

## Habitats: Biotic and abiotic factors

This resource offers profiles of some of the diverse range of habitats within the UK. Learners can use the provided specialist animal communities to explore the interactions between living and non-living parts of ecosystems. These specialist communities can also be combined with public biodiversity distribution data to begin to develop a profile of their local ecosystem.

### Teaching time

45 minutes - 1 hour

### Learning outcomes

- recognise the characteristics of woodland, grassland, and wetland habitats in the UK
- understand some of the relationships between biotic and abiotic factors which define these ecosystems

### Step by step

#### Introduction

**(Slide 3)** Learners look at the landscape image on slide three. How many different habitats can you spot?

Alternatively, print the image or disseminate it digitally so groups or individuals can annotate the image.

**(Slide 4-5)** Ask learners to reflect on how they differentiated different habitats. Ideas are included on slide four. Sort these factors into two columns (biotic and abiotic) as shown on slide 5.

Optionally, do not reveal the two categories and ask learners what the items in each column have in common.

**(Slide 6)** Explain that there is a diverse range of ecosystems in the UK. These are defined by having different biotic and abiotic characteristics.

Ask learners to hypothesise what abiotic factors might affect whether an area is a grassland, woodland or wetland habitat.

**(Slide 7)** Explain that one of the many factors that can affect the plant composition of an area is the amount of moisture in the soil, but there are many other factors.

## Green Skills



### Suitable for

Key Stage 3  
Key Stage 4

### Location

Indoors

### Season

Spring  
Summer  
Autumn  
Winter

### What you'll need

Habitats - Biotic and abiotic factors presentation

Habitats - Biotic abiotic Profiles

### Key vocabulary

Habitat  
Ecosystem  
Biotic  
Abiotic

### Support and extension opportunities

More independent classes can use the animal communities on slides 35-40, and research each animal.

Reduce online distraction by using the **Biotic and abiotic profiles sheets** to match animal communities with their habitat.

**(Slide 8)** Explain that we can divide woodlands, grasslands or wetlands into more specific habitat types. Different combinations of abiotic factors have their own specialised biotic community.

## **Part 2: Main activities**

Below are two ideas for where you might take the lesson next. You could also do them sequentially, taking the activity from theory into the real world and your local context.

### **Activity 1: Researching and matching (slide 9)**

Disseminate sheets from *Habitats - Biotic abiotic Profiles*

Have learners research the animals in each community and try to match them with their habitat.

Review the answers. See slide notes (**slides 35-40**).

### **Activity 2: Apply concepts to our local area (slide 10)**

Disseminate the animal communities **with** their associated habitat. See notes (**slides 35-40**).

Have learners research the plants and animals in each ecosystem on [iNaturalist](https://www.inaturalist.org/) (<https://www.inaturalist.org/>), and try to identify habitats which might be in the local area.

- Is there enough information to suggest what habitats might be in our local area?
- What can we determine about the likely abiotic characteristics of the area around our school?

Note: the information available for this activity depends on how much biological recording happens in your area. If there are few observations on iNaturalist, learners can also try the [National Biodiversity Network Atlas](https://nbnatlas.org/) (<https://nbnatlas.org/>).

## **Plenary**

**(Slide 11)** Revisit the landscape image from the beginning of the lesson. Ask learners:

- Can you describe the habitats in different parts of the image using the concepts of biotic and abiotic factors?
- Can you predict anything about the ecosystems which might be present in the image?

See Background information for a few possible responses.

## **Reflection**

How can understanding the biotic and abiotic factors in the surrounding area help with deciding what enhancements we would like to make to our site?

## Background information: Landscape image



### A few possible responses

**Broadleaved deciduous trees** (which tend to have rounder canopies as seen here) suggest the area has milder winters, or there would be more evergreen trees (which tend to have pointier canopies, like Christmas trees).

**Woodland on the slope** has different trees from the **woodland near the pond/lake**. In this case the lighter coloured/silvery trees are willows, which grow well in wet conditions where other trees' roots will drown.

**Stream** flowing into the lake. The ecosystem is likely to be different because of the flowing, shallower water.

Change in **grassland vegetation** between the foreground and background, suggesting there is something different about the soil or habitat management. The darker grassland towards the background is likely mainly reeds, rushes, and other plants which thrive in wet conditions. This area is also lower and closer to the lake and stream where the soil is likely to be wetter.

The **hedge** in the foreground will likely be home to animals which need dense vegetation. It looks like it is mainly bramble, which produces blackberries, providing food for birds and mammals. It looks relatively narrow and runs in a line, suggesting it was likely planted by humans (biotic factor), rather than naturally occurring because of abiotic factors.

### **Suggested next steps: Profile our local ecosystem**

Conduct tests to characterise the abiotic factors present on the school site, and surveys to characterise the biotic community which is already present.

## Background information

The type of habitat that develops in an area is determined by the climate and the underlying soils and rocks. These characteristics are difficult to see in the field, but plants can be used as indicators. This is because plants cannot get up and move to more suitable areas. This means that different habitats have distinctive plant communities.

### Woodlands

- **Evergreen woodlands** have mostly evergreen trees such as pine or spruce. These habitats tend to form in areas that get less rain and have colder, snowier winters. The structure of coniferous evergreens sheds snow, reducing chances of damage from the weight of snow.
- **Deciduous woodlands** have mostly broadleaved or deciduous trees such as oak, birch, or beech. These habitats tend to form in areas that get a bit more rain and have warmer winters with less snow.
- **Temperate rainforests** are woodlands that get much more rain. The trees are usually deciduous, and they are often covered in mosses and liverworts, which are both special types of plants that grow very well in wet places. In addition to more rain, these habitats form in areas with mild winters and lots of humidity.

### Grasslands

- **Lawns** are maintained by human activity. Mowing, herbicides targeting broad-leaved plants or manual 'weed' removal maintain dominance of a small number of grass species. Walking or playing on lawns compacts the underlying soils, which further influences the plant and animal community.
- **Acid grassland** often has sandy soils where water leaches calcium ions deeper into the ground, leaving the surface soils more acidic. They also often form over less soluble rocks. These do not allow as much calcium to dissolve into the soil and become available to plants and other organisms.
- **Calcareous grassland** forms on top of chalk. Soils tend to be thin and quick-draining, but the soil chemistry and structure support a variety of specialist plants. Chalk dissolves relatively easily, so mineral nutrients are rapidly replenished.

### