

Environment & Ecology ^{Date.....}

Unit-1 (Environment)

Environment :->

the term environment means surrounding in which the organism. the term environment derived from Greek word, that means "covered from all sides".
envior

Environmental Study :-

the brief description of environment is called environmental study.

Environment create favorable condition for the existence and development of living organism.

Types of environment :-

Environment can be classified into two parts -

- a) Natural environment
- b) Man-made environment (anthropogenic environment)

a) Natural environment :-

The environment that comes into existence without interference of man is called natural environment. it operates through self regulating mechanism called homeostatic environment.

b) Man-Made environment :->

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

Human modify the environment according to their own needs and ways without taking into account its consequences.

Components of Environment :->

The environment is classified into two components -

- 1.) Biotic components (living)
- 2.) Abiotic components (non-living)

1.) Biotic components :->

It is composed of all living components like plants, animals, human, microorganism.

Biotic components also classified into three category.

- i) Producers or Autotrophs
- ii) Consumers
- iii) Decomposers.

i) Producers or Autotrophs -

Producers are also called autotrophs. Auto means self and trophs means feeder that means self feeder.

Ex → plants make their own food by the process of photosynthesis.

ii) Consumers :-

Consumers are also called heterotrophs. Hetero means other and trophs means feeder that means other feeder.

Ex → Animals, Human Being.

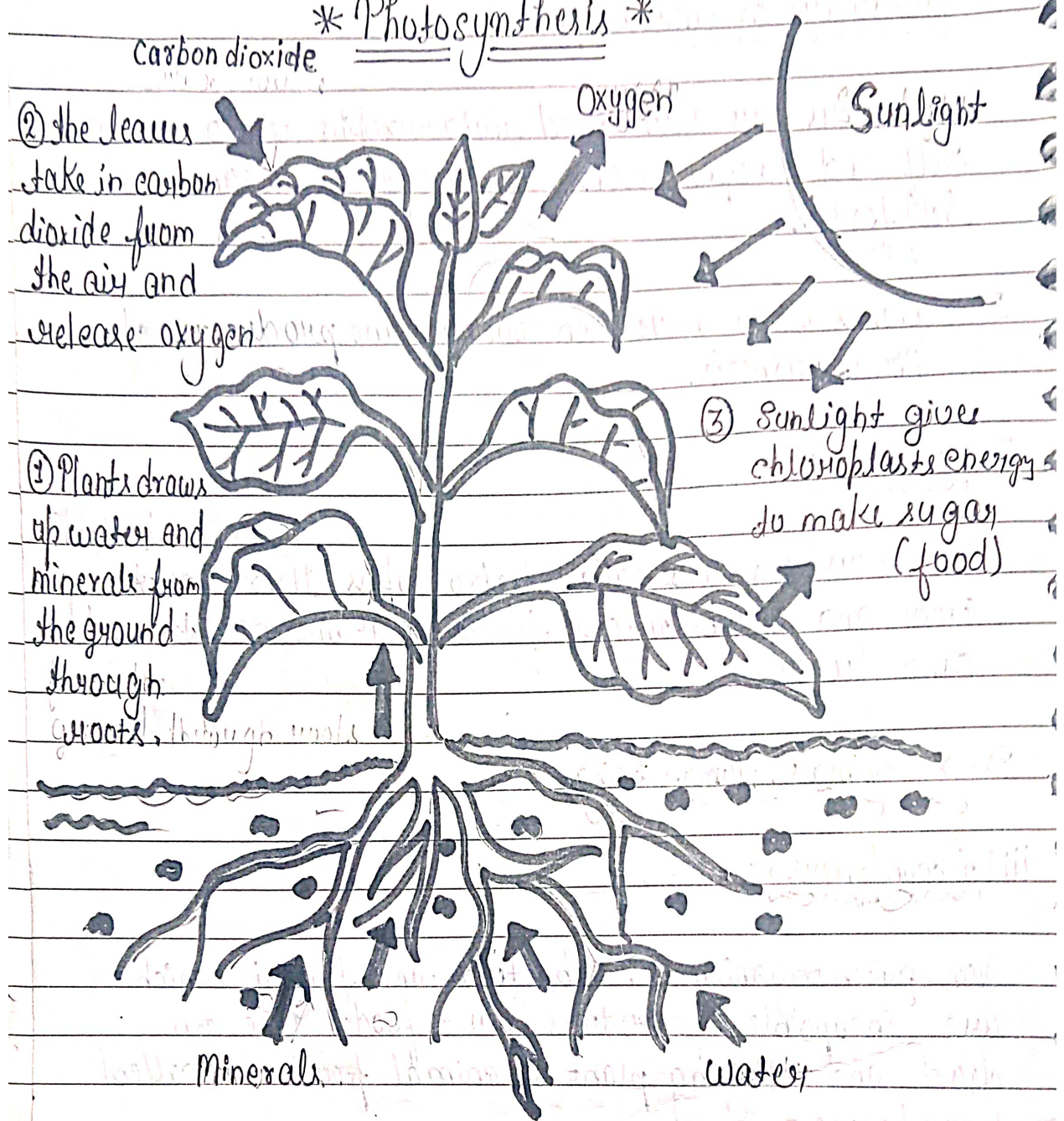
iii) Decomposers :-

Non-green organism like bacteria and fungi which are incapable of producing their food. Live on dead and dying plant or animal part are called decomposers.

2.) Abiotic components :-

It is composed of external physical factors like temperature, ~~humidity~~ water, minerals and gases.

* Photosynthesis *



(PHOTOSYNTHESIS)

Photosynthesis is a process used by plants and another organism to convert light energy into chemical energy that, through cellular respiration, can later be released to fuel the organism activities. Some of this chemical energy stored.

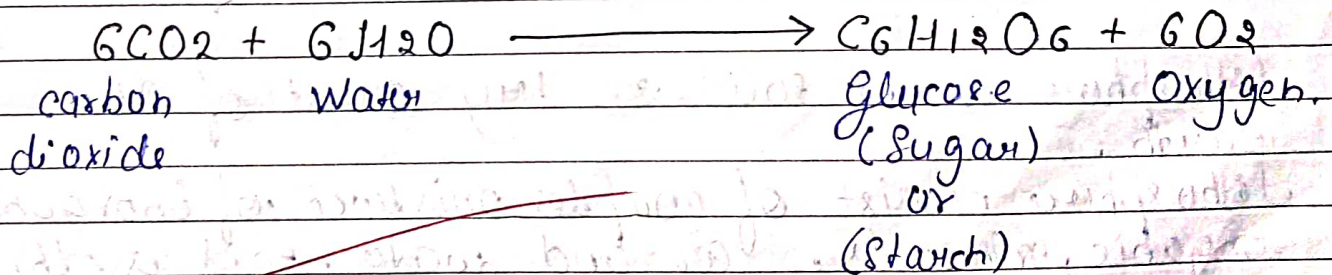
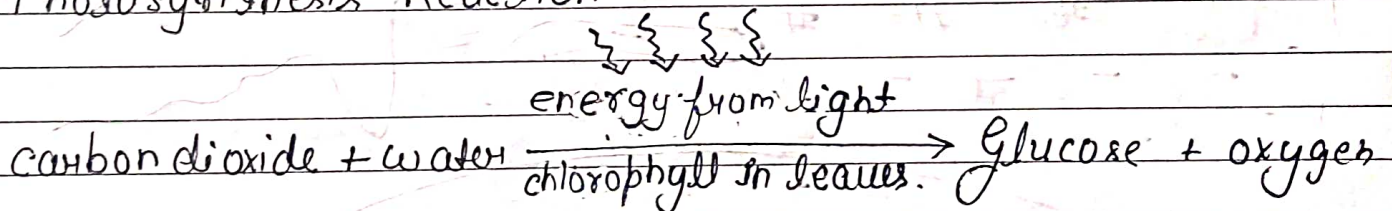
carbohydrate molecules such as sugar and starches, which are synthesized from carbon dioxide and water.

