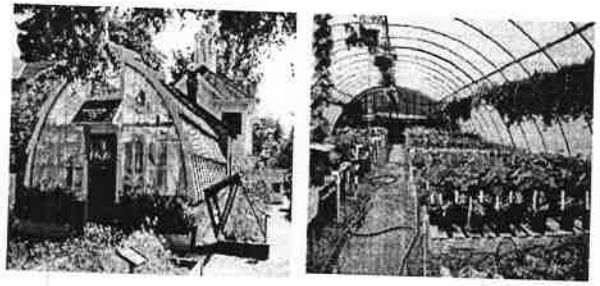
Greenhouse Effect:

- ❖ But absorb the outgoing long wave terrestrial radiation and remitting this energy in all directions.
- ❖ Greenhouse gases in the atmosphere behave much like the glass panes in a greenhouse.
- ❖ Thus fundamentally altering the radiation balance of the earth atmosphere system.

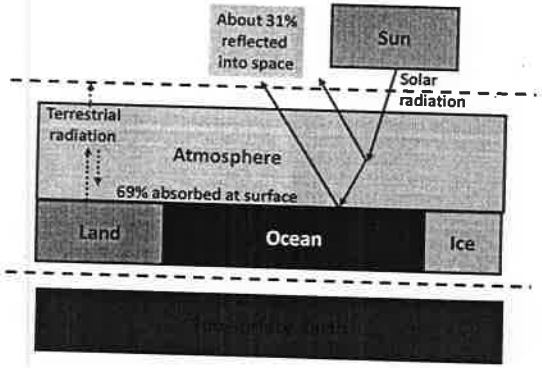


GREEN HOUSES

Green houses are used to grow plants, especially in the winter.



Earth's Climate System



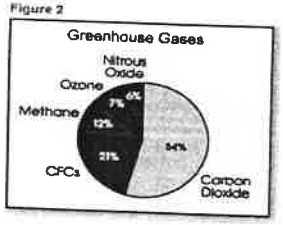
Green House Gases :

- ❖ These gases act as a shield that traps heat in the earth's atmosphere. The resulting greenhouse gas effect is thought to contribute to global warming .
- ❖ Gases in the atmosphere (water vapor, carbon dioxide, nitrous oxide, and methane) trap energy from the sun.

The greenhouse gases are:

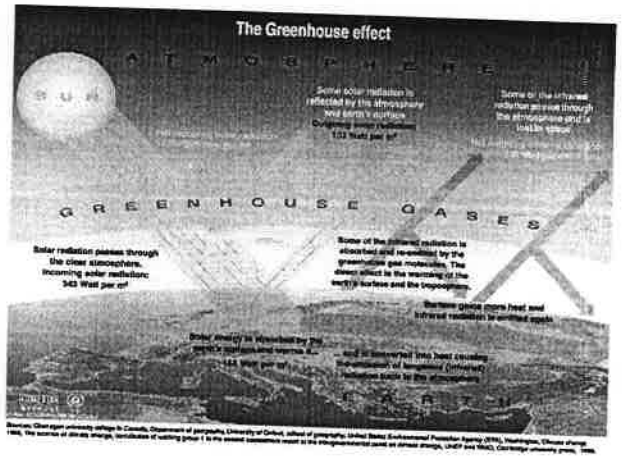
- ➢ Water Vapour
- ➢ Carbon dioxide
- ➢ Nitrous Oxide
- ➢ Methane
- ➢ CFCs

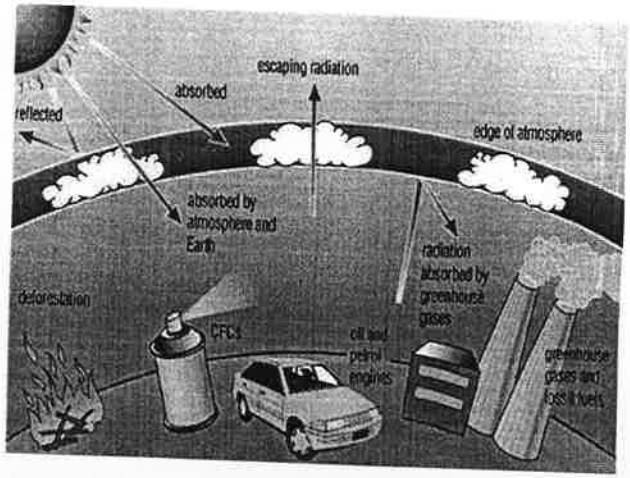
Figure 2



• Greenhouse Effect:

- ❖ Natural greenhouse gas effect known for last 175 years.
- ❖ Fourier (1827)- "atmosphere acts like glass of hot house because it lets through light rays of the sun but retains the dark rays from the ground".
- ❖ The greenhouse effect is the rise in temperature that the Earth experiences because certain gases in the atmosphere , trap heat from the Sun's rays.
- ❖ These trace gases are transparent to incoming short wave solar radiation.





- **Carbon Dioxide:**

❖ Carbon Dioxide is probably the most important of the greenhouse gases and is currently responsible for 60 % of the 'greenhouse effect'

❖Source: Fossil fuel burning, deforestation, vehicles, industries, etc.

- Anthropogenic increase: 30%
- Average atmospheric residence time: 500 years

- **Methane (CH_4) :**

- It occurs in lower concentrations than carbon dioxide but it produces 21 times as much warming as carbon dioxide.
- Methane accounts for 20%of the 'enhanced greenhouse effect'.

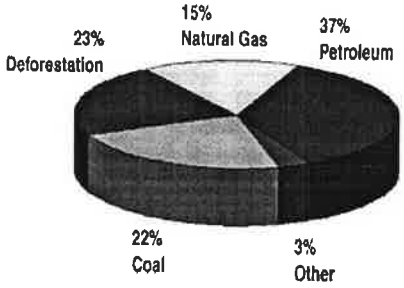
❖Source: Rice cultivation, cattle & sheep ranching, decay from landfills, mining, etc.

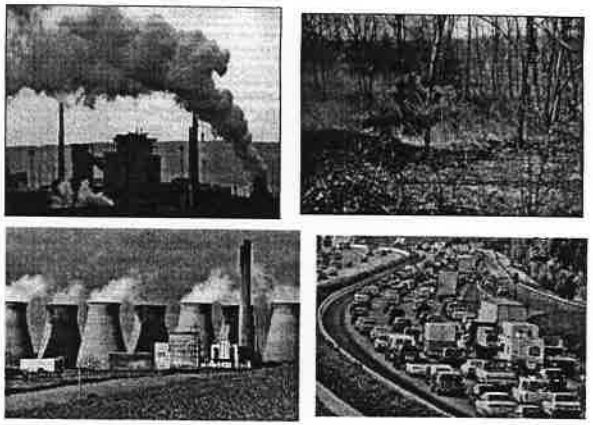
- Anthropogenic increase: 145%
- Average atmospheric residence time: 7-10 years

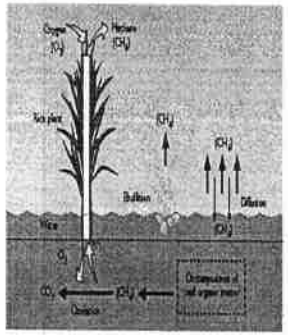
- **Nitrous Oxide:**

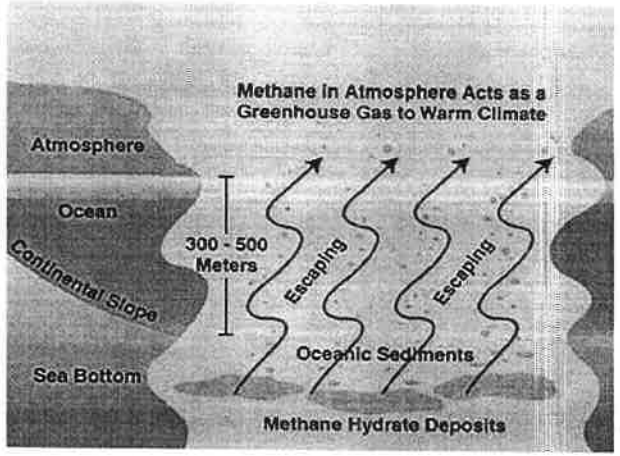
- Nitrous Oxide has one of the longest atmosphere lifetimes of the greenhouse gases, lasting for up to 150 years.
- Since the Industrial Revolution, the level of nitrous oxide in the atmosphere has increased by 16%.
- Source: Industry , agriculture (fertilizers), Vehicle exhaust and sewage treatment plants, etc.
- Anthropogenic increase: 15%
- Average atmospheric residence time: 140-190 years

- **Global Carbon Dioxide Emissions**

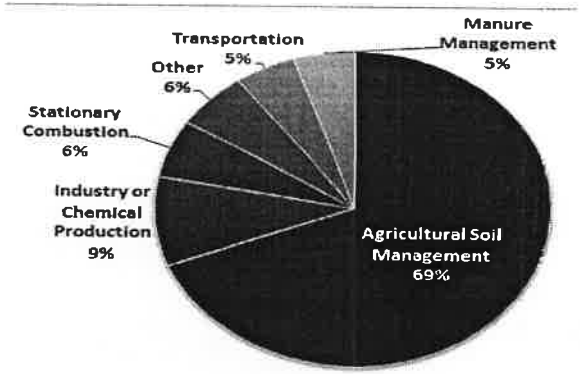








Nitrous Oxide emission



CFCs (Chlorofluorocarbons):

❖ Each CFC molecule can trap as much heat as 100 000 CO_2 molecule.

