

Ecosystem

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All living organism whether plant or animal or human being is surrounded by the environment on which it derive its needs for its survival.

Each living component interacts with non-living components for the basic requirements from different ecosystem.

What is ecosystem?

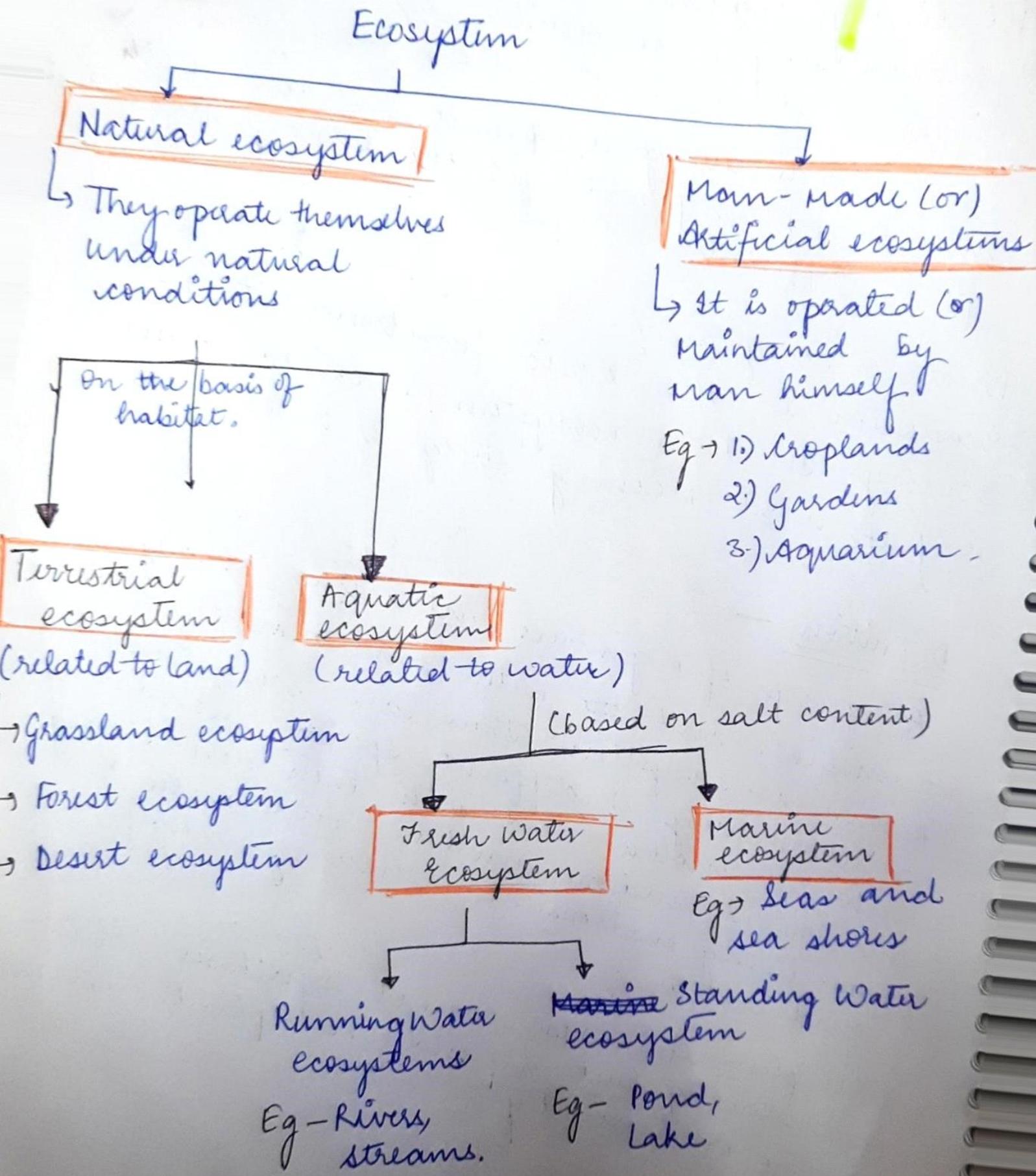
Ecosystem is the basic functional unit of ecology. The term ecosystem is coined from a greek word meaning 'study of home'.

Definition -

A group of organisms interacting among themselves and ~~the~~ with environment is known as ecosystem. Thus an ecosystem is a community of different species interacting with one another and with their non-living environment and one another and with their non-living environment exchanging energy and matter.

Examples - Animals cannot synthesis their food directly but depend on plants either directly or indirectly.

Types of Ecosystem



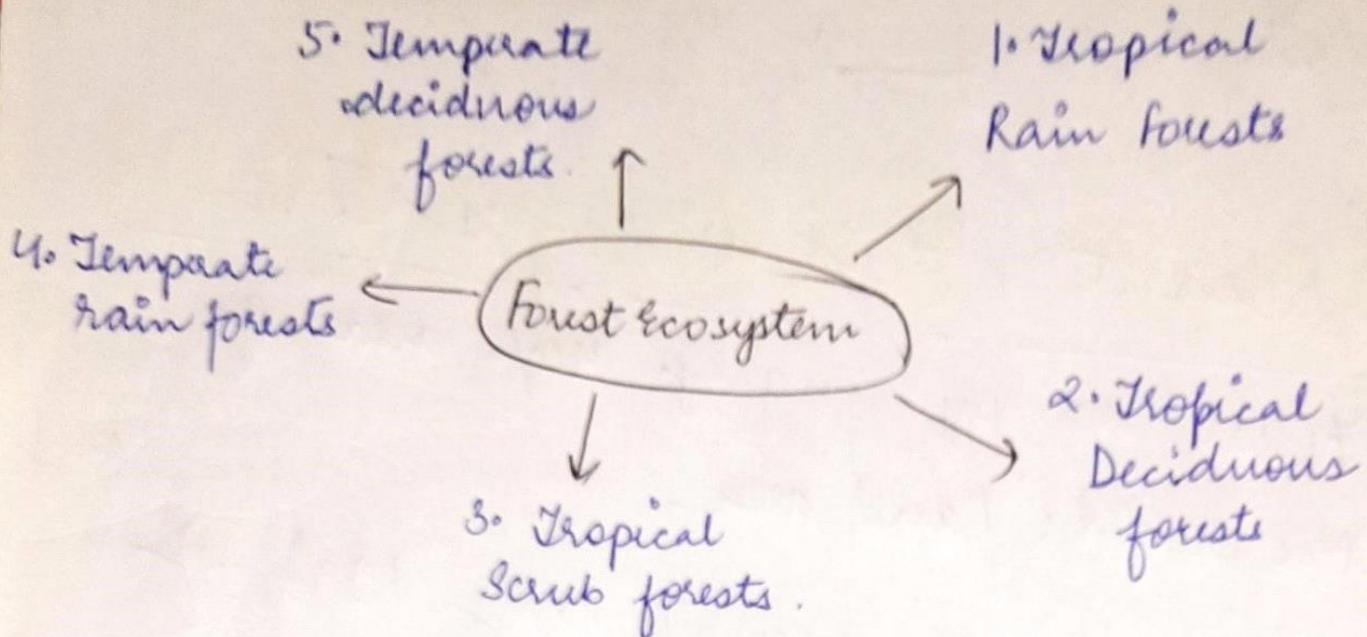
Natural Ecosystem

1.) Terrrestrial ecosystem

Forest Ecosystem

- ✓ Forest occupy roughly 40% area of the world's land area.
- ✓ In India, it occupies only 19% of its total land area.
- ✓ A forest ecosystem is the one in which tall and short trees grow and support many animals and birds. The forests are found in undisturbed areas receiving moderate to high rainfall.

