

Assignment No 3

Topic 2:Ecosystem

Introduction -

An **ecosystem** is a **community** of living organisms (plants, animals and microbes) in conjunction with the **nonliving components** of their environment (things like air, water and mineral soil), interacting as a system.

These biotic and **abiotic components** are regarded as linked together through nutrient cycles and energy flows.

As ecosystems are defined by the network of interactions among organisms, and between organisms and their environment, they can be of any size but usually encompass specific, limited spaces (although some scientists say that the entire planet is an ecosystem).

Energy, water, nitrogen and soil minerals are other essential abiotic components of an ecosystem. The energy that flows through ecosystems is obtained primarily from the sun. It generally enters the system through **photosynthesis**, a process that also captures **carbon** from the atmosphere.

By feeding on plants and on one another, **animals** play an important role in the movement of matter and energy through the system.

They also influence the quantity of plant and **microbial biomass** present. By breaking down dead organic matter, **decomposers** release carbon back to the atmosphere and facilitate **nutrient cycling** by converting nutrients stored in dead biomass back to a form that can be readily used by plants and other microbes.

Ecosystems are controlled both by external and internal factors. External factors such as **climate**, the **parent material** which forms the soil and **topography**, control the overall structure of an ecosystem and the way things work within it, but are not themselves influenced by the ecosystem.

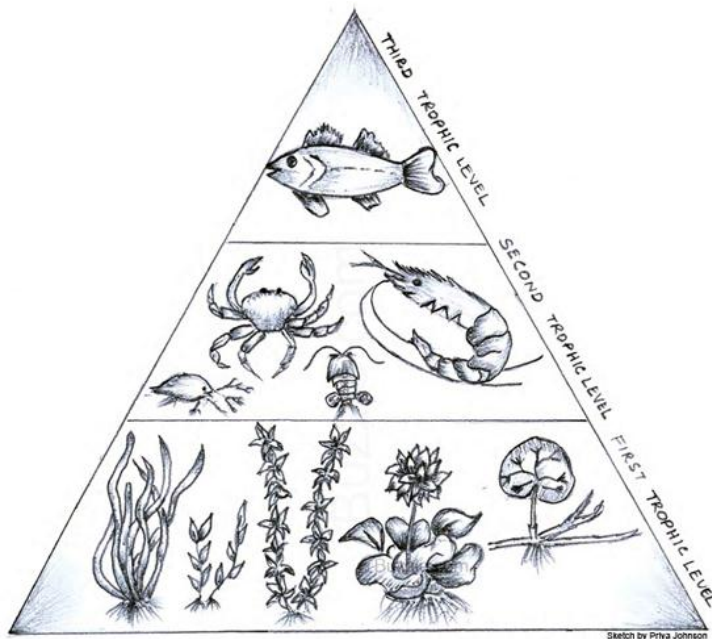
Ecosystem Types -

- [Aquatic ecosystem](#)
 - [Marine ecosystem](#)
 - [Large marine ecosystem](#)
 - [Freshwater ecosystem](#)
 - [Lake ecosystem](#)
 - [River ecosystem](#)
 - [Wetland](#)
- [Terrestrial ecosystem](#)
 - [Forest](#)
 - [Littoral zone](#)
 - [Riparian zone](#)
 - [Subsurface lithoautotrophic microbial ecosystem](#)
 - [Urban ecosystem](#)
 - [Desert](#)

Ponds Project

A pond is different from a river. Rivers are generally fast flowing. Ponds are hollows with water in them. There is very little water flow in a pond. In this still water a whole community of plants and animals can grow. The pond at Roe Valley Country Park has been there for a very long time. Old maps as far back as 1782 show the pond. It is thought to have been a quarry from which the stones to build Limavady town were taken. By the year 2000 the pond had been neglected for a long time. It had become completely choked with dead leaves.

The pond was cleaned out. Water plants were replanted and wildlife encouraged to develop in the pond.



Habitat and Biodiversity

At one time there were many more ponds than we have today. Farmers needed ponds for their cattle. They now have piped water. Ponds were also needed to make linen. These ponds have disappeared. This has reduced the habitat available to wildlife. This means that many pond creatures become rarer. The word for the variety of life is biodiversity. Our native biodiversity is being reduced due to the lack of pond habitat.

Safety

Ponds are very interesting places to study. They are also very dangerous. Steep sides and mud at the bottom can make even the shallowest water very dangerous. Your visit to the pond will have been very carefully supervised. The next few pages will look at some of the things you studied on your visit to the park.

- **POND PLANTS**

The picture above shows many of the plants you would expect to find in a pond. The pond at Roe Valley Country Park does not have all these plants because the pond was scrapped out some years ago. Plants were introduced but not all of them have grown successfully.

Photosynthesis

Plants are different to animals. Plants can make their own food. They do this by using water, minerals and carbon dioxide to absorb the sun's rays. This is called photosynthesis. Plants are essential for all life on earth. They absorb carbon dioxide and produce oxygen which allows animals to breath. They also provide food for animals to eat. This is true for all ecosystems be it on land or water. A simple way to understand this is to think of a food chain: sun, grass, rabbit and fox. Food chains also exist in ponds and all of them depend upon plants.