❖ Can remain in the atmosphere for a long time (up to 20 000 years)

❖ Sources :

- Aerosol sprays
- Making foam packaging
- Coolants in fridge and air cons
- Cleaning solvents

► Villages move as environment becomes a swamp due to permafrost disappearing.

► Polar bears hibernate less as temperature rises. Must swim further and more often to reach prey/ destination which uses more energy.

► Biodiversity could change and herbivore animals would need to change their eating patterns.

✓ Public awareness

✓ Legislative measures

✓ To control the emission of green house gasses

✓ Whenever we use electricity, we help put greenhouse gases into the air. Turn off lights, the television and the computer.

✓ International cooperation for attempting the reduction of green house gasses:
Kyoto treaty (1997) → was started to reduce emission of greenhouse gases by 5% of 1990s levels by 2012.

Impacts of greenhouse effect :

► Increased frequency and intensity of droughts.

► Flooding as a result of higher rainfalls, increased snowmelts and rising sea levels.

► Decline in food production.

► Increased disease (pathogens survive better in colder temperatures).

► More extreme weather.

- Increased warming at the poles will reduce the thermal gradient between the equator and the high latitude region.
- change the global pattern of wind and ocean currents , disturbs in rainfall and change in seasons.
- Shifting pattern of rainfall disturbs agricultural practices.
- Increasing level of pollutants in atmosphere.

- Greenhouse Effect & Global Warming
- The *"greenhouse effect" & global warming* are not the same thing.
  - Global warming refers to a rise in the temperature of the surface of the earth

*

- An increase in the *concentration of greenhouse gases* leads to an increase in the *magnitude of the greenhouse effect.* (Called enhanced greenhouse effect)
  - This results in global warming

► Loss of biodiversity.

► As global temperatures rise, many ecosystems would be affected but the artic ecosystem would show clearly visible changes.

► The average artic region temperature is rising at twice the speed of the rest of the world.

► Species, like caribou, polar bears, seals, are changing their migration pattern to respond in changes to their feeding patterns.

- Controlling measures :

✓ Reducing the consumption of fossil fuels like coal, petroleum, etc.

✓ The use of non conventional renewable sources of energy such as, solar energy, wind energy etc.

✓ By converting CO2 to another chemical forms and disposed it in the places other that atmosphere. E.g. ocean.

✓ Plantation for absorption of CO2 from atmosphere.

Global Warming:

- Global warming is the increase in the average temperature of the Earth's near-surface air and oceans since the mid-20th century and its projected continuation.
- Global surface temperature increased 0.74 ± 0 .18 °C (1.33 ± 0.32 °F) between the start and the end of the 20th century.
- Global warming is when the earth heats up (the temperature rises).

- It happens when greenhouse gases (carbon dioxide, water vapor, nitrous oxide, and methane) trap heat and light from the sun in the earth's atmosphere, which increases the temperature.

- This hurts many people, animals, and plants. Many cannot take the change, so they die.

Air Pollution :

Air pollutants like CO_2 , CFCs, NOx, Sox, CH_4 etc.

Sources :

- Burning of fossil fuels like coal, oil, wood etc.
- Automobile exhaust
- Industries
- Power plants

• Population:

• Causes of Global warming:

Global warming is caused by several things, which include man-made or anthropogenic causes, and natural causes.

a. Natural Causes:

- Natural causes are causes that are created by nature. One natural cause is a release of methane gas from arctic tundra and wetlands. Methane is greenhouse gas and a very dangerous gas to our environment. A greenhouse gas is a gas that traps Heat in the earth's atmosphere.

- Another natural cause is that the earth goes through a cycle of climate change. This climate change usually lasts about 40,000 years

Emission of Green house gases:

Sources :

- Sources and relative contribution of different greenhouse gases to global warming are as follows:

a) Carbon Dioxide(CO2)

b) Methane (CH4)

c) Chlorofluorocarbons (CFCs)

d) Nitrous oxide (N2O)

• Deforestation:

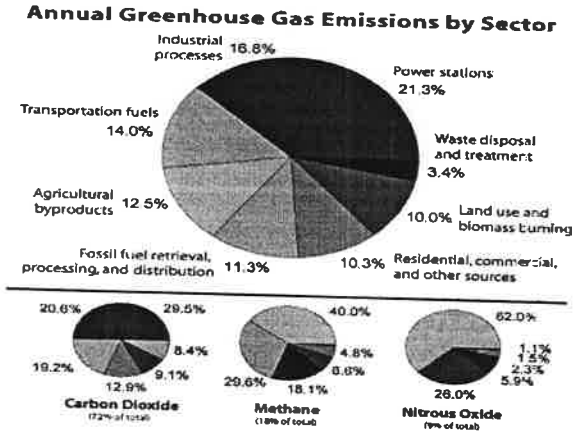
- It is to be blamed for 25% of all CO_2 release into the atmosphere by cutting and burning of about 34 million acres of each year.

- Thus greater cutting of trees leading to greater concentration of CO_2 in the atmosphere.

- Greater urbanization ,requirement of land for factories and buildings ,requirement of timber are the reasons leading to deforestation which interns leading to global warming.

b. Manmade Causes:

- Air Pollution
- Emission of Green house gases
- Population
- Deforestation



• Global Warming Effects:

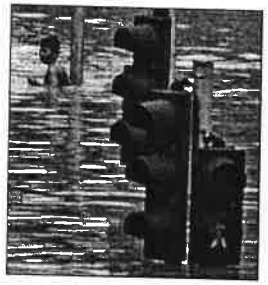
• Sea level change

• Crop yield :

- Global warming may make the Earth warmer in cold places.
- Destroy food crop → rice, wheat and corn
- People living in these areas may have the chance to grow crops in new areas.
- But global warming might bring droughts to other places where we grow crops

• Water balance :

- ❖ This warming trend is expected to bring droughts and flooding of low lying coastal areas as the polar ice caps melt and raise sea level.
- ❖ Global warming will lead to an increase in the evaporation of water → more water vapour.
- ❖ With more water vapour, more rain fall is expected.
- ❖ But it is not evenly distributed:
  - ❖ Dry areas → severe drought condition, water shortage and heat waves occurs
  - ❖ Wet areas → floods and avalanches (landslides)



• Human Health:

- Heat stress and other heat related health problems are caused directly by very warm temperatures and high humidity.
- Heat stress – A variety of problems associated with very warm temperatures and high humidity eg. Heat exhaustion and heat stroke.

• Plants and Animals:

- ❖ need to migrate
- ❖ Encourage growth of weed and pests →
- ❖ may lead to diseases
- ❖ Climate change may alter the world's habitats.
- ❖ All living things are included in and rely on these places.
- ❖ Most past climate changes occurred slowly, allowing plants and animals to adapt to the new environment or move someplace else.
- ❖ Plants and animals may not be able to react quickly enough to survive if future climate changes occur as rapidly as scientists predict.

• Climatic condition :

- Increased warming at the poles will reduce the thermal gradient between the equator and the high latitude region.
- change the global pattern of wind and ocean currents , disturbs in rainfall and change in seasons.
- Shifting pattern of rainfall disturbs agricultural practices.

Controlling measures :

❖ Kyoto Protocol:

- The Kyoto Protocol is an amendment to the United Nations Framework Convention on Climate Change (UNFCCC)
- UNFCCC, an international treaty on global warming
- Countries which ratify this protocol commit to reduce their emissions of carbon dioxide and five other greenhouse gases
- A total of 141 countries have ratified the agreement. Notable exceptions include the United States and Australia.

❖ UN Framework On Climate Change:

- Article 2 (iv) Research on, and promotion, development and increased use of, new and renewable forms of energy, of carbon dioxide sequestration technologies and of advanced and innovative environmentally sound technologies
- (vi) Encouragement of appropriate reforms in relevant sectors aimed at promoting policies and measures which limit or reduce emissions of greenhouse gases not controlled by the Montreal Protocol;
- (viii) Limitation and/or reduction of methane emissions through recovery and use in waste management, as well as in the production, transport and distribution of energy

- Other preventive measures:

- Plant trees
- Conserve energy
- Reduce use of car
- **3R's**
  - **Reuse**
  - **Recycling**
  - **Reduction**

Thanking you

Earthquake

❖Earthquake is one of the most destructive natural hazard .

❖They may occur at any time of the year, day or night with sudden impacts and little warning .

❖Earthquake is the sudden shaking or vibration of the earth crust .they make the land move and the effect of earthquake vary upon the magnitude and intensity.

❖Most earthquakes occur along the edge of the oceanic and continental plate .

Earthquakes can be of three types based on the focal depth:

1. Deep:- 300 to 700 kms from the earth surface
2. Medium:- 60 to 300 kms
3. Shallow: less than 60 kms

❖The deep focus earthquakes are rarely destructive because by the time the waves reach the surface the impact reduces.

❖Shallow focus earthquakes are more common and are extremely damaging because of their proximity to the surface.