Photosynthesis word come from Greek word. photo (phōs) means "light" and Synthesis means "putting together" that means light putting together.

Most plants algae and cyanobacteria perform photosynthesis; such organisms are called photoautotrophs.

Photosynthesis is largely responsible for producing and maintaining the oxygen content of the earth's atmosphere, and supplies most of the energy necessary for life on earth.

→ Photosynthesis Reaction -

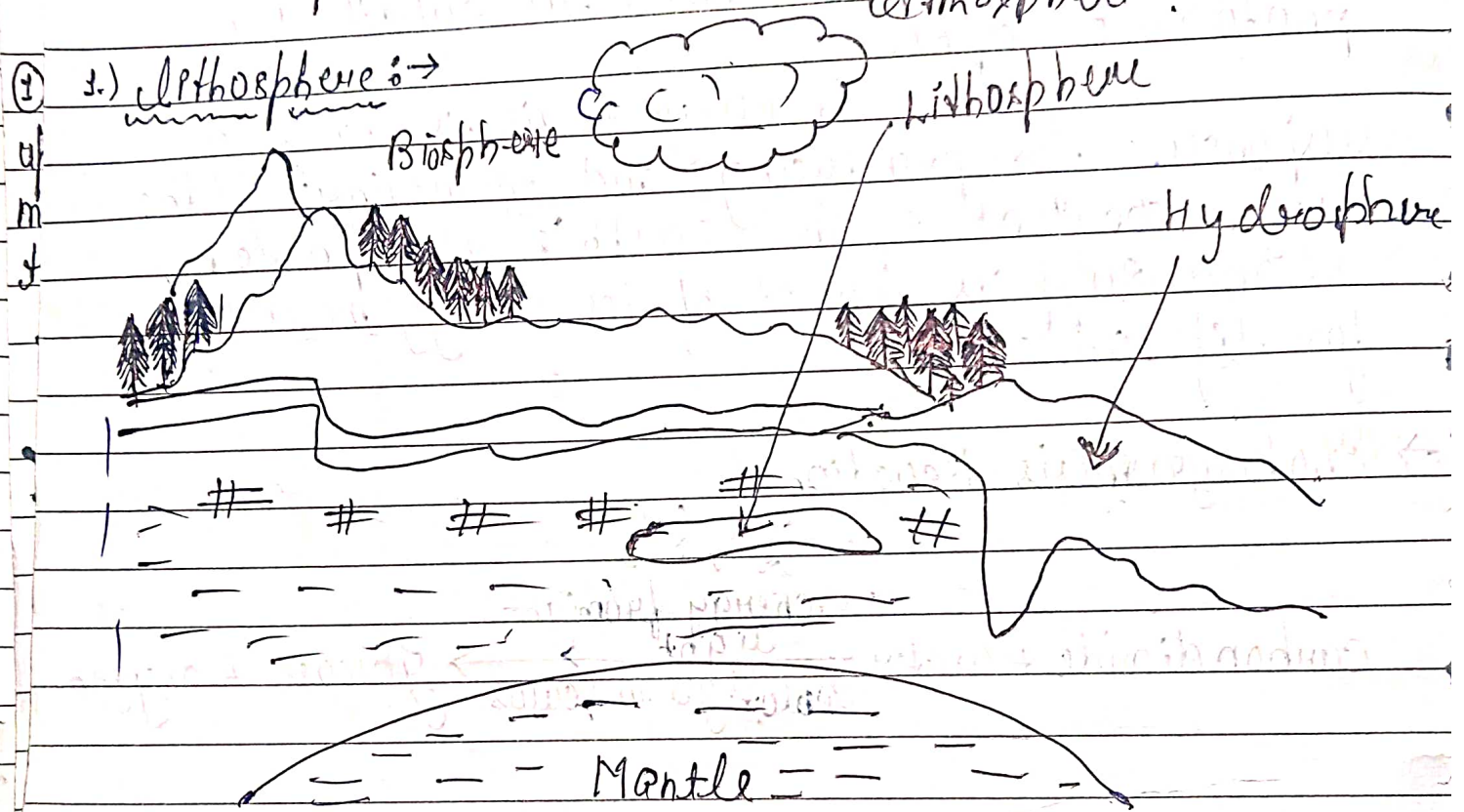


* Segments of environment :-

②: the environment consist of four segments-

- 1.) Lithosphere
- 2.) Hydrosphere.
- 3.) Biosphere.
- 4.) Atmosphere.

① 1.) Lithosphere :->



Lithosphere is the solid or dry crust of the earth.

Lithosphere consist of complex mixture of inorganic, organic, minerals, air and water. Soil is the store & home of minerals conserve of soil producer of crops & home of wild life.

2) Hydrosphere :-

The water mantle of earth exist present in oceans, sea, lakes, ponds, rivers, ground etc. earth is called blue planet because of 80% it's surface covered by water.

3) Biosphere :-

Biosphere is the region of earth where life exist. Biosphere cover the living organism and there interaction with the environment.

