

LECTURE'S NOTE ON ENVIRONMENT STUDY

Semester - 3rd

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Air Pollution

Air → Air is a mixture of many components
i.e. Gases, water vapour, dust particles.

In Gases mostly Nitrogen, oxygen, carbon dioxide present in the atmosphere. Other gases are also present in the atmosphere.

Air Pollutant → A substance in the air that have adverse/negative effect on human and ecosystem.

- Air Pollutant may be Natural or Man made.

Natural source

- Dust particle
- Gases released from the body process.
- Smoke from the wildfire (in the forest)
- Volcanoes.
- Natural Radioactivity

Manmade sources

- Burning of fossil fuel.
- Agricultural activity
- Industrial activity
- Mining operation
- Artificial radioactivity.

Effect of Air Pollution 2

- Global warming → ~~Rise~~ It is defined as rise in temperature due to excess amount of CO_2 .

- Acid Rain — Pollutants in air like Nitrogen oxide, sulphur dioxide causes acid rain which effect on building, monument, terrestrial and aquatic animals and plants.

- Green house effect — The greenhouse effect is a natural process that warms the earth's surface. When the sun's energy reach the earth's atmosphere, some of it is reflected back to space and the rest is absorbed by greenhouse gases. The absorbed energy warms the atmosphere and the surface of the earth.

Greenhouse gases

- Water vapour
- Carbon dioxide
- Methane
- Ozone
- Nitrous oxide.

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- Hole in ozone or Depletion of ozone layer -
 - Releases of CFC (from Refrigerator) removes some of the ozone.
 - This caused hole in ozone.
 - Harmful UV (ultraviolet) rays coming from the sun will directly enter the surface of earth which causes harmful to mankind.

- Effect on human health - It affects the human being in a larger than other kinds of pollution since every human being breathes the air of the atmosphere constantly. It may cause headache, respiration problem, lungs cancer, allergies, cold & cough, asthma etc.

- Effect on plants - Air pollution causes decreased growth rate and increased death rate of plants.

- Bad quality of crop production.

- Effect on wildlife - Loss of habitat.

Control strategy

- Make use of wind energy and solar energy as well as other Renewable energy, to minimize burning of fossil fuel.

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suitable selection of fuels for combustion in domestic, industrial and automobile sectors. i.e. Fuels with low sulphur, low ash.

- Modification in industrial process and in equipment to reduce emission.
- correct selection of manufacturing site and industrial setup to disperse pollutants to a wider area.
- Planting of more and more trees.
- Educating people for saving ~~and~~ natural resources.
- Using less fossil fuels and to switch for green energy.
- Laying down strict environmental laws.

Water Pollution

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Water

- It is an integral part of life.
- It is tasteless.
- Three fourth of the earth's surface is water.
- It is the main element for many industrial purposes.
- It is useful for drinking, agriculture, industrial purpose, domestic use, energy production etc.

Water Pollution

- Water pollution is the contamination of the water resources with harmful substances.
- It affects the entire plants and living organisms.
- Due to human activities water becomes pollute.

Causes of Water Pollution

Water pollution occurs due to organic and inorganic contaminants.

The water becomes pollute because

- Use of detergent
- Food processing waste
- Insecticide & herbicide.

- Petroleum hydrocarbons⁶ including fuels (Petrol, diesel, gasoline, jet fuels).
- Industrial discharge
- Fertilizer containing nutrients - nitrate and phosphate.
- Heavy metals from motor vehicle.
- Municipal waste water.
- Due to oil spillage (cause death to many fishes)
- Mining activities near water bodies.
- Ocean and marine dumping (Food waste, plastic, rubber are thrown).

Effect

- Death of Aquatic animals - It kills life that depends on these water bodies.
 - Dead fish, crabs, dolphins and many other animals often found dead on the beaches.
- Disruption of food chain - Disrupt the ~~the~~ natural food chain.
 - Pollutants such as lead, cadmium are eaten by tiny animals. These animals are consumed by fish, so food chain affected.

- 7 Human diseases ~~7~~ people can get diseases by eating seafood that has been poisoned.
- In many poor nations, there is always outbreak of cholera and disease as a result of poor drinking water.
- 7 Destruction of Ecosystem - Ecosystem can be severely changed or destroyed by water pollution.

