

Environment

Environment

Environment science is the study of nature, and the fact about environment. Environment can be defined as "All the social, economical, physical and chemical factors that surrounds man."

OR.

"All abiotic and biotic components around man, living and non living things surrounds man."

Types of environment

Environment can be divided into two categories:

i. Natural environment

ii. Man made environment or Anthropogenic Environment

i. Natural environment

The environment that comes in its existence by its own or naturally without the influence of human being is called as "natural environment".

ii. Man made environment

The environment which has been modified by human activities is called "man-made environment".

This is two types

i) The inner environment

The inner environment is the social environment that induces as long as society environment conditions to adjust to it.

ii) Outer environment

The outer environment is the physical environment that man has created on his own with the evolving technology and science.

It is the modification of the physical environment that helps the mankind.

Components of environment

1. Atmosphere

2. Lithosphere

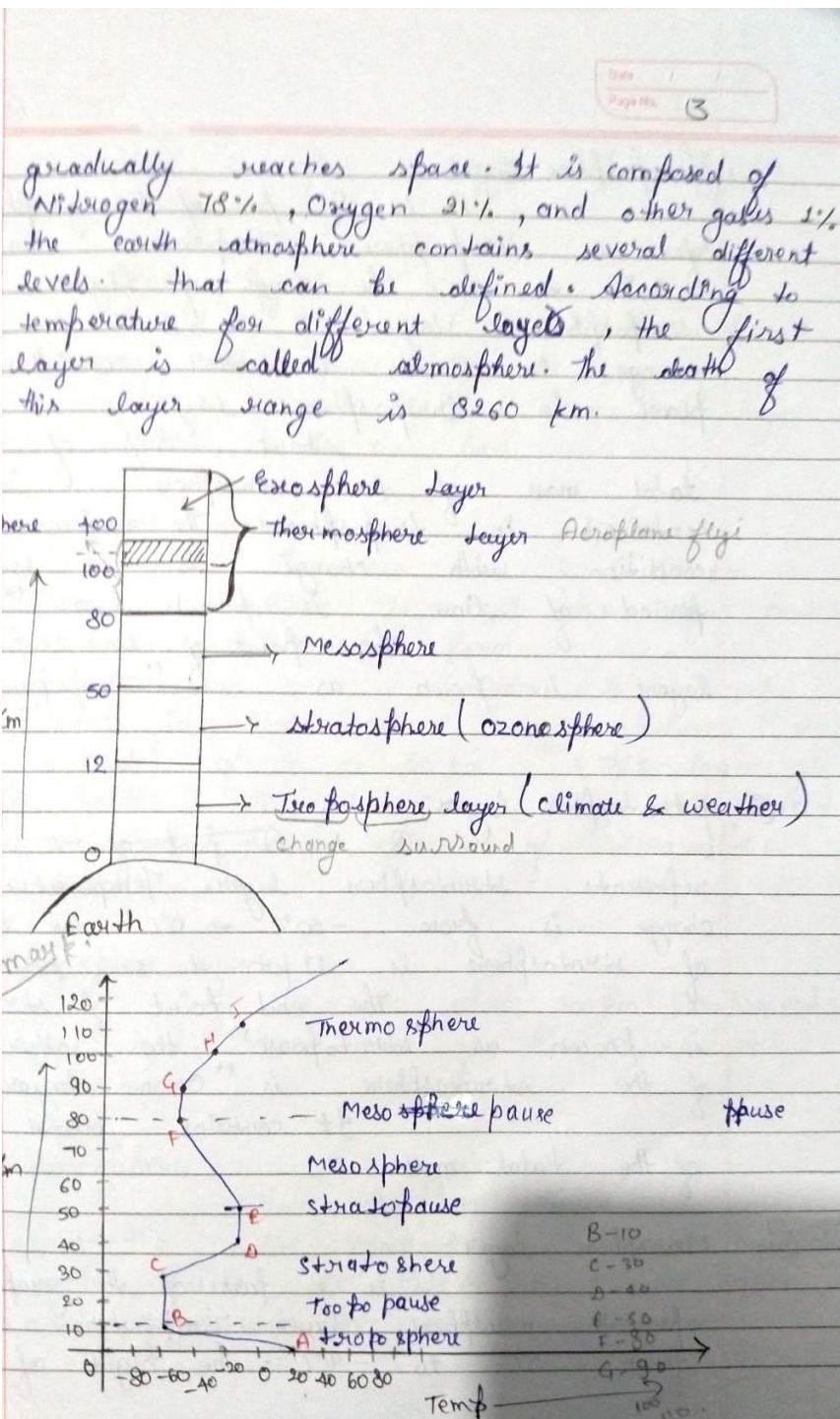
3. Hydrosphere

4. Biosphere

i. Atmosphere

Blanket of gases surrounding the earth is called "atmosphere". The atmosphere surrounds earth and protect us by blocking out dangerous rays from the sun.

The atmosphere is a mixture of gases that becomes thinner until it



Date / /
Page No. 3

(i) Troposphere layers:

A to B part of the graph refers to troposphere. Temperature changes from 0°C to -50°C . The range of height of troposphere layer is 0 to 12 km. Change in climate & weather condition take place in troposphere layer.

About 80% of the total mass of the atmosphere is contained in troposphere. The environment condition with change is a long period of time is known as "Climate". The point of time troposphere layer is known as "Tropopause".

(ii) Stratosphere layers:

B to D part of the graph represents stratosphere layer. Temperature change is from -50°C to 0°C . The height of stratosphere is 12 km to 50 km. The end point of stratosphere is known as "Stratopause". The other name of the stratosphere is "Ozone layer". It contains above 90% of the total mass.

(iii) Mesosphere layers:

D to F part of the graph represents mesosphere layer. Temperature changes from 0°C to -80°C . The height of the

Mesosphere is 50km to 80km. The end point of mesosphere layer is called mesopause.

(iv) Thermosphere layer :-

E to F part of the graph represents thermosphere layer. The range of thermosphere above 80 kms. Thermosphere layer is divided in two parts.

(a) Ionosphere layer:-

The area b/w 90 to 100 km represents ionosphere layer. In this layer particles are present in ionic form.

Ozone is primarily formed in Atmosphere at varying between the altitude of 10 to 50 km. This layer of ozone is called ozone layer. It protect us from harmful effects of ultraviolet radiations.

(b) Exosphere layer:-

The area above 100 km represents layers and the end of this layer is not clear.

(c) Lithosphere :-

In lithosphere layer we study about the solid components of earth mountains, rocks, salt, soil, etc. Soil is the upper most layer of the earth.

Q. hydrosphere

97% ocean

salty water

3%

(Glacier / Polar Ice)

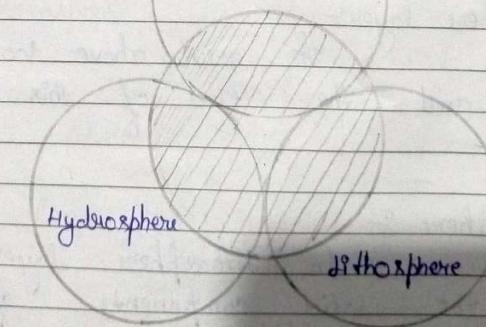
78% water

1% river, ponds, lakes

In hydrosphere who study about the presence and distribution of water on earth or near the earth this include the sea water's, rivers, lakes and, ponds, and the moisture in the air.

Q. Biosphere :-

Atmosphere



The living component present in atmosphere, hydrosphere and lithosphere is known as



Biosphere.

Scope of environmental science.

The scope of environmental science
is very wide.

1. In the study of natural resources [water resource, forest etc.]
2. Conservation of natural resources.
conservation of biological diversity.
3. In the study of ecology and eco system of the nature.
4. To know about environmental pollution and its management and control.
5. To know about biodiversity of the nature and conservation of biodiversity. [Varieties of animals, plants etc.]
6. To know about ecofriendly products and their marketing.
7. Research and development [To create environmental friendly engineering projects]

Importance of environmental science

Environmental science is very important for healthy environment. and requirement of healthy environment are as follow.

1. Pure Air:

Pure Air means it should not contain type of air pollutants.

Ex SO_2 , CO , NO_2 etc.

2. Pure Water: For good health, water should not contain any type of chemical, physical and biological impurities.

3. Pure Food: For good health, food should not contain any type of chemical pollutants in it.

4. Good Health: For good health environment causing disease agent.

5. Environmental science is important for sustainable development.

6. Environmental science is very important for pollution control.

1 Environmental science is very important for to solve social issues related to environment.

2 Environmental science is very important for good environment management plane.

3 To solve current issues related to environment (Green house effect, global warming, ozone layer depletion)

Need for public awareness.

Now a days we are facing several environmental challenges. Some are given below.

- Pollution
- Population growth.
- Scarcity of drinking water.
- Climate change
- Green house effect
- Ozone layer depletion
- Modern human activity
- Urbanization
- Mining activity
- Industrialization

Method of public awareness.

1 → Mass Media : T.V, F.M studio, etc.

2 → Environmental education :

3 → By organization seminar and conference

4 → Green Slogan : "Better environment, better tomorrow."

"Environment care is the most profitable investment."

5 → Entertainment : Street play, folk dances, by opening science centers, by studying famous environmental movements.

6 → Eco-mark labeling

Ecology

"The term ecology was first given by 'F. Haeckel' in 1869. Ecology means study of biotic & abiotic components."

OR

"Study of interaction of the organism with their environment is called ecology. Ecology is further divided into two parts."

1. Autecology अपनी की विशेषता के अध्ययन
2. Synecology. समुदाय की विशेषता

1. Autecology: The study of single species or organism with respect to their environment is known as Autecology.

Ex: Study of life history of a single tree.

2. Synecology: The study of group of species or organism with respect to their environment is called as synecology.

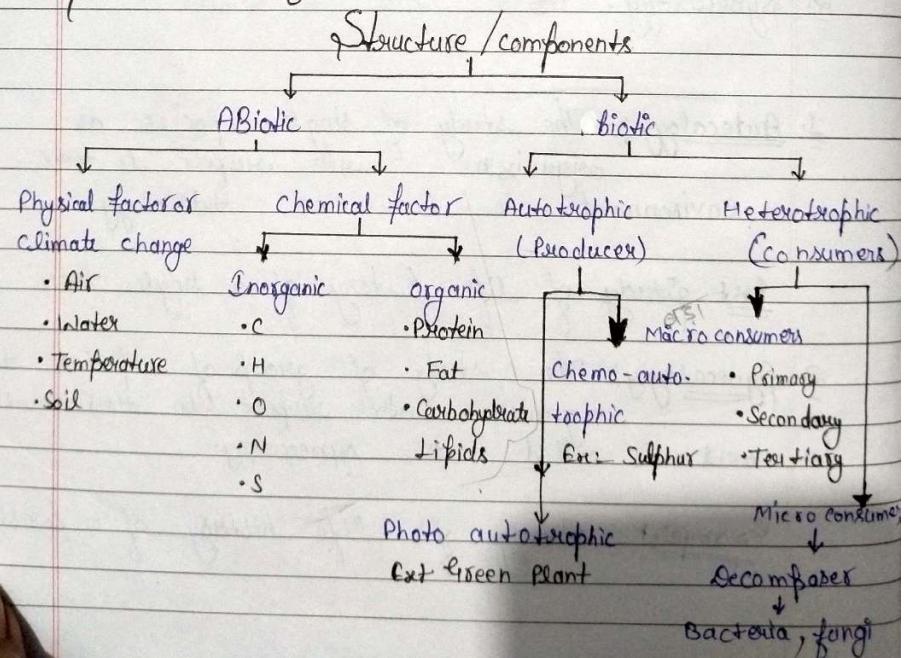
Example: Study of life history of a forest.

⇒ Ecosystem: The term ecosystem was first given by 'A. Tansley' in year 1935. (living) Biotic components cannot be isolated from non-living (abiotic) components because biotic components provide materials and energy.

For the survival of living organism so there is an interrelation between biotic and abiotic components to produce a system which is known as 'ecosystem'.

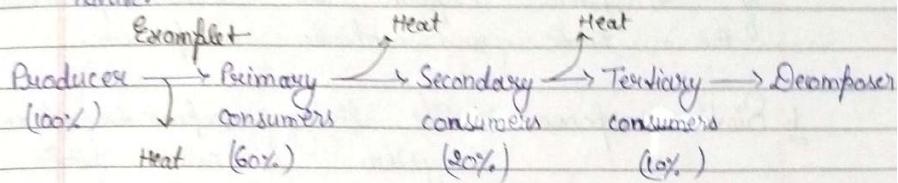
Example: Pond, forest, grassland etc.

⇒ Structure of Ecosystem.



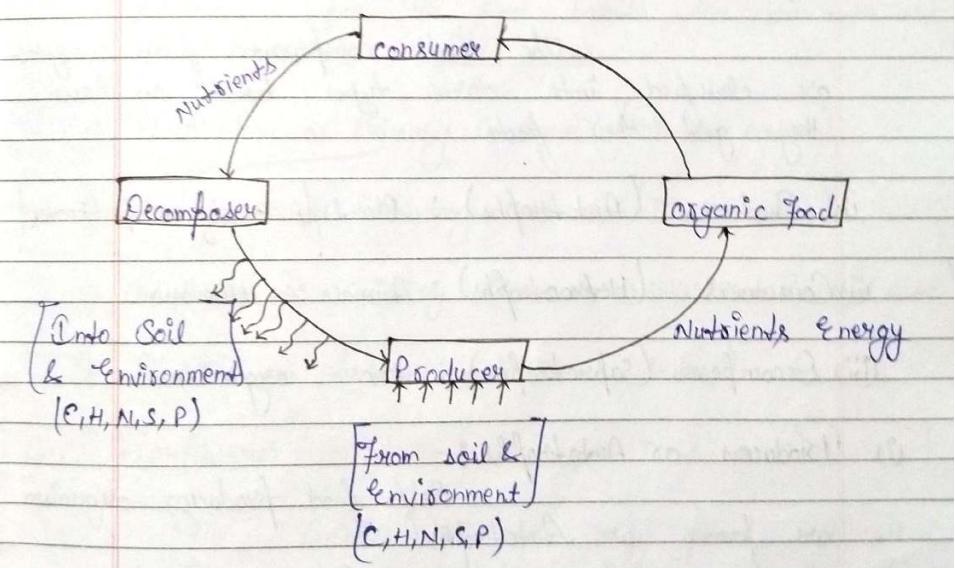
⇒ Function of ecosystem.

Flow of energy : Flow of energy in an ecosystem is always one way or unidirectional nature.



Flow of nutrients or chemical compounds

flow of nutrients in an ecosystem
is always cyclic in nature.



⇒ Components of an ecosystem

The term structure refers to various components, so the structure of components of ecosystem explain the relationship between the biotic and abiotic components.

i. Biotic components: The living components of an ecosystem is called biotic components.

Example Plants (Producers), animals and human (consumer) and micro organism (decomposers).

The biotic components of an ecosystem are classified into three types based on how they get their foods.

ii) Producers (Autotrophs) : Plants [Auto-self, troph-Feeder]

iii) Consumers (Heterotrophs) : Animals & Humans

iii) Decomposers (Saprotrophs) : Micro organism.

ii) Producers or Autotrophs : Self food producing organism are known as Autotrophs.

Example: All green plants and trees.

Producers synthesize their food themselves.

through photosynthesis hence they are called photoautotrophs.

(ii) Consumers or Heterotrophs [Hetero - other, troph - feeder]

Consumers are organism which cannot prepare their own food and depend directly or indirectly on the producers.

Example: Plants eating species (insect, rabbit, cow, deer, etc.)

Animals eating species (fish, lions, tigers, etc.)

Depending upon the food habits the consumers are divided into four types

A: Herbivores or Primary Consumers (Plant eaters)

B: Carnivores or Secondary consumers (Meat eaters)

C: Omnivores or Tertiary Consumers (With Plant & Meat eaters)

D: Detritivores (dead organism eaters)

A: Herbivores [Herbi - The green Plant, vores - To devour]

Animals that eat only plants are called herbivores they directly depend on the plants for their food. So, they are called plant eaters.