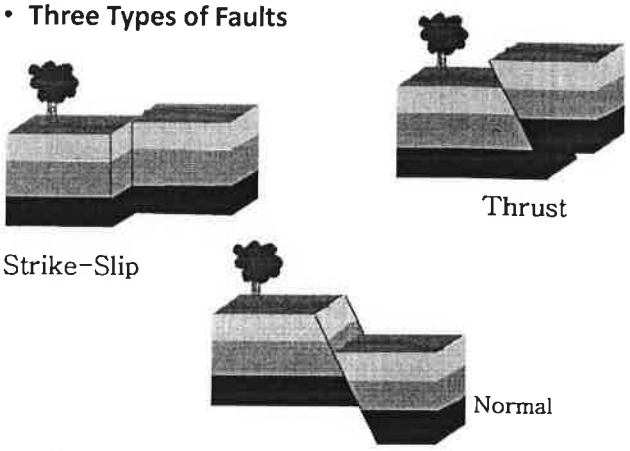
- What is an earthquake?

➢Used to describe both sudden slip on a fault, and the resulting ground shaking and radiated seismic energy caused by the slip

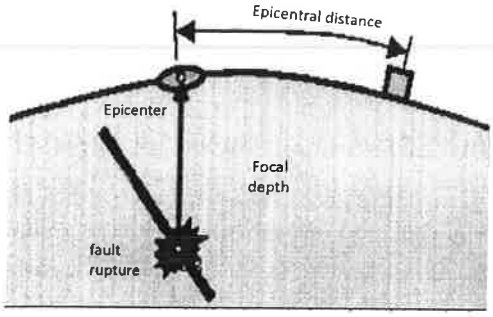
➢Caused by volcanic or magmatic activity,

➢Caused by other sudden stress changes in the earth.

- Three Types of Faults



- Focus – point inside the Earth where an earthquake begins
  Epicenter – point on Earth's surface above focus



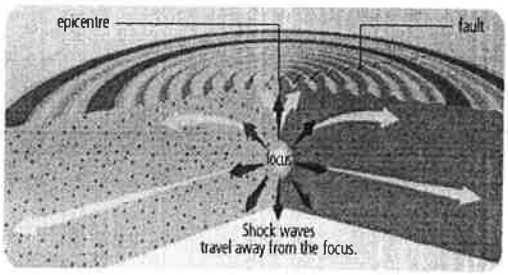


Figure 5
Comparing the focus and epicentre of an earthquake.

- Earthquake: Seismic Waves

❖Seismic waves emanating from the focus can travel as body waves or surface waves.

❖*Body waves* travel in all directions from the focus through the body of the Earth

❖*Surface waves* are different from body waves because they don't travel through the Earth; instead they are constrained to travel along the surface of the Earth from the epicenter.

- Properties of Seismic Waves:

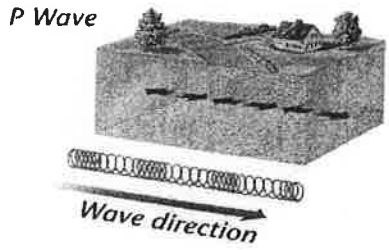
There are two types of body waves; the compressional or *P waves* and the shear or *S waves.*

P waves (or primary waves) travel with a velocity that depends on the elastic properties of the rock that they travel through.?

S waves (or secondary waves) are shear waves.

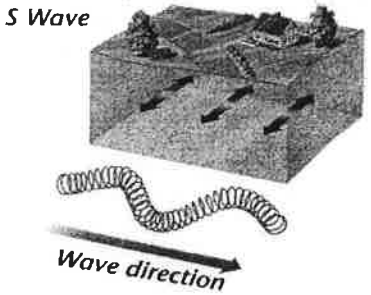
Primary Waves (P Waves)

- ❖ A type of seismic wave that compresses and expands the ground
- ❖ The first wave to arrive at an earthquake



Secondary Waves (S Waves) :

A type of seismic wave that moves the ground up and down or side to side



Comparing Seismic Waves

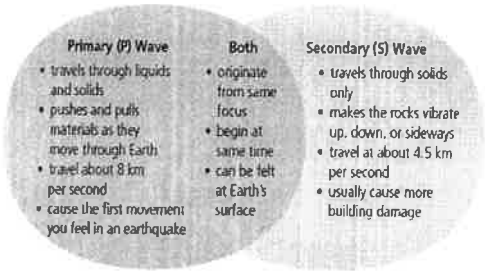


Figure 6
The two types of seismic waves that are produced by an earthquake cause different effects.

Surface Waves:

- Move along the Earth's surface
- Produces motion in the upper crust
  - Motion can be up and down
  - Motion can be around
  - Motion can be back and forth
- Travel more slowly than S and P waves
- More destructive

❖ In order to determine the location of an earthquake, the earthquake needs to be recorded on three different seismographs that are at significantly different locations.

❖ The other piece of information needed is the time it takes for P-waves and S-waves to travel through the Earth and arrive at a seismographic station.

- Locating the Epicenter:

✓ In order to determine the location of an earthquake, the earthquake needs to be recorded on three different seismographs that are at significantly different locations.

✓ The other piece of information needed is the time it takes for P-waves and S-waves to travel through the Earth and arrive at a seismographic station.

✓ If three arrival times are available at three different seismic stations then triangulation can be used to find the location of the focus or epicenter and the time of occurrence of the earthquake.

✓ The distance between the beginning of the first P wave and the first S wave tells you how many seconds the waves are apart.

✓ Since the P (or "primary") waves travel faster than the S (or "secondary") waves, P waves will arrive at a given seismograph station sooner than S waves.

✓ In other words, the S waves *lag* behind the P waves. In fact, the time difference between when the P waves arrive at a seismograph station and when the S waves arrive at the same station is called *Time Lag*.

✓ Knowing the time lag for a number of seismograph stations is essential in pinpointing the location of the epicenter of an earthquake.

Epicenter Distances

❖ Finally by ploting the P and S wave travel-time curves to find the distance from each station to the earthquake epicenter.

❖ This can be by finding the unique epicenter distance where the difference in the P and S wave travel times is exactly equal to the difference calculated from the seismogram. (time/distance curve plot)

- **Magnitude:**

- Measure of energy released during earthquake.
- There are several different ways to measure magnitude.
- Most common magnitude measure is Richter Magnitude, named for the renowned seismologist, Charles Richter.

Richter Magnitude

- Measure amplitude of largest S wave on seismograph record.
- Take into account distance between seismograph & epicenter.

Richter Scale

- Logarithmic numerical scale
- Increasing one whole unit on Richter Scale represents 10 times greater magnitude.
- Going up one whole unit on Richter Scale represents about a 30 times greater release of energy.

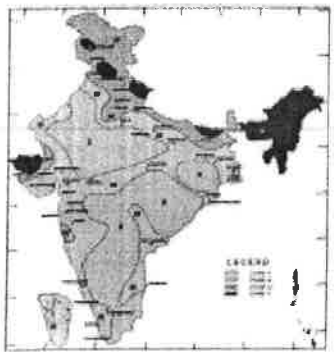
Intensity

- Intensity refers to the amount of damage done in an earthquake
- Mercalli Scale is used to express damage

Distribution of earthquake in India

Year	Location	Maguitude of 6+
1950	Arunachal Pradesh - China Border	8.5
1956	Anjar, Gujarat	7.0
1967	Koyna, Maharashtra	6.5
1975	Kinnaur, Himachal Pradesh	6.2
1988	Manipur - Myanmar Boarder	6.6
1988	Bihar - Nepal Border	6.4
1991	Uttarkashi - Uttar Pradesh Hills	6.0
1993	Latur - Maharashtra	6.3
1997	Jabalpur, Madhya Pradesh	6.0
1999	Chamoli, Uttar Pradesh	6.8
2001	Bhuj, Gujarat	6.9
2005	Muzaffarabad (Pakistan) Impact in Jammu & Kashmir	7.4

Distribution of earthquake in India



Zones	Magnitude
	8 Very High risk quake
Zone IV	7.9 Very high risk quake
Zone III	6.9 Moderate risk quake
Zone II	4.9 Seismic disturbance

Effects of Earthquake :

Physical damage :

- Damage occurs to human settlement, buildings, structures and infrastructure, especially bridges, elevated roads, railways.

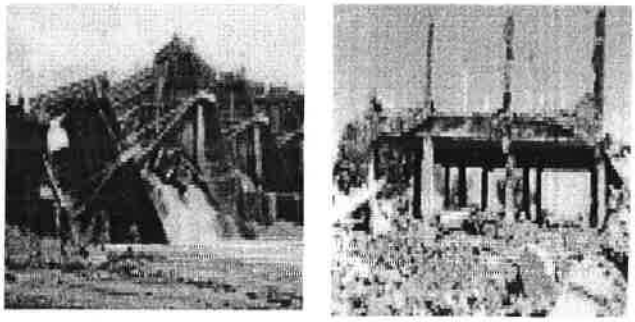
- water towers, pipelines, electrical generating facilities.

- Aftershocks of an earthquake can cause much greater damage to already weakened structures.

- Sewage pipes may be damaged causing major sewage disposal problems.

- There are large number of casualties because of the poor engineering design of the buildings and close proximity of the people.