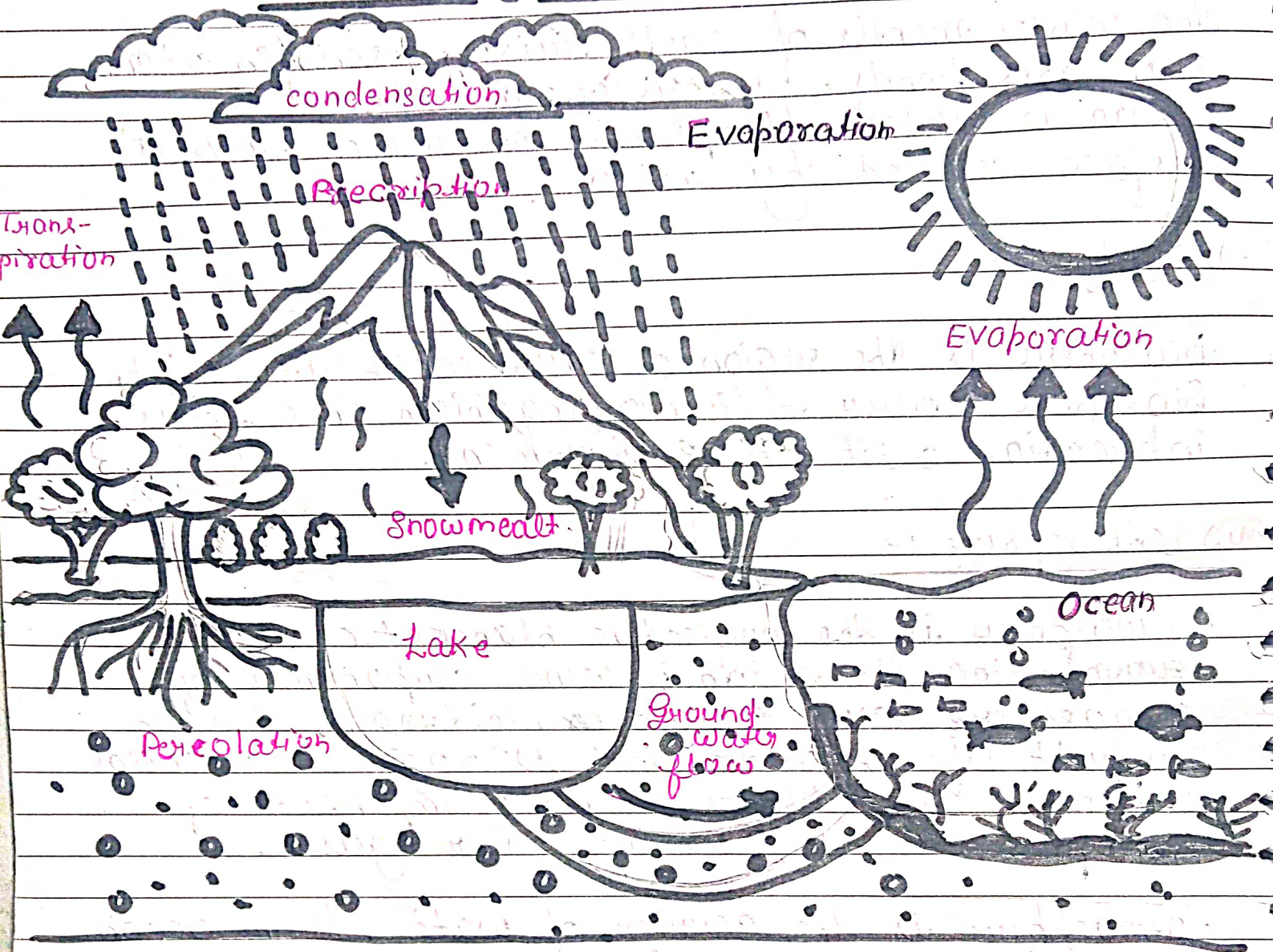
4) Atmosphere :-

Atmosphere is the protective blanket of gases, surrounding the earth. major components of atmosphere are oxygen, nitrogen, oxygen support life on earth and nitrogen is essential nutrient for plants. minor components of atmosphere are CO₂, and other gases.

Atmosphere is the carrier of water, from ocean to land by a cycle known as hydrological cycle or water cycle.

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* Water Cycle or hydrologic cycle *



The water cycle, also known as the hydrologic cycle or the hydrological cycle, is a biogeochemical cycle that describes the continuous movement of water on, above and below the surface of the earth. The mass of water on earth remains fairly constant over time but the partitioning

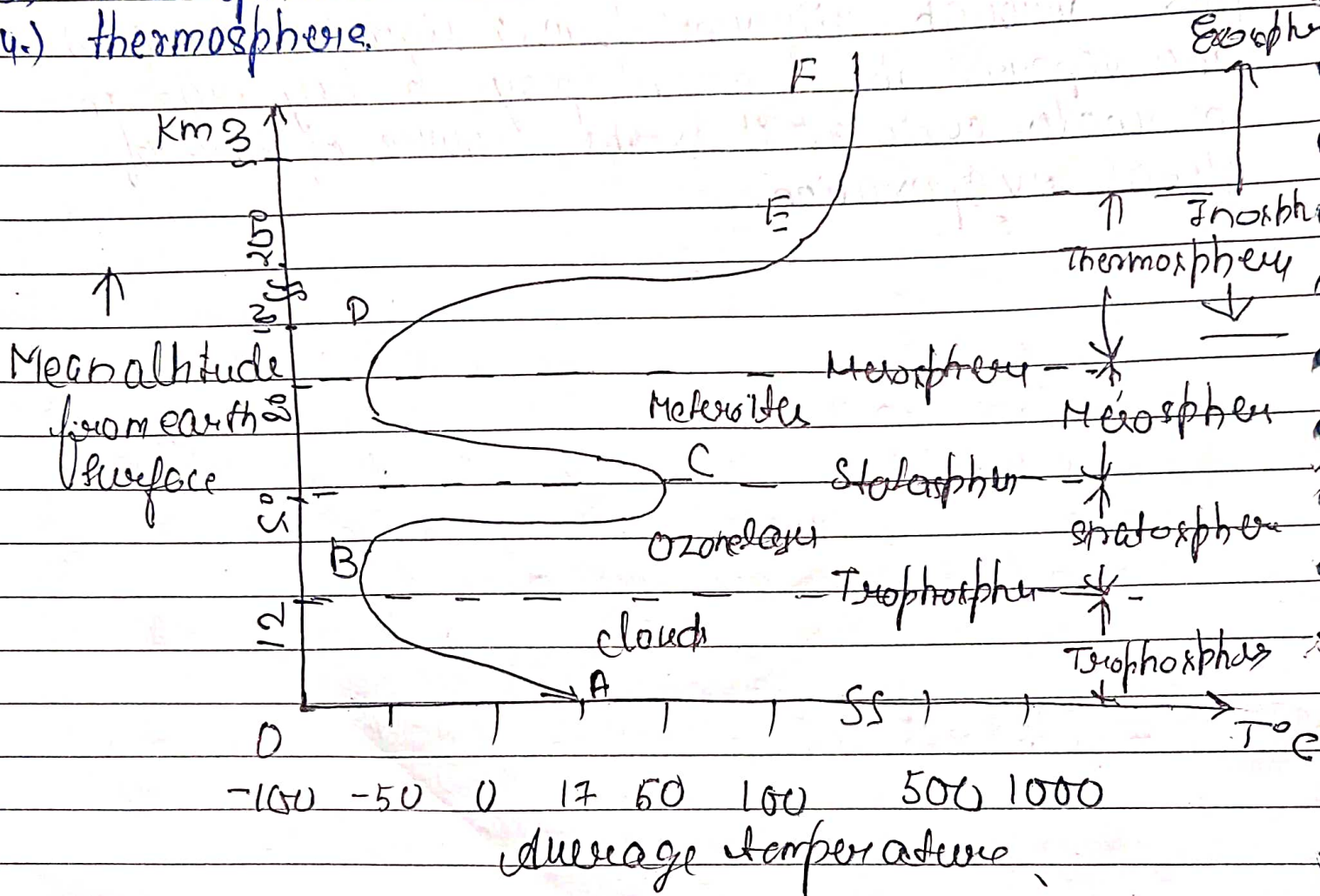
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of the water into the major reservoirs of ice, fresh water, saline water (salt water) and atmospheric water is variable depending on a wide range of climate variables. The water moves from one reservoir to another, such as from rivers to ocean, or from the ocean to the atmosphere, by the physical processes of evaporation, transpiration, condensation, precipitation, infiltration, surface runoff, and subsurface flow. In doing so, the water goes through different forms; liquid, solid (ice) and vapour. The ocean plays a key role in the water cycle as it is the source of 86% of global evaporation.

* Structure of atmosphere :-

The structure of atmosphere is divided into four zone / parts / layer.

- 1) Troposphere
- 2) Stratosphere
- 3) Mesosphere
- 4) Thermosphere



1) Troposphere :->

It is most dense and contains about 75% of total atmospheric mass.

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Average altitude of 12 km from earth surface.

2) Stratosphere :->

Main activity in this zone is absorption of ultraviolet radiation by ozone. It's average altitude of 50 km from earth surface.