Ex: Goat, insects, cow, etc.

B: Carnivores [Carni - flesh meat & vores = To devour]

Animals that eat other animals are called carnivores they directly depend on the Herbivores for their food.

Example: frog, cat, snake, fox, etc.

C: Omnivores [Omni - whole comes from 'ohm' & vores = To devour]

Animals that eat both plants and animals are called omnivores. They depend on both Herbivores & Carnivores.

Example: Human, ~~tiger~~, bear, etc.

D: Detritivores: Animals that eat dead organism and waste of living are called detritivores.

Example: Ants, earthworms

E: Abiotic Components: The non-living thing

(iii) Decomposers (saprotrophs) [sapros = Rotten, trophs - feeder]

Decomposers attack the dead bodies of compounds. During the decomposition in organic nutrients released. The organism which breakdown the complex compounds into simple products are called Decomposers or

producers.

Example: Bacteria and fungi

Q. Abiotic Components: The non-living components of an ecosystem is called abiotic components. These non-living components enter the body of living organism, take part in metabolic activities and then return to environment.

The abiotic components of the ecosystem divided into three parts:

i) Physical factors like light, fire, soil, air, etc.

ii) Climate factors like Solar radiations, temperature, wind, winter, rainfall, etc.

iii) Chemical factors: organic and inorganic substances.

⇒ Classification of ecosystem

Ecosystem

Natural Ecosystem

Artificial Ecosystem
(Controlled by Human)

Example: Reservoirs

Natural Ecosystem

Terrestrial Ecosystem
(Land)

Forest Grassland Desert

Aquatic Ecosystem
(Water)

Fresh water Sea water other eco system.

Lentic (still water)
like Pond, Lake

Lotic (Running water)
like River

⇒ Function of ecosystem

The function of ecosystem is a related cycling of material and flow of energy.

Types of functions

types:

1. Primary
2. Secondary
3. Tertiary

Functions of an ecosystem are three

Date / /
Page No. 19

Primary Function: The producers (Plants) can make their food themselves through photosynthesis. This process is called Primary Function.

Secondary Function: The consumers (Animals & humans) cannot make their own food. They are always depending on [Primary function] of producers for the energy.

Tertiary Function: Decomposers attack the dead bodies of consumers and Producers decompose them into

Eat Bacteria & fungi etc.

The function of an ecosystem may be understood by studying following terms:

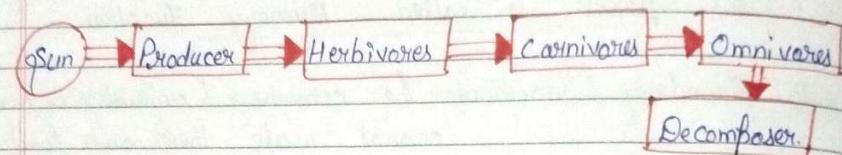
- (i) Food chain
- (ii) Food webs
- (iii) Food Pyramids
- (iv) Energy & Material flow

(i) Food chain: Anything which we eat to live is called "food." Food contains energy. Food can be transferred from one organism to a series of organism is called as food chain.

Food chain always start with a plant (producer) life and end with animals life thus a food chain is a picture of an model that shows the flow of energy from producer to series of organism in an environment.

Date / /
Page No. 20

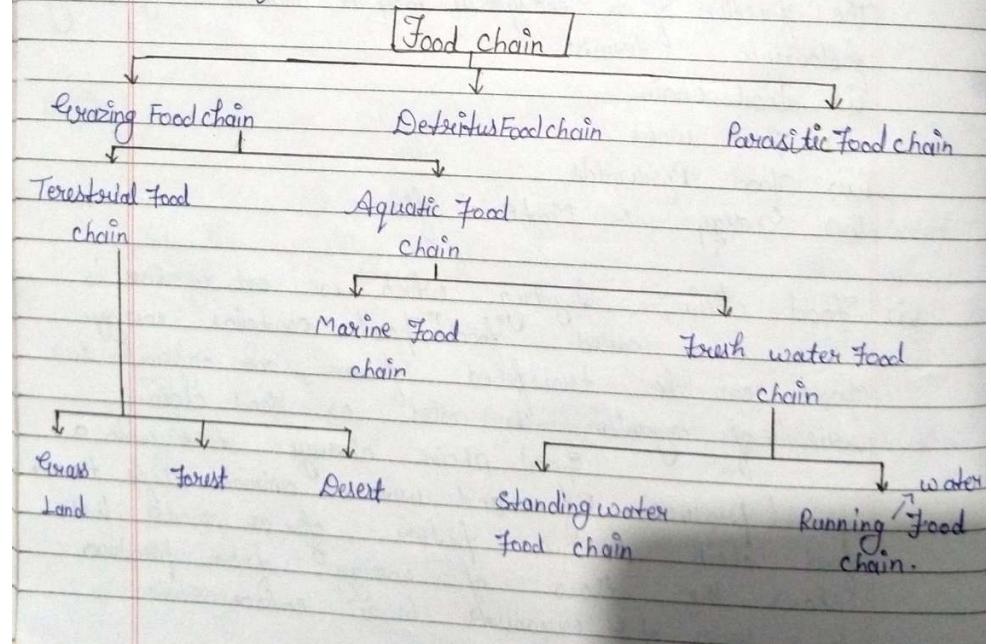
In which is shown in figure:



Infact all the food chains starts with the sun. The sun provides energy for plants. The producers can make their food themselves with the food chlorophyll, water and air.

The consumers including animals and humans can not make their own food.

Types of food chain.



The basic types of food chain given below:

1. Grazing Food chain
2. Detritus Food chain
3. Parasitic Food chain

1. Grazing Food chain: Grazing food chain starts with green plant (producers) and ends with decomposer food chain. It has two types:-

- (i) Terrestrial food chain
- (ii) Aquatic food chain

i) Terrestrial food chain: Food chain on land is called terrestrial food chain.

Ex Grassland food chain
Forest food chain, Desert food chain.

Grassland food chain

Grasses → Grasshoppers → Frog → Snake → Eagles

Forest food chain

Green plant → Deer → Tiger or Lion

ii) Aquatic food chain: This food chain is slightly different from terrestrial food chain it is seen in aquatic (water) ecosystem. Food chain in water is called aquatic

Food chain

- 1st • Marine food chain (Ocean)
- Fresh water food chain (Pond, Lake)

Food chain in a Pond

Phytoplankton → Zoo Plankton → Small fish → Large fish
↓ Man.

Marine food chain :-

Sea weeds → Small fish → Large fish → Man

2nd Detritus food chain: Detritus food chain system starts with dead organic matter (Plants & animals) and goes to decomposers through consumers.

Detritus food chain, independent of solar energy, but they depends on dead organic matter.

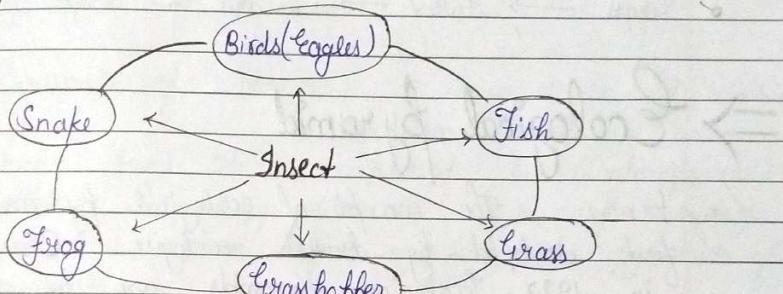
Dead Plants → Soil Plants → Algae → Crabs → Small fish → Large fish.

3. Parasitic food chain :- Parasitic food chain operates in many ecosystems. In this food chain either consumer or producer is parasite (parasitism) and organism. A parasitic food passes to

parasite, hyper parasite, links.

Breast → Fruits Eating Birds → Bugs → Bacteria → Fungi

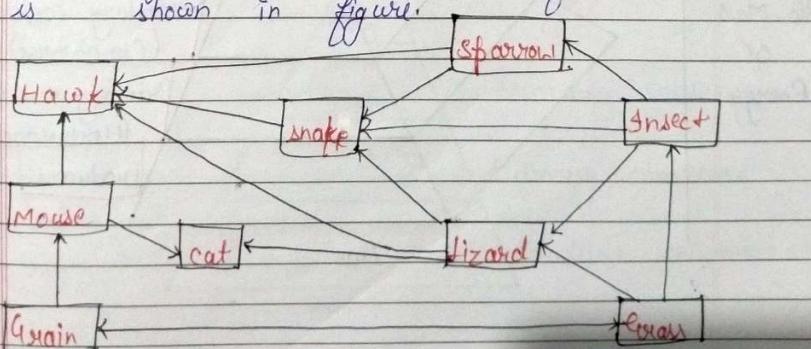
⇒ Food Web
5 May 2023



Network of food chain is called as food web.

Web means network such as spiders web., so food web is a network of food chains. In a food web many food chains are interconnected, where different types of organisms are connected at different trophic levels.

There is a interconnecting of various food chains are called food webs which is shown in figure.



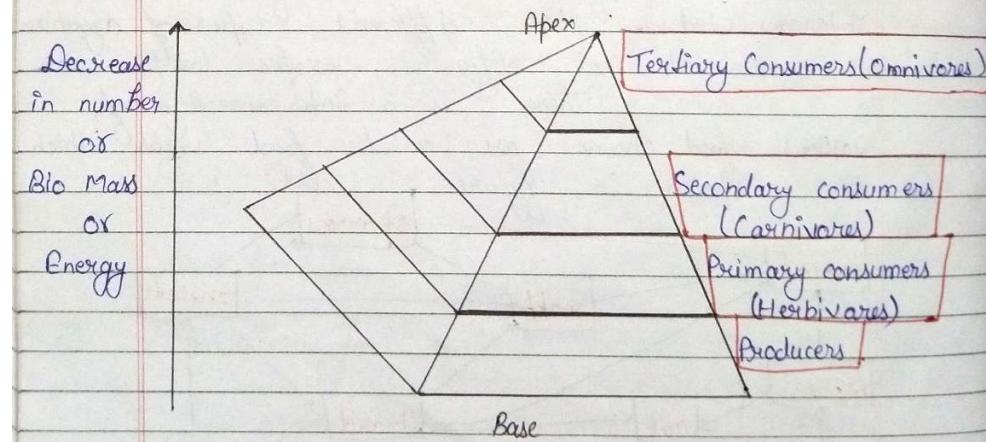
Date / /
Page No. 23

This food web shows many linear food chains as shown in figure.

- Grains → Mouse → Cat
- Grains → Mouse → Hawk
- Grains → Insect → Sparrow → Hawk
- Grass → Insect → Lizard → Snake → Hawk

⇒ Ecological pyramid

The concept of ecological pyramid was first developed by British ecologist Charles Elton in 1927. Ecological pyramids are the diagrammatic representation of trophic structure in which the trophic levels (tiers) are explained in successive stages and ecological pyramid is shown in figure.



Date / /
Page No. 25

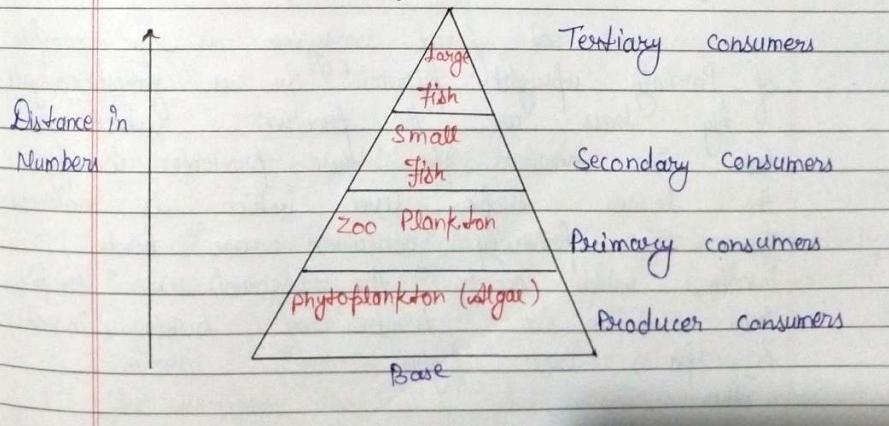
On the bases of the no. of organism, the biomass of organism and energy flow in organiza population three types of ecological pyramids are

1. Pyramids of Number
2. Pyramids of Biomass
3. Pyramids of Energy

1. Pyramids of Number: It shows the no. of individual organism present in each trophic level. It is expressed in numbers per unit area. Depending upon the type of ecosystem, we have three types of ecosystem pyramids of number.

- (a) Upright pyramid of Numbers.
- (b) Partially upright pyramid of Numbers
- (c) Inverted pyramid of Numbers.

(a) Upright pyramid of Numbers.



Date / /
Page No. 26

100	Large Fish	Tertiary
200	Small Fish	Secondary
500	Zoo Plankton	Primary
(1000, Quantity)	Phyto Plankton	Producer
Person		

It shows the number of individual organism in each trophic level. It is expressed in numbers per unit area. Depending upon the type of ecosystem we have three types of pyramids of numbers.

1. UPRIGHT pyramid of number.

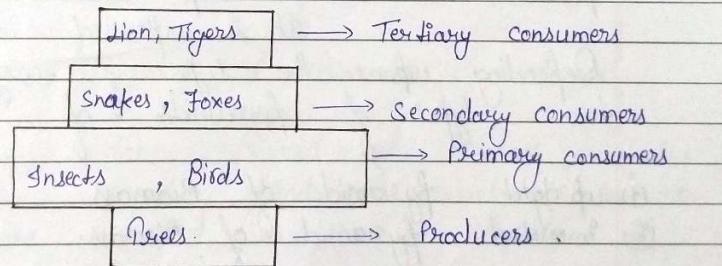
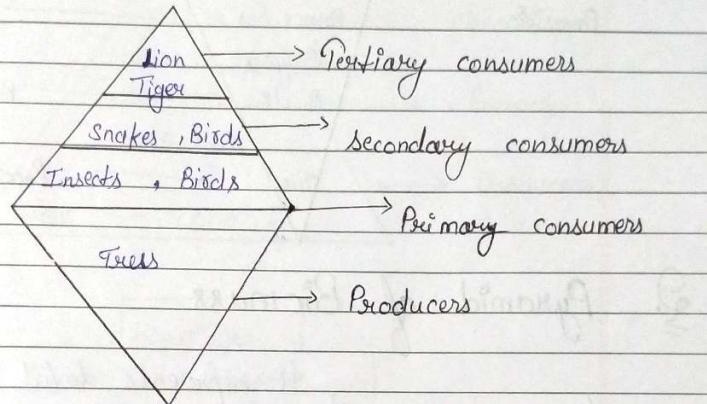
The numbers of individual organism gradually decreases from lower trophic level to higher trophic level is called upright pyramid of number.

2. Partially upright pyramid of numbers

A forest ecosystem is an example of Partially upright pyramid. In a forest ecosystem big trees are the producer, which are less in number. So, these producers occupy the lower trophic level which is narrow base. The primary consumers are birds, insects, which occupy the (second) 2nd trophic level. Since the number of birds, insects & other species are higher.



Where compared to the trees, the size of which is more other trophic levels are same as upright pyramid of numbers.

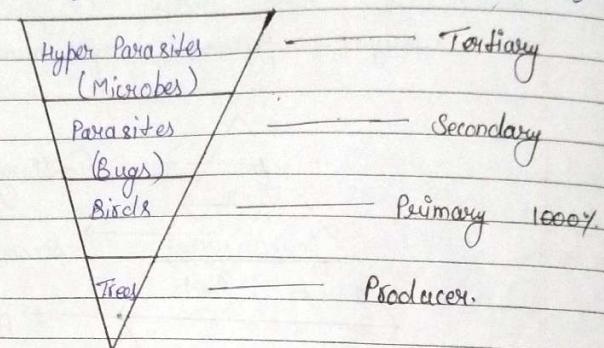


(c) Inverted pyramid of numbers:

The numbers of individual organism gradually increases from lower trophic level to higher trophic level is known as inverted pyramid of numbers.

For example parasitic food chain is shown

as inverted pyramid number as shown in figure.