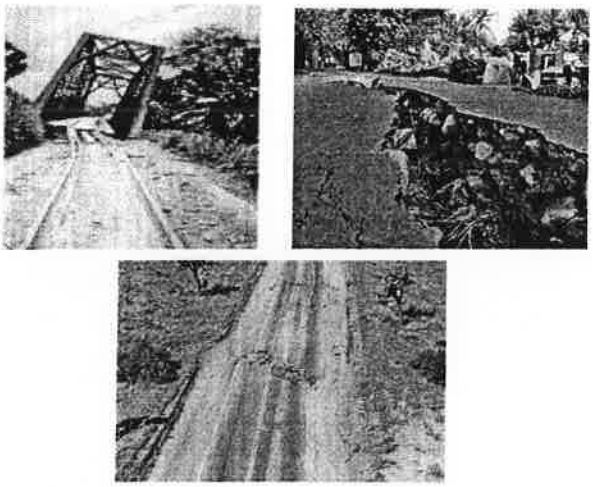
- Dam failure and landslides which may block water ways and also cause flooding.



Shows the adverse effect of An earthquake

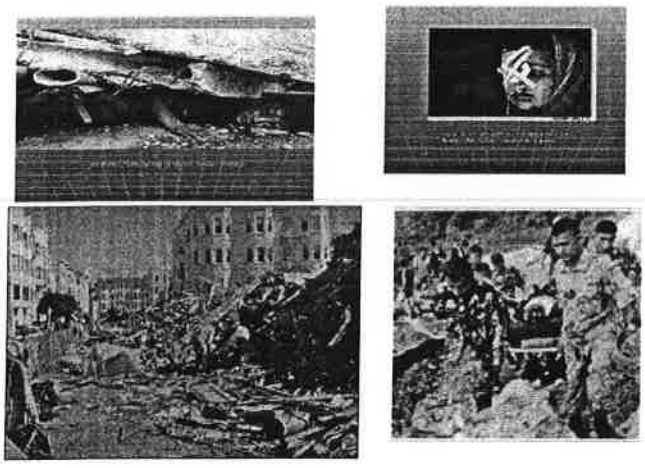
Communication system :

- **Water towers, pipelines, electrical generating facilities damaged .**
- **There may also be a break down of communication facilities**
- **The loss of transport and communication and water supply in the affected areas.**
- **Blockage of roads**



Human health :

- **About 95 per cent of the people who are killed or who are affected by the earthquake is because of the building collapse.**
- **Shattering of family life due to the death or injury to kith and kin**
- **Tension ,mental disorders, mental admissions increases due to loss of family members.**
- **critical injuries to the peoples.**

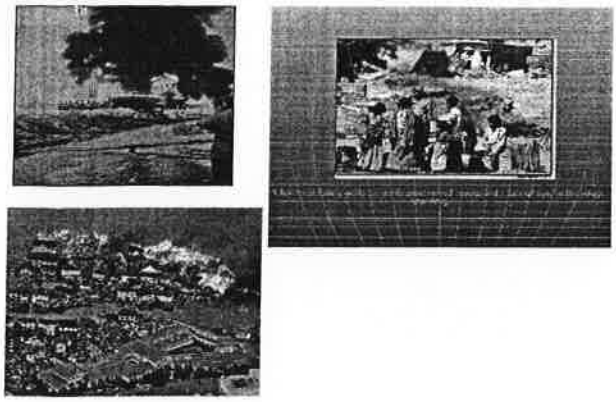


Crops and food supplies:

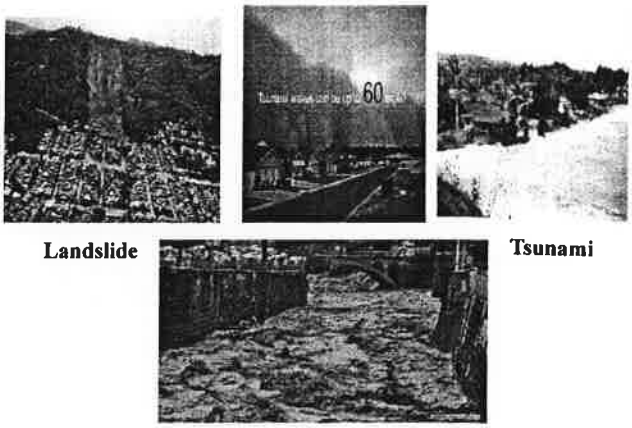
- **Harvests and food stocks may be lost to inundation.**
- **Huge crop loss and that may leads to the shortage of food and animal fodder.**
- **Affects on soil characteristics**

Other effects:

- **Loss of biodiversity**
- **Terrestrial ecosystem get damaged**
- **Family members missing.**
- **Affects on the development.**
- **Blockage of streams and later release of the impounded water create flash floods with disastrous effects.**
- **Reservoirs damages /subjected to the earthquake**
- **Results other hazards like flood, landslide, tsunami (earthquake in seas and oceans) , fire ,etc.**
- **Results environmental pollution**



Earthquake results fire hazard



Landslide Tsunami

Flood

- **Mitigation measures**

❖ **Community preparedness**

❖ **Planning:**

- ✓ **The Bureau of Indian Standards has published building codes and guidelines for safe construction of buildings against earthquakes.**
- ✓ **Before the buildings are constructed the building plans have to be checked by the Municipality, according to the laid down bylaws.**
- ✓ **Lifeline buildings such as hospitals, schools and fire stations their earthquake safety needs to be upgraded by retrofitting techniques.**

❖ **Public education:**

✓ **Public education is educating the public on causes and characteristics of an earthquake and preparedness measures**

✓ **It can be created through sensitization and training programme for community, architects, engineers, builders, masons, teachers government functionaries teachers and students.**

❖ **Engineered structures:**

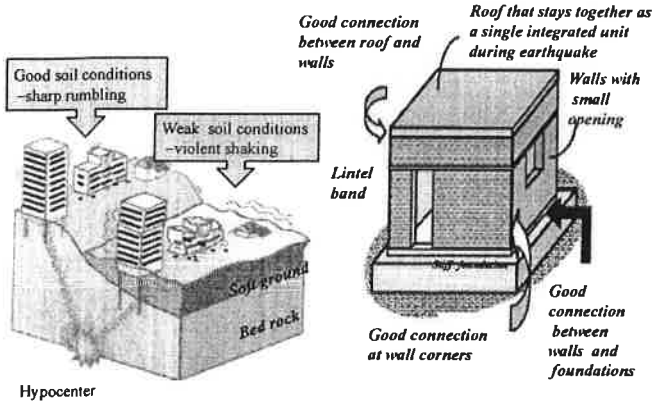
➢ **Buildings need to be designed and constructed as per the building by laws to withstand ground shaking.**

➢ **Architectural and engineering inputs need to be put together to improve building design and construction practices.**

➢ **The soil type needs to be analyzed before construction**

✓ **Building structures on soft soil should be avoided because more likely to get damaged even if the magnitude of the earthquake is not strong.**

✓ **Similar problems persist in the buildings constructed on the river banks which have alluvial soil.**



Effect of Soil type on ground shaking

Hazard zone mapping

✓ **A seismic zoning map should be prepared. It was prepared by the Bureau of Indian Standards in 1962 which was revised in 1970**

✓ **It is based on earthquake occurrences, maximum intensifies reaches and also maximum probable intensifies that could be caused in various areas of the country in future earthquake resulting from the seismogenic features of the area.**

Monitoring /Forecasting /Warning:

- ✓The India Meteorological Department is the key agency in India for monitoring earthquake.
- ✓It maintain 56 seismological stations.
- ✓5 Regional Meteorological Offices control 32 seismological observatories in different parts of India.
- ✓Apart from this there are about 2 dozen temporary Observatories at various project sites indifferent states.
- ✓13 are being planned for the future.
- ✓Arrangements are also exist to monitor seismic disturbances in some identified reservoir/dam sites.

Other :

- ✓Vulnerability reduction programme
- ✓Earthquake insurance for the buildings and structures to reduce economical impact on individuals .
- ✓Emergency communication system
- ✓Emergency exercise and training
- ✓Evacuation plans and training including rescue and restoration .
- ✓Contact with national ,international governmental and non-governmental organization for emergency help.

An analysis of policy documents

Food supply to the disaster prone peoples

Temporary habitat provided to the peoples

Ecosystems

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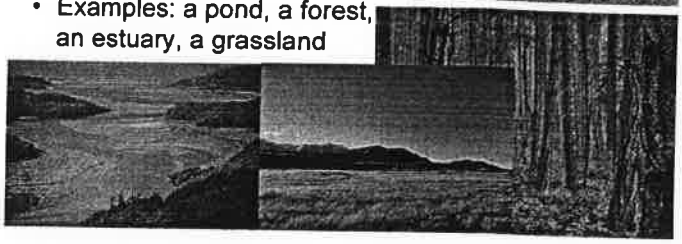
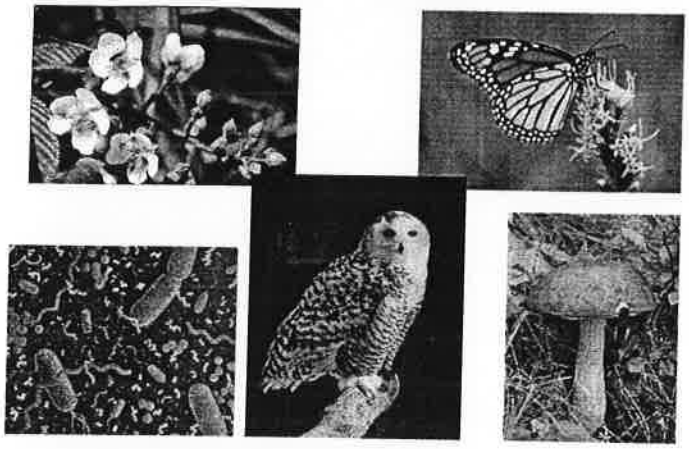
What is an Ecosystem?