Types of Forest ecosystem



depending upon the climate conditions, forests can be classified into the following types which are stated above.

Features of different types of forests —

1.) Tropical Rain forests —

They are found near the equator. They are characterized by high temperature. They have broad leaf trees like teak and the animals like lion, tiger and monkey.

2.) Tropical deciduous forests —

They are found little away from the equator. They are characterized by a warm climate and rain is only during monsoon. They have different types of deciduous trees like maple, oak and ~~hickory~~ hickory and animals like deer, fox, rabbit and rat.

3) Tropical scrub forests

These are characterized by a dry climate for longer time. They small deciduous trees and shrubs and animals like maple, oak and hickory and animals like deer, fox etc.

4) Temperate Rain forests

They are found in temperate areas with adequate rainfall. They are characterized by coniferous trees like pines, fir, red wood etc. and animals like squirrels, fox, cat, bear etc.

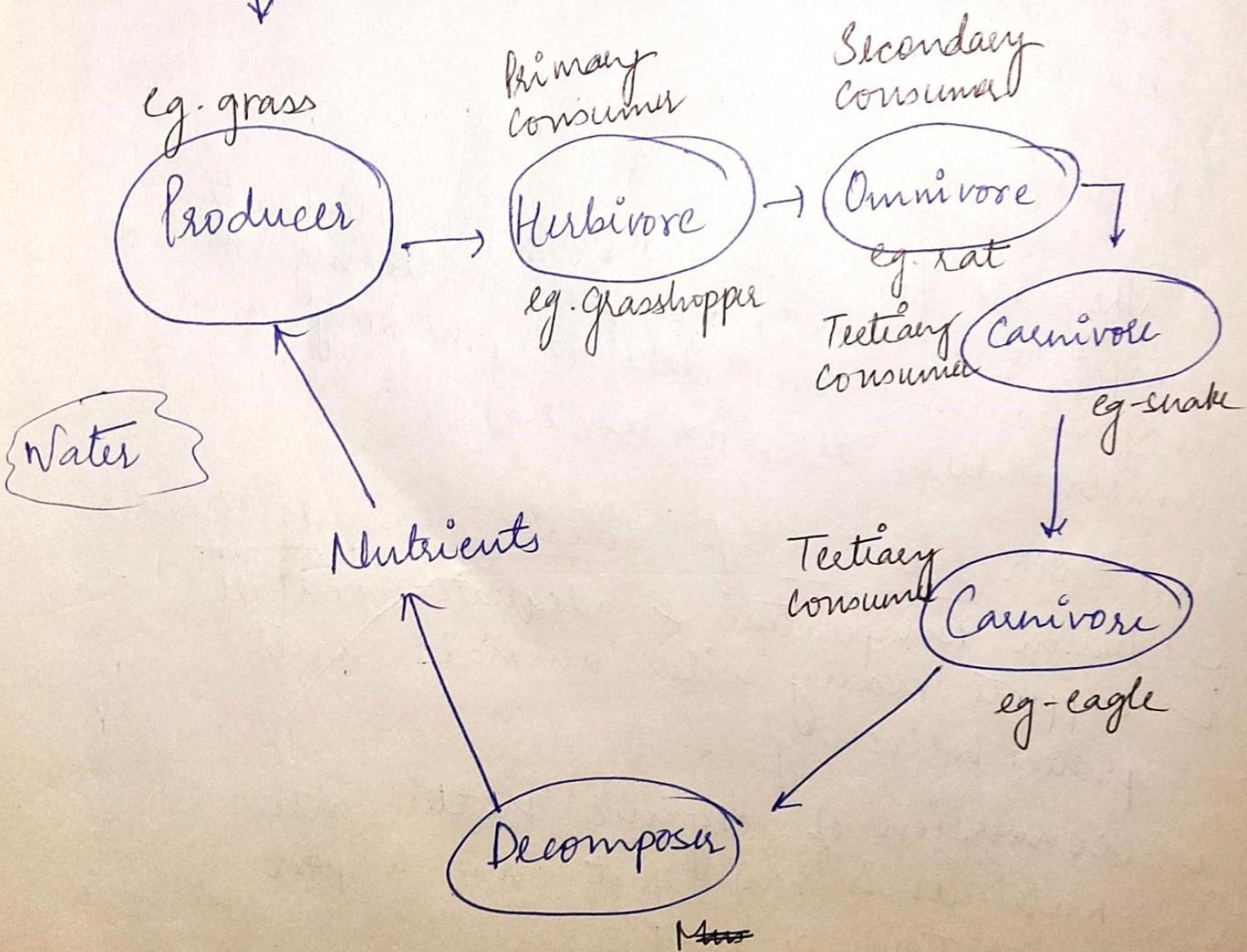
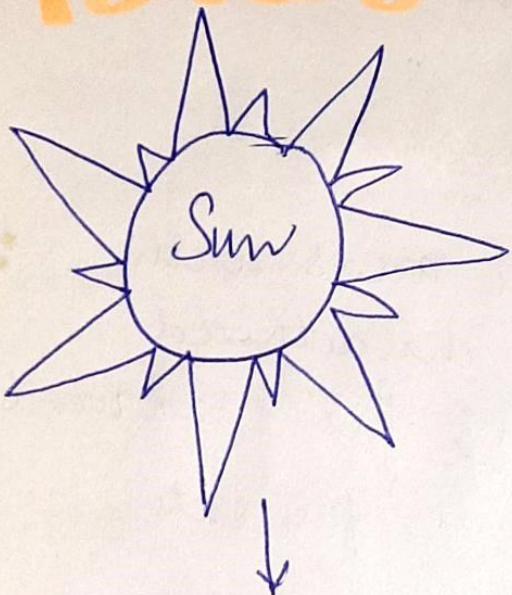
5) Temperate deciduous forests

They are found in areas with moderate temperatures, have major trees including broad leaf deciduous trees like oak, hickory and animals like deer, fox, bear etc..