2. Pyramid of Biomass

It represents total amount of biomass (mass or weight) of materials or organism present in each of trophic level.

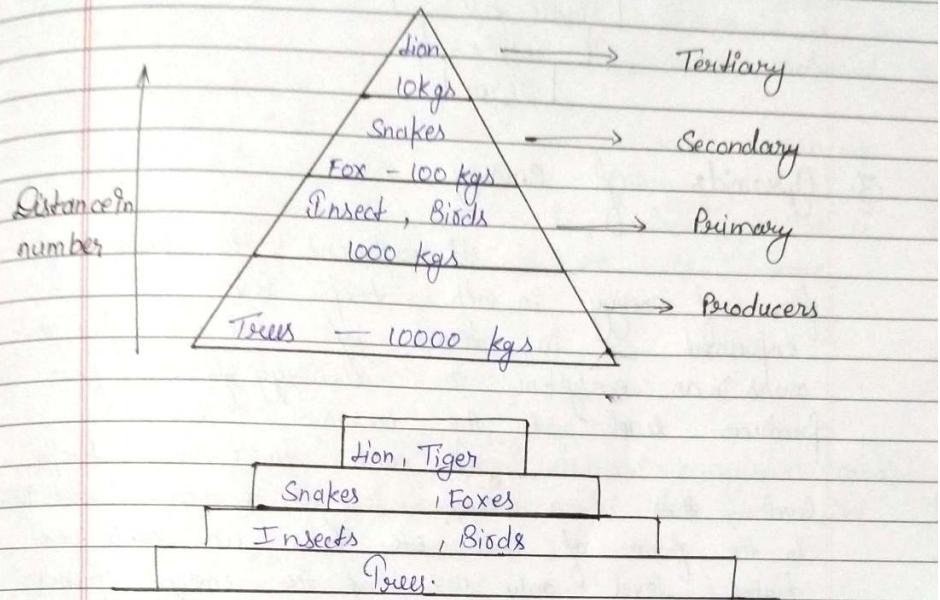
It is expressed in gm/unit area. Depending upon the type of ecosystem, we have two types of pyramids of biomass.

- (i) upright pyramid of Biomass
- (ii) inverted pyramid of Biomass.

(i) Upright pyramid of Biomass

The pyramid of biomass gradually decreases from the producer level or first trophic level is called upright pyramid of biomass. A forest ecosystem shows an upright pyramid of biomass which is shown in figure.



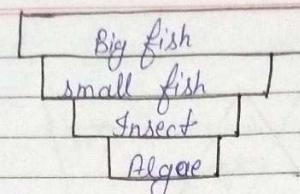
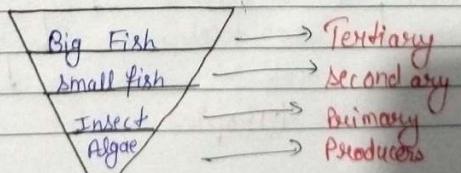


(ii) inverted pyramid of Biomass

The pyramid of Biomass gradually increases from producer level to consumer level are called as inverted pyramid of biomass.

Example: Pond ecosystem.

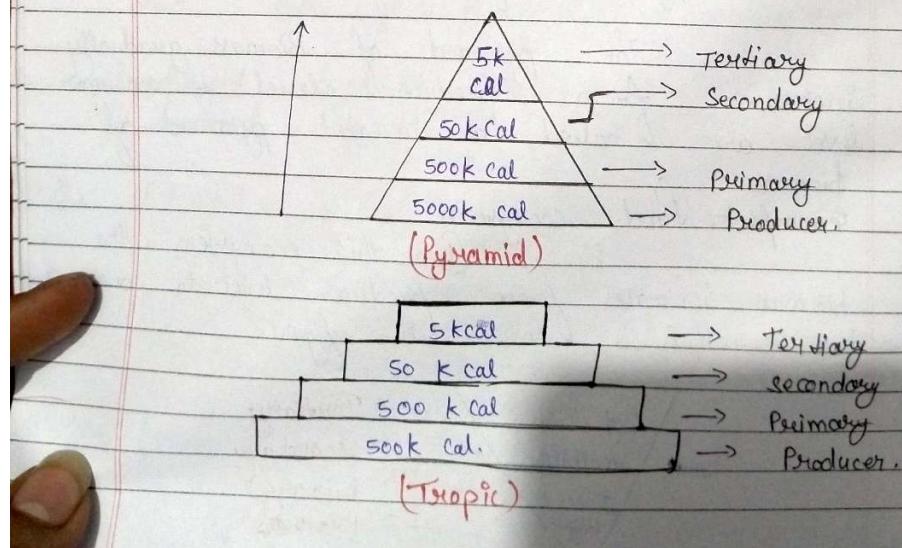
In this ecosystem the biomass increases from producer level to consumer level which is shown in figure.



3. Pyramids of energy

It represents the amount of flow of energy in each trophic level it is expressed in terms of Calories per unit area. In an ecosystem the energy flow from producer level to the consumer level.

At each successive trophic level, there is a ~~loss~~ loss of energy (about 90%) in the form of heat etc. Thus at each next higher level only 10% of the energy passes hence there is sharp decrease in energy at each level.



Ques Balanced ecosystem.

Ans When biotic and abiotic components are in equilibrium that ecosystem is called balanced ecosystem.

An ecosystem is balanced when the natural animals and plants and non-living elements are in ^{तात्त्विक} harmony that is there is nothing to disturb the balance.

Types of Ecosystem.

1 Forest ecosystem: It is natural ecosystem consist of growth of trees and wild animals.

Types

i) Tropical ex- evergreen, wetgreen.

ii) Sub tropical ex-

Example of forest ecosystem.

Producers (Trees), consumers (Primary — Elephant, deer, etc, secondary — Bird etc, tertiary — Lion, tiger), Decomposers (Fungi, Bacteria).

2 Aquatic ecosystem: Aquatic ecosystem deals with water bodies and biotic communities present in them classified as fresh water and marine ecosystem.

Types of Aquatic ecosystem.

- i) Pond ecosystem : Small fresh water ecosystem, seasonal in nature organism. Ponds are very often confused to reservoir like cloth washing, cattle bathing, swimming.
- ii) Lake ecosystem: Big fresh ecosystem (especially during summer is a common one.)

Example Algae, fishes, snail

3 Stream ecosystem:

fresh water ecosystem where water current plays a major role. Oxygen and nutrients content are uniform.

Stream organism have two face extreme difference in climatic condition but they do not suffer from oxygen deficiency. Pond and lake organism. This is because large surface area of running water provides more oxygen supply the animals have very narrow range of tolerance towards oxygen deficiency.

4 River ecosystem:

Large stream flowing from mountains high lands are rivers. Mountains high land eroding down water fall, large attached plants to rocks and fishes quantity of dissolved oxygen,

Ocean &
Estuary
Page No. 33

that required more oxygen are found.

Grassland ecosystem: Dominated by grass, trees also or ~~are~~ in grassland ecosystem. This is three types depending on the climate.

Tropical grassland: Found near the borders of tropical rainforest. ~~East~~ Savanna in Africa. Animals → Zebra, Giraffe.

Polar grassland: Found in arctic polar region organism. ~~complete~~ arctic wolf, fox etc.

Ocean ecosystem: Lignistic reservoir of water covering is greater than 70% of earth surface. Many types of species, huge variety of sea product, dugongs etc. There are two zones—

- 1) ~~High~~ zone
- 2) Coastal zone
- 3) Open zone.



Date / /
Page No. 34

Impact of Human Activity on Environment

Ques Explain the effect of Industrialization, housing, transportation activity on the environment.

S.No	Industrialization	Housing	Transportation
1	Development of industries in particular area is known as Industrialization.	Development of house in a particular area is known as housing.	Development of way for transport (medium (land, water)) is known as transportation.
2	<u>Effect</u> :	Effect	Effect
	<ul style="list-style-type: none"> • Air pollution. • Soil pollution. • Noise pollution. • Water pollution. • Production of solid waste. • Deforestation. • Loss of Biodiversity. • Effect on wildlife system. 	<ul style="list-style-type: none"> 1 to 17 are same. 	<ul style="list-style-type: none"> 1 to 17 are same.
		What is Biodiversity do you know?	
		And the existence of a number of different kinds of animals and plants which together make a good and healthy environment.	Mines pollution
			both



- Effect on food chain and foodweb.
- Climate change
- Increased production of green house gases

Date / /
Page No. 35

Ques What is the meaning of Mining? Explain effect & control method of mining.

Ans Mining: Minerals are crystalline solid having a definite chemical and physical properties.
Extraction of minerals from the mines is known as "mining". Minerals are non-renewable resources.

Example Coal extraction.

Effect of mining:

- i) Mining causes air, water, soil and noise pollution.
- ii) Extraction of presence of natural resources.
- iii) Mining causes soil erosion.
- iv) Deforestation.
- v) Effect on wild life habitat.

(ii) Effect on food chain and food web

(vii) Effect on human health

(viii) Effect on natural beauty.

(ix) Effect on soil nutrients.

(x) Mining causes several disease in human being.
Ex skin disease, T.V., cancer.

Control Method

- i) By minimizing the use of mineral resources.
- ii) By searching new materials.
- iii) By using latest technology.
- iv) By using more and more natural resources.
- v) By more and more plantation.
- vi) By making rules and act.

Ques What is the meaning of farming or modern agricultural activity? Explain the effect of farming and modern agricultural activities and its control & method.



Date / /
Page No. 36



Agriculture or modern agricultural activity

Nowadays about 50% of the world depend on the agricultural activity but in India 70% public is depend on the agricultural activity. Agricultural activity generally causes three types of effect on the environment.

- (i) Local change
- (ii) Regional change
- (iii) Global change.

i) Local change— Local changes means the changes which take place at the site of farming is known as local changes.

Ex :- Small scale water pollution, loss of soil fertility.

ii) Regional changes— Regional changes means the changes which take place in a particular region are known as regional changes.

Ex :- Large scale water pollution, soil pollution.

iii) Global change— Global change means the changes which take place in a global world level are known as global changes.

Ex :- Change in nutrients cycle (carbon, nitrogen, sulphur cycle), increases concentration of

nitrogenous gas into the environment which causes green house effect. Nowadays we are using two types of agriculture techniques.

= 1. Traditional agricultural techniques.

= 2. Modern agricultural techniques

= 3. Traditional agricultural activities:

In it we use organic fertilizers, small agricultural tools.

= 2. Modern agricultural activities

In modern agricultural activities, we are use hybrid seeds, fertilizers, pesticides and chemicals and other modern techniques.

The effect of modern agricultural techniques are as follows:

(i) Effect of hybrid seeds:

It produces monoculture species.

(ii) Effect of pesticides: Pesticides contain different types of chemicals. These extra pesticides causes harmful effect to the environment.

"The process of increase

Date / /
Page No. 39
concentration of pollution from one trophic level to another trophic level through a food chain is called biomagnification."

(iii) Effect of fertilizers: Fertilizers mainly contains Nitrogen, Phosphorous, Potassium and the extra amount of fertilizers causes following effect: →

@ Effect of nitrates: Extra amount of nitrates causes blue baby syndrome disease in infant.

(iv) Eutrophication: Extra amount of fertilizers in agricultural activities increases the growth of algae blue. These algae blue consume oxygen present in the water. Due to shortage of oxygen aquatic plant and animals do not survive, therefore pond becomes dead full. This process is known as eutrophication.

(v) Water logging: Storage of extra amount of water in agricultural activity is known as water logging.

(vi) Salinity: Conversion of normal soil into saline is known as soil salinity.

10 mark Q.

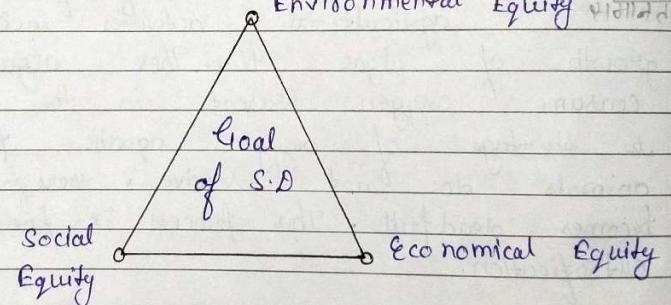
Ques What is sustainable Development? Explain its effects and control methods.

Ans * Sustainable Development

प्राकृतिक सम्पद
It means progress. The idea of sustainable was first directed in 1970's. According to Brundtland, sustainable can be define as meeting needs of present without compromising the availability of the future generation to meet their own needs.

* Principle or goal of Sustainable development

Environmental Equity प्राकृतिक सम्पद



Environmental Equity

It means to create a balance in natural resources to minimize pollution and conserve our biodiversity प्राकृतिक सम्पद

Economical Equity

It means to provide the modern technology to developing countries by developed country & create a balance in.

economical conditions.]

Social Equity

It means to create a balance in society. Social equity is impartiality, fairness and justice for all people in social policy.

Objectives of sustainable Development.

1. To create equity or to promote equity [social, economical or environmental].

2. To improve the quality of human life.

3. Sustainable use of natural resources.

4. To protect the ecosystem.

5. To fulfill international standard.

6. To minimize pollution

7. To minimize the emission of ^{3C4G} SO_2 , NO_2 , CO_2 , etc.

8. To minimize the emission of green house gasses.

Challenges of sustainable development or factors affecting sustainable development -

1: 3P
(Pollution, poverty, population of

2. Excess use of natural resources.

3. Excess use of ^{NR} non-renewable resources.

4. Shortage of productive lands ^(BCHIG)

5. Due to more and more production of industrialization.

Control Methods

1. To minimize environmental pollution.

2. To minimize poverty.

3. To minimize population growth.

4. By using 3R. [Reduce, Reuse, Recycle].

5. To conserve the biodiversity.

6. To conserve the food web and food chain.

7. By public awareness.

⇒ EIA "ENVIRONMENTAL Impact Assessment"

Visualising and assessing the impact of a project on the environment before the establishment is known as EIA.

Objectives of EIA

1. To predict the environmental impact of a project on the environment.
2. To find ways and means to reduce the ~~bad effect~~ adverse impact of a project on the environment.
3. To shape the project according to local environment.
4. Provide power to the decision maker.
5. Take necessary steps or action to follow. Proper environmental management plan.

Participants in EIA

1. Proponent = Owner of the project.
2. Advisor = Company organization who will prepare EIA report.
3. Reviewer = Reviewer will check the EIA report.
4. Decision maker = Can take final decision regarding

project.

5. Public NGO Media = For public Awareness.

Stages of EIA

1. Project proposal.

2. Screening

3. Scope and consideration of alternatives

4. Data collection:

Air, water, soil, etc.

i) Condition of agricultural production.

ii) Wildlife condition

iii) Traffic condition or transportation

iv) School, college or university

v) Hospitals

vi) Any other environmental significant factors.

5. Impact prediction and assessment of alternatives.

6. EIA report



- Date /
Page No. 45
- # Decision making.
 - # Public awareness
 - # Monitoring of project
 - # Importance of FIA
 - # FIA is very important for good environment.
 - # FIA is very important for good management plan.
 - # It is a government policy that any individual project has to obtain FIA from the ministry of environment and forest before approved by the planning commission.
 - # Flow chart of FIA.
- Project Identification
- ```

graph TD
 A[Project Identification] --> B{FIA Required}
 B --> C[Scoping]
 B --> D[Not FIA Required]
 C --> E[Impact Analysis]
 E --> F[Mitigation and Impact Management]
 F --> G[FIA]
 G --> H[Review]
 H --> I[Decision making]
 I --> J[Not Approved]
 J --> K[Redesign]
 K --> L[Resubmit]
 I --> M[Approved]
 M --> N[Implementation]
 N --> O[Monitoring of Project]
 O --> P[Post monitoring]
 D --> Q[Public Hearing]
 Q --> R[Implementation]
 R --> O

```



- Date /  
Page No. 46
- Screening:** It is a first stage which determines whether the proposed project required or not.
  - Scoping:** By this we study that what is the scope of our project.
  - Impact analysis:** By this we study that the project is favourable for environment or not.
  - Mitigation:** The step of FIA give the solution to reduce and avoid the adverse environment effect.
  - Reporting:** This stage present the result of FIA in the form of a report to the decision maker.
  - Review of FIA:** This stage providing the necessary information for decision maker.
  - Decision maker:** It decides whether the projects is rejected or accepted or need for further change.
  - Post monitoring:** This stage inqk. after the completion of project. that every thing according to impact assessment



Date / /  
Page No. 47

or not and its satisfied all necessary standard or not.