Solutions.

- Do not throw waste in open.
- Do not throw chemicals, oils, paints and medicines down to water bodies.
- If we use chemicals and pesticides, be mindful not to overuse pesticides and fertilizers.
- Use of environment friendly liquids and other items.
- Grow trees near water source.
- Develop awareness ^{among} people regarding the importance of water.

Soil Pollution

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- The contamination/impurity of soil with ~~solid waste~~ is called soil pollution. It may be due to solid waste, agricultural waste, industrial waste, Household waste etc.
- Due to soil pollution, the soil becomes infertile.

Causes of Soil Pollution

- * Deforestation - Removal or cutting down of forest.
 - once converted into dry land, can never be made fertile again.
 - Loosens the soil.
 - major reason to soil pollution
- * Irrigation - supplying the water to cropfields.
 - Due to wrong practice of irrigation soil pollution occurs.
 - water logging condition (excess water)
- * Toxic fertilizers and pesticides
 - Demand for food has increased.
 - use of highly toxic fertilizers and pesticides, contaminates the soil.

* Mining

- metals like cadmium and lead are the toxic and contaminates the soil.

* soil erosion - soil erosion means loss of top cover of soil.

- loss of fertile land.

* Acid Rain - Harmful gases from industry i.e. sulphur dioxide, nitrogen oxide released into the atmosphere. These acidic gases becomes cloud. When it rains, it falls on the surface of earth. It can kill plant, it pollute the water bodies.

- The Acidic water falls on the soil. It pollutes the soil making the soil Acidic.

Impact/Effect of Soil Pollution

* change in ~~also~~ climate pattern - It directly or indirectly affects the climate pattern.

- contamination of underground and surface drinking water.

* Effect on human health

- The land ~~also~~ contaminated with toxic chemicals and pesticides.
- Toxic chemicals reach our body through food and vegetables.

10 Problem of skin cancer and human respiratory system.

* Environmental Effect

- With deforestation, tree cover is reduced.
- It leads to imbalance in ~~water~~ rain cycle.
- Global warming, irregular rainfall and floods.

* Distraction for tourist

- City loses its attraction as tourist destination due to landfills.
- It leads to loss of revenue for the government.

* Effect of wildlife

- Loss of habitat.
- Species are pushed to the verge of extinction.

* Global warming

- Rise in temperature leads to global warming. The temperature increases due to excess amount of CO_2 .

Remedies/control

* Awareness among people.

* Garbage disposal - ~~Garbage~~ Garbage should not be disposed in open.

- There should be dumping ground.

* Do not use plastic - As plastic is non-degradable.
- say "No" to plastic.

* Waste management - proper treatment of liquid waste from industries and mines must be done.

* Grow trees - Grow more number of trees and avoid deforestation.

* Biofertilizer - Use biofertilizer and natural pesticides.

Marine Pollution 12

Pollution of marine occurs due to

- Due to spillage of oil, chemicals in oceans due to accident of ships, submergence of ships due to cyclone etc.
- Movement of motor boats, sheeps in deep ocean.
- Over fishing
- Discharge of municipal solid waste and liquid waste in ocean.
- Discharge of chemicals and pollutants from chemical fertilizers, oil refinery and power plant.
- Discharge of radioactive ~~or~~ pollutants from nuclear power plant.
- Discharges from hotels, hospitals, etc.
- Discharge from food processing industries.
- Ocean mining in the deep sea.

Steps to control

- Discharges from municipality, hotels, hospitals, after due treatment can let them to ocean.
- Over fishing, over shipping in ocean ecosystem are banned in some region of ocean.
- Radioactive discharges can be buried in deep ocean very much away from coast.

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- chemical plants and ~~refineries~~ refineries can not directly discharge toxic material to the ocean without treatment and neutralisation.
 - strict laws are enforced to save marine ecosystem.

Solid waste pollution

- There are many solid substances which after a short period of time becomes waste and have to be disposed somewhere away from the living space.
- such solid wastes are newspaper, bottles, plastics and polythene, other domestic garbage. Also there are metallic and non-degradable solid wastes are there.
- These solid wastes pollute the air and water surroundings the area.
- The dumps create foul smell and health hazards.