3) Upper thermosphere :-

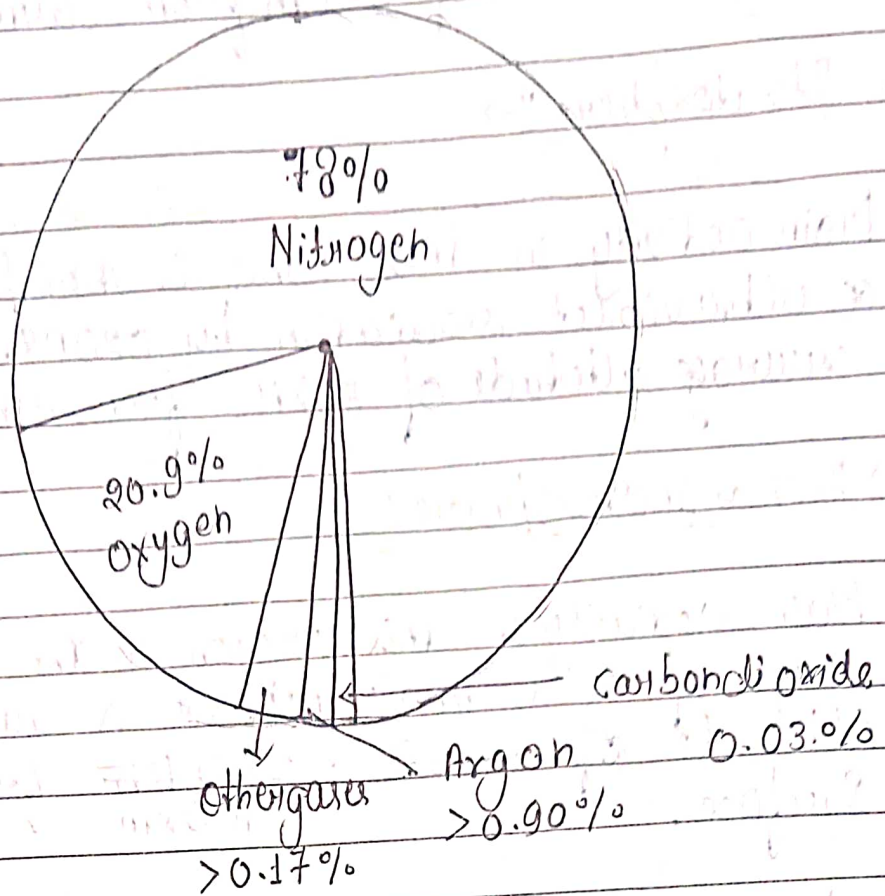
Main activity in this region is the high kinetic energy of gas molecules. It's average altitude of ~~80 km~~ 400 km from earth surface.

4) Mesosphere :->

Main activity in this region is burning of meteoric meteorites. It's average altitude of 80 km from earth surface.

* Composition of atmosphere :-

Our atmosphere comprises of many gases and water vapour it is called air.



- The atmosphere is made up of different type gases, water vapour and dust particles.
- The composition of the atmosphere is not static and it changes according to the time and place.

- Permanent Gases of the Atmosphere -

Constituent	Percentage by Volume	Concentration (PPM)
Nitrogen (N_2)	78.084%	780,840
Oxygen (O_2)	20.946%	209,460
Argon (Ar)	0.934%	9,340
Carbon dioxide (CO_2)	0.036%	360
Neon (Ne)	0.00182%	18.2

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Helium (He)	0.000524	5.24
Krypton (Kr)	0.000114	1.14
Hydrogen (H ₂)	0.00005	0.5

- The atmosphere is mixture of different types of gases.
- Nitrogen and oxygen are the two main gases in the atmosphere. ~~is made~~ and 99% of the atmosphere is made up of these two gases.
- Other gases like argon, carbon dioxide, neon, helium, hydrogen, etc. form the remaining part of the atmosphere.
- The position of the gases changes in the higher layers of the atmosphere in such a way that oxygen will be almost negligible quantity at the heights of 120 km.
- Similarly, carbon dioxide (and water vapour) is found ~~only up to 90 km~~ from the surface of the earth.

Date: 10/Nov/2022

Ecosystem

The term ecosystem describe both the living and non living components of an area, that interact with each other.

"The term ecosystem was given by Arthur Tansley in 1935."

⇐ Types of Ecosystem ⇒

Natural Ecosystem

Artificial Ecosystem

Terrestrial

Aquatic

grassland Desert Forest

Freshwater

Marine water

Running (Lotic)

Standing (Lentic)

Rivers, canal

Waterfalls

Ocean

~~Lakes, pond.~~

1.) Natural eco-system:-

These eco-system that occur naturally and can survive without any intermention from human beings-

Natural eco-system divided into two parts-

(A) Terrestrial eco-system -

(B) Aquatic eco-system -

(A) Terrestrial eco-system:-

Terrestrial eco-system are of three types - forest, desert and grassland.

(a.) Forest eco-system:-

The forest cover a big area on earth they are of different types - some forest are dense, some are have too many wild animals, some have tall trees, some have shrubs.

Depending on the climatic condition, rainfall, temperature and other factors there are several kind of forest - eco-system.

(i) Tropical - rain - forest - eco - system

(ii) Tropical - seasonal - forest - eco - system

(iii) Temperature - forest - eco - system

(iv) Boreal - forest - eco - system.

(i) Tropical-rain-forest-eco-system :->

Such forest are located in central america, congo-river basin of africa, where the rainfall is high these forest have following features.

- (i) Broad leaf and tall plants
- (ii) Warm and humid climate
- (iii) High diversity of trees species.

(ii) Tropical-seasonal-forest-eco-system :->

Such forest are located in plains of america, south east asia, australia and some part of india where the rainfall is seasonal. These forest have following features

- (i) dry and wet season alternate each other.
- (ii) warm climate.

(iii) Temperate forest-eco-system :->

Such forest are found in asia and USA, north central europe. average annual temperature is not more than 20° .

- (i) Dominance of hard wood trees which are suitable for quality furniture and building purpose.

(iv) Boreal forest - eco-system: →

Such forest are found across east-west Band of North Europe, north-Asia and North America. These forest have following features.

- (i) cold climate due to high altitudes and high latitudes.
- (ii) Dominated by conifers which are important source for making paper pulp and lumber.

(b) Desert eco-system :-

Desert refers to an area in which the rain fall is negligible. In them the days are hot and the night are cold. These desert have following features -

- (i) climate is generally dry
- (ii) there is scanty of water.
- (iii) scanty flora and fauna.

(c) Grassland eco-system :-

Based on the type of major vegetation, Grassland eco-system is a ~~terrestrial~~ type - eco-system. The rainfall is usually seasonal and temperature are moderate then eco-system have following features.

- (i) climate is neither too dry nor too moist.
- (ii) Vegetation is of flowering plants, shrubs & tall grasses.

(B) Aquatic Eco-system:-

An aquatic eco-system is an eco-system formed by surrounding a body of water. Aquatic eco-system contain community of organism that are dependent on each other and on their environment.