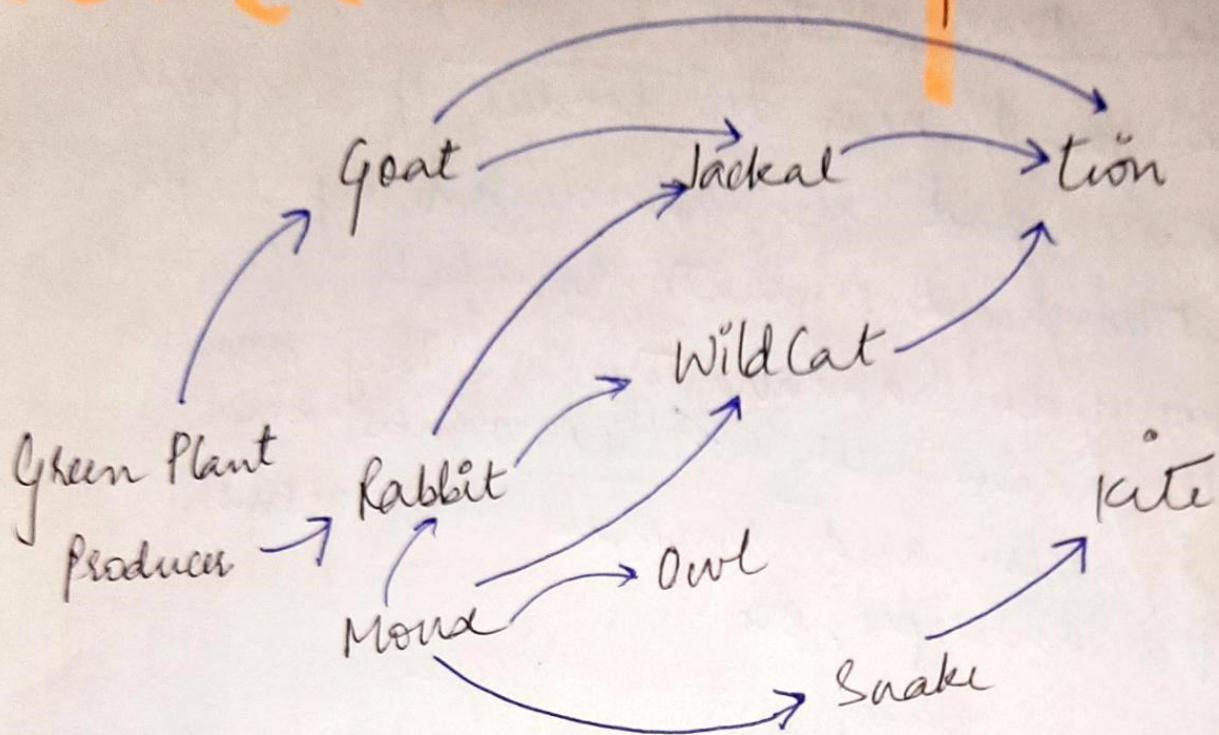
Characteristics of forest ecosystems

- ✓ warm temperature & adequate rainfall
- ✓ supports many wild animals and protect biodiversity
- ✓ conversion of organic matter into nutrients is very fast due to poor penetration of light

Temperate Deciduous Forest Food Chain



Food Web in a forest

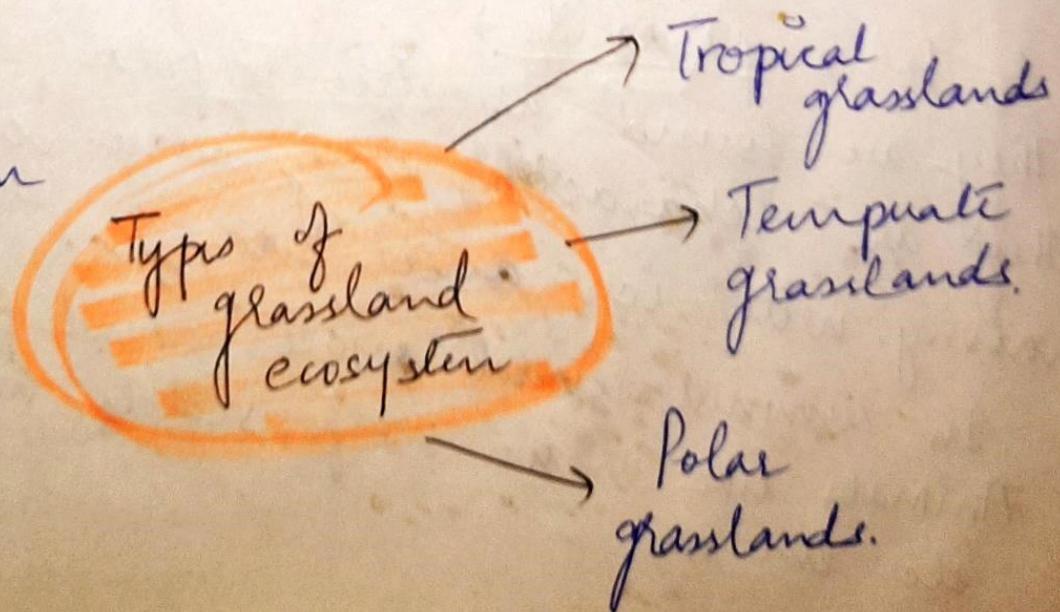


Grassland Ecosystems

Occupies 20% of earth's surface.

↳ Limited grazing helps to improve the net primary production of the grasslands.

Depending upon climatic conditions.



Nature -

1. Tropical grasslands →

They are found near the borders of tropical rain forests and are characterized by high temperature and moderate rainfall (90 to 100cm).

Also known as 'Savanna type.' They consists of tall grasses with scattered shrubs and stunted trees. and animals like zebras, giraffes, antelopes, etc -.

2. Temperate grasslands →

They are usually found in the centers of continents, on sloped hills. They are characterized by very cold winters and hot summers.

Intense grazing and summer fires don't lead shrubs and trees to grow.

3. Polar grasslands →

They are found in arctic to polar regions. They are characterized by severe cold, ^{and strong} winds along with ice and snow.

In summers, several small annual plants grow. Animals like arctic wolf, weasel, arctic fox, etc. live here.

Food Chain in Grassland.

Grasses and plants (Producers) → Grasshopper (Consumer of the first order) → Frog (Consumer of the second order) → Snake (Consumer of the third order) → Hawk (Top carnivore)

Grassland Food Web

~~Producers~~ → green plants
~~green plants~~ Primary Consumers (herbivores) → Zebras
~~Zebras~~ Secondary Consumers (Carnivores) → Cheetah.
Decomposers and Detritus feeders.
Scavenges → Vulture

Desert Ecosystem

Desert occupies about 35% of our world's land area. It is characterized by less than 25 cm rainfall. The atmosphere is dry and hence it is a poor insulator

Types of
desert
ecosystem
(Based on
climatic
conditions)

→ Tropical deserts

found in —

Africa - Sahara desert
Rajasthan - Thar desert.