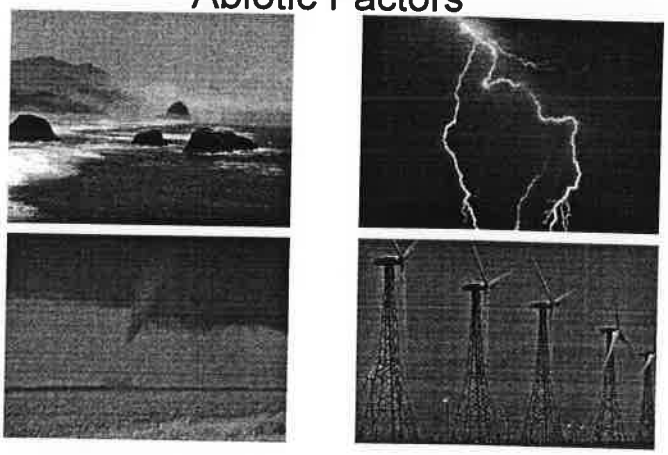
- All living organisms + the nonliving environment in a certain geographical location
- In other words, an ecosystem is made up of biotic as well as abiotic factors
- Examples: a pond, a forest, an estuary, a grassland



Biotic Factors



Abiotic Factors

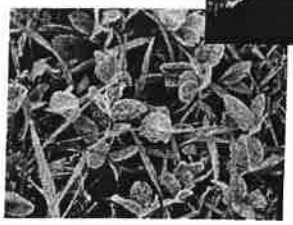


Abiotic factors affect living organisms in an ecosystem

Fires destroy forests, but can sometimes help a forest community by allowing new organisms to thrive

Early or unexpected frost can kill plants and an entire food chain.

Wind can affect the way an organism grows



Biotic factors affect the abiotic factors in an ecosystem

Lichens on rocks help break them down into soil. Lichens are made up of algae and fungi.

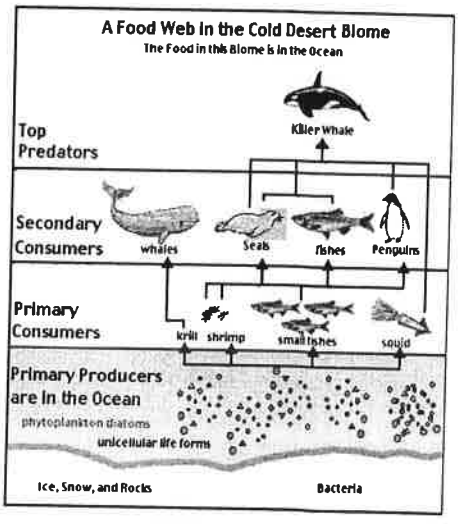
Dead organisms and animal waste contribute to soil nutrients (with the help of decomposers, of course)

The Biosphere

- All the ecosystems of the planet put together, form the biosphere.

Food Chain

- A **food chain** describes a single pathway that energy and nutrients may follow in an ecosystem. There is one organism per trophic level, and trophic levels are therefore easily defined. They usually start with a primary producer and end with a top predator.
- Here is an example of a food chain: phytoplankton → zooplankton → fish → squid → seal → *Orca* (Killer whale)



Food chains always start with producers

- Plants, algae and certain types of bacteria called cyanobacteria are **producers**
- Producers use radiant energy (sunlight) to synthesize chemical energy (sugar)
- In other words, plants perform a complex set of chemical reactions called photosynthesis
- Producers are also called "**autotrophs**" which means **self-feeders**, because they make their own food.

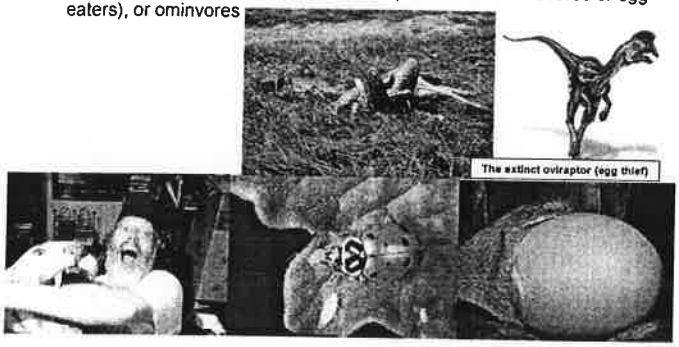
Primary Consumers

- Organisms that eat plants are called primary consumers
- Primary consumers are herbivores – the only eat plant material

•Primary consumers are right above plants in any given food chain

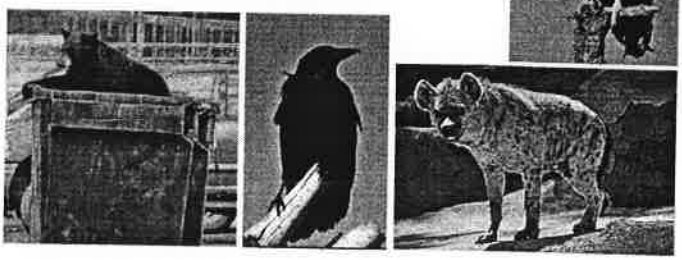
Secondary, tertiary, quaternary consumers

- Secondary consumers are those that eat primary consumers, tertiary consumer secondary and so on…
- These consumers are either carnivores (sometimes insectivores or egg eaters), or ominvores



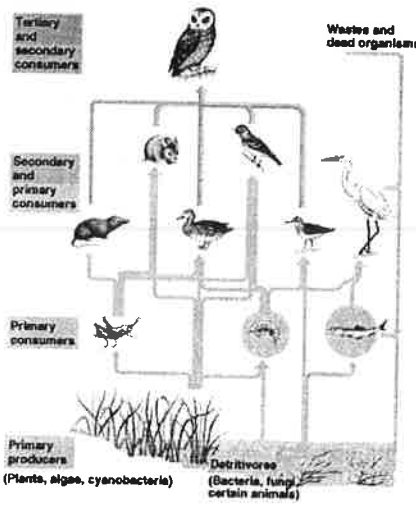
Scavengers

- Scavengers are animals that do not kill for a meal, but pick on "leftovers" from other animals
- Hyenas, vultures, crows, racoons, and some bears are scavengers



Decomposers

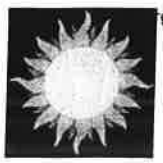
- Decomposers or detritivores are organisms that degrade or decompose dead or organic material in simpler molecules
- Fungi and bacteria are decomposers



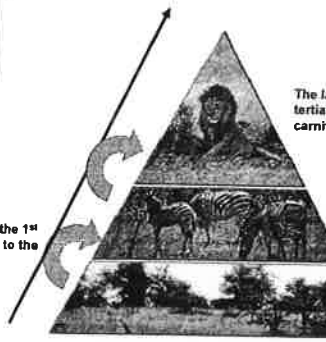
FOOD WEB

A combination of different food chains is called a food web.

Can you identify all the different organisms and their levels?



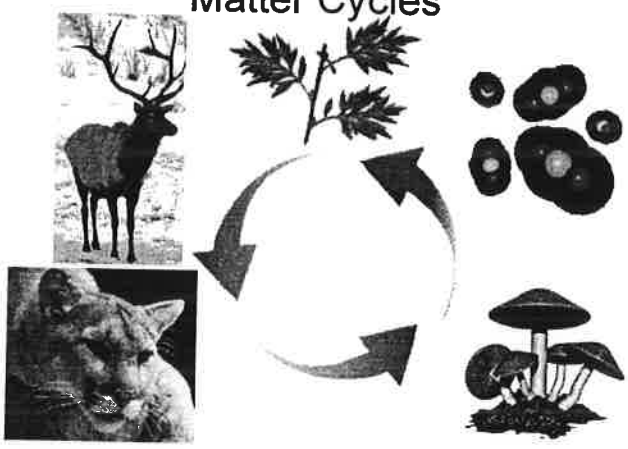
gy is eventually lost as heat on the top of the pyramid



10% of the energy from the 1st trophic level is available to the 2nd trophic level

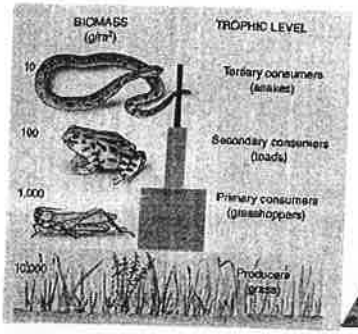
90% of the energy at any given trophic level is used for growth and reproduction, and is eventually lost as heat.

Matter Cycles



Pyramid of Biomass or Numbers

Just like energy, biomass decreases at each level, because there is only enough energy at that level to support the biomass found there.



Definitions

- Habitat – where an organism lives
- Niche – the organism's role in its environment – what does it do for a living?