## ⇒ Economic and social security on environment

The economy of the India is the 5th economy in the world with a G.D.P (2021) 3.2 trillion dollar when measured on purchasing power parity (PPP) basis. The India remains one of the poorest countries in the world.

Although the Indian economy has grown steadily over the last two decades, its growth has been uneven when comparing different social groups, economic groups, geography group and rural and urban area.

1. Agriculture: India ranks 2nd world wide in farm output. Agriculture and allied sector like forestry, fishing accounted for 20.19% of the GDP in 2021, employed more than 50% of the total work force and despite a steady decline of its share in the GDP.

2. Industry + Industry account for 29% of the GDP and employ 25.1% of the total work force. However about  $\frac{1}{3}$  of the industrial labor is engaged in simple household manufacturing only.

3. Natural resources: India's total cultivable area is 53.71% of total land area, which is decreasing due to growing population and increased India major mineral resources include (5th largest reserves in the world), iron or magnetite, mica, bauxite, Petroleum etc.

4. Education and Employment: Fewer than 40% in India attend secondary school. Only 16% of manufacturers in India offer in service training to their

5. Income and consumption: The world bank estimates that one  $\frac{1}{4}$  of the global poor now reside in India. Today more people effort to a by cycle whenever before. According to time of India a majority of India have

Total capita space equivalent it can less than a 10 ft x 10 ft room for there living, sleeping, cooking, washing and Bath room needs and One in every three urban Indians lives in homes to exceed even the minimum requirements of prison sell in the US.



# Unit $\Rightarrow$ 2

## Natural Resources

### # Natural Resources

Natural resources can be defined as variety of goods and services provided by Nature which is necessary for our day to day life.

Example: Plants, animals, biotic Part, Air, water, soil, solar energy etc.

### $\Rightarrow$ Types of natural resources

They are two types of natural resources:

Renewable and Non-Renewable resources.

i) Renewable resources: The resources that can be replenished through rapid natural cycles are known as Renewable resources.

These resources are increase their reproduction and utilization of simple substances.

Example: Plants and animals. Some examples of Renewable resources are water, solar energy, soil, etc.

### (ii) Non-renewable resources

The resources that cannot be replenished through natural process are known as non-renewable resources. These are available in limited amounts, which cannot be increased. These resources include fossil fuel like (petrol, coal, etc.) Metals like (iron, copper, lead, silver, Al etc.), Minerals and salt (phosphate, nitrate etc.).

Non-renewable resource can further divided into two categories.

#### (a) Recyclable

#### (b) Non-Recyclable

(a) Recyclable: These are non-renewable resources which can be collected after they are used and can be recycle. These are mainly the non-energy minerals resources, which occur in the earth crust.

Ex: Ores of Al etc.

, copper, mercury

(b) Non-Recyclable: These are non-renewable resources which cannot be recycle.

Ex: Fossil Fuels.

## # Energy resources

Energy distribution in world. Developed countries like U.S.A or Canada constitute only 5% of the world population but consume 25% of the world available energy. Energy consumed by a person in a developed country for a single day is equal to energy consumed by a single person in a poor country for one year.

National product increases and energy consumption increases. In the poor country G.N.P and energy consumption are less. There are two types of energy resources.

- i Renewable energy resources or non-conventional energy resources.
- ii Non-Renewable energy resources or conventional energy resources.

¶ Renewable energy resources. Energy which can be regenerated.

Merits of renewable energy:

- i Unlimited supply
- ii Provides energy security
- iii Reliable and the devices are modular in size.

- v) fits into sustainable development concept  
vi) Decentralized energy production.

Types of Renewable energy resources

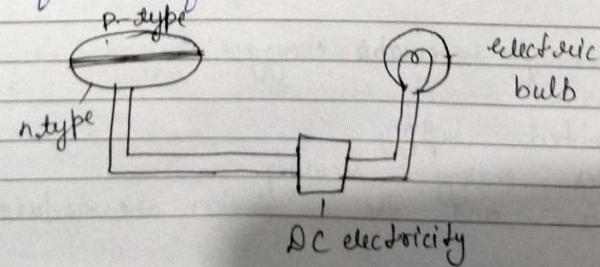
vii) Solar energy

Nuclear fusion reaction of sun provides a lot of amount of energy. Several techniques are available for collecting, storing and using solar energy.

viii) Solar cell or Photovoltaic cell or PV cell

Solar cell consist of P type semi conductor (Silica doped with Boron) and N type semi conductor (Phos Silica doped with P (Phosphorus)). P type forms top layer and N types forms on bottom.

Solar rays fall on the top layers, the electrons from valence bond promoted to the conduction band which cross the P-N Junction N-type semi-conductor potential difference b/w the two layer is created which causes flow of electrons.



Applications: It is used in calculators, electronic watches, street lights, water pumps etc.

b) Solar water heaters: It consists of insulated box painted with black paint with glass tube inside the box. Black painted copper coil is present. Cold water is allowed to flow, it is heated up and flows out into a storage tank from which water is supplied through pipes.

(ii) Wind energy:

Moving air is called wind energy. The energy recovered from the force of the wind is called wind energy.

Uses or applications

i) Wind Mills: When a blowing wind strikes the blade of the wind mill, it rotates continuously and rotational motion of the blade drives. No of machines like water pump, flour mills and electric generator.

ii) Wind farm: When a large no. of mills are installed and join together in a definite pattern, it forms wind farm. It produces large amount of electricity.

### Q. Ocean energy

a) <sup>Waves</sup> Tidal Energy or Tidal Power

Ocean Tides are due to gravitational force of sun and moon which produces a lot of energy. High tides means rise of water in the ocean. Low tides means fall of water in the ocean.

Tidal energy can be used by constructing a tidal barrage. During high tides sea water enters into the reservoirs and rotates the turbine, produces electricity.

During low tides water from the reservoirs enters into the sea and rotates the turbine to produce electricity.

b) Ocean thermal energy

Temperature difference b/w surface water and the deep level water in ocean generates electricity. The energy available due to the difference in temperature of water is called ocean thermal energy.

c) Geo Thermal energy

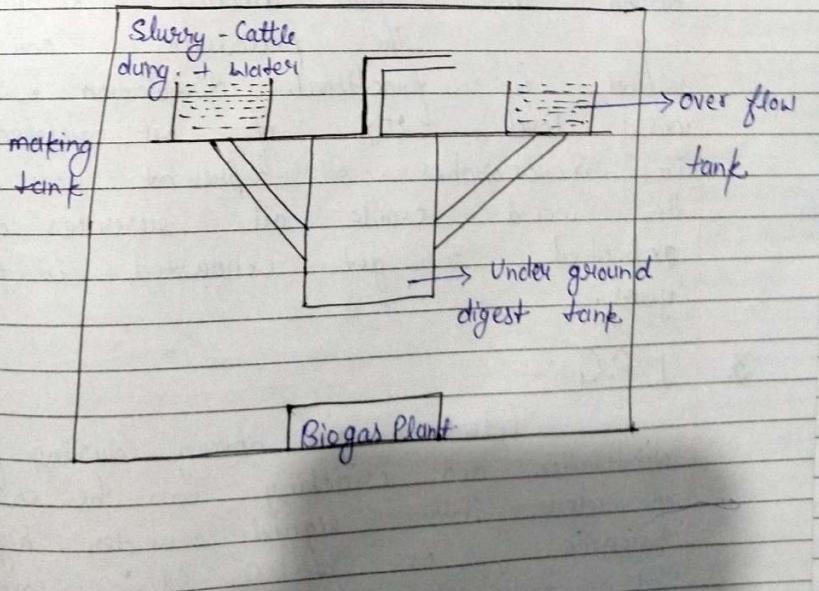
Temperature of the earth increases at a  $10^{\circ}\text{C}$  to  $75^{\circ}\text{C}$  per km. When we move down the earth,

Date / /  
Page No. 55

the energy utilized from the high temperature present inside the earth is called Geo thermal energy.

5. Bio - man energy: Biomass is produced by plants or animals used as source of energy. Biogas is mixture of methane, carbon dioxide and hydrogen sulfide. Methane is the major constituent. It is obtained by anaerobic fermentation of animal dung or plant waste in the presence of water.  
Bio fuel is obtained by the fermentation of biomass.

Ethanol, Methanol.



B. Non-renewable and energy resources

Energy which cannot be regenerated is called as Non-renewable energy sources

1. Coal + It is a solid fossil fuel.

Disadvantage

i) When coal burnt large amount of CO<sub>2</sub> is released which causes global warming.

ii) S, N produces toxic gases during burning

2. Petroleum Crude oil is a liquid consisting of more than hundred of hydrocarbons and small amount of impurities. The petroleum can be refined by fractional distillation. In the world level 25% of oil reserves are in Saudi Arabia. At present rate of use, the world crude oil reserves are expected to get exhausted in just 40 years.

3. L.P.G :

Petroleum gas obtained during fractional distillation and cracking can be easily converted into liquid under high pressure as L.P.G. It is colorless and odourless but during filling in



Date / /  
Page No. 57

Cylinder mercaptans are added to detect to leakage.

4. Nuclear energy - Nuclear energy produces of India city. Nuclear energy can be produced by two type of reactions.

→ Water resources Water is needed for daily use by living organisms for respiration, industrial use, electricity production and domestic use of the total water resource of the earth, 97.97.3% is salt water. And the rest is fresh water about 97% of earth surface is covered by water and most of the animals and plants have 60 to 65% water their body.

Of this about 77.2% is permanently frozen, 22.4% occurs as ground water and soil moisture, 0.35% is found in lakes and wet lands and 0.01% in rivers and streams.

The total volume of ground water found in underground reservoir called aquifers, is estimated to be  $42.3 \times 10^{10} \text{ m}^3$ . At present about 2.5% of ground water is being used by man.

### Uses

1. It is essential for all forms of life.
2. Many use of water include agricultural,

industrial, household and environmental activities

No plant or animal species can survive without water. If water in our body drops by 5% we feel thirsty, if it drops by 10% we face death.

### # Hydrological cycle

Intakes from various water bodies

Evaporated by solar energy

Enters into the atmosphere as cloud

Falls again on earth as rain or snow

Ultimately returns to the ocean

### # Distribution of water resources

Distribution of water resources

↓  
Fresh water

↓  
surface water

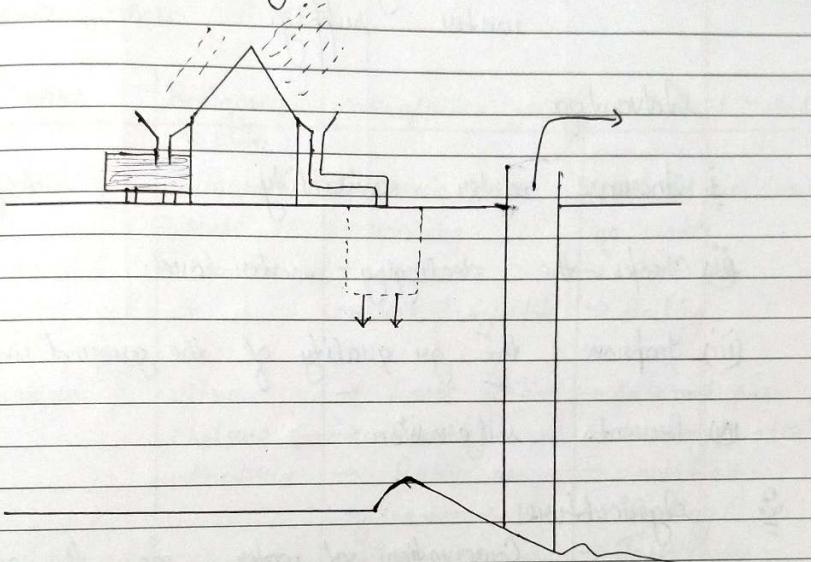
Standing water bodies

↓  
Under ground water

Flowing water bodies.

## # Water conservation

### i. Rainwater harvesting



In urban areas the construction of houses, footpath and road has left little exposed earth for water to soak in. In parts of rural areas of India, flood water quickly flows to the rivers, which then dry up soon after the rain stops.

If this water can be held back, it can seep into the ground and recharge the ground water supply.

This has become a very popular method of conserving water specially in urban areas. Rain water harvesting means collecting rain water from the roofs of building and storing it underground.

face lesser use. Not only helps in recharging arrest ground water depletion, it also raises the declining water level and can help water supply.

### Advantage

- i) Increase water availability.
- ii) Checks the declining water level.
- iii) Improve the quality of the ground water.
- iv) Prevents soil erosion.

### 2. Agriculture

Conservation of water in the agricultural sector is essential for the survival of stabilising growth of plants and crops. A declining water level and arise in salinity due to over use of chemical fertilizers and arise fast rate has made a serious matter.

Various methods of water harvesting and recharging have been and are being applied all over the world problem. In areas where rainfall is low and water is scarce the local people have used simple techniques that are suited to their region and reduced the demand for water.

M&P

# Water born diseases and water induced diseases [V.V. Impairment].

Water born diseases

| S.NO | Diseases  | Pathogens<br>(प्रतिवेदन)          | Mode of action (Symptom)                                                     | Control Method                                                                               |
|------|-----------|-----------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| 1.   | Typhoid   | Salmonella<br>Typhoid<br>Bacteria | → Chronic fever<br>→ Vomiting<br>→ Headache<br>→ Loss of appetite            | → Safe and pure drinking water<br>→ Sanitation<br>→ Boiling                                  |
| 2.   | Cholera   | Vibrio<br>Cholerae<br>Bacteria    | → Loose motion<br>→ Vomiting<br>→ Rapid dehydration<br>→ Fever<br>→ Headache | → Safe and pure drinking water<br>→ Sanitation<br>→ Boiling<br>→ Tetra cyclic<br>Antibiotic. |
| 3.   | Hepatitis | Hepatitis<br>Virus                | → Jaundice<br>→ Loss of appetite<br>→ Vomiting<br>→ Liver inflammation       | → Vaccination                                                                                |
| 4.   | Polio     | Polio Virus                       | → Muscular pain<br>→ Vomiting<br>→ Fever<br>→ Pyrexia/attack                 | → Vaccination                                                                                |
| 5.   | Dysentery | Shigella                          |                                                                              |                                                                                              |

|                     |                                               |                                                                                       |
|---------------------|-----------------------------------------------|---------------------------------------------------------------------------------------|
| dysenteric bacteria | → liquid stool with blood<br>→ Abdominal pain | → By washing hands and vegetables with disinfectants<br>→ Sanitary disposal of humans |
| 6. Amebiasis        | Entamoeba histolytica                         | → Loss motion with blood<br>→ fever<br>→ Vomiting<br>→ Abdominal pain                 |

Water induced diseases →

| S.R.NO | Diseases | Pathogens                                          | Mode of action (Symptoms)                                                                                                                                        | Control Method                                                                                                                       |
|--------|----------|----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| 1.     | Malaria  | Plasmodium transmitted by ♀ anopheles mosquito     | → High fever with cold<br>→ Shivering<br>Loss of appetite                                                                                                        | → Quinine and chloroquine                                                                                                            |
| 2.     | Dengue   | Caused by virus transmitted by culicoides mosquito | → High fever<br>→ Headache<br>→ Loss of appetite<br>→ Red spots on skin<br>→ Decrease no. of platelets in blood<br>→ Body ache<br>→ Bleeding from any body part. | → By avoiding water by destroying the breeding place of mosquito<br>→ By using insecticides<br>→ By maintaining sanitation condition |

## # Fluoride Problems in drinking water.

Fluoride is one of the few chemicals that has been shown to cause significant effect in people through drinking water.