Characteristics —

few species, wind blow sand
dunes.

→ Temperate deserts

found in —

South California : Mojave.

Characteristics

very hot summer
and very winter
time.

→ Cold deserts

found in —

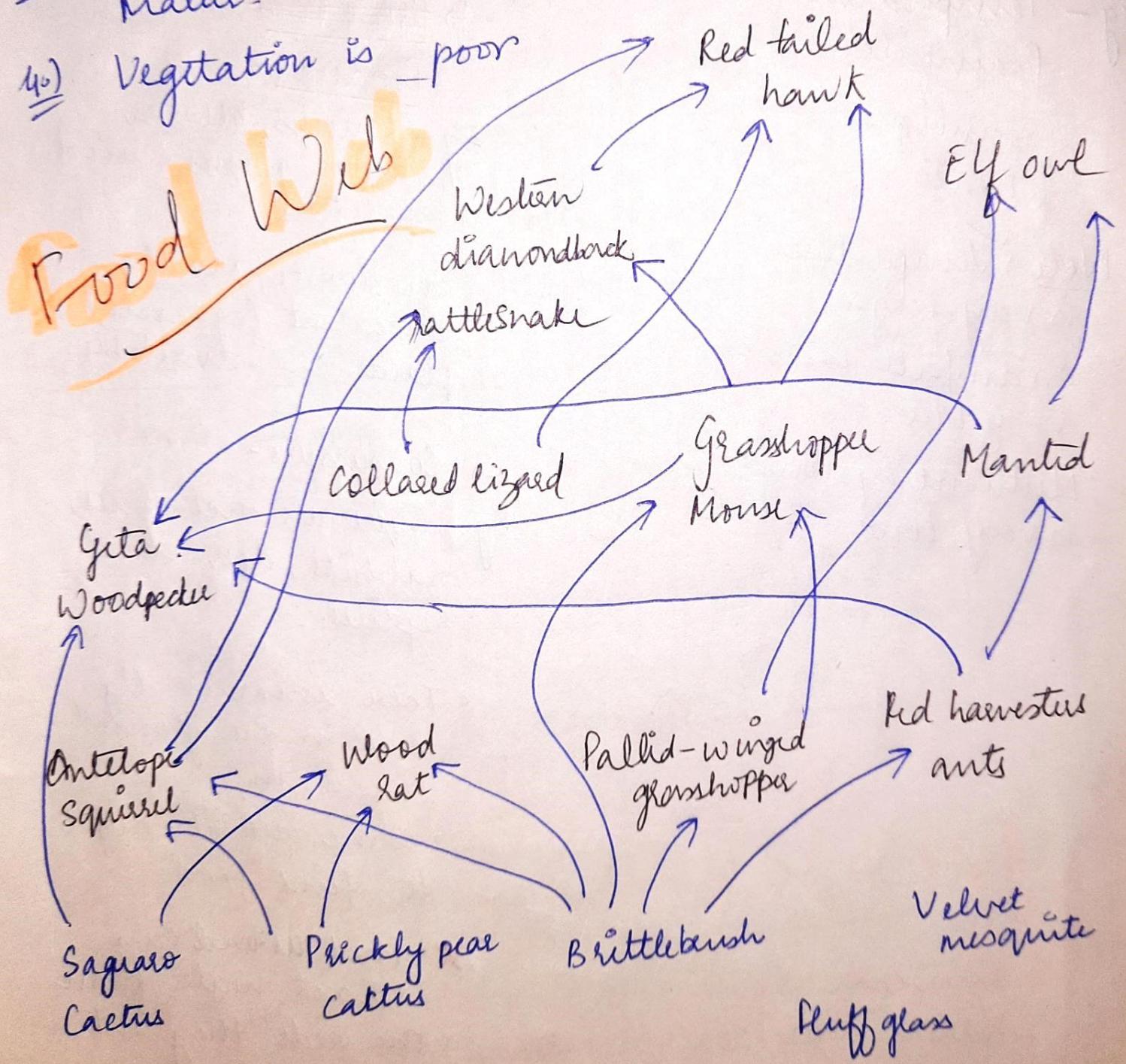
China : Gobi desert.

Characteristics

cold winters and warm summers.

Characteristics of Desert ecosystem

- 1) desert air is dry & climate is hot.
- 2) Annual rainfall is less than 25 cm.
- 3) Soil is very poor in nutrients and organic matter.
- 4) Vegetation is poor



Structures & Functions of the desert system ecosystems →

Abiotic Components

Eg - Temperature

Rainfall

Sunlight

Water

Note → Temperature
is very high

✓ Rainfall is
very low.

✓ Nutrient cycling
is very low

Biotic Components

↳ ~~Producers~~

Producers-

Eg - Shrubs, bushes,
some grasses and
few trees.

In deserts, mostly
succulent (eg - cacti)
plants are available.

↳ Consumers -

Eg - Squirrels, mice, foxes,
rabbits, deer and
reptiles.

- These animals dig holes in the ground to live in.
- come out at night to find food.

★ • Most animal can extract water from the seeds they eat.

↳ Decomposers -

Eg - Fungi and Bacteria

✓ Desert has poor vegetation with a very low amount of dead organic matter.

Aquatic Ecosystems.

The aquatic ecosystem deals with water bodies. The major types of organisms found in aquatic environments are determined by the water's salinity.

Aquatic life zone

Fresh Water life zone

Eg- Ponds, streams, lakes, rivers etc..

Salt Water life zone

Eg- Oceans, estuaries, wetlands
Mangrove swamps
Open sea.

Fresh Water ecosystem

Pond

Ecosystem

A pond is a fresh water aquatic ecosystem where water is stagnant. It receives enough water during rainy season. It contains several types of algae, aquatic plants, insects, fishes and birds.

Characteristics of pond

- Pond is temporary, only seasonal.
- It is a stagnant fresh water body.
- Ponds get polluted easily due to limited amount of water.

Structure and functions of pond ecosystem

Abiotic Components

- Eg -
- Temperature
 - Light
 - Water
 - Organic & Inorganic compounds.

Biotic Components

↳ Producers

These include green photosynthetic organism

Phytoplankton

↳ These are microscopic aquatic plants, which freely float on the surface of water.

Eg → Algal, small floating plants like volvox, pandorina, anabaena, consmarium etc..

Microphytes

Eg →
large floating plants, and submerged plants like hydrilla, Jussiaea, Wolffia, Demna.