Symbiosis

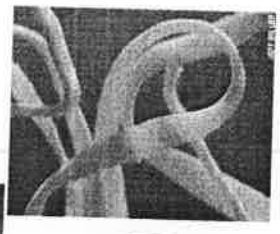
- Organisms of different kinds living together in the same ecosystem
- Any of the following relationships are considered to be symbiotic:
  - Predator – prey
  - Parasite – host
  - Commensalism
  - Mutualism
  - Pathogen - host

Predator - Prey

- Lions and zebras, for example
- One hunts and kills, the other gets killed and eaten

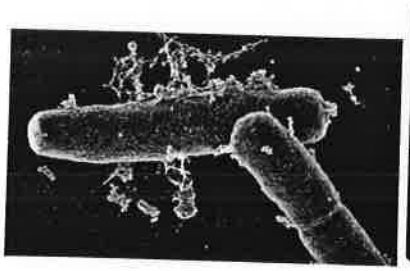
Parasite - Host

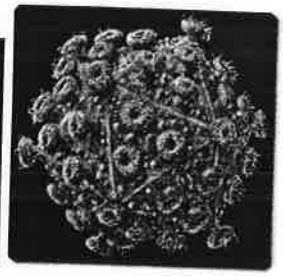
- Fleas and dogs for example
- The parasite harms the host and benefits from the relationship. The host is harmed, but not usually killed



Pathogen - Host

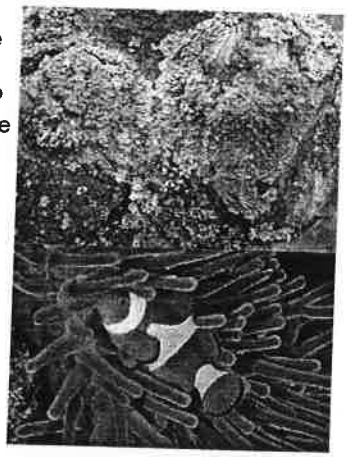
- A pathogen is a disease-causing agent, like a bacterium or a virus





Mutualism

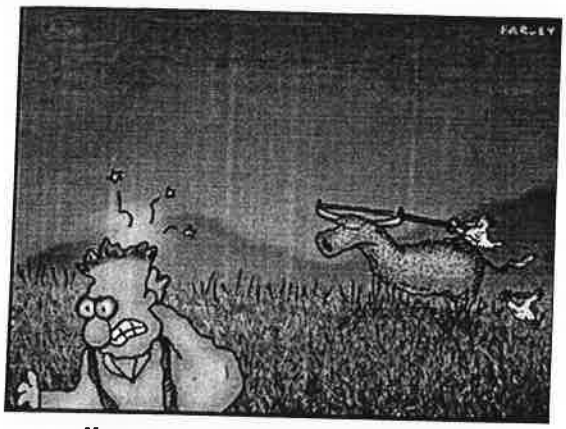
- A symbiotic relationship where two organisms are in a mutually beneficial relationship
- Examples: Lichens are not one organism but two – an algae and a fungus living as one. The algae provides the fungus with glucose in return for moisture from the fungus.



Clown Fish are protected from predator fish by the stinging tentacles of the anemone. The anemone receives protection from polyp-eating fish, like Butterfly Fish, which the Clown Fish chases away. The anemone also gets fertilizer from the feces of the Clown Fish.

Commensalism

- In this relationship, one organism benefits but the other is neither harmed nor benefited
- Examples: Shark and remora,

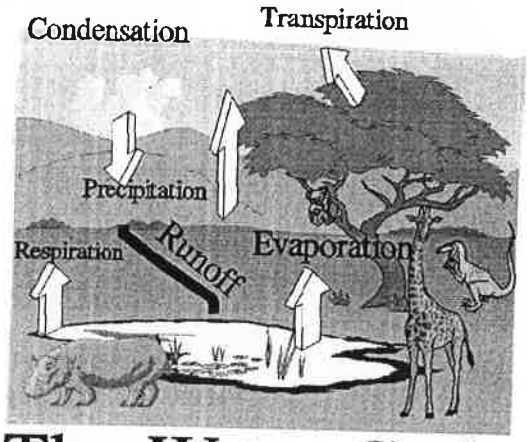


More unusual examples of animal symbiosis

How nutrients cycle

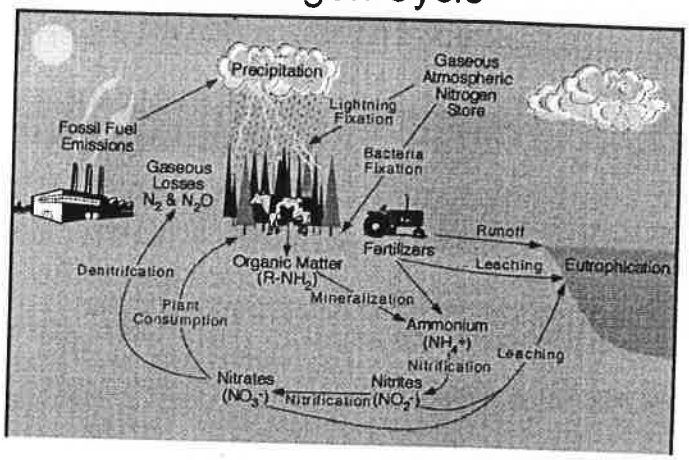
- Nitrogen cycle
- Carbon cycle
- Water Cycle

These are some of the various nutrient cycles on Earth.

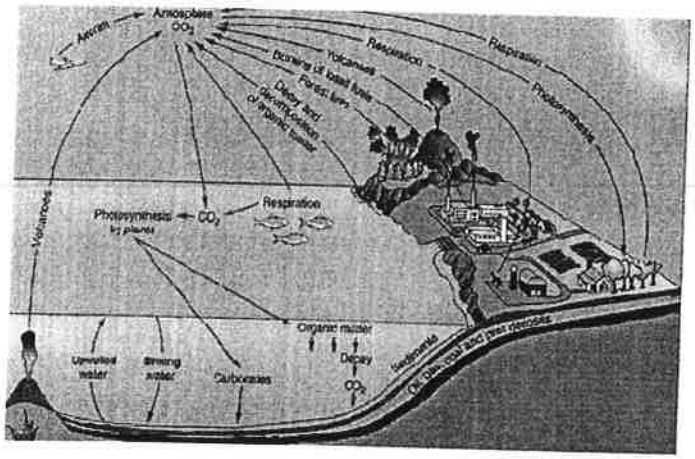


The Water Cycle

Nitrogen Cycle

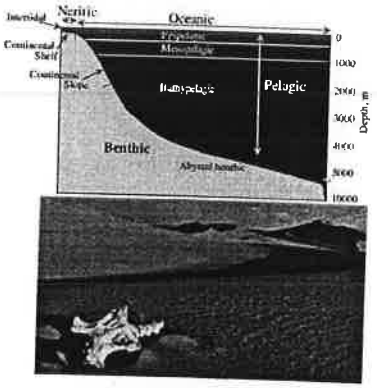


Carbon cycle



Limiting Factors

- Any abiotic factor that limits the survivability of organisms in a particular ecosystem is called a limiting factor
- Examples: Water in a desert, light in the deepest parts of the ocean (abyssal and benthic zones), etc.

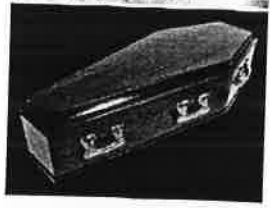


Population Dynamics

- A population is defined as the number of individuals in one particular species in a particular place, at a given time. For example: The population of zebras in Kenya in the year 1980
- Population density : The number of organisms per unit of land area or ocean volume

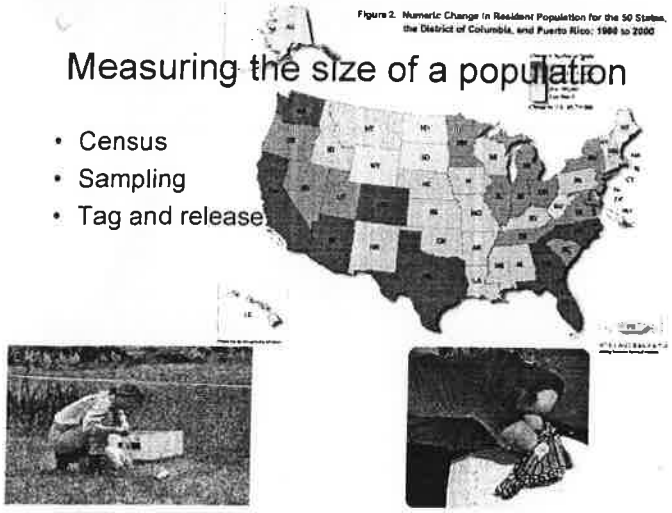
Factors that affect population size

- Mortality
- Natality
- Emigration
- Immigration



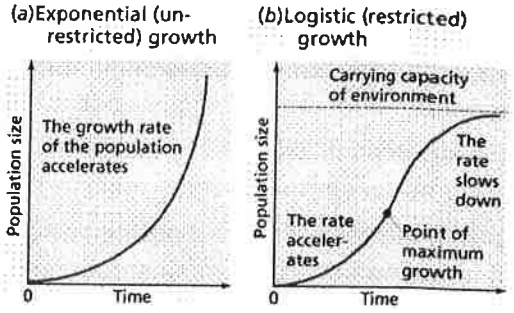
Measuring the size of a population

- Census
- Sampling
- Tag and release

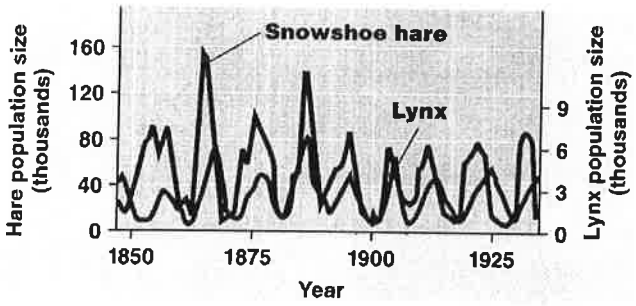


Carrying Capacity

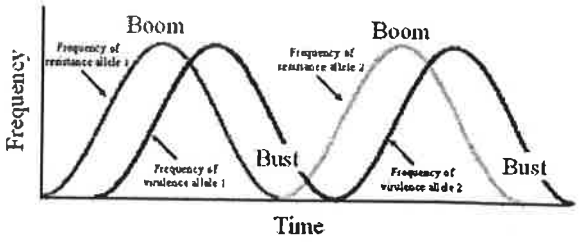
- The maximum number of individuals of a particular species that an ecosystem can support without depleting its resources
- These are two types of population growth curves – one shows exponential growth (unrestricted) and the other logistic growth (restricted)



