

## National 4 Biology

### Unit 3 summary notes

#### Ecosystems

An ecosystem consists of all the living things in a particular area and the non-living components (e.g. rivers) with which the organisms interact. It can be broken down into different parts:

<b>Ecosystem Component</b>	<b>Definition (what it means)</b>	<b>Example</b>
habitat	The place where an organism lives.	Pond, hedge, leaf litter.
population	A collection of plants or animals that are all the same species.	A population of rabbits or a population of wolves.
community	All the living things within an ecosystem.	Grass + rabbits + foxes.
ecosystem	All the living and non-living components together.	Habitats + communities, for example, a wood land and all the things that live there.

#### Biodiversity

Biodiversity is the term used to describe the variety or range of species present within an ecosystem.

A wide variety of species (lots of different types of living things) = high biodiversity. A small variety of species (few different types of living thing) = low biodiversity.

An ecosystem is more stable when there is a **higher** biodiversity.

A high biodiversity is beneficial to the human population for the following reasons:

- Variety of food sources.
- Raw materials (for building materials etc).
- Medicines (we make a lot of medicines from plants).
- Maintaining genetic diversity for use by future generations.

The increasing human population is affecting biodiversity and therefore having a negative impact on the above benefits we get from having a high biodiversity.

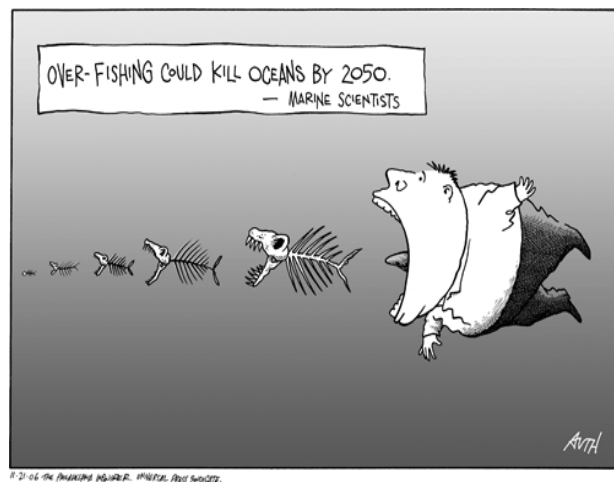
Here are a few examples of how increasing human populations are having a negative impact on biodiversity:

### Overfishing:

The increasing population means that there is a greater demand for food to feed everyone.

Overfishing can upset the food chain and can have negative effects on many different species.

The whole ecosystem can be at risk of collapsing and we could lose a very valuable food source.



### Pollution:



Pollution can affect the air, water, soil and many other habitats of wildlife.

Increasing pollution can make it difficult for organisms to live in their normal habitat.

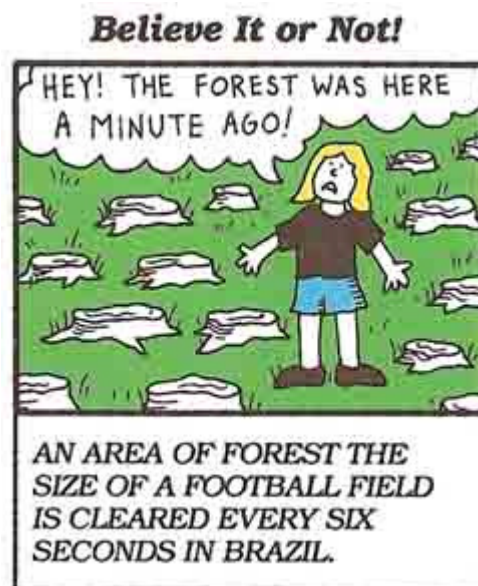
Plants can be affected by acid rain, soil

## Deforestation:

Deforestation increases global warming as it causes more carbon dioxide to remain in the atmosphere.

It also removes habitats for many species and therefore reduces biodiversity.

Deforestation has been played a major part in the decrease of the critically endangered orang-utan.



## Natural Disasters:

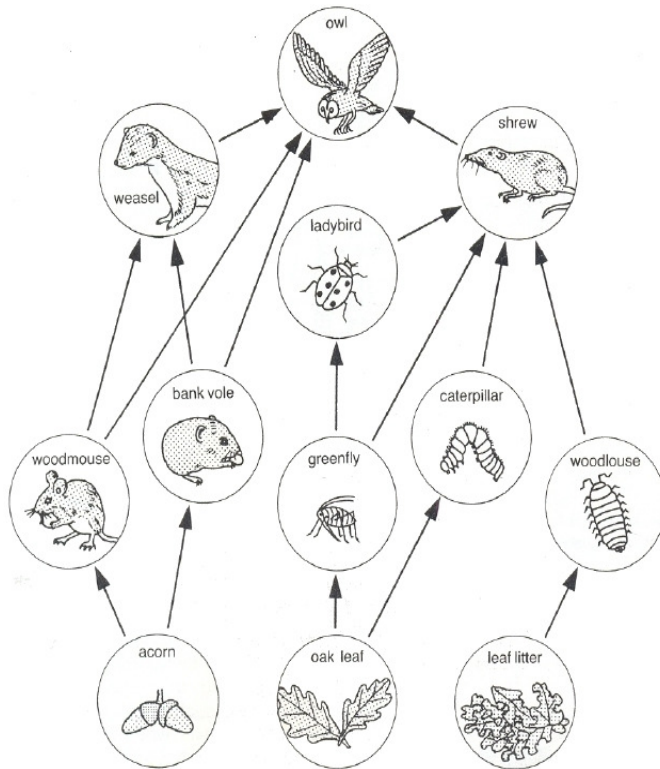
In addition to humans impacting the planet's biodiversity, natural hazards can also have an effect. For example, earthquakes, tsunamis, forest fires and hurricanes can all have a negative impact on the biodiversity of an area. This is because many habitats are destroyed.