↳ Consumers

Primary Consumers (zooplanktons) →

These are microscopic animals which freely float on the surface of water. zooplanktons are found along with phytoplankton. They feed on plants (phytoplankton)

Example - Protozoa, very small fish, ciliates, flagellates and protozoans.

Secondary Consumers (carnivores) →

They feed on zooplankton.

Example - Insects like water beetles and small fish.

Tertiary Consumers.

They feed on smaller fish

Example - Large fish like game fish

↳ Decomposers

They decompose the dead plant and animal matter and their nutrients are released and reused by the green plants.

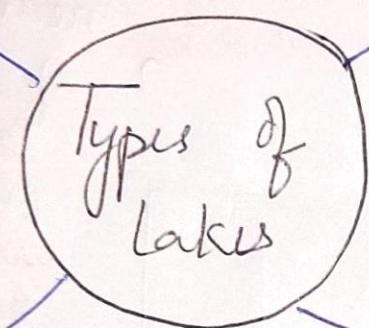
Examples - Fungi, bacteria and flagellates.

Lake Ecosystem

Lakes are large natural shallow water bodies. Lakes are used for various purposes. Lakes are supplied with water from rainfall, melting snow and streams.

Volcanic lakes

They receive water from magma after volcanic eruption



Oligotrophic lakes

They have low nutrient concentration, they are unproductive.

Dystrophic lakes / Humic lakes

They have low pH, ~~high~~ humidity contains

- high amount of humic substances and organic acids.
- Due to presence of these substances, water is brown in colour.

- pH around 4.0 - 6.0.

Eutrophic lakes

They are overnourished by nutrients like N and P.

① ~~Kiptooi zone~~ littoral zone

- ✓ It is the top layer of the lake.
- ✓ It has shallow water.
- ✓ shore area of the lake or pond
- ✓ it consists of area from the dry land sloping to the open water and can be narrow or wide.

Zones of Lakes

② Limnetic zone

- ✓ Next to the ~~li~~ open water area of the lake or pond.
- ✓ portion of water that receives sunlight.
- ✓ Its upper portion near the surface of the water is called Euphotic zone (warm water region) or epilimnion.

③ Profundal zone

(Hypolimnion)

Cold water region.

- ✓ It is located below the thermocline where the sunlight doesn't penetrate

④ Euphotic zone

⑤ Benthic zone

- ✓ This is the bottom of the pond or lake.

- ✓ it consists of organic sediments and soil.

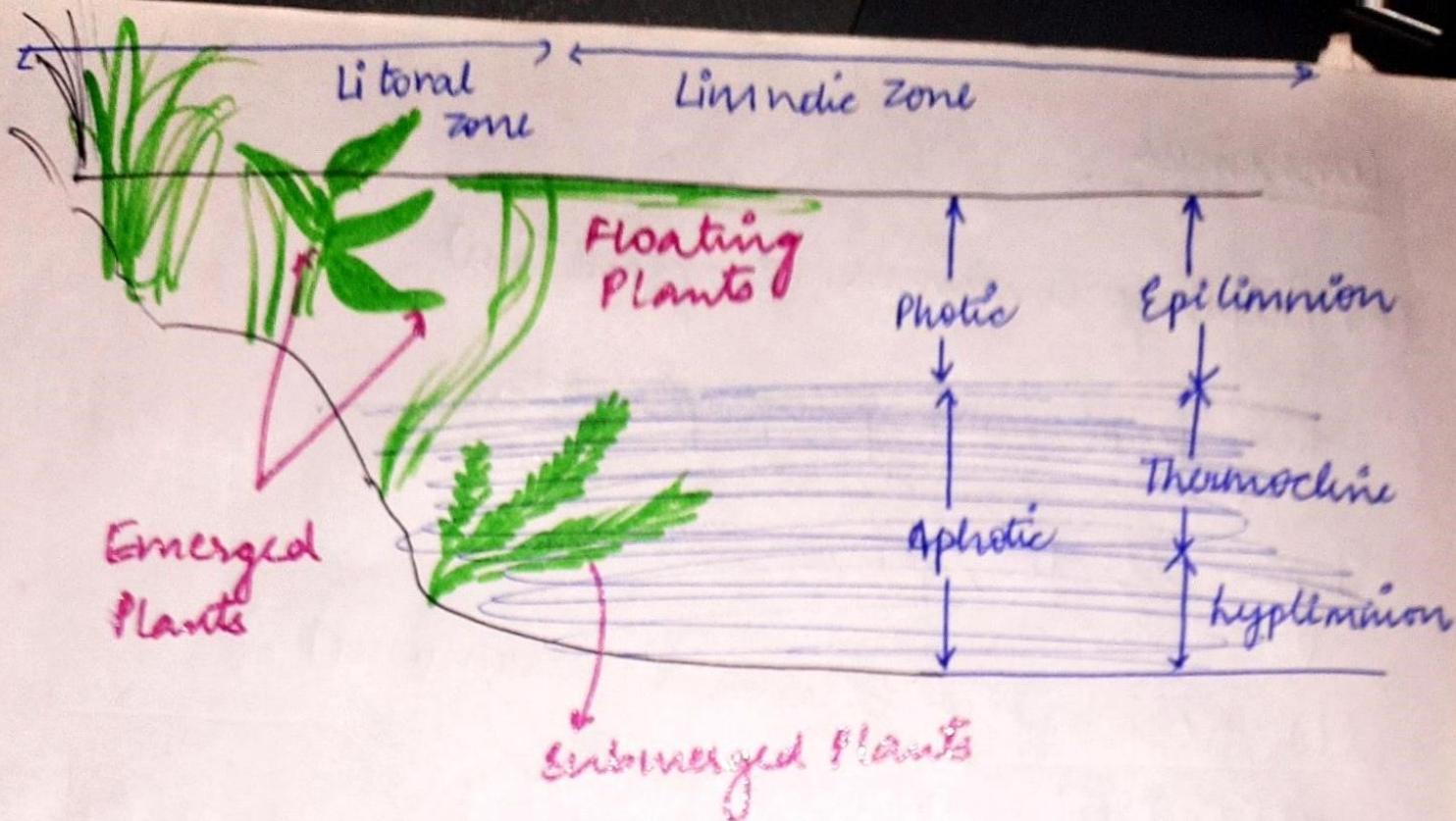
- ✓ It is the

Lake Digestive System

This is where bacteria decompose organic matter from dead algae, aquatic plants, fish and animal waste.

✓ Size of this zone depends upon the age and water clarity of the pond or lake.

✓ has low fish population because of the lack of oxygen.



Characteristics of lake ecosystem

- 1) Lake is a shallow fresh water body.
- 2) It is a permanent water body with large water resources.
- 3) It helps in irrigation and drinking.

Structure & function of lake ecosystem

Abiotic components

Temperature, light, proteins, lipids, O_2 , CO_2

Biotic Components

- 1) Producers → They are green plants; may be submerged, free floating or amphibious plants

Eg, Phytoplanktons, algae and flagellates

Consumers

(a) Primary consumers. (zooplanktons)

they feed on phytoplankton.