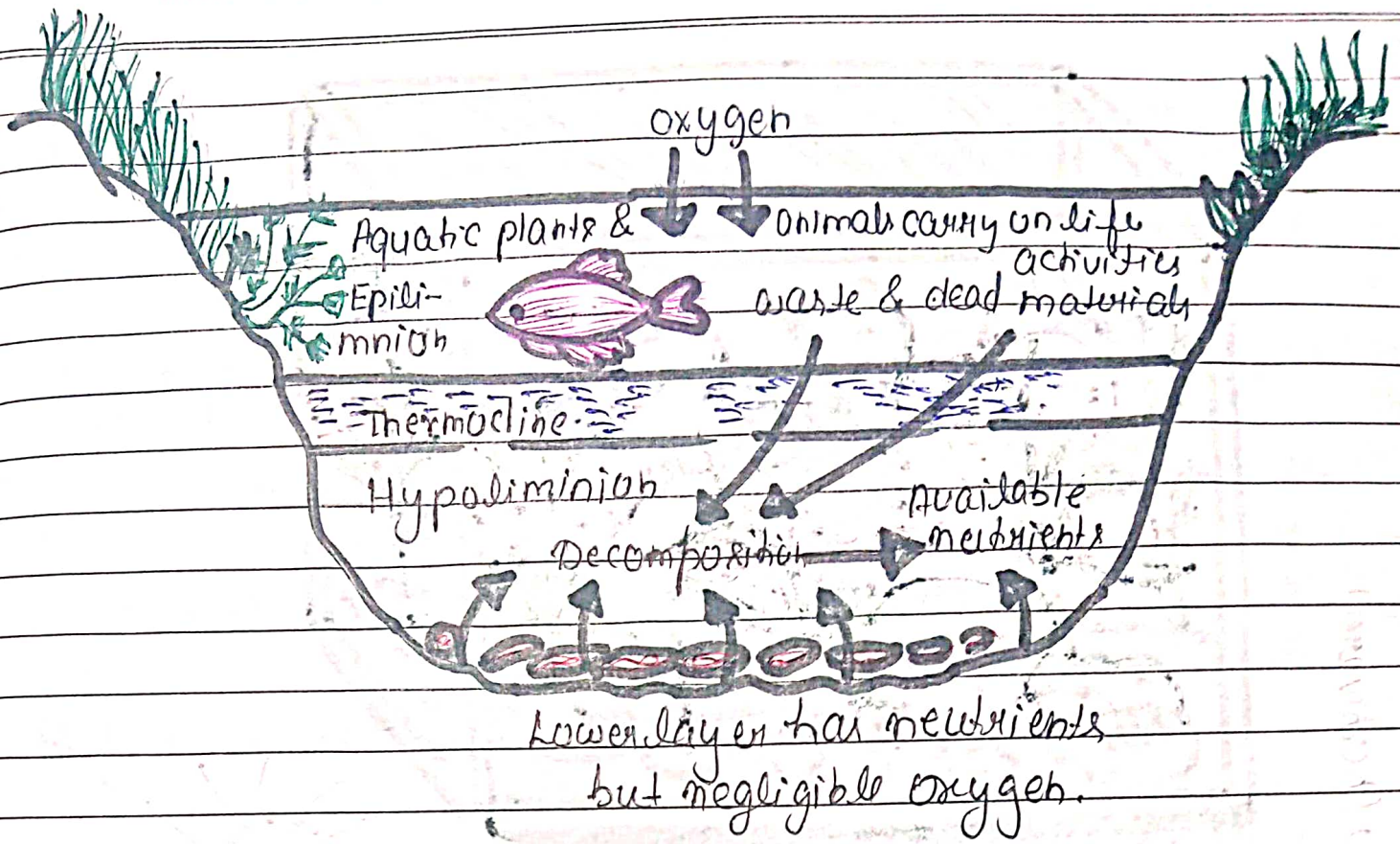
they are classified into two categories -

- (a) fresh water, (b) Marine water.

(a) fresh water:-

(i) lake eco-system:-

A lake is a stationary fresh water aquatic eco-system. The water in lake comes from rain, snow melting, ice and streams. It depend depth varies from 395m (1300 feet) below sea level.



(ii) Pond - eco - system :-

A pond is a stationary fresh water aquatic eco-system. It may be a natural pond or man-made pond.

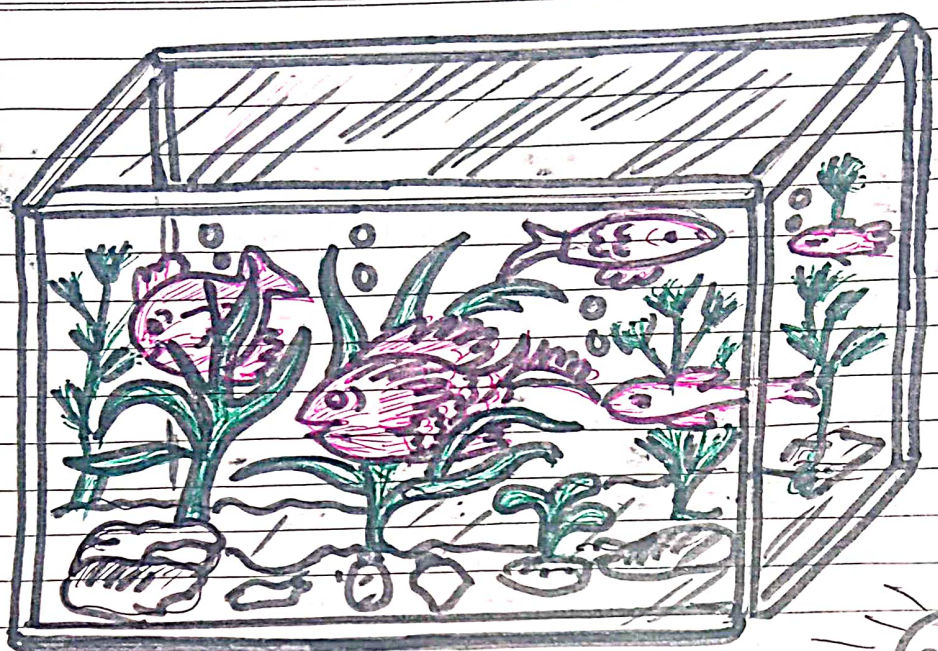
A pond eco-system is a community of organisms that live in a pond.

An aquarium is an example of artificial ponds.

Biotic and Abiotic elements are found in pond.

NOTE :- Aquarium is a glass container in which filled with water.

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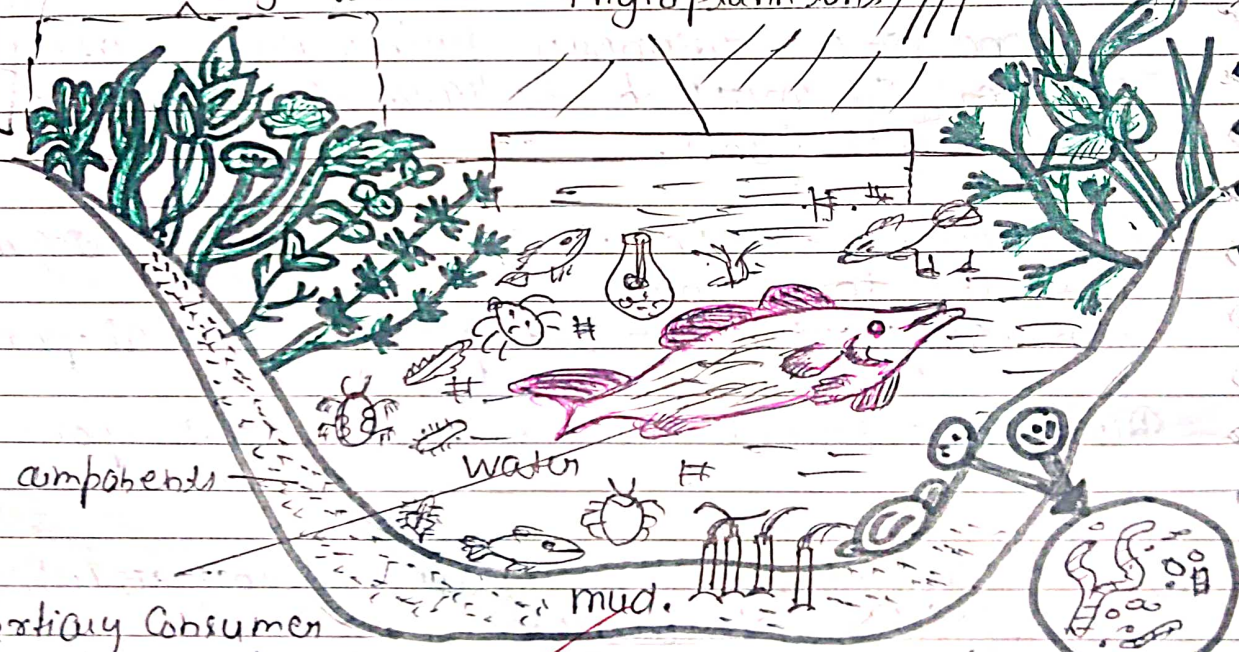
Consumers
Primary Consumers (herbivores)
benthos

Producers
Macrophytes (rooted) Phytoplankton



abiotic components

Tertiary Consumer (carnivores)



Ecosystem of natural pond.