— End —

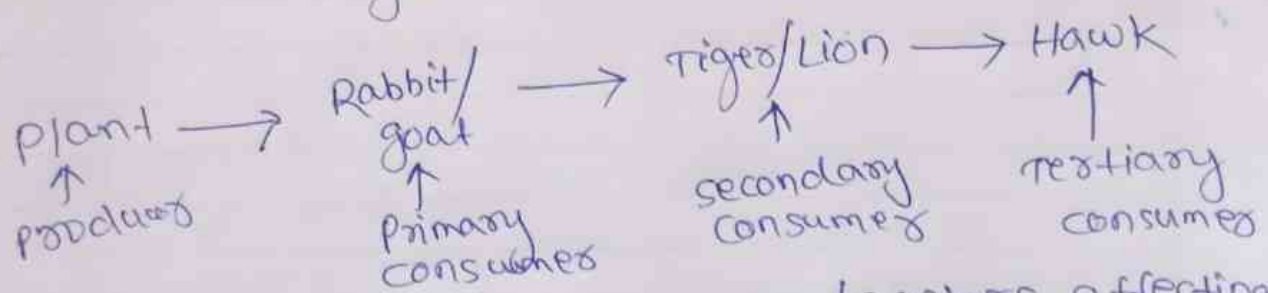
Ecosystem

→ Definition - All the biotic (living) and abiotic (non living) components exist on the earth surface is called Ecosystem.

- Biotic - *Producers (Green plant)
- * Consumers
- * Decomposers

- consumers is further classified as primary consumer, secondary consumer, tertiary consumer.

- Abiotic - water, soil, organic substance, inorganic substance, sunlight, gases.



Common Threat to Ecosystem / Factors affecting Ecosystem

- Increase in population
- Infrastructure development - Dams, highway, building construction
- Deforestation
- Release of pollutants - Human, agriculture & industrial waste.

Protecting Ecosystem

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- Use Ecofriendly products i.e. avoid polythene bags, use paper bags.
- Plantation of tree.
- Do not throw waste product to water bodies like pond, river.
- Conserve our forests.

Terrestrial Ecosystem (Ex Forest)

- A community of organism and their environment that occurs on the land masses of continents and islands.

Abiotic — water, temperature, soil, sunlight, nutrients, gases.

Biotic — plants, animals.

Characteristics

- Low available of water.
- Greater temperature function
- Available of light is greater.
- More available of gases.

Function of Ecosystem

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- * Productivity and Level
- * Decomposition
- * Energy flow
- * Nutrient cycling

* Productivity → Rate of production of biomass per unit area and per unit time.
biomass → energy

It is of two types.

- Primary productivity — Amount of biomass produced by Producers (Plant)

- Secondary productivity — Amount of biomass produced by consumer is called secondary productivity. It is lower than primary productivity.

→ Productivity level depends on sunlight, soil type, nutrition available, types of plant species.

* Decomposition — It depends on food chain.

Food chain — Food transfers from one level to another is called food chain.
ex plant → Rabbit → Lion

Food web — Number of food chains are interconnected is called food web.

Ecological pyramid — Graphical representation of food chain is called ecological pyramid.

* Energy flow

- Flow of energy is unidirectional.
- Flow of energy takes place from one level to other.
- It follows laws of thermodynamics
 - 1st law - Amount of energy is constant.
 - Energy can neither be created nor destroyed.
 - It is transferred from one level to another.
 - 2nd law - Total energy can not be transferred from one level to another.
 - Some energy lost in the form of heat.

* Nutrient cycling

- carbon cycling
- Nitrogen cycling
- Hydrogen cycling
- sulphur cycling

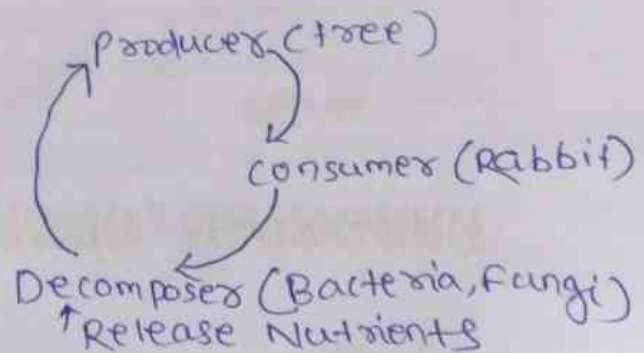
Types of Ecosystem

Natural Ecosystem - Forest, Desert, Grassland, marine, Fresh water

Man made Ecosystem - Aquarium, cropfield, flower bed.

