Assigment

On

Pond ecosystem (Ecology)

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Introduction

What is an Ecosystem ?

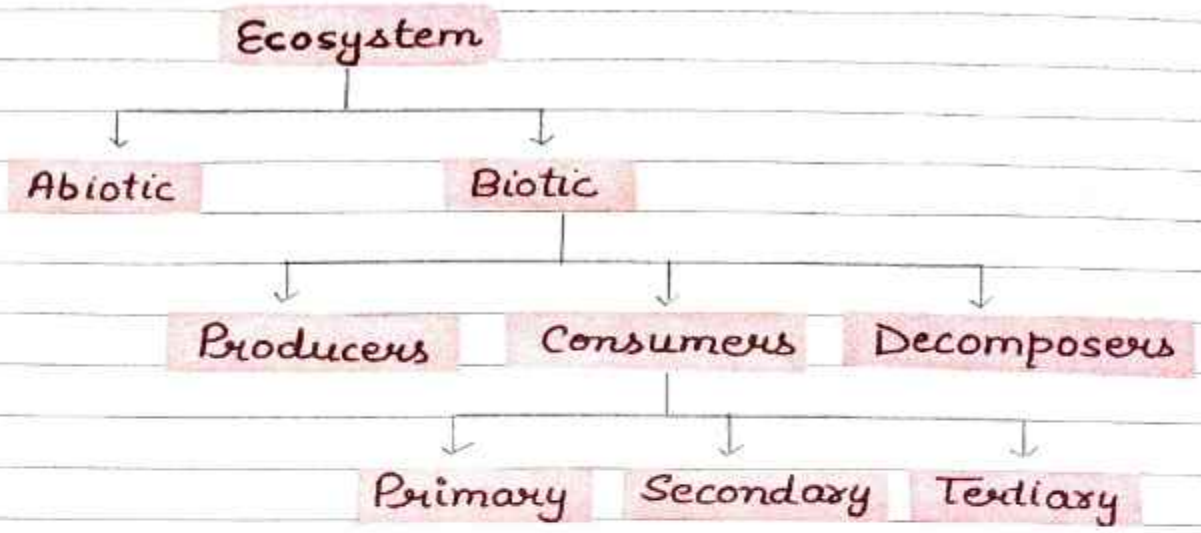
An ecosystem is a structural and functional unit of ecology where the living organisms interact with each other and the surrounding environment. In other words, an ecosystem is a chain of interaction between organisms and their environment.

The term "Ecosystem" was first coined by A.G Tansley an English botanist, in 1935.

Ecosystems are too necessary for all the living beings existing on this earth. we as humans totally depend on a healthy ecosystem in order to survive or remain healthy. for example - we need pure air in order to breathe, clean water to drink, healthy food to eat that we obtain from the plants, etc.

Structure of the ecosystem.

The structure of an ecosystem refers to the explanation of living beings and the physical features of the environment in which the organisms live.



- The structure of an ecosystem can be split into two main components namely :

i Abiotic ii Biotic

1 Abiotic Components

Abiotic Components are the non-living Component of an ecosystem. It includes air, water, soil, mineral, light, temperature, nutrients, wind, altitude, turbidity, etc

2 Biotic Components

Biotic Components refer to all living Components in an ecosystem. Based on nutrition, biotic Components can be Categorised into autotrops, heterotrops, saprotrophs (or decomposers)

- Producers include all autotrophs such as plants They can produce food through the process of photosynthesis. Consequently, all other organisms higher up on

the food chain rely on producers for food.

- Consumers or heterotrophs are organisms that depend on other organisms for food. Consumers are further classified into primary consumers, secondary consumers and tertiary consumers
  - Primary consumers are always herbivores as they rely on producers for food.
  - Secondary consumers depend on primary consumers for energy. They can either be carnivores or omnivores
  - Tertiary consumers are organisms that depend on secondary consumers for food. Tertiary consumers can also be carnivores or omnivores
- Decomposer include saprophytes such as fungi and bacteria. They directly thrive on the dead and decaying organic matter.

Decomposers are essential for the ecosystem as they help in recycling nutrients to be reused by plants

Types of ecosystem.