1. Plankton and Algae

The smallest plants in ponds are plankton. These are so tiny that they cannot be seen except with a microscope. They provide for many of the smaller creatures in the pond. Another small plant is algae. This can sometimes be seen floating on ponds as what looks like a green scum. Algae can become a problem in some ponds. Farmers use chemicals called nitrates and phosphates as fertiliser.

If too much of these wash into ponds they can cause an increase in algae growth. You can sometimes see this as a carpet of green covering the whole pond. The algae use up all the oxygen in the pond killing off all life in the pond. Pond life can also be destroyed by bacteria. Sometimes a pond can be filled with leaves. Bacteria, which rot the leaves, use up all the oxygen in the pond. This kills off any other life in the pond.

2. Plant Succession

If you look at the pond you will see that some plants live entirely outside the water and some live entirely in it. Others are partially in the water. Flowers like forget-me-nots and marsh marigolds live in the wet ground around the pond. Reeds have there roots in the pond but most of the plant is above the water. Water lilies float in the pond and are attached to the bottom by long stems. You will also see Canadian pond weed which is completely submerged under the water. Each of these plants need special adaptations to survive where they grow.

- **POND CREATURES**

You will have found many strange looking creatures in the pond. Because they all live in water they are different from land based animals. They are adapted for living in or on water. This means have things on their bodies which allow them to live successfully in this environment.

Snail

You will find many snails in the pond. They can vary from 25mm to 50 mm in size. Like all snails they have a hard shell. They are molluscs and are closely related to their land cousins. There are many different kinds of snail to be found in the pond. The water snail floats about. It has gills which allow it to breath under water. The pond snail and the ramshorn snail cannot breath under water. They hold air in their shells and must come to the surface when their air runs out. All the snails eat algae.

Water Spider

Water spiders can be about 16mm. They are arachnids. They cannot breath under water. They spin a web and use it as an air bell. They are able to breath in this air bell. They spend most of their time in this air bell only coming out to catch the small creatures they eat. You will catch lots of spiders but not all of them will be water spiders. Some of the spiders you catch will simply be hiding in the plants above the water.

Shrimp

The shrimp is about 16mm long. They have 7 or 9 pairs of legs. They swim on their sides. The shrimp is a crustacean related to crabs, lobsters and woodlice. It breathes using gills. Shrimps eat floating dead matter in the pond. They will not live in polluted water. Their presence means that the pond is not polluted.

Caddis Fly Larva

You will have found various kinds of caddis fly larva cases. They are about 20mm long. They can be made from plants, stones or shells. The caddis fly is moth like fly. Like many insects it has a life cycle of egg, larva, pupa and adult. The adult caddis fly lays its eggs in water. The larva stage makes it own case from silk like material surrounding this inner case with different material. The pupa stage also remains in the case. Eventually the adult fly emerges and begins its short life as a fly.

Beetle Larva

Many insects have part of there life cycle in water. Dragonflies, damsel flies, caddis flies and mayflies all leave the water at the adult stage. Others remain in the water only occasionally flying.

Their larva stage lives in the water feeding on smaller creatures. You will find various kinds of larva in the water. The one shown here is the larva of the great diving beetle. It is the largest larva

in the pond about 50 mm when fully grown. It is fierce predator eating whatever it can catch.

Pond Skater

Pond skaters are the first creatures you will notice on the water. They are about 20mm across. You will be able to tell immediately that they are insects as they have 6 legs. These are held out from the body so it can spread its weight as widely as possible. This allows it to move across the surface very quickly

allowing it to catch its prey, the small creatures which live on the surface. Some species of pond skater can fly others cannot.

Whirligig Beetle

In spring time and early summer the whirligig beetle is very obvious on the surface of the water. You will see large numbers of them whirling about in the manner that gives them their name. They are small beetles about 15mm long. They whirl about on the surface to disturb the small creatures they eat.

Food Chains and Ecology of the Pond

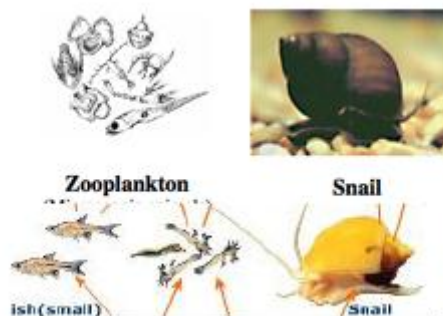
The picture above illustrates some of the life in the pond. All life in the pond depends upon the ability of the plants to photosynthesise. The animals are then able to feed from the plants. You will be familiar with the idea of a food chain. One simple food chain might be:

Sun- algae- tadpole- kingfisher.

To this we could add the water boatman which eats dead material at the bottom of the pond. There will be many others you could think of. All these food chains added together form an interconnected web that make up the pond ecosystem. The idea of an ecosystem means that all the living things in the pond depend upon one another. We have seen that ponds are very susceptible to pollution. This can destroy the pond ecosystem. Ponds are very important for wildlife of all sorts, biodiversity. It is important that we conserve them.

Following are the consumers of the pond habitat food chain:

- **Primary Consumers** are the herbivores that depend on the producers for food - examples are tadpoles , snails, very tiny fish



- **Secondary Consumers** are the organisms which depend on the primary consumers for food- examples are medium sized fish, frogs

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- **Tertiary Consumers** are the organisms which can feed on the primary and the secondary consumer –examples are the duck, crane



- **Top Consumers** or the predators, which include the osprey, fish hawk, and humans.

