Environmental Studies

Environment : Derived from French word – **Environner** which means **To Surround** or **Our Surroundings.**

It may be defined as the sum total of Air, Water and Land & their inter-relationships with human beings, other organisms & materials.

Environmental Science : The Scientific study of basic components of our surroundings & their interactions is called environmental science.

Ecology : Derived from two **Greek words - Oikos** means **Home** & **Logos** means **Study**.

Coined by **Eaenst Haeckel** in **1869.**

It may be defined as the study of organisms in their natural home interacting with their surroundings is called Ecology.

For example : How a small insect interacts with Air, Water, Soil, Plants & other Animals in forest.

Ecosystem : It is a self-regulating group of biotic communities of species interacting with one another & with their non-living environment exchanging matter & energy.

Structure of an Ecosystem : Divides into two components :

A. Biotic (Living) Components
B. Abiotic (Non-living) Components

A. Biotic (Living) Components : Include all living organisms present in Ecosystem such as Human beings, plants, animals & Micro-organisms.

Biotic (Living) Components Divides into three types :

1. Producers
2. Consumers
3. Decomposers

1. Producers : These are mainly Green Plants which synthesize their food themselves by using Co_2 present in air & water in the presence of sun light & Chlorophyll by photosynthesis process.

2. Consumers : All organisms which get their food by other organisms.
Consumers are of following types :
1. Herbivores : Plant eaters. e.g. Man, Rabbit etc.
2. Carnivores : Meat eaters. e.g. Snake, Frog etc.
3. Omnivores : Both plants & Meat eaters. e.g. Fox, Humans etc.
4. Detritivores : Feed on waste of living organisms/parts of dead organisms. E.g. Ants, termites etc.

Environmental Studies

3. Decomposers : Derive their food by breaking complex organic molecules into simple organic compounds & then inorganic nutrients. e.g. Fungi, bacteria etc.

B. Abiotic (Non-living) Components : Includes Physical & Chemical Components of the Ecosystem.

1. Physical Components : Sunlight, Temperature, Rainfall, Soil etc. are physical components which influence ecosystem strongly.

2. Chemical Components : Carbon, Oxygen, Hydrogen, Nitrogen, Sulphur, Salts etc. are chemical components which influence ecosystem strongly.

Importance of Ecosystem : 1. Ecosystem provide clean air & water to food & fuel.

2. Ecosystem maintain air quality & regulate climate.

3. Ecosystem store clean & fresh water.

4. Ecosystem store & recycle nutrients.

5. Ecosystem provide medicines & maintain biological factors.

Sources of Energy : Classified into two caregories :

1. Non-renewable/Conventional sources of energy
2. Renewable/Non-Conventional sources of energy

Non-renewable/Conventional sources of energy : These sources of energy are limited in quantity & will be exhausted over time. **e.g**. Natural gas, coal, oil etc.

Renewable/Non-Conventional sources of energy : Renewable energy is energy produced from different different sources like solar energy from sun light. These include bio-energy, solar energy, wind energy etc.

Sustainable Development : The development that meets the needs of the present witout compromising the ability of future generations to meet their own needs.

Following strategies be observed to obtain sustainable development :

1. Control the population growth.
2. Reduce the wastage of matter.
3. Reduce the wastage of energy resources.
4. Conserve natural resources e.g. water, soil, forests etc.
5. Make things that reused, recycled & repaired.
6. Help to sustain earth's biodiversity.

Environmental Studies

Air Pollution : It may be defined as the occurence or addition of dust, gases, smoke, odour etc. into the air which cause bad/adverse effect on human beings, plants, animals & other objects.

Sources of Air Pollution : The following are the sources of Air Pollution :

1. Stationary Combustion Sources : Burning of fossil fuels/coal in industries, houses, thermal plant etc. adds gases & other matter in the air.

2. Mobile Combustion Sources : Increase in automobiles, aircrafts etc., these are the largest source of air pollution in big cities. Major pollutnts emitted from these are Gaseous pollutants, aerosols etc.