Decomposers

(iii) River eco-system :-

flowing.

Rivers are the best example of 'fresh water aquatic eco-system.

They play an important role in transporting the materials from con. countryland to the sea (ocean) there are two types of rivers.

(a) perennial river (b) Non-perennial river.

(a) perennial river :->

The perennial rivers are the rivers that continue to flow through out the year.

Ex -> Ganga, Yamna, Brahputra, Kaveri.

(b) non-perennial river :->

Seasonal rivers that flow during rainy season only.

Ex -> mahanadi, Krishna, Narmada.

(iv) Ocean eco-system :->

An Ocean is a huge hole of salty water that extend over almost an infinite large area.

It covers about 70% of the earth surface

There are five oceans on the earth.

- (a) Pacific Ocean
- (b) Atlantic Ocean
- (c) Indian Ocean
- (d) Arctic Ocean
- (e) Antarctic Ocean

* Structure of eco-system :-

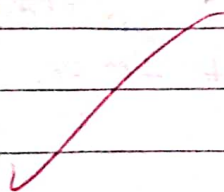
An eco-system is composed of two main major components.

1) biotic components

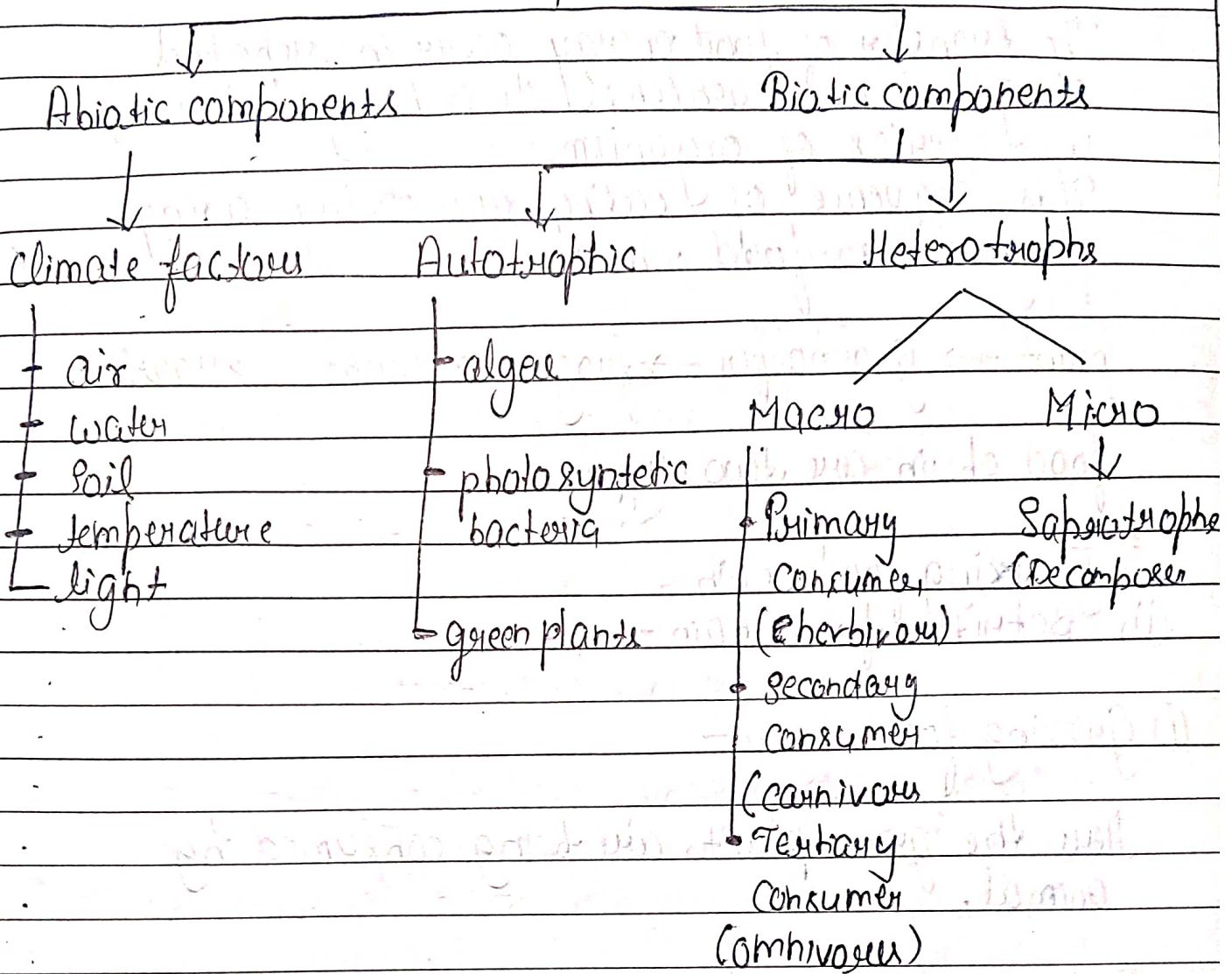
2) Abiotic components

The study of structure of an eco-system two knowing the following details-

- (i) The quantity of non-living organism and their distribution in an eco-system.
- (ii) condition of existence of living organism such as temperature, humidity, light air, soil, water etc.



Structure of eco-system



* functions of eco-system :-

- (i) to manufacture food
- (ii) flow of energy
- (iii) It controls the material cycle.

(FOOD CHAIN)

The transfer of food energy occur in repeated stage in which, It is being eaten by a series of organism.

This sequence of eating and being eating termed as food chain.

plant \rightarrow Grasshopper \rightarrow frog \rightarrow snake \rightarrow Hawk

food chain are two types -

(i) Grazing food chain -

(ii) Detritus food chain -

(i) Grazing food chain -

Here the green plants are being consumed by animal.