Fluoride has beneficial effect on the teeth at low concentration, in drinking water but excessive concentration of fluoride in drinking water can give rise to a no. of adverse effects.

Fluoride concentration causes several effects on dental or skeleton system. The maximum tolerance limit in human body of fluoride is 0.6 to 1.5 ppm [parts per million] according to WHO.

### → Source of fluoride

The main source of fluoride is geographical condition of the earth. Presence of fluoride containing ores in a particular area. Due to the mixing of fluoride containing ores into the water.

### → Effect of fluoride

i. Fluoride causes fluorosis diseases. It is two types:

- a: Dental fluorosis
- b: Skeleton fluorosis

Dental fluorosis High concentration of fluoride causes dental fluorosis.

Symptoms (टेक्नि) → Yellowish & Brownish color of teeth. Loss of enamel(shining).

Skeleton fluorosis High concentration of fluoride causes skeleton fluorosis.

Symptoms → It causes calcification in ligaments. Bone deforming.

### Control Methods and prevention of fluoride

Reverse osmosis filtration methods.

Distillation filtration method.

By using safe and pure drinking water.

Public awareness.

Another method of fluoride reduction is the use of ion exchange methods.

## Arsenic Problems in Drinking water.

The main source of arsenic in human bodies is drinking water. The source of arsenic in drinking water is mixing of arsenic containing minerals in underground water.

Industrial effluents also increases the concentration of arsenic in drinking water.

### Effect of arsenic

#### Short term exposure.

causes ~~the~~ <sup>the</sup> short term exposure of arsenic causes abdominal pain, diarrhoea, vomiting, etc.

#### Long term exposure

long term exposure of arsenic through drinking water causes arsenic poisoning. long term exposure of arsenic also causes skin cancer, lung cancer, kidney cancer, skin problems etc.

Arsenic also caused black foot disease in China. This disease effect the ~~blood~~ vessels in the human body

### Measurement

Measurement of arsenic require lab analysis.

Field test kit can also detect the presence of arsenic in drinking water.

## Prevention & control Methods

Prevention is better than cure.

The effect of arsenic can be minimized by providing safe drinking water in rural areas.

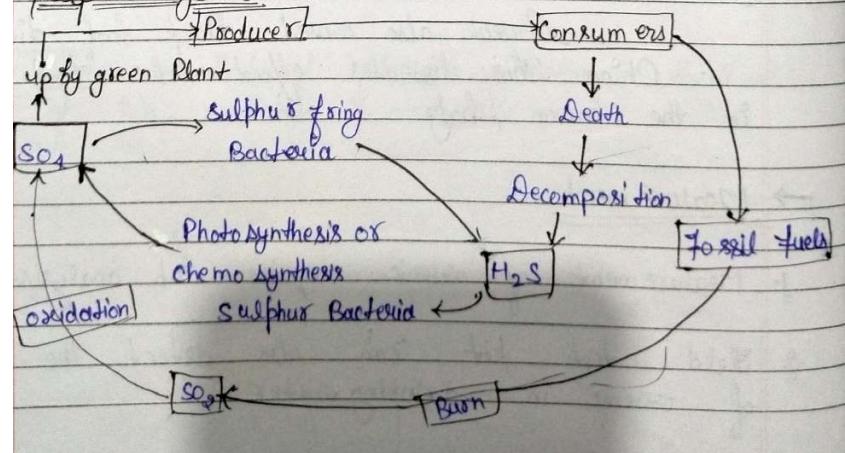
Public awareness. by making the hand pump with red colour cross signal.

By using latest technology and chemical methods such as iron exchange methods.

### Nutrient cycle or Material cycle

Nutrient cycle explain the circulation of Nutrients [Carbon, Nitrogen, Sulphur] from environment to organism or from organism to environment.

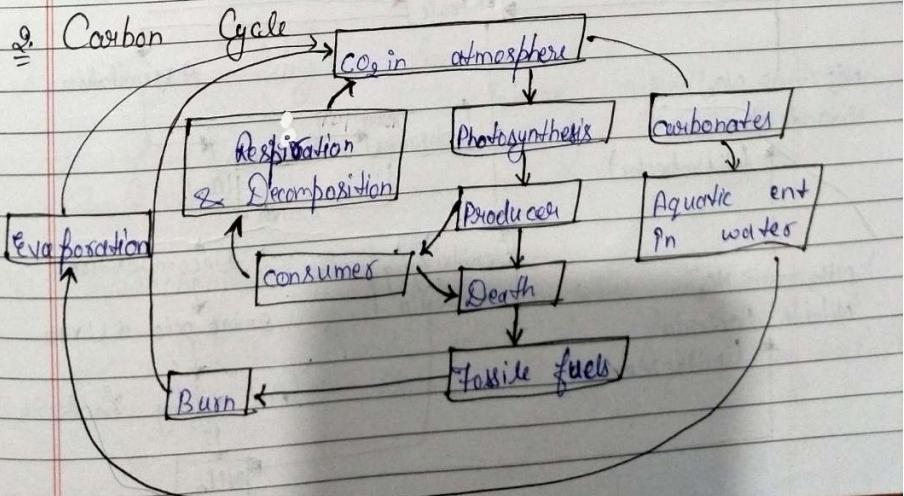
#### Sulphur cycle:



Sulphur is an essential element in protein synthesis it provide a linkage between poly peptide chain in protein molecules like known as

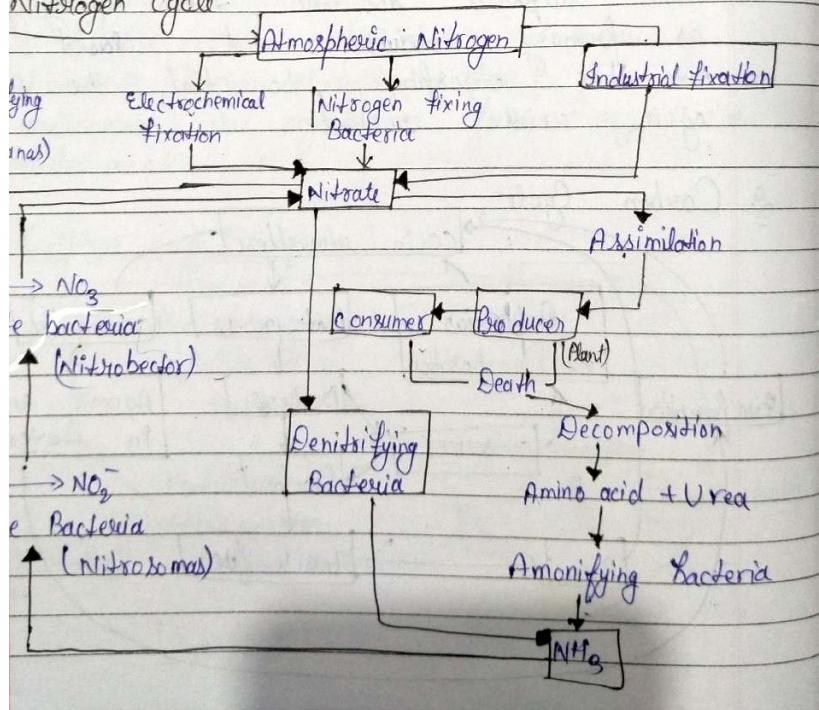
On earth could not exist without sulphur in nature. Sulphur exist in the elemental form and in several oxidation states including hydrogen, sulphide, ( $H_2S$ ), sulphates ( $SO_4$ ),  $SO_3$ .

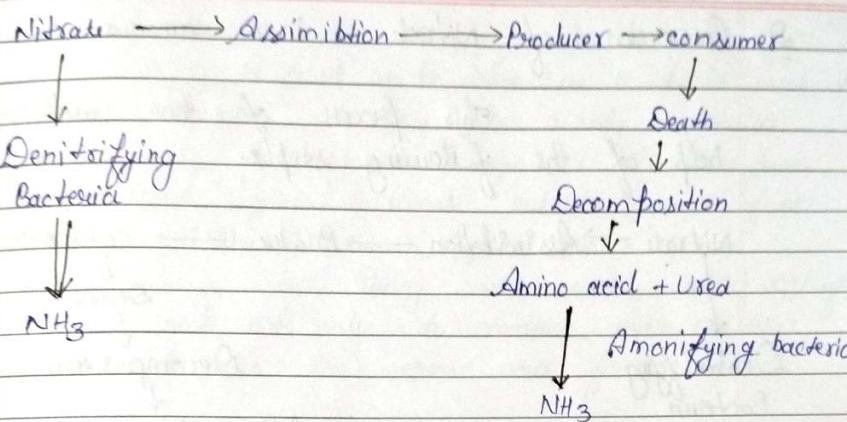
Organic sulphur in plant and animals is decompose ( $H_2S$ ) by bacterial action. This ( $H_2S$ ) is further oxidised to sulphates such as ( $Na_2SO_4$ ) by sulphur oxidised bacteria. These sulphates are then taken up by plant as primary nutrient and released back into the atmosphere, so that the sulphur cycle will restart.



Carbon is present in the form of carbon dioxide in air atmosphere. This carbon is stored by green plants. Through the process of photosynthesis. This stored carbon in green plant is taken by consumer. This carbon is again released into the atmosphere by the process of respiration. Atmosphere carbon is also stored in fossil fuel which on burning releases carbon dioxide in atmosphere.  $CO_2$  is also present in aquatic ecosystem. In the form of carbonates & bicarbonates after evaporation. This carbon is again released into atmosphere.

### Nitrogen cycle





Atmosphere contains 78% nitrogen but plants cannot absorb this nitrogen directly from nature. The circulation of nitrogen can be explained with the help of nitrogen cycle.

#### Conversion of Atmospheric nitrogen into nitrate:

This process is done with the help of two steps.

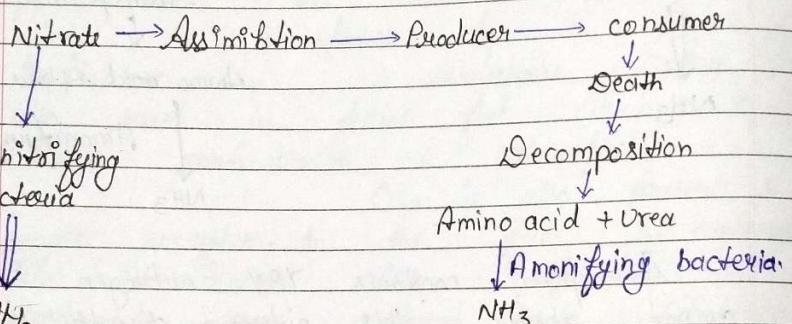
##### (a) Nitrogen fixing bacteria.

In here molecular nitrogen is fixed organic nitrogen by rhizobium bacteria.

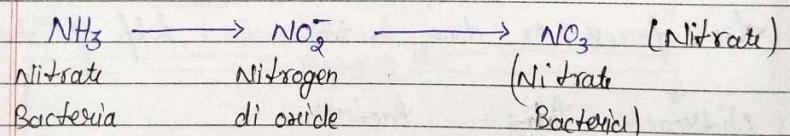
##### (b) Electrochemical fixation

In here nitrogen and oxygen of air combine each other to form nitrates which are the basis food of plants in soil.

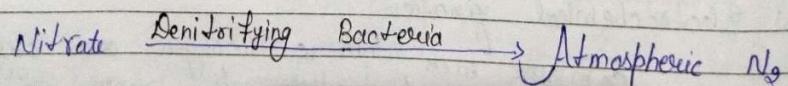
Q: Conversion of nitrate into ammonia  
This process is done with the help of the following steps:



Q: Conversion of ammonia into Nitrate.  
This process is done by following steps:



Q: Conversion of Nitrate into nitrogen ( $\text{N}_2$ )  
This process is done by following steps:



## # Forest resources

A forest can be defined as a biotic community of trees, shrubs and any other woody vegetation usually in a closed canopy. It is derived from Latin word 'foreis' means outside. India's forest cover is 6 to 6.77,000 square km.

Today we have only about 20% of forest thus we need not only to protect over existing forest but also to increase our forest cover.

### → Function of forest

- i. It performs very important function both to human and to nature.
- ii. They recycle rainwater.
- iii. They remove pollutants from air.
- iv. They control water quality.
- v. They moderate temperature and weather.
- vi. They influence soil condition and prevent soil erosion.

### → Uses of forest

- i. Commercial use.
- ii. Ecological use.

### I. Commercial uses

- i. As a fuel
- ii. Plants are used to medicine
- iii. Minor forest products are gum, resins etc.
- iv. Many forest lands are used for mining, greedding for stems and recreation.
- v. Supply variety of animal products such like honey.

### 2. Ecological uses

- i. Production of oxygen: Photosynthesis produces large amount of oxygen which is essential for life.
- ii. Reducing global warming:  $\text{CO}_2$  is one of the main green house gas. It is absorbed by plants for photosynthesis. Therefore the problems of global warming caused by  $\text{CO}_2$  is reduced.
- iii. Soil Conservation: Roots of trees bind the soil tightly and prevent soil erosion. They also act as wind breaks.
- iv. Regulation of Hydrological cycle: Water is shed

in forest act like giant sponges and slowly release the water for recharge of spring.

(v) Pollution moderator: Forest can absorb many toxic gases and noises and help in preventing air and noise pollution.

(vi) Wild life habitat: Forest is the home of millions of wild animals and plants.

#### → Reason for deficiency of forest

In India the minimum area of forest is required to maintain good ecological balance is about 33% of total area. But at present it is only 20%. Over exploitation of forest materials occur.

#### → Over exploitation of forest

Due to over population, there is an increase in demand for medicine, shelter, wood and fuel. Hence reduction of forest material is going on.

#### Causes of over exploitation

1. Increasing agricultural production

2. Increasing agricultural activity

3. Increase in demand of wood resources.

#### # Deforestation

It is process of removal of trees from forest resources due to natural or manmade activities.

#### → Causes of deforestation

1. Development of projects: Development of projects causes through two ways

i. Through submergence of forest.  
ii. Disturbance of forest area.

Example: Big dams, hydroelectric plants, Road construction

2. Mining operation: It reduces forest area by mining of like as coal, mica, limestone etc.

3. Forest fire: Forest fire reduces a large amount of area.

4. Over grazing: Over grazing by cattle reduces the cultivation land.

5. Raw material for industries

Wood is an important raw material for various purpose.

End

## → Impact of deforestation or consequences of deforestation

1. Economic loss
2. Loss of biodiversity
3. Reduction in stream flow
4. Increase the rate of global warming.
5. Breaks the water cycle.
6. Breaks the nutrients cycle.
7. Increase flood frequency

8. Degradation of soil and acceleration of the rate of soil erosion

9. Induces and accelerates land slides.

## → Prevent measures or avoid of deforestation or methods of conservations of forest.

1. New plants of more or less of the same variety should be planted to replace the trees cut down for timber (काढ़ी फूटी)
2. Use of wood for fuel should be discouraged.
3. Overgrazing by cattle must be control.

4. Education and awareness program must be conducted

5. Strict implementation law of forest conservation act.

6. Forest fire must be controlled by modern technique.

7. Steps should be taken by the government to discourage the migration people into the ice land from the main land.

water quality aspect.

### # Water quality aspect.

Pure water? For good health, water should not contain any types of chemical, physical and biological impurities.

| Physical parameters   | Chemical parameter (WHO standard) | Biological parameters                                                |
|-----------------------|-----------------------------------|----------------------------------------------------------------------|
| Parameter             |                                   |                                                                      |
| • Colour - colourless | pH 7-8.5                          | 1 Biological parameter                                               |
| • Odour - odourless   | T.S 500PPM                        | we check the presence of virus, bacteria & other pathogens in water. |
| • Taste - Tasteless   | T.D.S 500 PPM                     |                                                                      |
|                       | Chloride 100 PPM                  |                                                                      |
|                       | Hardness 100 PPM                  |                                                                      |
|                       | D.O 5 PPM                         |                                                                      |
|                       | B.O.D 6 PPM                       |                                                                      |
|                       | C.O.D 10 PPM                      |                                                                      |

→ D.O (Dissolved oxygen): Dissolve oxygen means measurement of oxygen present in dissolved forms.