How energy flow occurs

It is energy flow or food flow



15 - ~~How~~ first the energy or food is prepared by producers i.e. Tree by the process of photosynthesis.

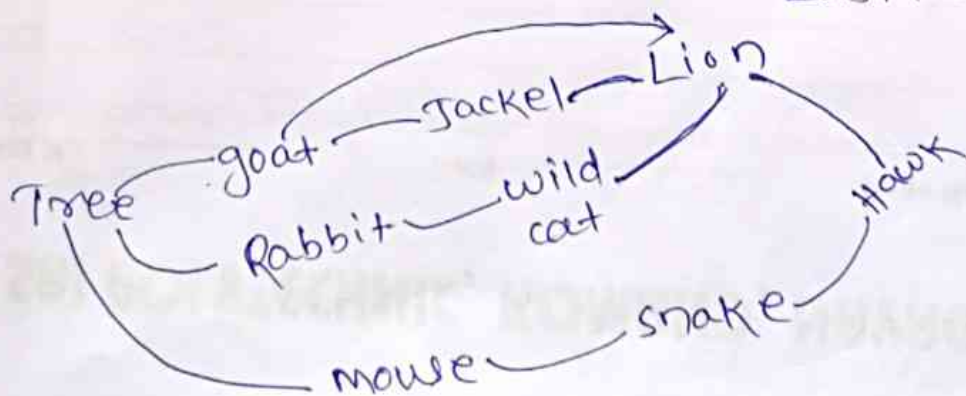
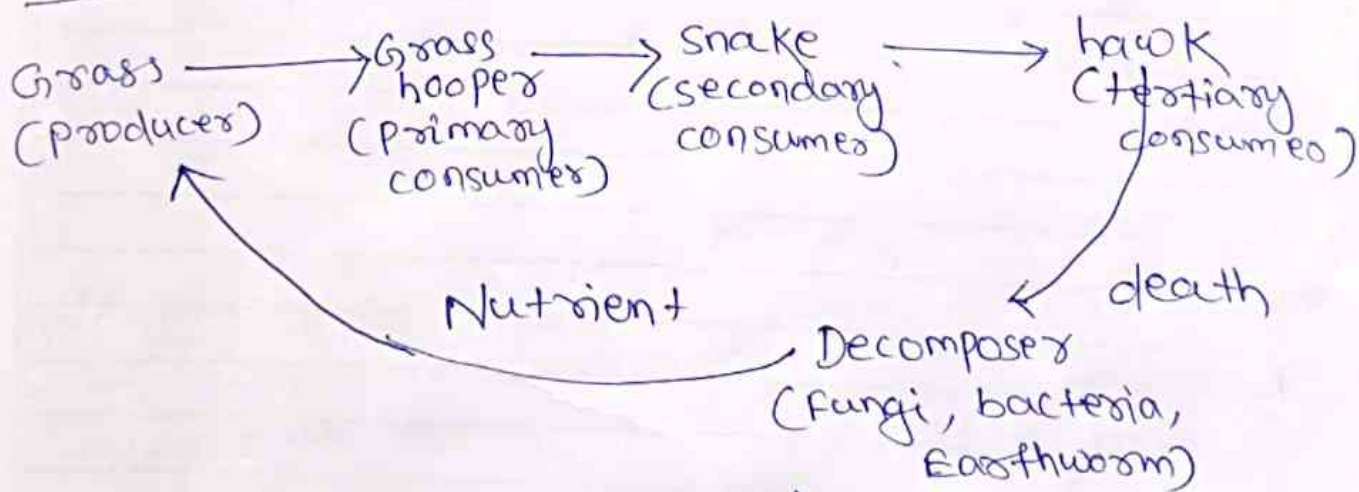
- Then flow of energy takes place in the ecosystem from producers to consumer again to decomposer and again to producer.

Ecological Niche - The role or ~~behav~~ behaviour of species in the ecosystem is called ecological niche.

- No two species have same ecological niche.

Habitat - A place to live. To ~~stay~~ live, nutrition, shelter, water is required.