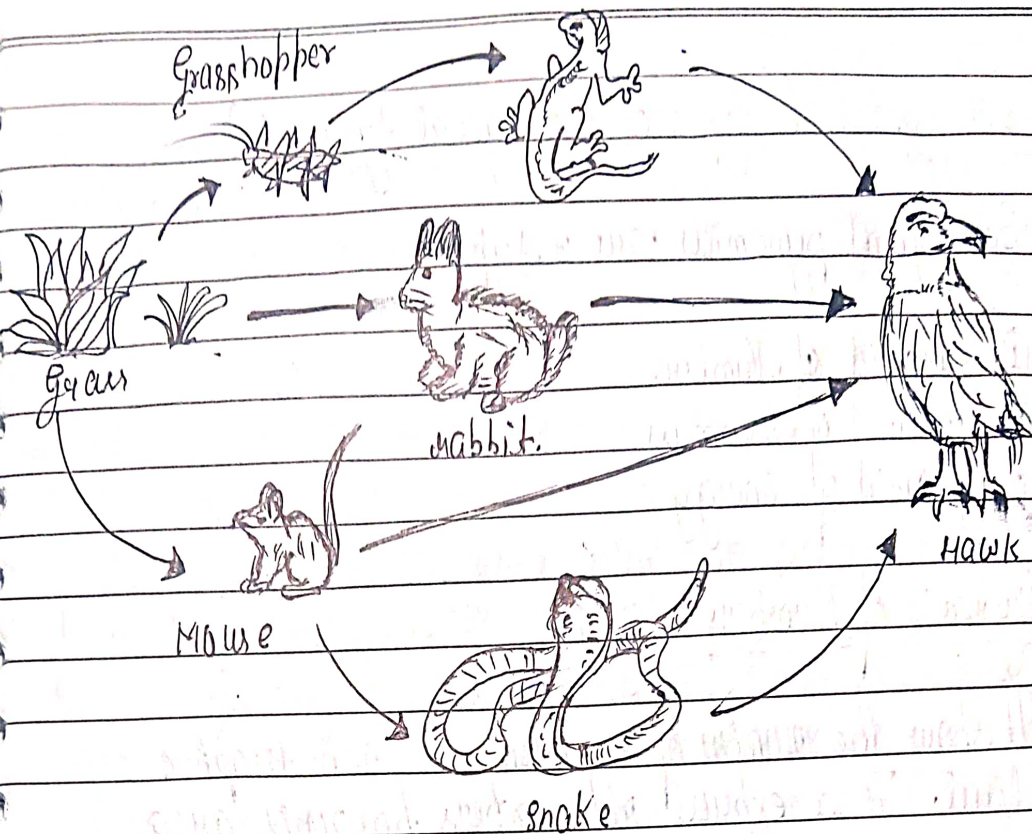
(ii) Detritus food - chain -

The dead organism matter is being consumed by bacteria etc.

(FOOD WEB)

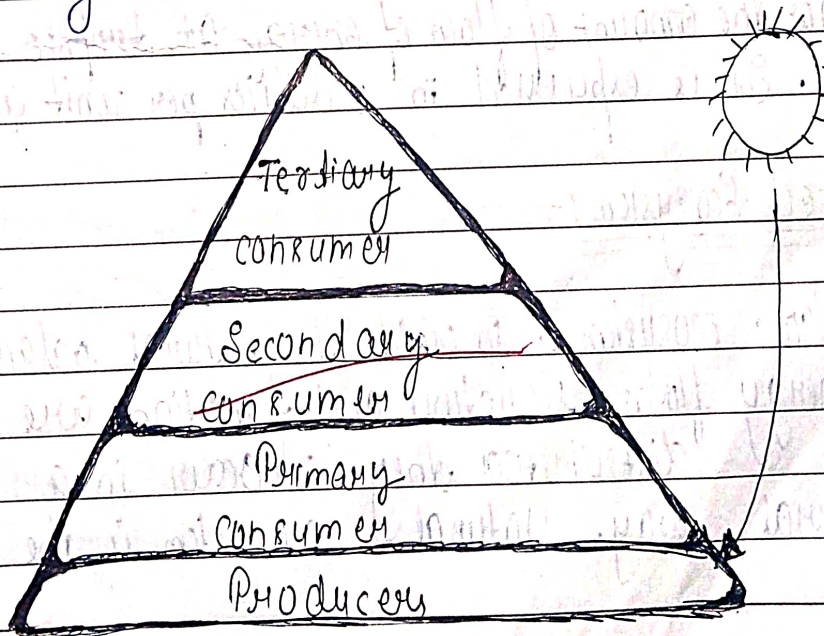
Food chains are interconnected through different types of organism. This inter connection is called a food web.

Lizard. Date.....



Ecological Pyramids

An ecological pyramid is graphical representation showing the relationship between different organism in an ecosystem. It show the flow of energy at different trophic levels in eco-system.



(Types of Ecological Pyramids)

Ecological pyramids are 3 types -

- ① Pyramid of Numbers
- ② Pyramid of Biomass
- ③ Pyramid of energy

(1) Pyramid of Numbers:-

It shows the number of organisms at each trophic level. It is expressed in numbers per unit area.

(2) Pyramid of Biomass:-

It shows the total weight of total amount of living matter. It is expressed in gram per unit area.

(3) Pyramid of energy:-

It shows the amount of flow of energy at trophic level. It is expressed in calories per unit area.

* Balanced Ecosystem:-

A balanced ecosystem is in which the natural balance of energy flow, structure and function are not distributed they occur in a natural way. Natural ecosystem is the

under natural condition without any external inter-
ference.

★ Effect of Human Activity :-

→ Food :- To keep a body alive, the process of meta-
bolism occur continuously in the cells.

In this process the consumed raw-material from
food is called nutrition. Nutrition is obtained
from different kind of foods.

Food is a combination of various energetic
substance such as given below-

- (i) Carbohydrate - which are organic energy producer.
- (ii) Protein - which are organic body builders.
- (iii) fat - which are organic fuel substance.
- (iv) Vitamin - which are organic metabolic regulators.
- (v) Minerals - which are inorganic metabolic regulators.
- (vi) Water - which is inorganic metabolic regulators.
- (vii) Nucleic acid - which are organic heredity substances.

→ Food Security :-

Food Security refers to the availability of food and
one's easy access to eat it.

There are two kinds of in-sufficiency

- 1) Under nourishment
- 2) Malnourishment.

1) Undernourishment :->

Undernourishment lack of sufficient calories in available food.

Effects of undernourist food on human beings are the following.

- (i) less energy in the body for doing any kind of work.
- (ii) Body becomes weak and fall sick.
- (iii) an adult may look like an old man.

~~Malnourishment~~ :-> depending on the degree of under nourishment children may suffer with one or more of the following problems.

- (i) Slow body growth
- (ii) mentally retarded.
- (iii) illness such as anaemia, goiter, thyroide etc.
- (iv) abnormalities like - weakness, ~~decolouration~~ decolouration of hair.

2) Malnourishment :->

Malnourishment is the lack of specific components of food, such as proteins, vitamins or essential chemical elements. Some of the major problems of malnourishment are -

- (i) Kwashiorkor -> lack of sufficient protein in diet.

(ii) Anaemia → lack of iron.

→ Shelter Security :-

A basic structure or building that cover or provide protection is called shelter.

Causes of homelessness :-

- (i) Natural disaster
- (ii) Unemployment
- (iii) force eviction.
- (iv) ~~prison~~ prison release and reentry into society.

Problem face by homeless people :-

Homeless people face many problems beyond the lack of a safe and suitable home. they forced many faced many social disadvantage and reduce access to private and public services such as -

- (i) Discrimination (भेदभाव)
- (ii) Reduce access to health care
- (iii) Increased risk of suffering from violence and abuse

* Economic Security and unemployment :-

By economic security we mean regular in flow of money, accumulation of wealth and availability of resources, which keep us wealth generation.

The economic security may be expressed in term of currency, wealth, raw material etc.

of strong economic security to an individual, a society or a nation. This gives them confident, optimistic (आशावादी) and of prosperous in thinking.

* Assessment of the economic strength of a country :-

The economic activities and growth of a nation can be measured in a number of ways.

- (i) Gross domestic product (G.D.P.)
- (ii) Exchange rates of its own currency with the foreign currency.
- (iii) Interest rate
- (iv) National Debt
- (v) Rate of inflation (महंगाई दर)
- (vi)

* Unemployment :-

~~xxx~~ ~~xx~~ ~~xx~~

Unemployment is a measure hindrance (बाधा) in the development of a country.

→ Effects of unemployment :-

- (i) loss there self confidence
- (ii) Suffer from mental strains, depression, Psychological anxiety.
- (iii) Generally ^{esp.} handy kept of having a home, health care etc.
- (iv) unemployment person are unable to earn livelihood, do not have money to meet there financial obligation. (काश्चा)

* Social Security :-

Society is a group of individuals. It assimilates young and old people, healthy and disable people. man and women etc. each of the these require social security for safe and peaceful living.