Predator-Prey cycle



Boom-and-bust cycle



In species that reproduce rapidly, the population can grow exponentially and for a brief period it can exceed the carrying capacity. After that, there is a period of rapid decline in the population due to reduced reproductive rate and increased death rates.

END OF CHAPTER 24

CLIMATE CHANGE AND GLOBAL ENVIRONMENTAL PROBLEMS

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CLIMATE CHANGE

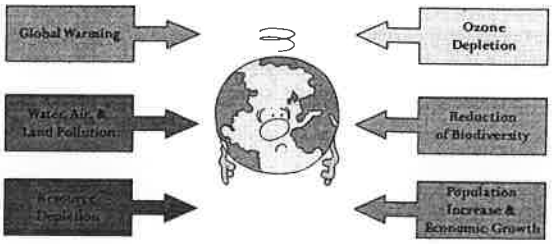
Climate is the average weather of an area. It is the general weather conditions, seasonal variations and extremes of weather in a region. Such conditions which average cover thirty years is called climate change.

The change in the climatic conditions is mostly due to the man made activities.

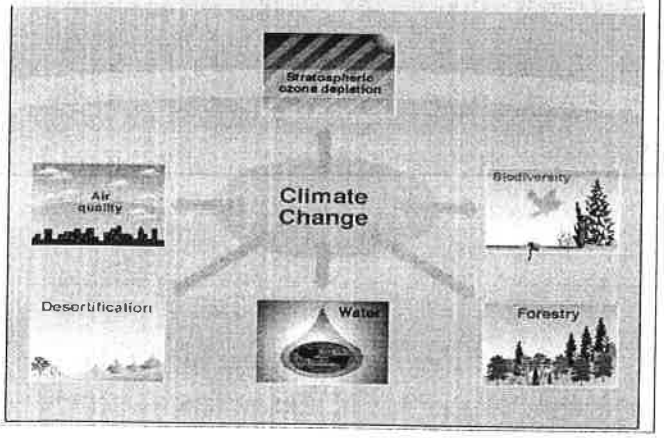
FACTORS RESPONSIBLE FOR CLIMATE CHANGE

- Human Population
- Industrialization
- Urbanization
- Change in agricultural practices
- Human activities

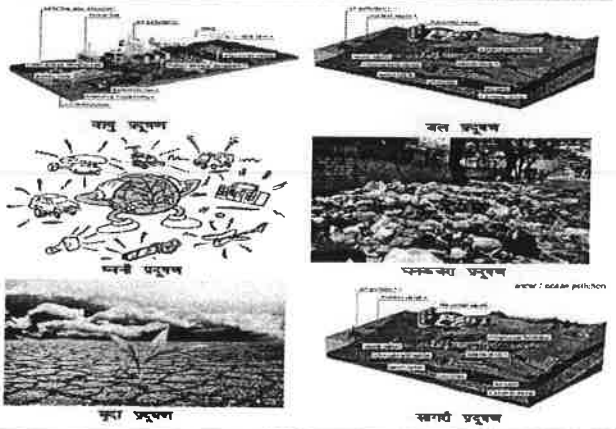
Human activity = impacts



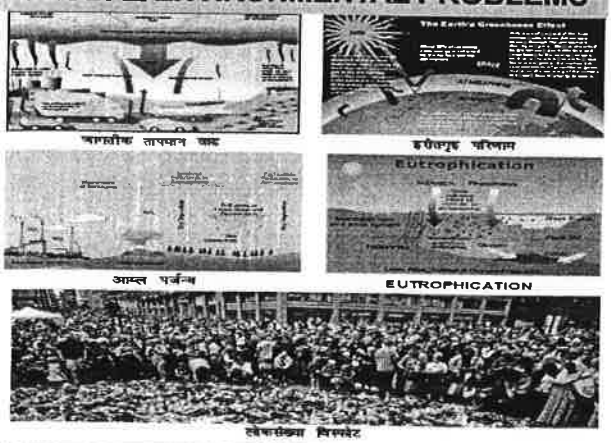
Climate change & other environmental issues are inter-linked



ENVIRONMENTAL POLLUTION



GLOBAL ENVIRONMENTAL PROBLEMS



GREEN HOUSE EFFECT & GLOBAL WARMING

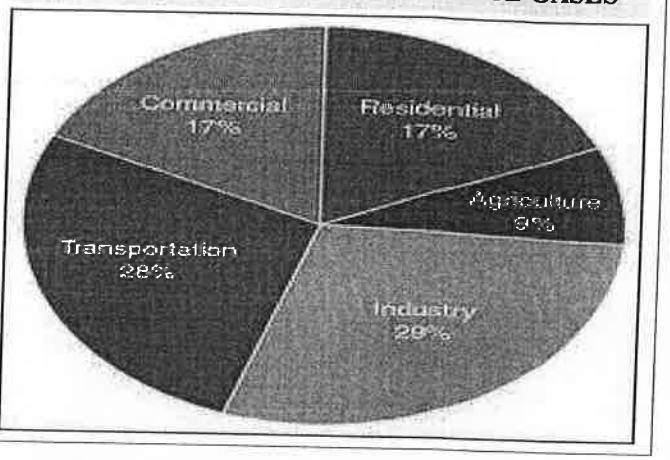
- Troposphere the lowermost layer of the atmosphere, traps heat by a natural process due to the presence of certain gases. This effect is called Green House Effect as it is similar to the warming effect observed in the horticultural green house made of glass.
- The amount of heat trapped in the atmosphere depends mostly on the concentrations of heat trapping or "green house" gases and the length of time they stay in the atmosphere.

GREEN HOUSE GASES

The major green house gases are

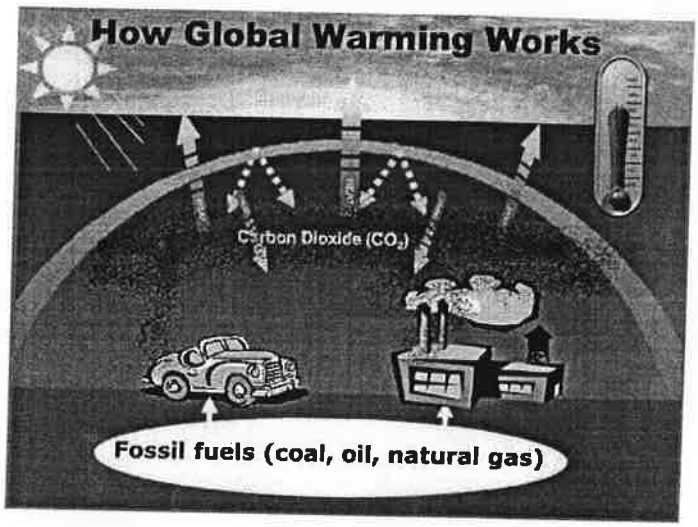
- Carbon dioxide,
- Ozone,
- Methane,
- Nitrous oxide
- Chlorofluorocarbons and
- Water vapors.

CONTRIBUTION TO GREENHOUSE GASES



ROLE OF GREEN HOUSE GASES IN THE ATMOSPHERE

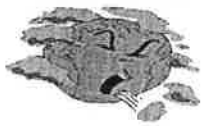
- The average global temperature is 15°C.
- In the absence of green house gases this temperature would have been -18°C .
- green house effect contributes a temperature rise to the tune of 33°C.
- Heat trapped by green house gases in the atmosphere keeps the planet warm enough to allow us and other species to exist.
- The two predominant green house gases are water vapors, which are controlled mostly by the global carbon cycle.
- Levels of water vapors in the troposphere have relatively remained constant, but the levels of carbon dioxide have increased.
- Other green house gases have increased due to human activities are methane, nitrous oxide, and chlorofluorocarbons.