Eg- Ciliates, protozoans etc..

(b) Secondary Consumers (carnivores)

They feed on zooplankton.

Eg- Insects and small fishes.

(c) Tertiary Consumers

They feed on smaller fish.

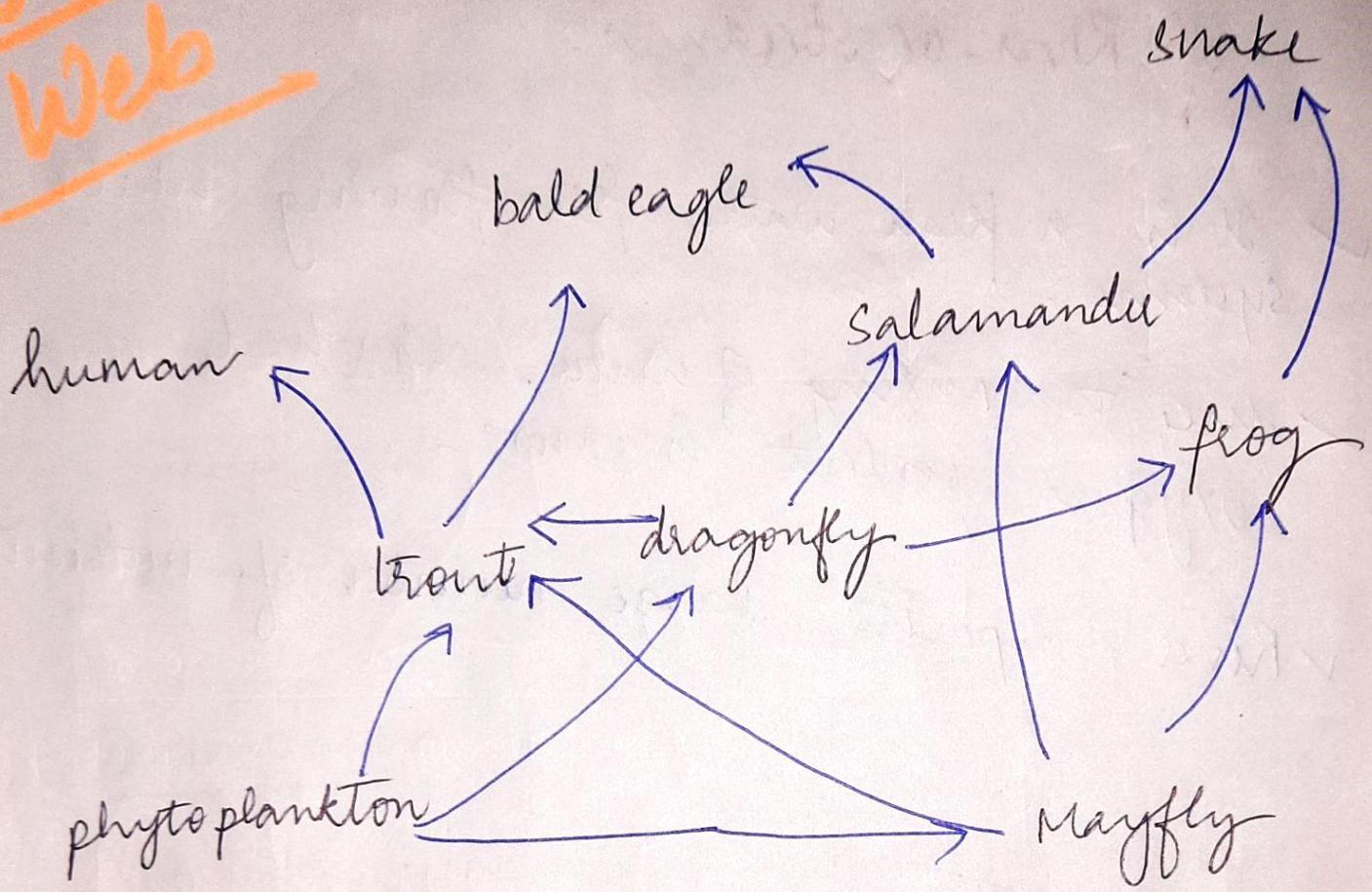
Eg- Large fishes like game fish.

Decomposers

They decompose on dead plants and animals.

Eg- Bacteria, fungi and actinomycetes

Food Web



River (or) Stream Ecosystem

The running water of a stream or a river is usually well oxygenated, because it absorbs oxygen from the air. The number of animals are low in river or stream.

Characteristics of River or Streams.

- ✓ It is a fresh water, free flowing water system.
- ✓ due to mixing of water, dissolved oxygen content is more
- ✓ River deposits large number of nutrients

Structure & Function of River or Stream Ecosystem.

I. Abiotic Components

Eg- River, light, Temperature, Chemistry, Substrate.

II. Biotic Components.

Producers

Phytoplankton, algae, water grasses, aquatic mosses, amphibious plants.

Consumers -

i) Primary Consumers-

They feed on phytoplankton.

Eg - Water insects, snails, fishes.

ii) Secondary Consumers-

They feed on primary consumers.