Food chain



Aquatic Ecosystem (Water Body) 19

- An ecosystem in a body of water.
- Largest ecosystem.
- It covers two-third of the surface of the earth.
- large biodiversity.
- In plants algae, Floating plants are there.
- In animals fishes, shark, frog, starfish, snail, other animals are there.

Ecological pyramid

Graphical representation of food chain is called Ecological pyramid. It is of 3 types

- pyramid of Number
- pyramid of Biomass
- pyramid of Energy



pyramid of Number

- It indicates Number of organism.
- How many no. of trees, giraffe and lions are there.
- Number reduces as we go higher

ex Lion - 10
Giraffe - 50
tree - 100

pyramid of Biomass

- It indicates weight of organism.
- It indicates weight of tree, giraffe & lion.
- weight reduces as we go higher.

Pyramid of Energy 20

- Energy is transferred from one level to another.
- One organism eats other organism and the food is transferred and hence energy is transferred.
- Some amount of energy is lost when energy transfer occurs.
- Energy level decreases as we go higher.

CHAPTER-1

Renewable & Non Renewable Energy source

Renewable Energy source

- Those resources which can be regenerated in a short period of time is called renewable energy source.
- Supply is unlimited
- It is available to the nature.
- It can be used again and again.

Ex Air, water, sunlight, forest, wind

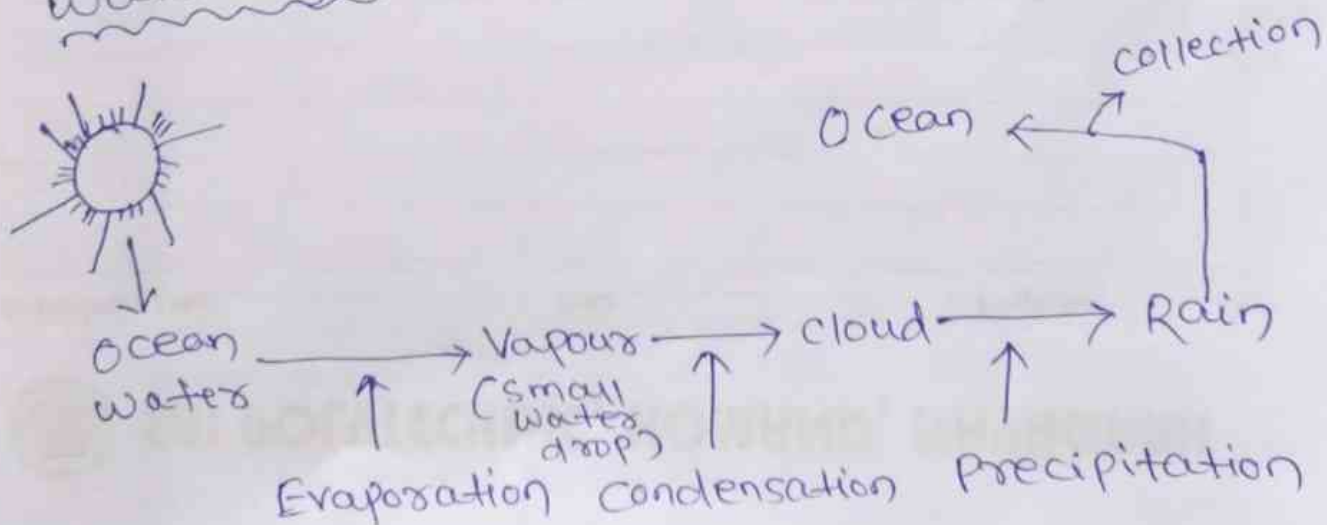
Non renewable energy source

- Those resources which can not be regenerated in a short period of time is called non-renewable energy source.
- Supply is limited.

- It can not be used again and again. 21
Ex Coal, petroleum, Minerals.