→ B.O.D (Biological or Biochemical Oxygen Demand): The measurement of oxygen supplied to decompose biological impurities in water.

→ C.O.D (Chemical oxygen demand): The measurement of oxygen supplied to decompose chemical impurities in water.



Unit → 4

## Current environment Issues of Importance

# Weather: Any environmental condition which changes daily with place and time is known as weather.

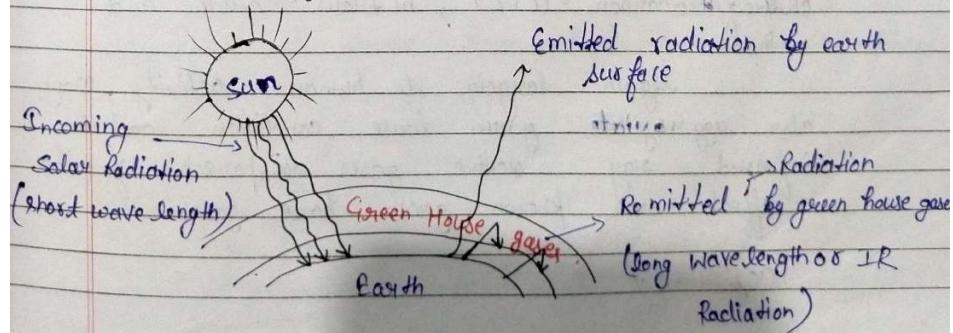
Example: Temperature, Moisture, etc.

# Climate: It refers to the long term pattern of weather condition of a given area.  
OR

Any environmental condition which changes after a very long time period is known as climate.

Example: Summer, winter, etc.

\* Imp: # Green house effect or global warming.



The green house effect is a warming of the Earth's surface and lower atmosphere that tends to intensify with an increase in atmospheric CO<sub>2</sub>. The atmosphere allows a large percentage of the rays of visible light from the sun to reach the earth's surface and heat it.

A part of this energy is radiated by the earth surface in the form of long wavelength infrared radiation, much of which is absorbed by molecules of CO<sub>2</sub> and water vapour in the atmosphere which is reflected back to the surface as heat. This is roughly analogous to the effect produced by the glass panes of a green house, which transmit sunlight in the visible range but hold in heat.

The trapping of this infrared radiation causes the earth surface and lower atmospheric layer to warm to a higher temperature. And increase in atmospheric concentration of other trace gases such as chlorofluorocarbon (CFC), nitrous oxide and methane.

Again largely due to human activity, may also aggregate green house condition and the active gases responsible for the effect are known green house gases.

CO<sub>2</sub> - 52%



$\text{CH}_4$  - 24%

$\text{N}_2\text{O}$  - 18%

$\text{CFS}'8$  - 6%

## # Sources and causes of Green house gasses

1.  $\text{CO}_2$ :

- (i) Burning of fossil fuel
- (ii) Automobile emission
- (iii) Population growth
- (iv) Deforestation

2.  $\text{CH}_4$ :

- (i) An aerobic decomposition of organic waste
- (ii) Production of biogas.
- (iii) Production and uses of natural gasses.

3.  $\text{CFCs}$ :

- (i) Cooling devices such as refrigerator A.C.
- (ii) In Industrial solvents.
- (iii) Manufacturing of foam aerosol.

4. Ozone  $\text{O}_3$ :

- (i) Diffusion of ozone from stratosphere to troposphere layer.
- (ii) Human activity.

5. (Nitrous Oxide)  $\text{N}_2\text{O}$ :

- (i) More use of nitrogenous fertilizers
- (ii) Nitrate contaminated ground water.

(iii) Burning of fossil fuel.

# Effect of global warming & green house effect

i) Climate change: @ Modern human activities increase the  $\text{CO}_2$  concentration in atmosphere the increase concentration of green house gasses causes climate change.

- (A) Global warming causes maintaining of glaciators.
- (B) Global warming increases the sea level.
- (C) Global warming causes change in rainfall pattern.
- (D) Global warming increases the changes of floods.

(iv) Agriculture:

@ Green house effect decreases the crops production of the world due to the loss of soil moisture.

- (E) Global warming increases the disease in plants.
- (F) Global warming causes the change in cropping pattern.

(v) Human health:

Global warming causes several disease in human being.

(vi) Eco system:

- (G) Global warming causes loss of biodiversity
- (H) Global warming destroyed the produce

food chain therefore it affects the whole ecosystem.

- ① Global warming causes deforestation.

## # Control methods of global warming or green house effect

1. Kyoto protocol, this is an international agreement to minimize the carbon dioxide ( $CO_2$ ) gas (green house gas) emission.
2. By controlling population growth.
3. By controlling deforestation
4. By minimizing the use of CFCs product.
5. By controlling automobile emission or air pollution.
6. By minimizing the use of fossil fuel.
7. By minimizing the use of non-renewable resources.
8. By planting more trees.
9. By using latest technology which can minimize the effect of green house gases emission.

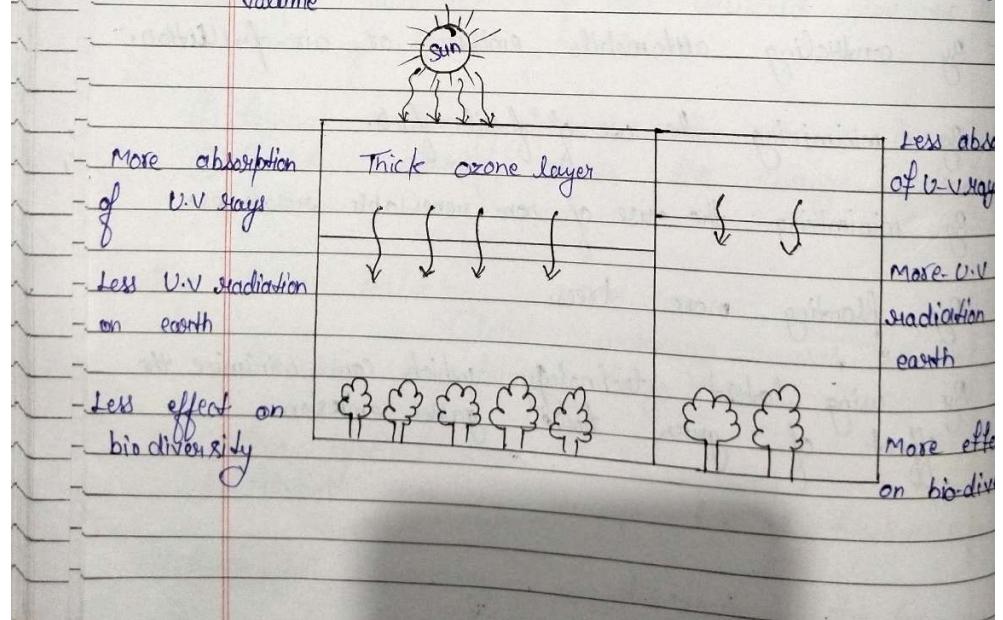
## # Ozone layer depletion or Ozone hole

Ozone is a blue gas mainly found in stratosphere layer. It is called ozone layer because ozone layer formation takes place in this layer.

Ozone layer acts as an umbrella of the earth because it absorbs harmful solar radiation in it. The thickness of ozone layer is measured in Dobson (DU).

### → Ozone hole

If the thickness of ozone layer becomes less than 200 DU, it is known as Ozone hole. At the height of 30 km the concentration of ozone is 8-10 ppm by volume.



## → Causes of ozone layer depletion

The main cause of ozone layer depletion is CFC's compounds. The main source of CFC's are as follows.

i) Manufacturing farms

ii) Use of cooling devices.

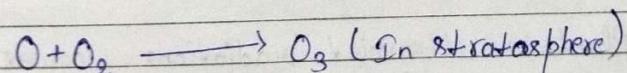
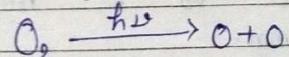
iii) Use of aerosol products, industrial solvents.

iv) CFC's molecules dissociate into the chlorine atom by absorbing the ultraviolet radiations.

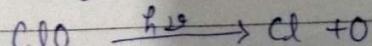
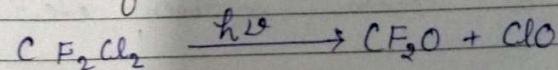
v) Each liberated chlorine atom decomposes nearly about one lakh ozone molecules before it disappears.

## → Mechanism of ozone layer depletion.

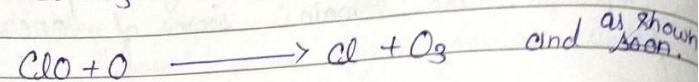
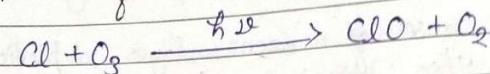
### a) Formation of ozone layer



### b) Formation of chlorine atom.



### c) Depletion of ozone layer



## → Effect of ozone layer depletion

The main effects are as follows:

i) Human being: Ultraviolet radiations causes skin cancer, blood cancer etc. Ultraviolet radiations causes sun burn. Ultraviolet radiations causes premature ageing of the skin.

ii) Aquatic ecosystem: Ultraviolet radiations destroy the life of producer and consumer. Therefore it affects the whole aquatic ecosystem.

Phosphine is formed by the decomposition of organic phosphorus. This phosphine is found to be harmful for the aquatic animal.

iii) Plants: Ultraviolet radiations causes photoinhibition and chlorosis in plants. Ultraviolet radiation decreases the growth of plants such as cotton, soyabean etc.

4. Climate + Ultraviolet + radiation increase the temperature of the environment is known as global warming.

→ Control Methods

1. Montreal Protocol → It is an international agreement to minimize the effect of ozone layer depletion. By minimizing the use of CFC's products.

2. By minimizing the use of foaming devices, cooling devices, industrial solvents etc.

3. By minimizing the use of non-renewable resources

4. By minimizing the use of nitrogenous fertilizers.

5. By planting more trees.

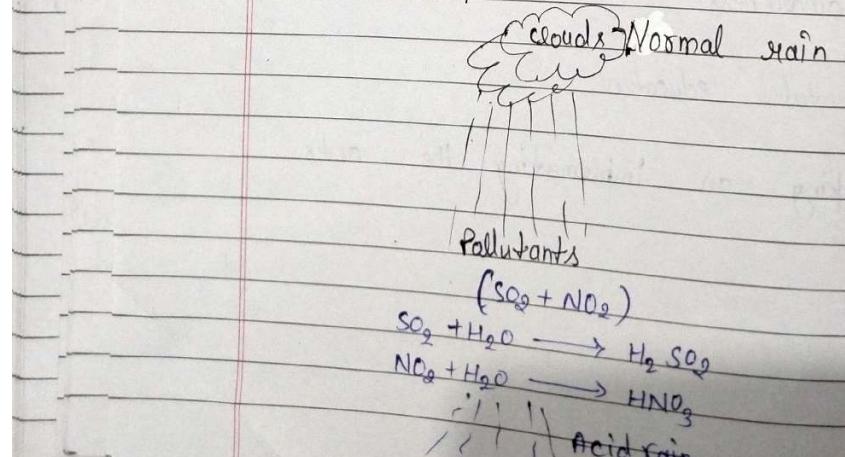
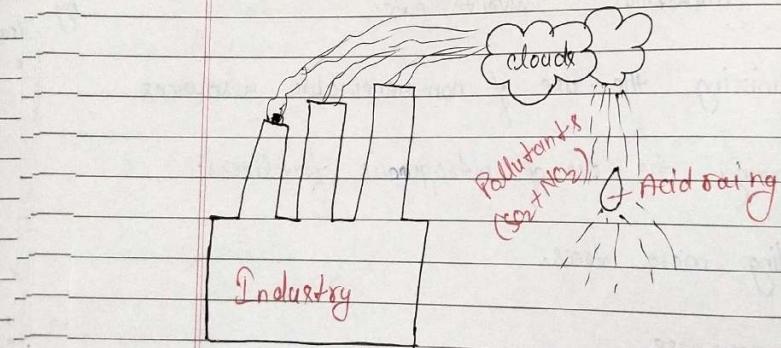
6. Public awareness.

7. Environmental education.

8. By making and implementing the acts.

## # Acid Rain

The term acid rain was first given by R.A. Smith. Acid rain is the mixture of  $H_2SO_4$  (50-60%),  $HNO_3$  (30-40%),  $HCl$  (10%) etc. The pH of normal rain water is 5.6-5.7. But the pH of acid rain is always less than 5. According to R.A. Smith, rain can be defined as a condition in which normal precipitation becomes acidic after reacting chemically with the pollutants ( $SO_2$  &  $NO_2$ ) present in the air.



## → Sources and causes of acid rain

The main cause of acid rain are the emission of acidic oxides. The main source are as follows:

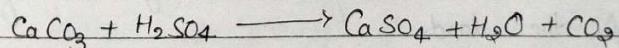
- i) Thermal power plant or pollutants emitted by these types of plant.
- ii) Burning of fossil fuel
- iii) Automobile emission
- iv) Pollutants emitted by explosive industries.
- v) Pollutants emitted by acid manufacturing industries

## → Effect of acid rain

### a) Building :-

Acid rain can cause the damage of the building materials.

The attack of acid rain on marble is known as strong leprosy



The marble of tajmahal is destroy due to the soil erosion of acid rain.

Acid rain can damage the colour of building.

### b) Human Health :-

- 1 Acid rain can effect the digestive and nervous system of human health beings.
- 2 Acid rain can damage the skin of human being.

### c) Aquatic eco system

- 1 Acid rain decreases the pH of water and convert normal water into acid water. There fore destroy producer and consumer.
- 2 Acid rain increases the concentration of acidic nature in water due to this gills of the fishes and effects the aquatic system.

### d) Plants

- 1 Acid rain causes chlorosis and plasmolysis in plants.

Earth worms are also killed due to the presence of acid rain. There fore destroy the fertility of the land.

### e) Terrestrial eco system

- 1 Acid rain causes deforestation.
- 2 Acid rain can destroy the producer of a foodchain.

therefore effects have terrestrial ecosystem.

#### → Control Methods of Acid rain

1. By controlling thermal pollutants.
2. By minimizing the use of fossil fuel.
3. By controlling automobile pollution.
4. By controlling air pollution.
5. By planting more trees.
6. Environmental education.
7. By making and implementing proper acts.

#### # Automobile emission.

Automobile emission is the pollution caused by vehicles. Automobile emission releases many air pollutant into the atmosphere which causes a variety of negative effects on nature as well as on human being.

#### → Causes of automobile emission

The main cause of automobile pollution are the automobiles that emits gases into the atmosphere

The main sources are as follows:

- i) Partially burning of hydrocarbons.
- ii) Monitoring of gases causing green house effect and global warming.
- iii) Gasoline evaporation
- iv) Emission of air pollutant.

#### → Effect of Automobile emission.

- i) It causes negative effect on human health such as asthma.
- ii) Car pollution plays major role in human health issues.
- iii) Automobile pollution also contribute in global warming.
- iv) It also plays major role in ozone layer depletion.
- v) It also contribute in acid rain.

#### → Control methods of automobile emission.

- i) Modification in equipment to reduce emission.



- (ii) Use of zero CO<sub>2</sub> emission vehicles such as battery and electricity control vehicle.
- (iii) Proper maintenance of cars, trucks emission control system not only limits harmful emission but also can improve fuel efficiency.
- (iv) Use of public transport or bicycle.

## # Burning of Paddy straw

Paddy straw is produced as a byproduct of rice production at harvest during harvest rice straw is removed with the rice grain or spread out in the field depending on how it was harvested manually or by using machine. The +

The Paddy crop is harvested 8/11. the first and last week of October in Punjab and Haryana. Another reason is rainy weather after harvest can leave fields too wet. Burning straw is considered a low cost solution alternated to filling in the straw.

In addition to wheat and Paddy, sugarcane leaves are most commonly burnt. According to an official report more than 5000 million tons of Paddy (crop residue) is burnt annually in the

country. According to an estimate 20 million tons stubble is produced every year in Punjab along 80% of which is burnt.

