

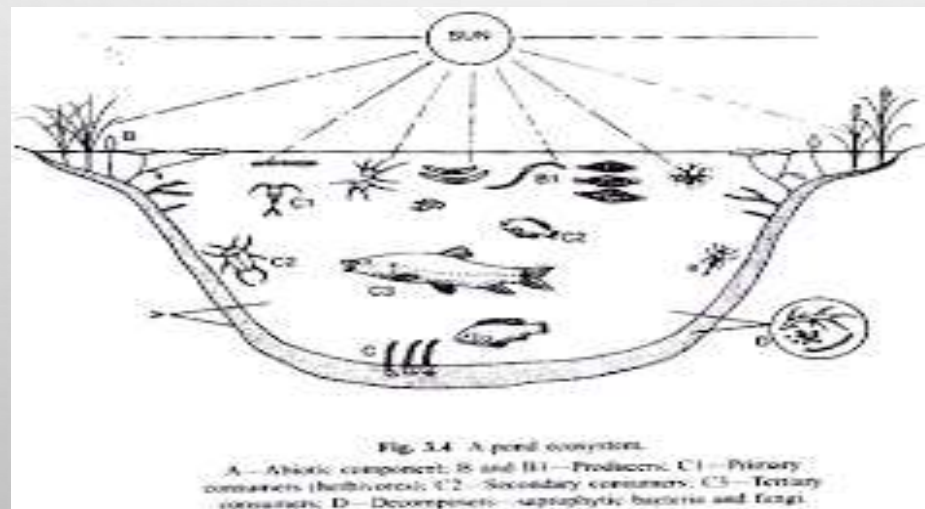
DURGA MAHAVIDYALAYA

Pond Ecosystem

Presented by - Chetna Sona (Asst. Prof.)

CONCEPT OF POND ECOSYSTEM

A pond ecosystem is a freshwater ecosystem where living organisms (biotic factors) like plants, animals, and microbes interact with their non-living environment (abiotic factors) such as water, sunlight, temperature, and nutrients, creating a self-sustaining biological system.



FEATURES OF THE POND ECOSYSTEM

- A pond is a small, freshwater, self-sustaining ecosystem.
- It has distinct zones like shoreline, open water, deep water, and bottom, each supporting specific life forms.
- Producers include algae, phytoplankton, and aquatic plants.
- Consumers include zooplankton, insects, fishes, amphibians, and birds.
- Decomposers like bacteria and fungi recycle nutrients from dead matter.
- Abiotic factors such as water, sunlight, oxygen, carbon dioxide, and nutrients regulate life.
- Energy flows from producers → consumers → decomposers, maintaining ecological balance.

TYPES OF POND ECOSYSTEM

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 receive 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 form. Salt ponds can also materialize in rocky areas of the beach, also known as rock pools.

Vernal 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. Birds use them for drinking water and hunting food.

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.

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](#).

BIOTIC COMPONENTS OF THE POND ECOSYSTEM

producers - are the green plants and algae, such as phytoplankton, Hydrilla, lotus, and water hyacinth. They use sunlight, carbon dioxide, and water to make food by photosynthesis and form the base of the food chain.

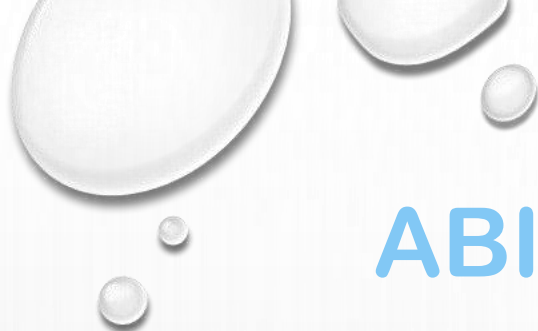
primary consumers - are small animals that eat these producers. These include zooplankton (tiny microscopic animals), snails, insect larvae, and tadpoles. They depend directly on plants and algae for food.



secondary consumers - feed on the primary consumers. Examples are small fishes, frogs, aquatic insects, and beetles. They control the population of smaller organisms.

Decomposers - are bacteria and fungi that break down dead plants, animals, and waste materials into simple nutrients. These nutrients return to the water and soil, making them available again for the producers.





ABIOTIC COMPONENTS OF THE POND ECOSYSTEM

Light – Provides energy for photosynthesis; intensity decreases with depth, so plants grow more near the surface.

Temperature – Changes with seasons and affects metabolism, growth, and reproduction of organisms.

Dissolved Oxygen (O₂) – Essential for respiration of fishes, insects, and decomposers.



IMPORTANCE OF POND ECOSYSTEM

1. By absorbing pollutants and heavy metals, certain aquatic plants contribute to better water quality.
2. In addition to providing water, the pond ecology supports species outside of ponds.
3. By absorbing nitrogen and phosphorus, shoreline plants contribute to the maintenance of the pond's oxygen level and inhibit the growth of algae. Furthermore, animal excrement that aquatic plants absorb reduces the amount of nutrients available to plants, which prevents algae from growing.
4. The distribution of animal species in a pond is determined by stratification within the ecosystem. This helps lessen interspecies competition to some extent.

STRATIFICATION IN THE POND ECOSYSTEM

1. **Coastal Area** – The shallow water near the shore. It gets plenty of light, supports rooted plants (like lotus, Hydrilla), algae, snails, insects, and small fishes.
2. **Limnetic Zone** – The open water region away from the shore where sunlight penetrates. It is dominated by phytoplankton, zooplankton, and free-swimming fishes.
3. **Intensive Zone** – The deeper water region where light penetration is very poor. Oxygen is also less here, so only a few organisms like bottom-dwelling fishes can survive.
4. **Benthic Zone** – The bottom of the pond, consisting of soil and sediments. It is home to decomposers such as bacteria and fungi, and some burrowing animals, which recycle nutrients.

FOOD CHAIN IN A POND ECOSYSTEM

- The chain begins with **producers** such as algae, phytoplankton, and aquatic plants that make food using sunlight.
- These are eaten by **primary consumers** like zooplankton, snails, insect larvae, and tadpoles.
- **Secondary consumers** such as small fishes, frogs, and aquatic insects feed on the herbivores.
- **Tertiary consumers** include larger fishes, water snakes, and fish-eating birds (kingfisher, heron) that prey on smaller animals.
- **Decomposers** like bacteria and fungi break down dead plants and animals into nutrients, which recycle back into the pond and are reused by producers.



THANKYOU