An ecosystem can be as small as an oasis in a desert, or as big as an ocean, spanning thousands of miles. There are two types of ecosystem:

- Terrestrial ecosystem
- Aquatic ecosystem

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Types of Ecosystem

- **Terrestrial Ecosystem**

Terrestrial ecosystem are exclusively land-based ecosystem. There are different types of terrestrial ecosystems distributed around various geological zones. They are as follows :

1. Forest Ecosystem
2. Grassland Ecosystem
3. Tundra Ecosystem
4. Desert Ecosystem

- **Aquatic Ecosystem**

Aquatic Ecosystem are ecosystem present in a body of water. These can be further divided into 2 types

1. freshwater Ecosystem
   - Lotic (Running water) - spring, river, stream etc.
   - Lentic (Standing water) - lake pond, pools, puddles etc
2. Marine Ecosystem - ocean, sea or estuary etc

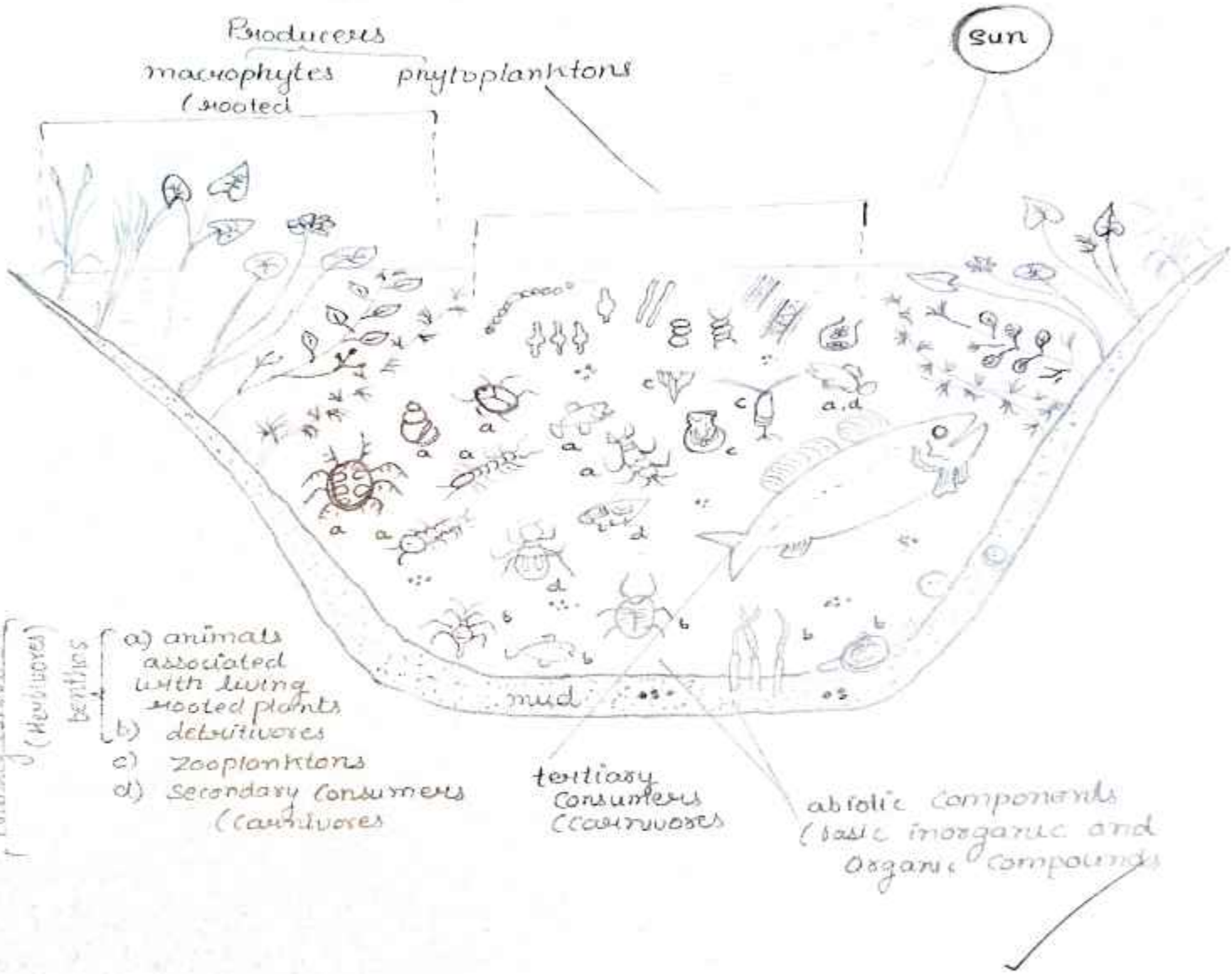

Diagram of the Pond ecosystem

What is Pond ecosystem?

freshwater habitat A pond ecosystem is a freshwater ecosystem on which different living organisms depend for their survival and nutritional needs. Ponds, due to their light penetration, are capable of supporting a diverse range of water plants.