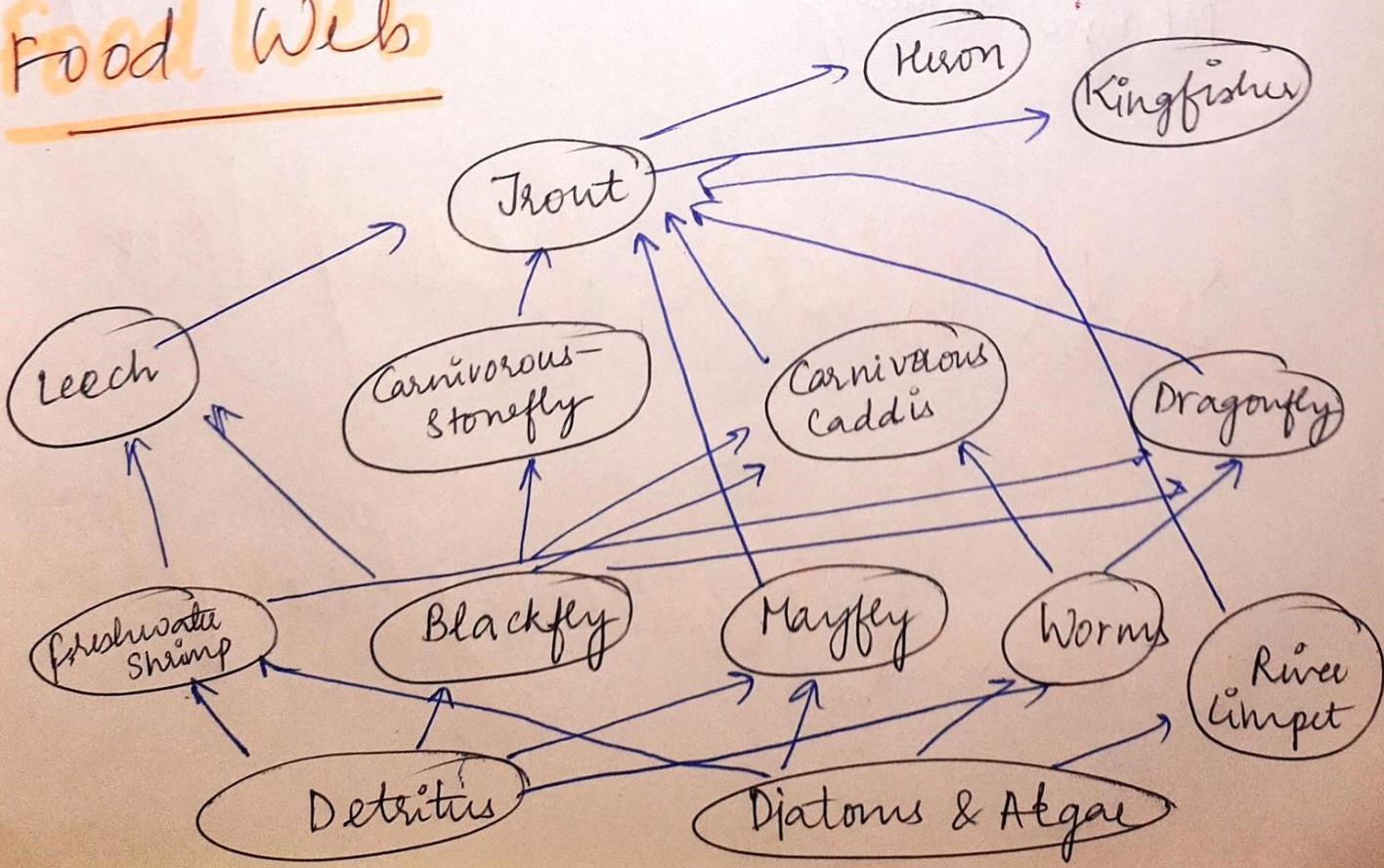
Eg - Birds.

Decomposers -

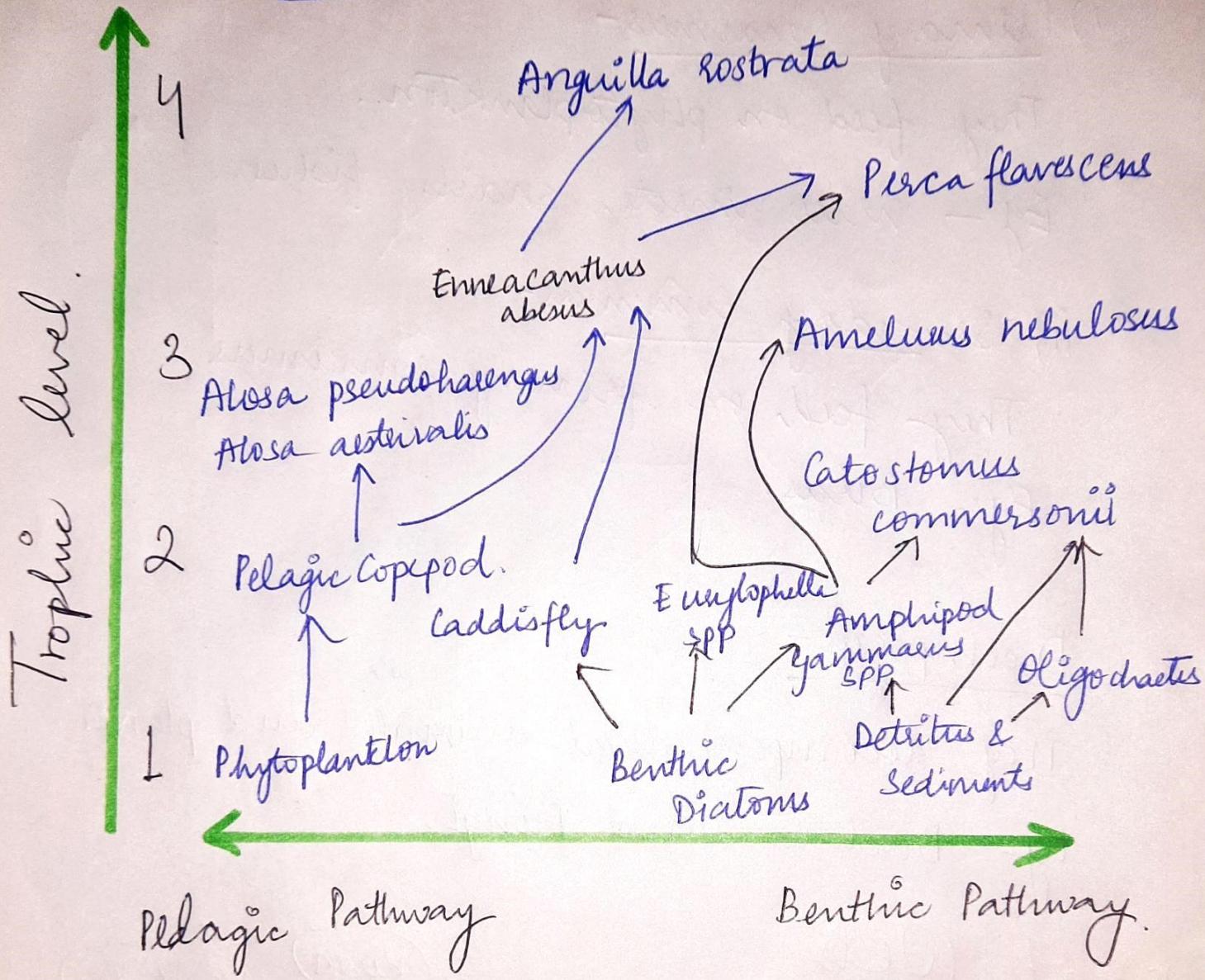
They decompose dead animals and plants.

Eg - Bacteria and Fungi.

Food Web



Freshwater River



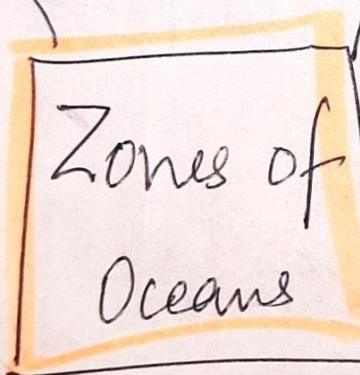
Salt Water Ecosystem

Ocean (Marine) Ecosystem

Ocean cover more than two-thirds of the earth's surface. Ocean environment is characterized by its high concentration of salts and minerals. It supplies huge variety of products and drugs. It also provides us iron, magnesium, iron, natural gas.