3. Industrial Processes : processes such as welding, synthesis of chemicals, grinding etc adds gases in the air.

4.Secondary Air Pollutants : Acid rain & photochemical smog are major secondary air polltants.

Effect of Air Pollution on Human Health :

(i) Dust & smog cause respiratory problems such as asthma, lung cancer etc.

(ii) High Concentration of So_2 in air cause cough, nasal discharge etc.

(iii) High Concentration of No_2 in air cause internal bleeding, oxygen deficiency etc.

(iv) Lead compounds affect children's brain.

(v) Mercury cause damage to kidney & nervous system.

(vi) Cadmium cause cardiovascular diseases & lever damage.

Effect of Air Pollution on Plants :

i) So_2 causes loss of chlorophyll & yellowing of the leaf.

(ii) No_2 retard the growth of plants.

(iii) Dust & smoke settle on leaves of plants which reduce sunlight & hence reduce photosymthesis..

(iv) Ozone causes dead area on the leaf structure.

(v) Tiny Plant's (Lichens) growth inhibited in air pollution.

Effect of Air Pollution on Animals :

(i) Acid rain affects aquatic life.

(ii) High amount of Fluorine results abnormal growth of bones.

(iii) Ozone in air causes irritation & various diseases in dogs, cats & rabbits.

(iv) Ultraviolet radiations cause cancer in wildlife.

(v) Lack of appetite in pet animals due to lead poisioning.

Effect of Air Pollution on Economy :

(i) **Corrosion** : Deposition of acid by acid rain on building roofs, railway tracks, metal on bridges etc. damage due to corrosion.

(ii) **Damage to building materials** : Due to acid Deposition which reacts with lime stone.

(iii **Damage to Paints & Protective Covering** : Due to pollutants like So_2, O_3, H_2S & Aerosols.

(iv) **Rubber Cracking** : Due to Ozone & PAN.

(v) **Damage of Textile Fibres & Textile Dyes** : Due to SO_x, NO_x, & O_3.

(v) **Damage of Leather & Paper** : Due to SO_2 leather lose much of its strength & paper decreases folding resistance.

(iv) **Effect on Glasses & Ceramics** : Due to air pollution these show a change in surface appearance.

(v) **Damage to Art & Architecture** : Like Taj Mahal damage due to acid rain.

Control methods of Air Pollution :

A. Preventive Measures

1. Shifting to less polluting fuel such as CNG, LPG etc.

2. Planting more & more trees.

3. Controlling Automobile pollution by the use of efficient engines & catalytic converters in the vehicles.

4. Selection of suitable fuel which reduce amount of pollutants in the emissions.

5. Control of Gasesous Pollutants through the tecniques of combustion at a high temp., absorption & adsorption.

B. Control Measures

Environmental Studies

(i) Gravitational Settling Chamber method : It is used to remove the particles exceeding 50 micrometer in size from the polluted gas.Polluted gas is allowed to enter from one end & velocity of gas stream is kept less than 0.3 m/s to give time to settle down the particles.

(ii) Cyclon Separator method : It can remove much smaller particles as compared to Gravitational Settling Chamber method & use centrifugal force to separate matter form polluted gas. Polluted gas enters the separater tangentially & receives a rotating motion & generate high centrifugal force due to which matter is thrown to the cyclon walls & is removed from outlet.

(iii) Fabric Filters method : In this system, polluted gas pass through a fabric which filters the polluted gas & allows the clean gas to pass through.

(iv) Electrostatic Precipitator method : It works on the principle of Electrostatic Precipitation i.e. electrically charged particles present in polluted gas get separated under the influence of electrical field. Polluted gas enters the Precipitator, large size particles settle down & small size charged particles settle on oppositely electrode surface & clean gas rises upwards through the cylinder.

(iv) Wet Collectors method : which utilize water or any other specific liquid to remove matter as well as gas by absorption/adsorption. Polluted gas pass through spray nozzles. Less than 0.2 micrometer size particles & toxic gases removed by thid method.