Lentic Ecosystem : The pond ecosystem is classified under the lentic ecosystem. A lentic or lacustrine ecosystem implies a body of still water ranging from seeps, seasonal pools, ponds, basin marshes, ditches.

- "Pond ecosystem is a freshwater ecosystem on which living organisms rely for their survival and food. Ponds are shallow water bodies going about 12-15 feet deep. Due to enough light penetration, ponds can facilitate plant growth"

Types of Pond ecosystem

There are many types of pond ecosystem, ie garden ponds, salt ponds, fish ponds, ephemeral ponds, freshwaterponds, Kettle ponds, and mountain ponds.

Garden ponds - Garden ponds are human-made or artificial ponds. They accommodate ornamental plant and animal species (backswimmers, water beetles

pond snails, and so on) from all over the world. Most garden ponds are usually closed ecosystems. They recieve materials from outside such as rainfall, leaves and export different creatures at larvae stages.

Salt Ponds - Salt ponds carry salty or brackish water. It can appear near the seaside where due to waterlogging, natural pools forms. Salt ponds can also materialize in rocky areas of the beach, also known as rock pools.

fish Ponds - fish ponds are human-made or artificial ponds. They can maintain and host all species of fish fish ponds require high maintenance, including continuous ph level & temp check, monitor absorbed oxygen content, water hardness, & nutrient levels.

Vernel or Ephemeral ponds- Vernal pools are cyclical seasonal ponds. They are formed in depressions in the ground but only when the rainfall is at its heaviest. Although they stay only for few months, they are largely depended on by species like salamanders, water crowfoot, frogs, and many more.

freshwater Ponds - freshwater pools can be formed anywhere, either due to rainfall or by the presence of water saturating the soil. They can be formed by rivers flowing into a depression in the ground.

Garden Pond

Fish Pond

Ephemeral Pond

freshwater Pond

Kettle Pond

Salt Pond

Mountain Pond

Kettle Ponds - Kettle ponds are formed when retreating glaciers create depressions in the ground. A part of the glaciers, when it detaches and gets inserted into the ground, slowly melts away and forms a pool or a pond that constitutes glacial sediment. They are usually found near mountains like prairies and savanna.

Mountain Ponds - Mountain ponds are located in mountainous regions. They are formed by shifting rock, water runoff, and melting snow. They are a unique pond ecosystem, for they are home to rare or endangered species.

Characteristics of Pond Ecosystem

Many things separate pond ecosystems from other types of ecosystem. Here is a list of some main characteristics of pond ecosystems :-

- **Pond habitats at different levels** - At the pond bottom, there is very little oxygen; hence only decomposers and scavengers live there. Fish dominates and prey in pond mid-water. On the pond surface, there is plenty of light and O_2. Ducks, tadpoles, midge larvae survive here. At the pond margin, plants provide shelter to small animals and insects.
- **Still water** - Still water pond ecosystem is a body of motionless or standing water. It is categorized under the lentic ecosystem, which includes lakes & wetlands as well.

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- Biological system - Ponds have both biotic and abiotic components. Biotic components include environment factor such as temperature, water and light, inorganic component such as nitrogen, CO_2, O_2, organic components such as fats, proteins, carbohydrates and amino acids. Abiotic components comprise producers, primary, secondary and tertiary consumers, and decomposers.
- Surrounded by banks - Pond ecosystems are almost always surrounded by either natural or artificial banks
- Pond stratification - There are three zones. The littoral zone is near the shore and has shallow water, which allows easy light penetration. Limnetic zone is open pond water with high light penetration dominated by plankton. The deepest pond region is a profundal zone dominated by heterotrophs and has no light penetration

Pond ecosystem food chain

The flow of energy : for an ecosystem to work, there must be a flow of energy within it. Living organisms require energy in the form of food. However, the supreme source of energy is the sun.