① Water Resource

- water is the integral part of our life.
 - water is essential natural resource for sustaining life and environment.
 - It is used for agriculture, Industrial purpose.
 - water may be fresh water & salt water. fresh water does not taste salty. where as salt water tastes salty. Example of fresh water is River, pond, Lake. Example of salt water is Sea, ocean. In earth maximum salt water is present.
 - It may be Hard or soft. In hard water Ca, Mg present. In soft water Ca, Mg is absent.
- Water cycle



- 22 - Plant evaporates water — Transpiration
- Solid ice directly converts to sublimation vapour

- Flood - Flood refers to the presence of unusually large amount of water at any place that can not be handled by the drainage system
- Depends on climate, rainfall, amount of snow
 - Due to sudden heavy rainfall, dam failure and river obstruction.
 - Due to cyclone activity like hurricane.
- Drought - It is a condition where available of water is less.
- Mainly due to constantly below average rainfall.

② Mineral Resource

- It is a non renewable energy source.
- Limited in amount.
- If we use it excessively, it will finish.
- It takes thousands of years again for construction.
- It is used in construction and manufacturing industry, building, vehicle, kitchen material, computer, mobile etc.
- It is found near the surface of the earth.
- mineral resource may be Metal, Non metal, fuel.
- When mineral or ore is purified or extracted we get metals, non metals.

Examples of metal is ²³ copper, zinc, gold, silver, Aluminium, ~~6~~ Manganese.

Cu - It is a good conductor of electricity.

$Cu + Zn = \text{Brass}$

$Cu + \text{Tin} = \text{Bronze}$

Iron - Machinery product, medical equipment, agriculture, vehicle, Household, Railway, building, bridge etc.

Al - It is used in Aeroplane, ship, Utensil.

Manganese - It is used in chemical industry, glass industry.

Non metal - Example is sand, coal, Gypsum, Petroleum.

- in cement - Gypsum

- Coal is used in thermal Power plant, cooking

Petroleum

- It is also called black gold.

- It is found in thick, dark form in the deep interior of the earth and under sea.

- Found in Mumbai High, Digboi (Assam), Ankaleswar (Gujarat)

- Refinery industry - Mumbai, Chennai, Kochi, Mangalore.

- Petroleum product are - Kerosene, petrol, diesel, Petroleum jelly.

(3) Food Resource

- Food is any substance consumed to provide nutritional support for the body.

- It is usually of plant or animal origin.

- Q1 - It contains nutrient of carbohydrate, fats, protein, vitamin and minerals.
- food is required for growth, body repair, daily activities.

Factors causing food problem

- Geographical condition
- Lack of rainfall
- population growth
- Poor quality of soil
- Natural Hazards - flood
- Use of chemical fertilizers

What is overgrazing?

Overgrazing

- It refers to the practice of grazing by a large cattle for a long period on a land without giving sufficient recovery time.

Effects of overgrazing

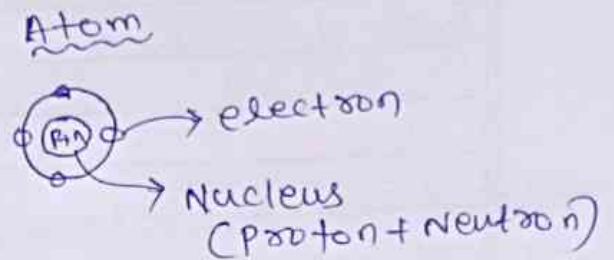
Soil degradation - It removes the vegetation cover from over the grassland. So the fertility of soil degraded. The water absorption capacity of the root will automatically get reduced.

Soil erosion - The soil erosion occurs due to wind, rainfall. The fertile soil layer containing nutrients is washed away.

Loss of useful species - Overgrazing of a land affects the composition of plant population and their regeneration capacity and get replaced by thorny plants

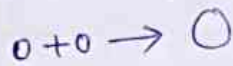
which are ²⁵ less nutritious. The rich grassland changes to desert.

(4) Energy Resources Nuclear Energy

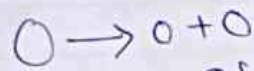


- If nucleus participate in reaction it is called Nuclear reaction.
- If electron participate in reaction it is called chemical reaction.
- Nuclear energy is obtained through fusion or fission of radioactive materials, contains large amount of energy. ex Uranium.

Fusion — Two smaller nucleus makes bigger nucleus.



Fission — One bigger nucleus breaks into the small nucleus.



- Huge amount of energy in the form of heat.
- Heat is used to boil the water and water is converted to steam and steam is used to produce electricity.

Disadvantage

- It is risk.
- High cost of building and operating.
- Technical issue.
- Deadly Radioactive waste.