### ⇒ Effect of burning of Paddy straw

- 1: They damage soil quality and cause ~~heat~~ heavy pollution.
- 2: The produces smoke and green house gasses in a large amount.
- 3: According to a report one tonne burning of paddy leads to a loss of 5.5 kg Nitrogen, 2.3 kg Ph, 25% Potassium and more than 1 kg of Sulphur.
- 4: The heat from burning paddy straw penetrates 1 cm into the soil, elevating the temperature 33.8°C to 49.9°C. This kills the bacteria and fungal population.
- 5: Burning of crop residue causes damage to other microorganism present in the upper layer of the soil. As well as its organic quality.

## → Control method of burning Paddy straw

1. Rice straw can be used for feeding the cattle, energy generation including ethanol, Biogas and Bio oil.
2. It can be used in different ways like composted manure, roofing in rural areas, brick kilns and biomass energy etc.
3. Paddy straw made into pellets can be mixed with coal in thermal power plant. This saves coal as well as reduces carbon emission.
4. Farmers can also manage crop residue effectively by employing agricultural machine. As these machines are too costly and the state government should come forward and provide better subsidy farmers can afford these machines.

## Unit → 5

# Environmental Protection

### # Environmental protection act 1986

This act comes into force on November 1986. This act gives the identification of :-

1. Environment Environment includes water air, land and the interrelationship which exist b/w water, air and land and human being other living creatures, plants, microorganism and property.

2. Environmental pollutant Environmental pollutant means any solid, liquid or gaseous substances present in such concentration as may be or tend to be injurious to environment.

3. Environmental pollution means the presence in the environment of any environmental pollutant.

Hazardous substance or preparation by means any substance which region of



## Ecosystem

Date / /  
Page No. 94

its chemical properties or handling liable to harm human being other living creatures, plant, microorganism, property of the environment.

This act consists four chapters and 96 sections.

# The important features of environmental protection act 1986 [EPA, 1986] follows:-

1. The standard of quality of air, water or soil for various areas and purpose.
2. The maximum permissible limits of concentration of various environmental pollutant.
3. The procedure and safe guard for the prevention of accidents which may cause environmental pollution and providing for remedial measures for such accidents.
4. The central government may by notification in the official gazette, make rules in respect of all or to protect and improve environment.
5. The government has the authority to close or prohibit or regulate any industry or its operation if the violation of provision of the act.
6. Violation of the act is punishable with

imprisonment of five years or fine of one lakh or both.

7. This act empowers the government to reduce pollution and remedies measures against pollution.

# This act consist of four chapter containing.

Chapter I Contains 9 sections.

Section 1: Contains short title, extent and commencement.

Section 2: Defines terminologies related to environment.

Chapter II: Contains 4 sections.

Section 3: Empowers central government measures to protect and improve environment.

Sec 4: Empowers central government for appointment of officers with their powers and functions.

Sec 5: Empowers central government to give directions.

Sec 6: Empowers central government to formulate rules and regulations.



Date / /  
Page No. 95



Chapter 3 Contains 11 sections.

Sec '7': States that the industries carrying industrial operations are not allowed to emit or discharge environmental pollutants more than the established standard.

Sec '8': States that person handling hazardous substances need to comply with procedural safe guards.

Sec '9': Decides furnishing information to authorities in certain cases.

Sec '10': Has provisions of entry and inspection.

Sec '11': Has provisions to collect samples and their analysis.

Sec '12': Has provisions to setup environmental laboratories for testing and analysis of air, water & soil and other samples.

Sec '13': Has provisions for appointing government analysts for testing and analysis of air, water & soil and other samples.

Sec '14': Refers to the report government analysis as evidence facts.

Sec '15': Has provisions of fines for the contravention of the provision of the act.

and the rules, orders and other directions.

Sec '16': Describes offence by companies.

Sec '17': Describes offence by government department.

Chapter 4 Contains 9 sections.

Sec '18': Provides protection of actions taken in good faith.

Section '19': Has provisions of cognizance of offence.

Section '20': Empowers central government regarding information, report or returns.

Section '21': Declares members, officers and employees of the authority construction under sec to be public.

Sec '22': Enforces law of civil court.

Sec '23': Describes powers to delicates.

Sec '24': Describes effect of other laws.

Sec '25': Provides powers to make rule.

Sec '26': States that the rules made under this act shall before parliament.

## # NGO (Non Government organization)

NGO is an non-profit citizen group voluntary organized on a local, national and international level.

### # Classification of NGO

#### 1. Local NGO or Community based organization [CBO]

These are grass root organization to solve basic problems of human beings. These organization operate in a particular community or society.

Ex- Youth club, WOmen association, farmers organization

#### 2. National organization or national NGO

These organization operate in particular nation. e.g.  
Example- Chipko movement.

#### 3. International organization.

These organization operates internationally. The head quarters of these organization are present in developed countries and branches are present or spread over developing countries. These organization solve international problems such as climate change, global warming etc.

Example- UNHCO, UNICEF, UNESCO etc.

### # Objectives of NGO or Roles of NGO in environment protection.

- 1. To bring about social and economical changes.
- 2. Environmental education.
- 3. Environmental awareness.
- 4. Environmental pollution control.
- 5. Protection of forest and trees.
- 6. Wildlife conservation.

#### 7. Population stabilization and population control.

#### 8. Conservation of biodiversity.

#### 9. Promote the uses of bio fertilizers.

#### 10. Use of non-conventional energy resources such as solar energy.

#### 11. Awareness about the ill effects of narcotics.

### # Some important NGOs and their work.

1. Chipko movement for the conservation of forest and trees started by

## Sundaulal Bahuguna

g. Narmada Bachao Andolan initiated by Medha Patkar for the protection of Narmada river.

ii. WWF [World wide life fund for nature]  
WWF (world wide life fund for nature)

### # Environment education.

Environment education is the education through environment, about environment & for the environment.

### ⇒ Objectives of environmental education

i. Awareness : Environment education is very necessary to create awareness about the environment to the public.

ii. Knowledge : Knowledge is provided to create awareness.

iii. Skill : Ecofriendly technology can be used to protect the environment.

iv. Evaluation ability : Evaluation ability can be changed by the fresher information about the environment.

v. Participation : Each person should participate equally to protect the environment.

## Stages of environmental education:

### Formal Method

Environmental education, college, and university level.

Environmental appreciation courses.

Environmental education in business and management courses.

### Non-formal Method

NFAC [National environment awareness campaign]

In this program some financial help is provided to the following organization

School, college, state government department, military units, these NGO help by getting fund. These organization spread environmental education by the help of following methods:

By cleaning local water bodies.

Tree plantation.

By cleaning roads



(iv) By mass media.

④ GLOBE (Global learning and observation to benefit the environment)

⑤ By opening eco club.

vi. By celebrating world environment day. [5 June]

# Importance of environmental education.

To know about ecofriendly product and ecofriendly technology.

To maintain ecological

To conserve over natural resources.

To minimize the environmental pollution.

To control human population and its effects on environment.

To gain the goal of sustainable development

Environmental education is very important to create happiness in human life.

Environmental education is very important for civilization.

~~smp~~ ~~imp~~ Women's education.

According to Jawaharlal Nehru  
"Educate a man you can educate one person, but educate a woman you can educate the whole family."

⇒ Objectives of women education.

i. In decision making.

ii. Pollution control.

iii. Population stabilization

iv. Child education

v. To improve the economical condition of the family

vi. To fillup the gap b/w male & female literacy rate.

vii. To bring about social and economical changes.

# Problems in women's education

i. Gender Discrimination

ii. Involvement of girls child in domestic work

iii. Low enrollment of girls in schools.

4. High drop out rate of girl child from school.

5. The gap in male and female literacy rate.

### # Roll of government in women education.

The government of India stabilized a department for women and child development in 1985. This department is responsible for the welfare of women. Some of the program taking for women betterment are as follows:

1. Rashtriya Mahila KOSH

2. Mahila Samridhi YOJNA

3. Balika Samridhi YOJNA

4. Sarva Siksha Abhiyan

5. National commission for women.

6. Reservation of women in education.

7. Employment and income generating training centres.

### # Some important rules and acts

1. Protection of women from domestic violence.

2. Dowry Prohibition act.

3. Sati Prevention act.

### # Population growth

Population is a group of organism of the same species usually found in one geographical area world birth rate 2% per annum and in India 1.33% per annum human population differs only two human being and its study in all areas, age group, growth, education and for future development of human being.

11 July as world population day.

### # Population explosion (uncontrolled growth)

Birth rate > Death rate

Increase in population of a particular area with rapid rate due to high birth and low death rate is known as population explosion.

→ Reasons for population growth.

Now a day birth rate is greater than death rate. Due to the following reasons.

1. Spread of the education.

3. Control of epidemics.

4. Controls of dangerous disease.

5. Good medical facilities.

6. Good availability of food.

7. Ignorance also causes of population growth.

## ⇒ Effect of Population

1. Shortage of food.

2. Housing problem.

3. Extra pressure on natural resources.

4. Shortage of drinking water.

5. Environmental pollution.

6. Shortage of electricity.

7. Deforestation.

8. Production of solid waste.

9. Loss of Biodiversity.

10. Health problem.

11. Unemployment.

12. Difficulty in education.

13. Transportation problems.

14. Security problems.

15. Over population causes economical problems.

## ⇒ Control Method.

1. Education for women. By improving the literacy rate of the women population growth can be minimized.

2. By improving the economical condition of family.

3. Public awareness.

4. Government benefit should be given to the family. By following proper population control policy.

5. Participation of NGOs by proper family planning.

6. Late marriage.

## ⇒ Characteristics of Population growth.

1. Exponential growth: When a quantity increase by a constant amount in per unit time it is known as exponential growth.

Ex. One, 3, 5, 7, 9, ... linear growth.

2, 4, 8, 16, 32 or  $10, 10^2, 10^3, 10^4$  exponential growth.

## 2. Doubling time

$$t_d = \frac{70}{r}$$

Where  $r$  = annual growth rate per annum.

The time needed for a population to double its size is known as doubling time. [At a constant annual rate]

$$\text{If } r = 2\% \Rightarrow t_d = \frac{70}{r}$$
$$t_d = 35$$

If a nation has 2% annual growth, then its population will double in 35 years.

## 3. Total Fertility Rate

It is one of the key major of a nation of population growth. It is defined as the average number of children that would be born to the women in her life time.

## 4. Infant Mortality Rate [IMR]

It is percentage of infants died out those though born in a year.



## Unit $\Rightarrow$ 3

# Pollution and their effects

Ques. What is the meaning of environment pollution and pollutants? Write down the classification of pollutants.

The term pollution is originated from Latin word Pollutionem which means to make dirty.

### # Environment Pollution:-

Introduction of any unwanted or foreign material into the environment which make change the physical, chemical and biological property of the environment at the time of injection or after a very long time is known as environmental pollution.

The substance which causes pollution are known as pollutants.

Example- Certain gases such as  $SO_2$  (sulphur dioxide),  $NO_2$ ,  $CO_2$  etc., radioactive product, biomedical waste, e-waste, deposited particles such as dust, smoke etc. Fertilizers, pesticides, insecticide etc.

# Classification of Pollutants  
Pollutants are classified as

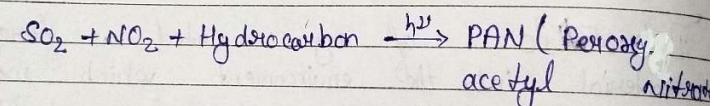
i) On the basis of existence in nature.  
They are classified into two,

#### (i) Primary pollutants:

Primary pollutants are those elements which enter directly into the environment  $SO_2$ ,  $CO_2$ ,  $NO_2$ , Hydrocarbon etc.

#### (ii) Secondary pollutants:

Secondary pollutants are those elements which are formed due to change of primary pollutants.



iii) On the basis of degradation nature.

they are classified in two types

#### (i) Biodegradable pollutants

Such as organic waste, sewage, fruits, vegetables etc.

#### (ii) Non-Biodegradable pollutants

Chemical wastes such as DDT [Dichloro Diphenyl Trichloro Ethane]



3 On the basis of origin

They are classified into two types:

i) Natural Pollutants

Such as forest fire.

(ii) Man made Pollutants Such as e-waste biomedical waste, industrial waste  
nuclear waste etc.

## # Water pollution

Q. What is the meaning of water pollution? Explain causes, effects and control methods of water pollution.

Explain waste water treatment plant with diagram

Ans.

Introduction of water pollution

Introduction of any unwanted or foreign materials into the water which may change the physical and chemical and biological properties of water at the time of infection or after a very long time is known as water pollution.

⇒ Source and effect of water pollution

A. Sewage and domestic water: sewage is a cloud dirty aqueous soln. containing organic matter and minerals, domestic waste such as soap, detergent, kitchen waste etc.

Effect

i. It is unfit for drinking.

ii. Objectionable order colour

iii. Infectious disease such as cholera, gastro etc.

B. Industrial waste such as Cadmium (Cd), Chromium (Cr), Nickel (Ni), lead (Pb), Iron (Fe), Arsenic (As)

Effect

i. Cancer Causing

ii. Mini-Mata disease

Methyl

iii. Mercury disease

C. Radio active pollutants: such as waste from nuclear power plant.

Effect

i. Genetic problems

ii. Radio active sickness such as vomiting, headache etc.

D. Thermal Pollutants: such as waste water from thermal power plant.

### Effect

- 1. Thermal pollutants increases the temperature of water.
- 2. Decreases the value of dissolve oxygen in water.
- 3. thermal pollutants destroy the life of aquatic plant and animals.
- 4. Agricultural wastes such as fertilizers and pesticides.

### Effect

- 1. Extra amount of fertilizers causes eutrophication
- 2. Extra amount of nitrate in water causes blue baby syndrome in infant.
- 3. Extra amount of pesticide in water causes biomagnification.

### Control methods of water pollution

- 1. Stabilization of ecosystem such as harvesting and removal of biomass, fish management etc.
- 2. The pollutant water can be treated by the use of a plant known as water treatment plant.
- 3. By using chemical methods such as ion exchange method, solvent extraction method, ultra-

filtration method etc.

4. Reverse osmosis filtration (RO) method.

5. 3R - [Reduce, Reuse, Recycle] method.

6. Some other common methods for water purification

#### (a) Chemical methods:

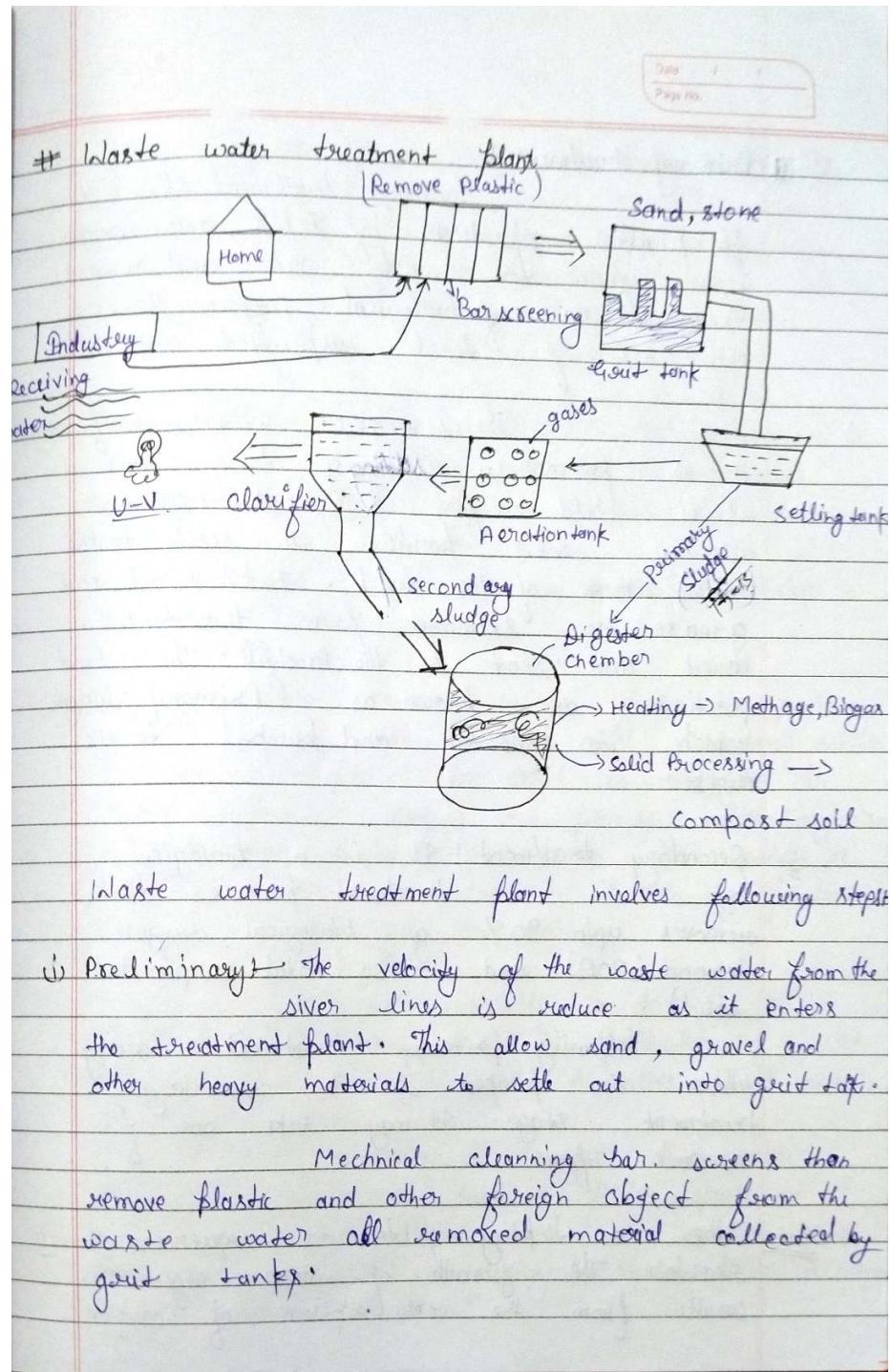
- i) Chlorination method.
- ii) Adding KMNO<sub>4</sub> to water.
- iii) Iodine treatment method.