Food chain - A food chain is a series in which each Organism feeds on the one below it

Habitat : All ponds support a wide diversity of plant & animal life that unitedly forms a food web, which is also called a food chain or an ecosystem. The food web

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explains how life's energy moves through the pond. An untidy pond generally supports most species.
Below is the explanation of the food chain of pond ecosystem

Producer level - The producer level includes species of rooted and floating (algae) aquatic plant life that intakes sunlight, air, water, and mineral of the soil. The aquatic life converts these absorbed units into living or sentient plant tissue that further supports every level of the ponds food web. There are two types of green aquatic plants - microphytes (Volvox and spirogyra) and macrophytes.

Primary Consumers - The primary consumers consist of small herbivorous animals that feed on food converted by producers such as algae and also feed on other waste plants to sustain themselves. These animals are snails, insects, tadpoles and small fish. They also include various microscope animals that are called Zooplankton.

Secondary Consumers - The second level in the pond food web makes up secondary consumers who feed on the primary consumers. The animals in the second level are frogs, fish, crayfish, other amphibians and reptiles like water snakes & turtles.

Tertiary Consumers - Tertiary consumers eat primary and secondary level animals. The third level consumer includes water birds, hawks, small mammals, & human beings.

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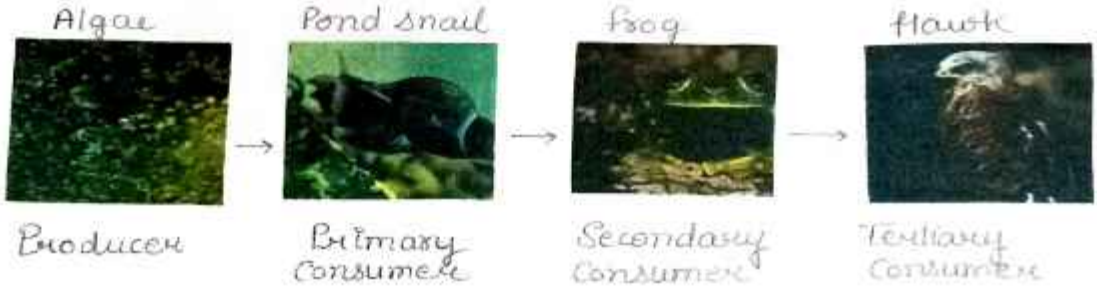
Decomposers - Bacteria, Scavenger, and fungi are the last consumers of the Pond's food web. They break down decaying and dead aquatic plants & animals. The recycling of elemental nutrients by decomposers makes available the nutrients to new generation of plants.

Pond Ecosystem food chain



Animals in Pond ecosystem.

Large pond species : More than a thousand genera of animals live in ponds, although you won't be able to find all of them in any one single pond. In a very large pond, you might find mammals like water shrews and water voles and birds such as herons, ducks and Kingfishers.