* Natural Gas — It is a mixture of methane, ethane, propane and butane.
Gas cylinder ← LPG — Liquefied Petroleum Gas
Vehicle ← CNG — Compressed Natural Gas

5) Land Resource 26

- The solid portion of the earth's surface.
- Human civilization has taken place on the land.
- Fullfill the basic need i.e. food, cloth and shelter.
- Used in agriculture.
- It is the source of minerals and fossil fuels.
- protect from high temperature of the earth's core.
- Provides habitat for ~~to~~ living and non living organism.
- Regulates water cycle & carbon cycle.

* Land degradation — The fertility of land supports the growth and productivity of natural vegetation and agricultural crops.

- A number of ~~to~~ natural and man made factors lower the quality of land. This is called as land degradation.

The land degradation occurs due to natural factors & man made factors.

Natural factors — Heavy rain

- High speed rain & storm
- Natural disaster like earthquake, flood.

man made — Mining

- Urbanisation
- Deforestation
- Excessive use of pesticides & fertilizers.
- Construction of dams, roads & canals.

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What is function of soil and what is soil erosion?

* Function of Soil

- It plays significant role in Nutrient cycle.
- Basic of the agricultural production.
- store water and regulate water supply.
- control pollution and filter ground water.
- produce most of clay for brick making.
- provide a foundation for building.

* Soil Erosion

- Soil erosion is removal of top soil from its place by various agencies like high speed ~~co~~ wind and water:

- - causes - Desertification, Industries, Pollution, floods, overgrazing, agricultural mismanagement, large violent wind.

- Effects - Decreases productivity of soil.
 - Desertification of land.
 - Reduction in agricultural land.

- control - control of overgrazing.
 - plantation of tree.

* What is Desertification

Desertification - conversion of fertile land into an infertile desert land is called desertification.

→ Desertification may occur due to Natural or man made.

- Natural cause - very low rainfall.
 - Excessive Evaporation
 - High salinity of soil

Man made

- continuous cutting of trees.
- overgrazing.
- over irrigation
- Excessive use of fertilizer.

- Effects - Poor the soil quality.
 - Huge economic loss.

- Control - Large plantation of trees.
 - control of overgrazing.
 - changing agricultural practice.

Biodiversity

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- The variety of life found on earth. It means different types of living organism, i.e. plants, animals, humans, microorganism present on the earth. In microorganism ~~virus~~ virus, bacteria, fungi are there.

Values of Biodiversity

- (i) Consumptive value
- (ii) Productive value
- (iii) Social value
- (iv) Aesthetic value
- (v) Economic value

Consumptive value

- Nature's product that are consumed directly without passing it through a market.
- Food
- Fibers - cotton, jute
- Drugs and medicine
- Fuel (firewood) - plant species - perfume, tea, coffee.

Productive value

- commercially usable values.
- Product is marketed and sold.

- * Tusk of elephant. 30
- * silk from silkworm
- * wool from sheep
- * fish culture

Social value

- Some of the social values are
- Use of the domestic animals for the protection of individual or community from threat or danger.
 - Use of ~~horses~~ horse, cow, camels and others can be used for transport.

Aesthetic value

- ↓ Beauty
- Attractive mountain, colourful flowers, beautiful birds, vibrant butterflies
 - Beauty of our planet is because of biodiversity.
 - Use of neem and mango leaves during festival.
 - Use of many ornamentals plants for house decoration and others.

Economic values.

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- There are many economic values i.e.
- Bacteria helps in making curd, cheese, vinegar, vitamins and others.
 - Plants give us gel, gum, colours, rubber and others.
 - There are many medicinal plants which can cure many diseases.
 - Special parts of animals like tusk of elephant, skin of deer, nails of tigers, head of wild animals and others are used for display or for some other purposes.

Threats of Biodiversity 932

- Habitat loss / destruction of habitat.
- Poaching of wild life
- Man - wildlife conflict

* Habitat Loss

- The region where some plants or animal live.
- Basically habitat is the natural home for an animal or plant.
- Habitat loss mainly occurs due to human activity.

Factors contributing to habitat loss

- Deforestation
- Urbanisation
- Industrialisation
- All type of pollution

* Poaching of wild life

- Poaching is an illegal practice of hunting, killing or capturing animals for commercial purpose.
- Animals are poached by using arrow and bow, nets etc.