## Food Webs

It is important to realise that animals and plants rely upon each other. If one species is removed from an ecosystem it can have various effects on a lot of other species.

An example of this would be to look at a food web:



The animals and plants in this food web rely on each other more than you may think.

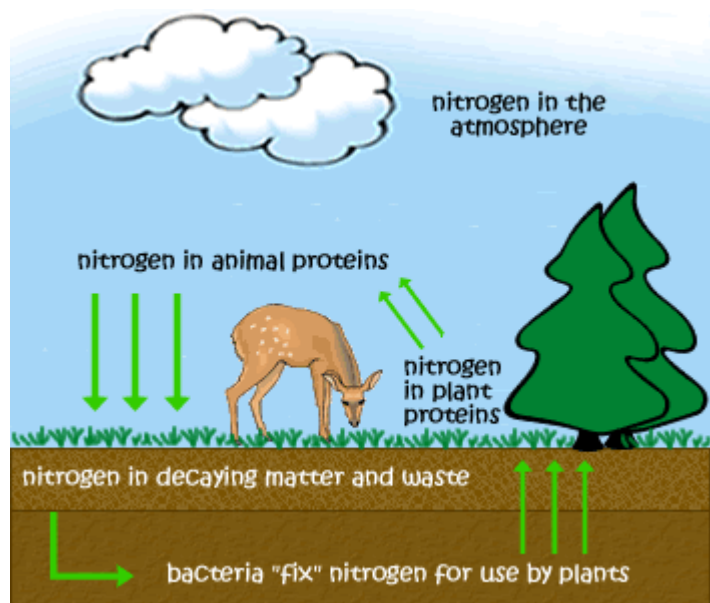
For example, if all the bank voles were removed then this would cause a decrease in the weasel and owl as one of their sources of prey has left the food web. It would also increase the acorns because now only the wood mouse would eat them. We would expect the wood mouse to increase as it has more food now but the weasel would need to eat more wood mice to make up for the bank voles.

As you can see it can get very complicated as a lot of species in the web are linked in some way.

## The Nitrogen Cycle

Animals and plants both require nitrogen so that they can make proteins.

There is only so much nitrogen around so it needs to be constantly recycled in the Nitrogen cycle. If it was not recycled then it would run out and it would not be possible to make new plants or animals.



## Fertilisers

Nitrogen is also added into ecosystems by the addition of **fertilisers**.

Fertilisers are added to the soil so that there is more Nitrogen to improve the growth of plants. It can be added in natural forms such manure or compost or can be artificial man made fertilisers.

When crops are harvested and taken out of fields, the nitrogen that is inside them is taken away from the field, this needs to be replaced. Farmers replace this missing nitrogen by adding fertilisers.

Fertilisers can also have negative impacts on the environment.

Fertilisers can be washed away from fields when it rains and can leak into rivers and lochs. If nitrogen from these fertilisers builds up in fresh water it can cause an algal bloom. This is where the algae grow very quickly and cover the surface of the water. This can block out the light and causes the death of some organisms living below the algae in



the water and a decrease in oxygen in the water. Therefore less life can be supported within the fresh water ecosystem.

### Adaptations

Animals and plants are required to adapt to their environment. They need to do this so that they can survive and reproduce within their own environment.

Adaptations can be:

- Structural - The physical features of the organism.
- Physiological - The way the organism functions inside the body.
- Behavioural - The things organisms do to survive.



#### Structural Examples:

- ❖ Moles have spade like front paws with claws for digging.
- ❖ The curlew has a very long curved beak to obtain a particular food source.
- ❖ Cacti have spiny reduced leaves to prevent water loss.



#### Physiological Examples:

- ❖ Snakes can produce venom to catch their prey.
- ❖ Camels can store large amounts of water within their hump to survive in very dry conditions.
- ❖ Some conifers (ever-green trees) give out a sticky resin to protect them from pests.



#### Behavioural Examples:

- ❖ Cock-of-the-rock bird displays very elaborate mating behaviour to show off its colourful appearance.
- ❖ The prairie dog will hibernate during the winter.
- ❖ Birds will migrate to a warmer climate during cold winter months.

## Behavioural Adaptations

The behavioural adaptations that an organism displays can either be learned or innate.

### ❖ Innate



Behaviour that is instinctive, they are born knowing how to do it; it has not been learned through previous experience. E.g. newly hatched sea turtles will move towards the sea automatically.

### ❖ Learned



Behaviour that is displayed after learning from previous experiences. E.g. if you tap a snail's shell it will hide the first time and after it has learned there is no danger it will stop hiding.