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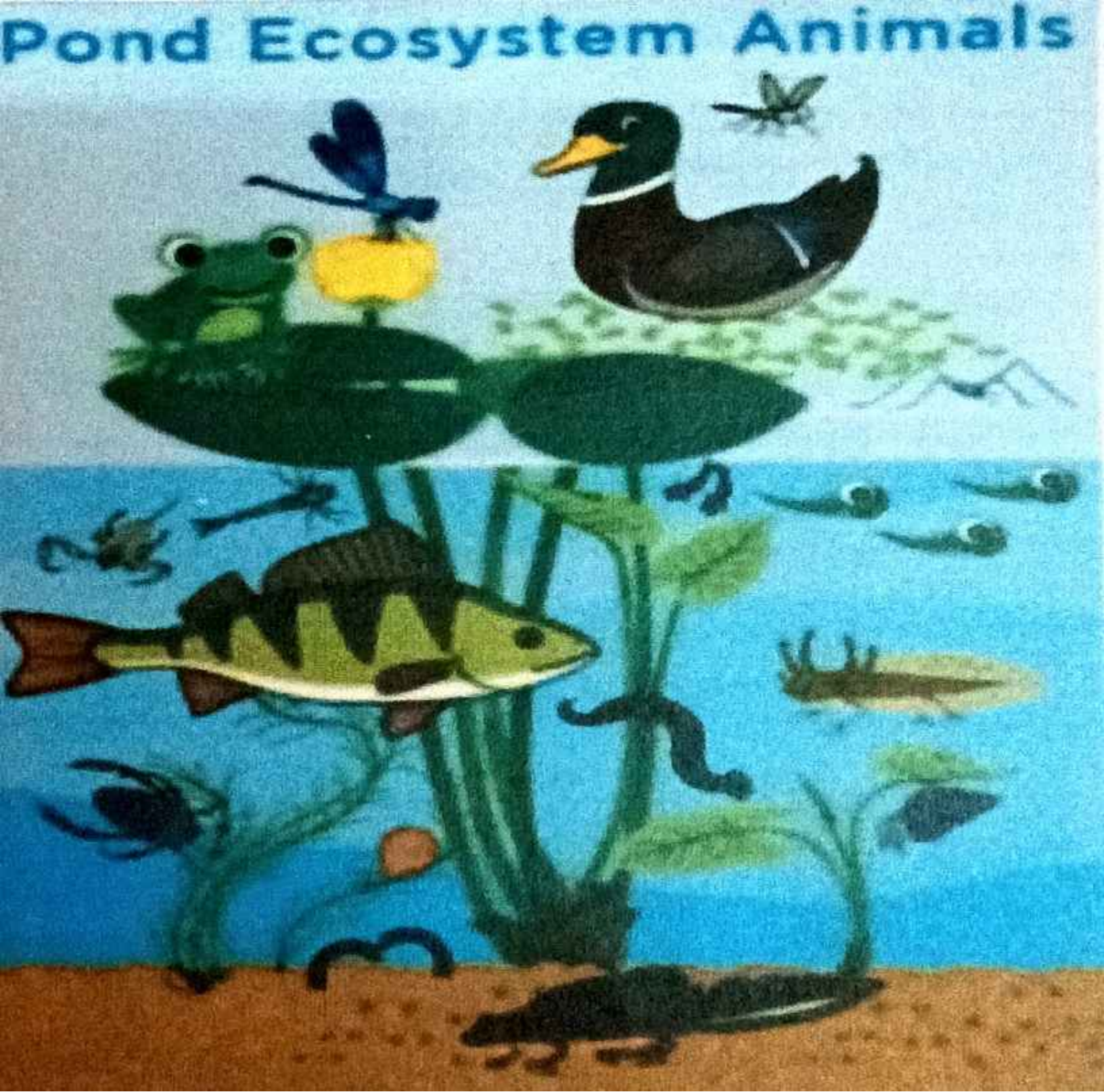
Pond Ecosystem Animals



- Small pond species – Even the smallest Pond will have a populace of amphibians such as newts, toads, frogs and, small fish like sticklebacks and invertebrates like minibeasts.
- Other Species – Some species are herbivores like water fleas and snails, while others are violent Carnivores who hunt the unfortunate herbivores. One of the mighty invertebrate predators in a pond is the diving beetle. No tadpole is safe when this hunter is around.

- Pond ecosystem animals with some examples are mentioned below :

1. **Pond Snail** – A soft-bodied animal with a hard, protective shell. They eat rotten organic matter, algae and aquatic plants.
2. **Ramshorn Snail** – freshwater snails with planispiral shells. They keep the water clean.
3. **Pond skater** – Are also called water scooters, water striders, water skippers. A bug that walks on water.
4. **Bloodworm** – Bloodworms are carnivorous and can grow up to 35cm. They are usually found at the bottom of shallow waters.
5. **Water Scorpion** – It is another type of animal in pond ecosystem. A venomous arachnid with a large stinger on its tail. They are poor swimmers, and that is why they are never found in open water. They live in muddy ponds and ditches.

6 **Leech** - Leech has muscular, soft, and segmented bodies that can lengthen and contract. Leeches are found in freshwater as well as on land. They are bloodsuckers but also eat organic debris.

7 **Perch** - A perch is long and rounded. True perch has rough scales. Red drum is a saltwater dweller and is called red perch.

8 **Frog** - Tadpoles grow up to be frogs. Frogs have moist, smooth skin. Frogs eat worms, insects, rodents, anthropods.

9 **Tadpole** - Tadpoles ~~grow~~ are the aquatic larva of amphibians. They breathe through gills. Tadpoles are generally vegetarians, but some species of frogs are carnivorous.

10 **Newt** - Newts are small, brightly-colored Salomanders and have rough skin. They lay eggs in water.

11 **Mosquito** - A small flying insect that is a carrier of the disease. female insects lay eggs on the pond surface that hatch into larvae. These larvae eat organic debris and algae.