Coastal Zone

It is relatively warm, nutrient rich shallow water. It has ~~is~~ high primary productivity because of high nutrients and sunlight.



Open Sea
it is the deeper part of the ocean. It is vertically divided into three regions -

Euphotic Zone
it receives abundant light & shows high photosynthetic activity.

Bathyal Zone
It receives dim light and is usually geologically active.

Abyssal Zone
It is the dark zone and is very deep (2000 m).

Characteristics

- 1) It occupies a large surface area with saline water.
- 2) Since ship, submarines can sail in ocean, commercial activities may be carried out.
- 3) It is rich in biodiversity.
- 4) It moderates the temperature.

Structure & Function

Abiotic Components —
Eg → Temperature, light, NaCl, K, Ca & Mg salts alkalinity.

Biotic Components —

- 1) Produces — Phytoplankton (diatoms, unicellular algae etc) and marine plants (sea weeds, chlorophyceks,

Phacophyceae)

2. Consumers —

They are heterotrophic macro consumers. They depend on producers for their nutrition.

- Primary Consumers — (Herbivores)

They feed on producers.

Eg — Crustaceans, molluscs, fish.

- Secondary Consumers — (Carnivores) —

They feed on herbivores.

Example. Herring sand, mackerel.

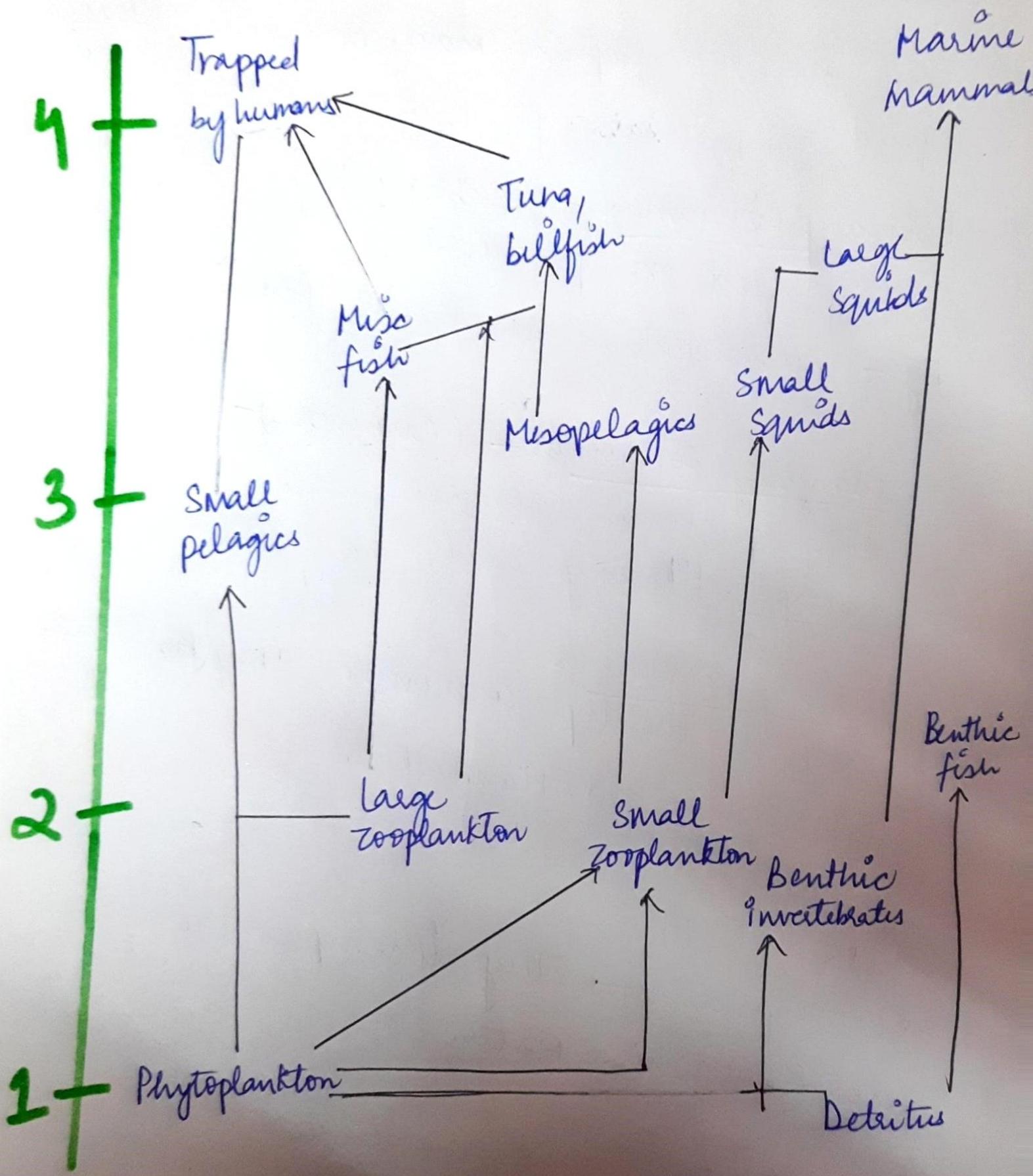
- Tertiary Consumers

They are the top consumers. Eg ~~etc~~

Example — Cod, Haddock etc.

3. Decomposers — They decompose the dead organic matter

Eg — Bacteria and some fungi



sunlight

One-celled life

Shrimplike creatures

Creatures

Small fish

Mackerel

Tuna

Large shark

Human

Seagull

Phytoplankton

Mussels

Fish

Zooplankton

Algae

Starfish

Octopus

Limpets

Shark

Estuarine Ecosystem

An estuary is a partially enclosed coastal area at the mouth of a river where sea water mixes with freshwater. It is strongly affected by tidal action. Estuaries are generally abundant of nutrients. Estuaries are useful to human beings due to their high food potential. It is essential to protect the estuaries from pollution.

Characteristics

- 1.) Estuaries are transition zones, which are strongly affected by tides of the sea.
- 2.) Water characteristics are periodically changed.
- 3.) The living organisms in estuarine ecosystems have wide tolerance.
- 4.) Salinity remains highest during the summer.

and lowest during the winter

Structure ~

& functions

- Abiotic Components —

Eg → Temperature, pH, sodium and potassium salts and various nutrients.

- Biotic Components —

- 1.) Producers —

Eg — Marsh grasses, seaweeds, sea-grasses and phytoplankton.

- 2.) Consumers —

Eg — Oysters, crabs, seabirds, small fishes.

- 3.) Decomposers —

Eg — Bacteria, fungi and actinomycetous