#### (b) Physical methods:

i) Boiling method

# Intake water treatment plan





, Primary treatment ;

Primary treatment allows the physical separation of solids and grease from the waste water and remove b/w 30- 40% of biological oxygen demand and 50% of total suspended solid

The screened waste water flow is to primary settling tank where it is held for several hours allowing solid particle to settle to the bottom of the tank. Fats, oil and grease are skimmed from the tanks, dried and sent to the landfill. The settled particles are known as Primary sludge which is collected and pumped to the digester.

Secondary treatment ; It is a biological treatment process that removes upto 90% of biological oxygen demand (BOD) and TSS (Total suspended solid).

Following primary treatment remaining water is pumped to the secondary stage. It may take one of several form.

Either a trickling filter or sequencing batch reactor. The growth of micro-organism results from the consumption of organic

Date / /  
Page No.



matter in the waste water as their food supply. The micro-organism create a solid organic material (sludge), which just like the sludge from the primary treatment. Secondary sludge is pumped to digester for processing and solids processing.

4. Final Treatment) The waste water that remains can be disinfected to kill harmful microorganism before being released into receiving water.

Although there are many methods available to kill these microorganism.

5. Solid Processing + Primary solids from the primary settling tank and secondary solids from the clarifiers are send to digester for solid processing during this process micro organism use the organic material present in the solids as a food source and convert it to by products such as methane gas and water.

Digestion results in 90% in 90 reduction of pathogens and the production of a wet soil like material called bio solids. That contain 95 - 97% water.

In order to remove this water mechanical equipment such as filter press or press are used to squeeze water from the bio solids, reducing its volume prior to being used in composting.

## Air pollution

Introduction of any unwanted material and foreign material into the air which make change the physical, chemical and biological property of air, at the time of infection and after a very long time is known as Air pollution.

Sources and causes of Air Pollution:

Natural Resources

Forest fire.

Volatile (volatilized) organic compounds

Radioactive decay by earth surface

Dust

Man made Resources

Thermal power plant.

Automobile emission.

Industrial emission.

Burn Practice in agriculture (Paddy straw)

# Some other measures air pollutants and their sources are as follows:

A. Carbon compounds:  $\text{CO}_2$  and  $\text{CO}$ .

Source: Automobile emission, industrial emission, burning of fossil fuel.

B. Nitrogen compounds:  $\text{NO}_2$  and  $\text{NO}_x$ .

Source: Automobile emission, industrial emission, burning of fossil fuel.

C. Sulphur compounds:  $\text{SO}_2$ ,  $\text{H}_2\text{S}$ ,  $\text{H}_2\text{SO}_4$  etc.

Source: Automobile emission, industrial emission, burning of fossil fuel.

D. Ozone compounds:  $\text{O}_3$  (ozone)

Source: Different human activities,  $\text{H}_2\text{O}_2$

E. Fluorides +  $\text{CaF}_2$ , Ceramics

Source: Pesticides, Industrial process.

F. Hydrocarbons: Benzene, Methane etc.

Source: Automobile emission, by burning of fossil fuels.

Toxic metals + Cd (Cadmium),  $\text{Cr}_2\text{O}_7$ ,  $\text{Pb}$ ,  $\text{As}$  etc.

Source: Different industrial processes, mining, by burning of fossil fuel.

Effect of air pollution

On human health

Irritation of eyes, nose etc.

Lead ( $\text{Pb}$ ) causes brain damage effect.

Cadmium (Cd) from cigarette smoke causes damage of lungs, liver and kidney.

Mercury damage kidney, liver, nervous system

In plants

Ozone: Ozone causes necrosis in plants dead spots on the leaves of the plants

$\text{NO}_x$  +  $\text{NO}_2$  causes premature fall of the leaves

$\text{SO}_2$  +  $\text{SO}_3$  causes chlorosis and plasma loss of chlorophyll and plasma in plants leaves.



### i) On Animals:-

Air pollution causes poisoning effect on material.

### ii) On Building:-

Air pollution causes building acid rain which effect is on building material.

- Air pollution causes colour of plants.
- Air pollution can damage textile, paper, leather etc. work of the build.

### iii) On Natural Beauty:-

- ① Air pollution decreases the beauty of the nature.
- ② Air pollution causes melting of glacier.
- ③ Air pollution causes ozone layer depletion.
- ④ Air pollution causes acid rain.

## # Control Methods of Air pollution:-

### i) Source collection method

- a) Substitution of grain material
- b) Process modification
- c) Maintenance of equipment

### ii) Pollution control equipment:-

- a) Cyclone separator, fabric filter
- b) Gravitational settling chambers
- c) Electrostatic precipitator
- d) Inlet absorption method.
- e) Dry absorption method.

### iii) Diffusion of pollutants in air:-

In this method pollutant is diluted before discharging into the environment.

### iv) Vegetation:-

Vegetation means planting more & more trees to reduce the environment adverse effect of pollutant in air.

### v) Zoning:-

In this, cities are divided into several areas or zone.

### vi) Some other common methods are as follows:-

a) By promoting clean fuel.  
Ex:- Using CNG, LPG.

b) By using mass or public transport system.

c) By making proper implementing control act (APTC).



## # Soil pollution / Land Pollution

Introduction of any unwanted or foreign materials into the soil, which make change the physical, chemical, biological properties of soil and effect the fertility and productivity of soil at the time of infection or after a very long time is known as soil pollution.

### composition of soil.

1. Minerals matters (45%)
2. Organic matter (5%)
3. Soil air (20%)
4. Soil water (20%)

### Sources of soil pollution.

1. Sewage and domestic waste
2. Human and animal dead body.
3. Insecticides and pesticides
4. Agricultural waste
5. Urban wastes
6. Industrial pollutants release from different industrial waste.

Example: soap & detergent, rubber.

7. Radioactive pollutant  
waste of nuclear power plant.

8. Waste of sugar industry, textile industry  
Presence of toxic metals in the soil.

### 9. Deforestation.

10. Presence of solid waste in the soil.

### # Effect of soil pollution:-

1. Radioactive pollutant present in the soil causes genetic problems.

2. Presence of toxic and heavy metal causes cancer (Cd, Ar, Cr, etc)

3. Presence of industrial pollutant in the soil causes the food chain, food web and ecosystem of the nature.

4. Presence of sewage and domestic waste, causes several diseases.

5. Presence of excessive nitrogenous fertilizers in the soil makes soil resistant to the attack of pathogens.

6. Fluoride absorb by the soil reach to the crops.



## # Control methods:-

1. By minimizing the production of solid waste.
2. By dumping the solid waste at proper place
3. By using proper disposal methods. ~~etc~~ composting method, filling method etc.
4. Use of biological fertilizers ~~etc~~ cow dung
5. By controlling acid rain.
6. Heavy metals are properly treated before mix into the soil.
7. By controlling soil erosion.
8. By controlling deforestation. ~~Eat~~ Plantation
9. Bio mass should be used for biogas products

## Noise Pollution

Unwanted and unpleasant sound is known as noise pollution. Noise is measured in decibel (dB)

Normal Hearing 20 (db)

Normal conversation 50 (db)

Traffic on busy road 70 (db)

Residential Area 40 to 45 db

### Source of Noise Pollution

Natural Resources Thunder

Man-made sources: Auto mobile, loudspeaker, printing machines, musical instrument etc.

Other source of noise pollution are-

Industrial source + Steel

Transportation source + Train, Aeroplane etc.

Domestic gadgets:- Washing machine, Hammer, Drill machine etc.

Indoor noise + playing, children, collision of utensils, stone crusher



(v) Scientific testing + e.g. Rocket launcher.

(vi) Public address system :- e.g. Loud speaker, Festival celebration.

## # Effect of Noise pollution.

1. Physical effect → temporary problems of Hearing.

(i) Permanent deafness.

(ii) Loss of ear drum memory.

## 2. Physiological effect

(i) Headache

(ii) Eye strain

(iii) Pain in Heart

(iv) Nervous break down

(v) Reduce concentration.

## 3. Psychological effect

(i) Depression

(ii) Frustration

(iii) Irritation

(iv) Emotional disturbance

(v) Disturbance in sleep

(vi) Reduce efficiency

## Control methods of Noise Pollution

Zoning → Noise Pollution can be controlled by  
a. increasing the distance b/w source  
and receiver end.

Source point

By proper maintenance of machines.

By using proper lubricants in machines

By using sound absorption material

By making sound proof chamber.

Receiver end :-

People working in noisy environment  
should use ear protection devices.

Ear plugs, noise helmet, etc.

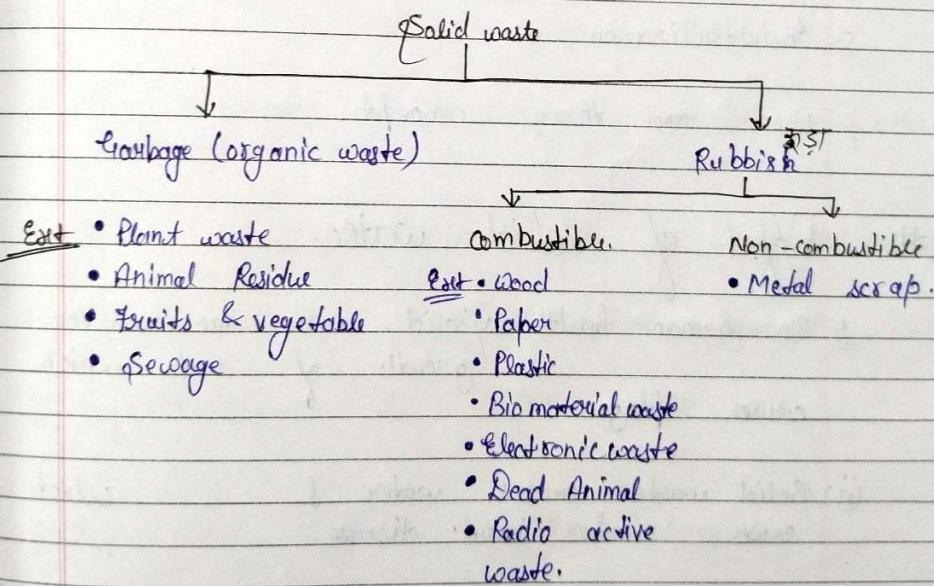


## # Solid waste management

Solid waste are those waste which are produced from houses, industries, mining process etc. Discarded materials or rejected materials.

Solid waste are those waste which have been rejected for further use and which can be neither be transported by water into streams. Nor can easily escape into the atmosphere.

## # Sources and classification of solid waste



Some other sources of solid waste are:

1. Domestic waste.

2. Construction waste
3. Mining waste
4. Agriculture waste.

## # Causes of solid waste production.

1. Advancement in technology.
2. Advancement in packaging technology.
3. Urbanization
4. Population growth.
5. Industrialization
6. Use-and-throw concept

## # Effect of solid waste.

- (i) On human health: (i) Solid waste increases the growth of rats which causes plague.
- (ii) Solid waste causes water & causes water born disease.
- (iii) Solid waste increase the growth of the mosquito which caused several diseases such as dengue, malaria, etc.

3 On environment

(i) Air pollution as burning of solid waste.

(ii) Water pollution such as dumping of solid waste in water.

(iii) Solid waste also causes objectionable odour.

(iv) Solid waste cause hygiene problems and losses the beauty of nature.

(v) Solid waste cause biodiversity of the nature.

4 Control method of solid waste.

1 By minimizing the production of garbage and other rubbish materials.

2 By minimizing the reduction in industrial wastes.

3 By controlling population growth.

4 By clumping the solid waste at a

5 By using solid dispose technique.

6 By making and implementing proper act.

7 Public awareness and environmental education.

- By following proper solid waste management plan or programme.

Solid waste management plan

1 Collection of solid waste

2 Transportation of solid waste:

After collecting the solid it is transported into the dump ground by using various methods of transport.

3 Disposal of solid waste

a) Pulverization:— In this method solid waste is converted into the powder form by grinding process.

After this treatment the quantity of solid waste is reduced.

Advantages:— Decrease the quantity of solid waste.

Disadvantages:—

i) It causes air pollution

ii) It is costly technique.



(B) Land filling: The basic principle of land filling method is to deposit the solid waste. Compact it with bulldozers and cover this material with soil.

Insecticides are also sprayed over it.

Advantages:

i) It is simple and economical.

ii) Separation of different kinds of solid is not required.

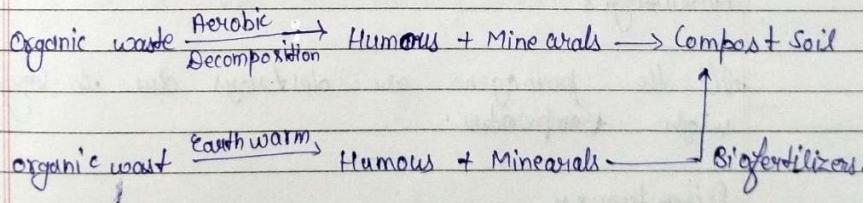
iii) No costly machine is required.

Disadvantages:

i) Insecticides are required.

ii) Causes objectionable order - odour.

(C) Composting Technique:



Solid waste contains 30 to 40% organic waste. In composting technique the organic matter of the solid waste is digested in presence of oxygen which converted the organic matter into

Humous + minerals compounds. This product is known as composted soil and use as bio fertilizers.

Advantage:

Composted soil is rich in nutrients and moisture.

Composted soil has water holding capacity.

Disadvantages:

Separation of organic waste is very difficult process.

D. Thermal volume Reduction method

Highly combustible solid waste burn at very high temperature.

Advantages:

All the pathogens are destroyed due to very high temperature.

Disadvantages:

- Causes air pollution.

- It is a costly technique.



### E. Distillation

#### Distillation method

In this method solid waste are heated without oxygen.

### F. Disposal in the sea.

Disposal solid waste is dispose under sea.

Disadvantages:

Causes water pollution and damage natural beauty.

### G. Waste utilization.

In the mentioned solid waste or some part of the solid waste is further utilized for beneficial. This method is based on 3R [Reduce, Recycle, Reuse] concept.

Biogas is used in electricity production.

Fly ash is used for building construction.