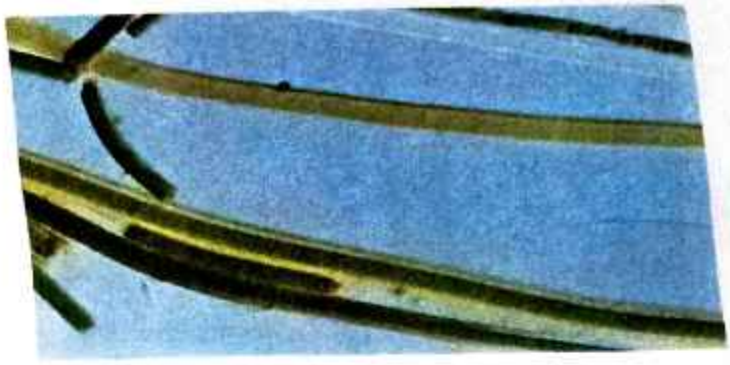
12 **Larva of Mosquito** - Mosquito larvae are called wrigglers because of their wriggling movement. Mosquito larvae eat algae, other, mosquitos and organic debris

Plants in Pond ecosystem

Aquatic plants provide shelter, food, and a healthy environment for fish in ponds. Aquatic plants are vital to maintaining a balanced ecosystem forming the

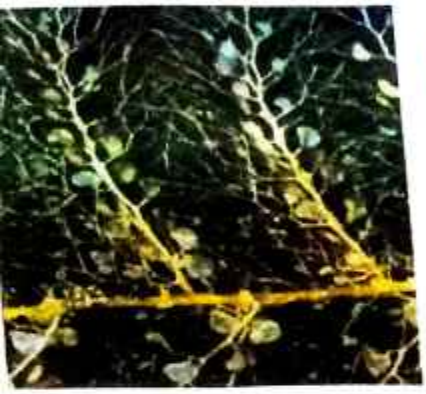
Algae

Musk grass



lyngbya

Submersed plants



bladderwort

hydrilla

Pondweed

Emerged plants

Cattails

arrowheads

rushes

forming the food chain base, they produce oxygen in the water and protect invertebrates and small fish.

Categories of aquatic plants.

- Algae : Algae is the most common aquatic plant. They are generally found in oceans. They are small & have no leaves, roots, or stems. But they are an imp basis of the pond food chain. Musk grass and lyngbya are example of algae.
- Submersed plants : Aquatic plants that live underwater and have roots in the soil, such as bogg moss, bladder wort, hydrillia, and pondweed. These plants have narrow and thin leaves.
- Floating leaved plants: Aquatic plants floating near or at the water surface either are rooted in soil like lily pads and duckweeds or have floating roots. They exist in freshwater and saltwater. The floating plants leaves are flat and firm, which helps in absorb a lot of sunlight.
- Shoreline : Aquatic plants prefer to stay on the shore but can tolerate being moist and flooded seasonally like trees, shrubs, and blue flag iris.
- Emerged plants : Emergent or emerged or emersed aquatic plants have strong roots in the soil, but their larger part stays above the water surface, such as Knotweed, cattails / redroot, arrowhead and rushes. These plants require constant sunlight.

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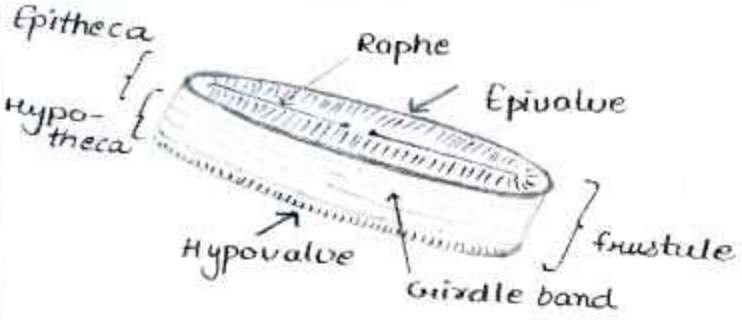
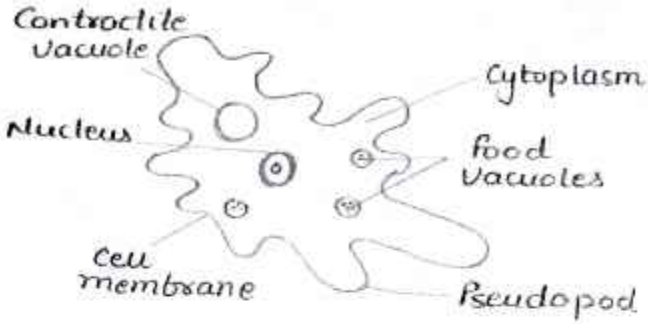
Q What type of micro-organisms can we observe in pond water?