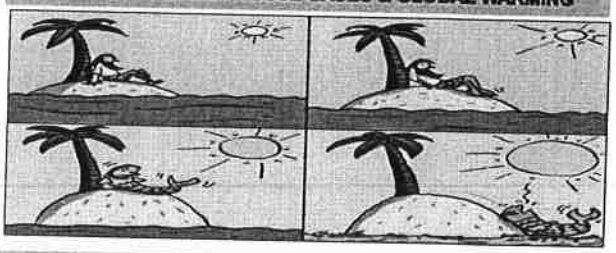
CAUSES OF GLOBAL WARMING

•Natural causes

•Man-made or anthropogenic causes



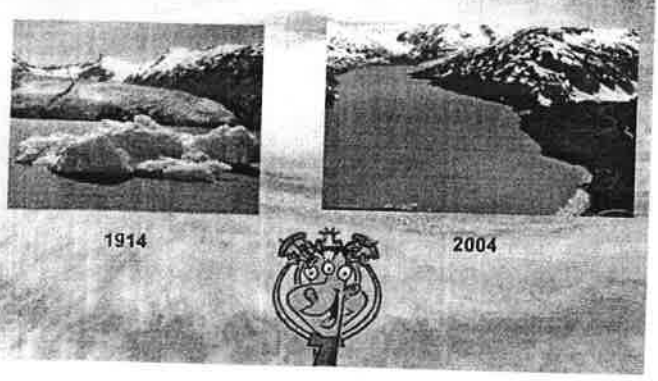
EFFECTS OF GREEN HOUSE GASES & GLOBAL WARMING



01. Global temperature increase.
02. Rise in Sea level.
03. Damage human Health.
04. Agriculture damage.

Portage Glacier

- Alaska



MEASURES TO STOP GLOBAL WARMING

- Cut down the current rate of use of CFSs and fossil fuel.
- Use energy more efficiently.
- Shift to renewable energy resources.
- Increase Nuclear power plants for electricity production.
- Shift from coal to natural gas.
- Trap and use methane as a fuel.
- Reduce beef production.
- Adopt sustainable agriculture.
- Stabilize population growth.
- Efficiently remove CO2 from smoke stacks.
- Plant more trees.

OZONE LAYER DEPLETION

- The ozone layer present in atmosphere above 40 km from earth surface (in stratosphere).
- Ozone protect the planet earth from ultraviolet radiation coming from sun.
- The depletion of ozone layer started in the early of 1960 because of the emission of NO_X by high flying supersonic aircrafts. NO_X acts as catalyst in ozone destruction.
- In coming years it was also found that the destruction of ozone layer is due to manmade chlorofluorocarbons used in the refrigerators.

FORMATION OF OZONE IN THE ATMOSPHERE

Ultraviolet radiations decompose Molecular oxygen (O_2) into atomic oxygen.

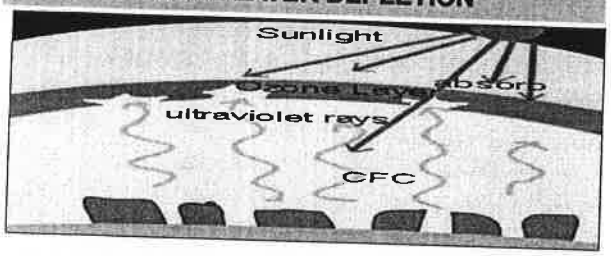
$$O_2 + h\nu \rightarrow O + O$$

The atomic oxygen is unstable and rapidly reacts with molecular oxygen to form Ozone.

$$O + O_2 + M \rightarrow O_3 + M$$

(M is the third body necessary to carry away the energy released in the reaction).

OZONE LAYER DEPLETION



Ozone layer is depleted from the atmosphere due to increase in the levels of NO_X and Chloroflurocarbons in the atmosphere.

$$O_3 \rightarrow h\nu \rightarrow O_2 + O$$

EFFECTS OF OZONE LAYER DEPLETION

- Worse sunburn.
- More eye cataracts.
- More skin cancers.
- Immunity system Suppression.
- Reduced yields for some crops.
- Reduced sea food supplies from reduced phytoplankton.
- Decrease forest productivity for UV sensitive to UV radiations.
- Increased acid deposition.
- Increased photochemical smog.
- Degradation of outdoor paints and plastics.

ACID RAIN

- Oxides of sulphur and nitrogen originating from industrial operations and fossil fuels combustion are the major sources of acid forming gases. Acid forming gases are oxidized over several days by which time they travel several thousand kilometers. In the atmosphere these gases are ultimately converted into sulphuric acid and nitric acids. Hydrogen chloride emission forms hydrochloric acid. These acids cause acidic rain. Acid rain is only one component of acidic deposition (acid rain) and dry deposition.

- Rain water is turned acidic when its pH falls below 5.6 in fact clean or natural rain water has a pH of 5.6 at 20°C because of formation of carbonic acid due to dissolution of CO_2 in water.

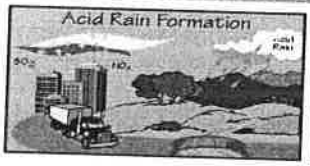
- The strong acids like sulphuric acid and nitric acid dissolved in rain water dissociate and release hydrogen ions thereby increasing the acidity in rain water.

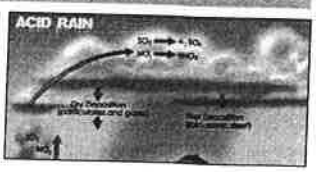
- In the absence of rain, dry deposition of acid may occur. Acid forming gases like oxides of sulphur and nitrogen and acid aerosols get deposited on the surface of water bodies, vegetation, soil and other materials. On moist surfaces or in liquids these acid forming gases can dissolve and form acids similar to that formed in acid rain.

EFFECTS OF ACID RAIN

- It causes deterioration of buildings especially made of marble. Ex. Monuments like Taj Mahal.
- It damages stone statues.
- It damages metals and car finishes.
- Aquatic animals like fish are badly affected by Lake Acidification.
- It damages reproductive damage and killing of fish.
- Many lakes in Sweden and Canada have become fishless due to acid rain.
- It weakens the trees.

CONTROL OF ACID RAIN





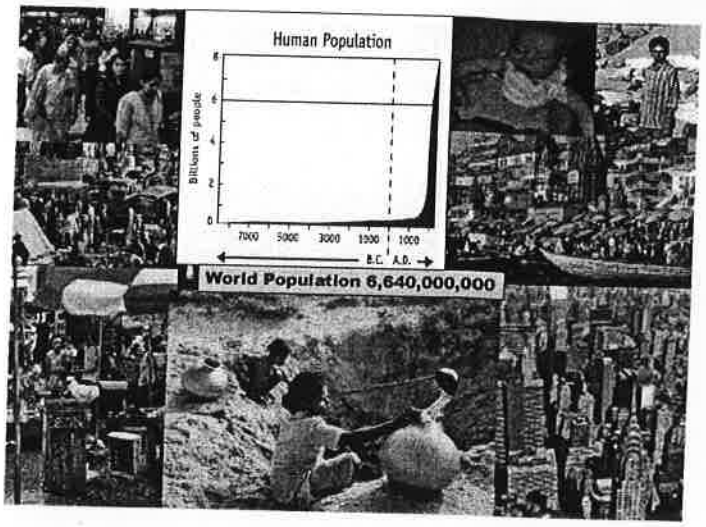
01. Emission of SO_2 and NO_2 from industries and power plants should be reduced by using pollution control equipment.

02. Limiting of lakes and soils should be done to correct the adverse effects of acid rain.

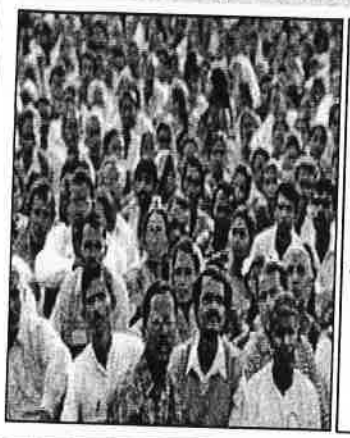
03. A coating of protective layer of inert polymer should be given in the interior of water pipes of drinking water.

Population Explosion

- Increased Population leads to global warming because of increased need for food production, animals , transportation etc



Population Growth



- The Population has doubled since 1950 to the present level.
- World population estimates that it was in 791 million in the year 1950 and now it will reach 8909 million in the year 2050.

Effects of Population Growth

- The growth of human population beyond the sustaining capacity of the Earth's resources are not desirable and should not be allowed.
- It brings misery to both humans beings and nature.

URBANIZATION

- The urban population swelled to 46% and expelled to be more than 60 % by the end of 2014.

Characteristic Features of Urbanization

Advantages of cities

Cities have certain advantages to a nation. But they bring with them several problems too- Physical, Ecological and Social in nature

- Cities spur economic development
- They serve as centuries of growth of economic, industrial and transportation and other amenities easily available.
- Large number of Jobs are created.

Disadvantages of cities

- Cities are the places rich in people and products.
- Environmental pollution – water, air, land pollution and noise pollution- resulting from urban activities.
- Social tensions increases and criminal activities breed in towns.
- Social evils such as gambling, consumption of narcotics and prostitution take root in cities.
- A characteristic features of urbanization is the growth of slums. The life style of people dwelling in slums is pathetic.

Problems due to Urbanization

Some of problems are shown below.

- Food
- Shelter
- Water
- Resources
- Health care
- Energy
- Jobs
- Transportation problems
- Storage of land
- Environmental problems
  - Water pollution
  - Land pollution
  - Spread of diseases
  - Deforestation

Challenges in Urbanization