↳ Social security means protection against in secure condition. examples of different segments of society and there insecure condition are of the following.

Segments of Society	Type of insecure conditions
1.) Poor people	1.) poverty
2.) Old age people	2.) inability of work
3.) Widow women	3.) Social abuse and economic
4.) Working women	4.) social abuse
5.) Unemployed youth	5.) work and earning.
Unemployed youth :-	
6.) Destitute woman	6.) Social abuse and economic
7.) Mentally retarded people	7.) Negligible work ability
8.) Marriagesable girl's	8.) social abuse and maintenance.
9.) Orphan children	9.) care, education and health.
10.) Disabled people	10.) Constraint work ability

Social Security to these people is generally being provided by means of social welfare services such as given below -

(1) Social (life) Insurance.

- (i) children insurance plan
- (ii) Retirement pension plan.
- (iii) Group insurance plan.
- (iv) Disability insurance.

2.) Providing Basic Amenities such as -

- (i) Shelter
- (ii) food
- (iii) Education
- (iv) clothing
- (v) Medical care.

3.) Categorical (Universal) Benefits such as -

- (i) public pension
- (ii) Old age pension
- (iii) Widow pension.

* family welfare program :- A social security measure.

Caring for the welfare of families, their women, children and other members is an essential task. A good health and better education is also necessary for their welfare. In this regard, many welfare programs are being implemented by various agencies.

→ Aims and objects →

It aims at improving the quality of life and serving the following objects. Hence, it advocates follow-

- (i) Two children per family.
- (ii) Good health to each one.
- (iii) Child Survival
- (iv) Literacy and education to all

* Agriculture :->

Agriculture is one of the oldest ~~per~~ profession in the world. It is also the largest sector. Livelihood of majority of people in the world is agriculture dependent. There have been broad changes in environment also, which are of the following nature.

-> 1) local change ->

(i) The changes that take place at the side of farming are called local changes. The nature of such changes are

- (i) Erosion of soil
- (ii) Fast fertilizer and pesticide mixed sediments
- (iii) mixed ~~sediments~~ pollutes the nearby water bodies.
- (iv) Fisheries are destroyed due to polluted toxic sediments.

→ 2) Regional changes →

(i) when the changes extend over large area beyond local surrounding, it is referred as regional changes. The effects of regional changes are -

- (i) Pollution at a larger scale.
- (ii) Alteration in fertility of soil.
- (iii) Desertification, land converted into Desert.
- (iv) Increasing ~~of~~ deforestation

→ 3) Global changes →

Such changes occur across the globe on the entire earth. The nature of changes are as follows -

- (i) change in climate
- (ii) changes in chemical cycles - such as - oxygen cycle, CO_2 , NO_2 - cycles.

*4) changes cause by overgrazing

Continue overgrazing ~~reduces~~ inputs of soil organic matter because less plant biomass is available as litter, which in turn, reduces soil organic matter, nutrients, and biotic activity. This leads to deteriorated soil structure, which increases the potential for erosion and reduces water-holding capacity of soil.

Industry

The industries are backbone of economy development and prosperity of a country. and it's people, yet it is the cause of massive concern for environmental deterioration. agriculture are responsible for the following consequences.

- 1.) They pollute air, water and soil. Because acid
- 2.) They cause acid rain.
- 3.) They cause climate changes.
- 4.) They cause adverse disease and ill effects.

* Mineral :-

Minerals in use-able form are obtain after mining and many stages of processing, these have considerable effects of environment and it's air, water, land, biological species.

→ Effects on air →

- 1.) Emission of dust, suspended particles and gases cause air pollution.
- 2.)

→ Effects on water →

- 1.) Surface water is polluted due to release of harmful trace elements.

→ Effects on soil →

- (1) fertility of soil is lost.
- (2) quality of soil degrades.
- (3) Soil gets toxic.

→ Effects on vegetation →

- (1) Growth of vegetation is adversely affected due to trace elements.
- (2) Deforestation cause loss of flora and fauna.

→ Effects on biological species →

- (1) The species are killed due to toxicity of water and soil.
- (2) Stability of ecosystem is affected.

→ Social Impact of large scale mining

- 1.) For construction of houses, the forest are demolished.
- 2.) Peace and routine of people living in nearby locality.
- 3.) The wild life in surrounding areas may be endangered.
- 4.) Increased urbanization will result enhanced pollution of water, soil etc.
- 5.) Air pollution will also increase due to dust, dirt from the account of construction activity.

Transportation

With increasing industrialization and organization the transportation activities have also increased many folds. by transportation activities we mean

- (i) Transport infrastructure such as construction of road, National highway, state highway, city road, village road.
- (ii) Transport auto vehicle such as cars, buses, trucks, motorcycles and other heavy vehicle.
- (iii) Marine transportation such as those ship and submarine etc.

→ Effects Marine transportation →

Pollution is a global problem. some marine pollution problem are local in nature, but many have global implication.

→ Effects of marine pollution →

Main effects of marine pollution are of the following -

- (i) It destroy the ocean's food sources.
- (ii) It cause threat to flora and fauna.
- (iii) sea fishes, animals, birds and other living organism are killed by oil leakage.
- (iv) It destroyed the marine life and disturbed the marine ecosystem.

→ Sources of marine pollution →

following are major sources of marine pollution.

- (i) Oil spilling
- (ii) water disposal.

→ Causes of marine pollution →

leaked

- (1) wrecked oil tankers and ship.
- (2) Industrial waste through throw rivers into the sea.
- (3) Oil from some man keepage
- (4) Natural decay of marine plants and animal life.

→ Environmental Impact Assessment :-

Environmental impact assessment is a tool used to assess the significant effects of a project or development proposal on the environment. Impact assessment sure that project decision maker think about the likely effect on environment at the earliest possible time and aim to avoid reduce or those effect.

→ History of EIA :-

The environmental impact assessment comes from section 102(2) of the national environmental policy act (NEPA), 1969 (USA).

→ EIA Legal provision: →

In India EIA was made mandatory in 1994 under the environment protection act of 1986 with the following objectives.

- 1.) Predict environmental impact of projects.
- 2.) Find ways and means to reduce adverse impact.
- 3.) Save the project to suit local environment.
- 4.) Present the prediction and option to the decision making.

→ EIA Procedure: →

The EIA process in India consists the following phases.

1.) Project Proposal →

The project proposal shall include all relevant information available including a land in order to move the next stage.

2.) Screening →

Identification of significant impact, identification of public interest and values.

3.) Scoping →

The public can contribute local knowledge and

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value to the prediction, evaluation and mitigation.

4) Baseline data →

Baseline data describe the existing environmental status of identify study area.

5) Assessment :- →

Improvement in quality and acceptability of EIA report.

6) EIA Report :- →

Public contribute to evaluation of quality and accepting of report.

7) Monitoring :- →

Public evaluate impact that occur and support project environmental management process.

8) Sustainable development :-

Sustainable development is define as meeting the needs of the present without compromising the ability of future generation to meet their own needs.

The necessary condition for achieving sustainable development.

(i) Social equity :-

There should be an equilibrium condition in the society among the same generation with in and b/w two different generation we should hand over a safe, healthy environment to our future generation.

(ii) eco-nomical equity :-

The technology should address to the problem of the developing countries producing drought (खरा). This type of technological development will support the economic growth of the poor countries.

(iii) ecological security :-

If any development process protect our biodiversity, decrease the rate of soil erosion and increase the forest cover area, that brings the ecological security.

* Objectives of sustainable development :-

- (i) It should protect our biodiversity
- (ii) It should prevent soil erosion
- (iii) It should increase forest cover
- (iv) It should bring benefits to all
- (v) It should reduce waste generation.