Main causes for poaching 33

- Human kills the animals for commercial purpose.
- Tiger and leopard for their skin and bones to make fashion products and it is used in medicines.
- Elephants for their tusk.
- Rhinoceroses for their horns.
- Bears for their skin, teeth and claws.
- sheep for their skin
- Deer for cosmetics.
- Snakes and lizard for their skin, for leather industry.
- Hen as food.
- Goat as food, milk.
- So around 25% of the world's species will undergo extinction.

Ways to protect wildlife from poaching

- National park should be provided with a dedicated antipoaching team.
- Volunteer activity should be involved. ~~It~~ If you do not have time, give time to many organisation who are working on it.

- Government should keep laws for poachers. ³⁴

Man-wildlife conflict

man wildlife conflict occurs due to

- Transformation of forest and other ecosystem into urban areas.

- Degradation of wildlife habitats.

- Due to climatic effect.

- Due to deforestation

It can be reduced by

- creation of ideal condition by creating zoo, National park.

- We should plant many trees, so they can get shelter.

- wildlife habitat should be brought under conservation network by declaring them as National park.

Conservation of Biodiversity 35

- Conservation involves protection, preservation and management of biodiversity.
- Conservation means man's management of man's use of Biosphere in such a way that maximum benefit is attained by the ~~present~~ present generation while maintaining its potential to meet the requirement of future generation.

Methods of conservation of Biodiversity

In-situ Conservation

- In this process biodiversity is conserved in their natural habitat.
- Protection through network of protected areas.
- Less expensive and easy to manage.
- Without Human interference.
- protect interest of indigenous people.
(native/local)

Ex-situ Conservation

- Biodiversity is conserved outside their natural habitat.
- Useful for conducting research.
- Endangered animals on verge of Extinction are successfully bred.
- observing wild animals.

In-situ conservation

National park

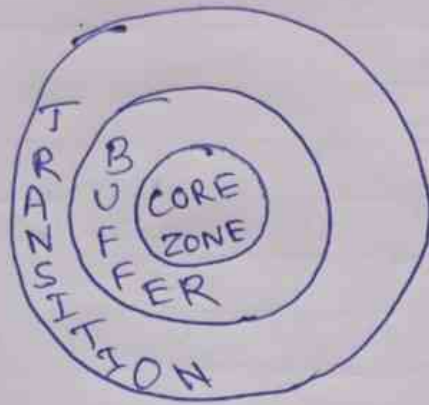
- Area strictly reserved for betterment of wild life and where activities like forestry, grazing are restricted within limits.
- Small areas - 100 sq. Km - 500 sq. Km
- maintained by national government.
- 103 National parks in India.
- first National park of India - Jim Corbett National Park.

Wildlife Sanctuary

- protected area which is reserved for conservation of only animals.
- Human activities like Harvesting of timber are allowed as long as they do not interfere with well being of animal.
- Boundaries are not well defined.
- controlled tourist activity.
- 544 sanctuary in India.

Biosphere Reserve

- protected areas where human population also forms a part of the system.
- Concept evolved by man and Biosphere Programme (MABP)
- 18 Biosphere Reserves in India



Core zone - Inner zone
 - Undisturbed
 - Legally protected area. No human activity.

Buffer zone - It is between core and transition region.
 - Research and Educational activities permitted.

Transition zone - It is the outermost zone.
 - cropping, forestry, fishing activities permitted.

- Function — conservation³⁸ of biodiversity.
- Development of economic
 - scientific research can be done.

Ex-situ conservation

Botanical Garden

- Different plants are kept in botanical garden.
- Plants from rare herbs, important medicinal plants, flowers, ~~fruits~~ present.
- Fruits, vegetable can be grown.
- Provide beauty and calm environment.
- Exotic plants for education and research purpose. Foreign origin

Zoological garden

- Commonly known as zoos.
- Wild animals are kept under supervision.
- India's 1st Zoo — Borjhar Zoo

Seed Gene Bank

- cold storage.
- seeds are kept under controlled low temperature and humidity for storage.
- Remains useful for long duration of time.

cryopreservation ³⁹ Living

- preservation of Biotic parts at ultra low temperature (-196°C) in liquid Nitrogen.
- Latex used for Research purpose.