- We can observe bacteria, protozoa, and algae in pond water. Bacteria, protozoa and algae are different classes of microorganisms
- Bacteria are found everywhere and are also present in a great amount in pond water.
- Protozoa like an ameoba, paramecium are also found in pond water.
- Algae like chlorophyta also remain present in abundance

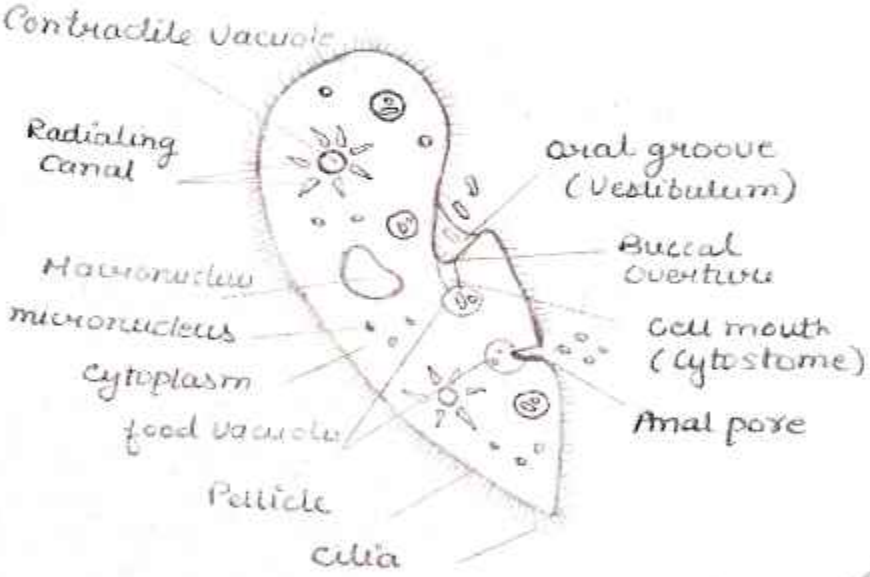
Microorganisms found in pond water.



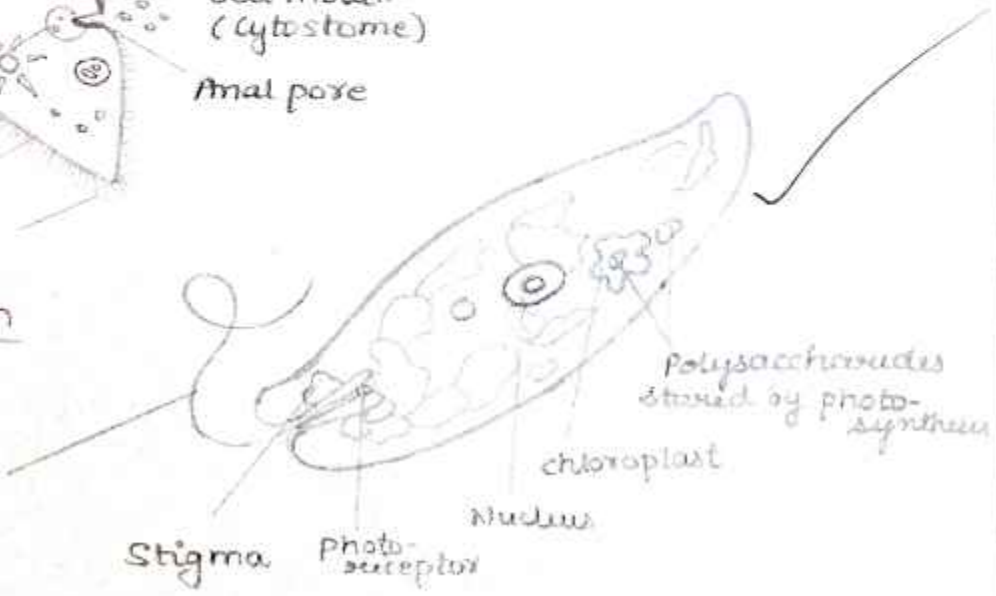
Diatoms



Amoeba



Paramecium



Euglena

BIBLIOGRAPHY

For Successfully Completing my Assignment. I have taken help from the following website links and book :-

- www.google.com
- www.wikipedia.com
- Book - P.D Sharma.

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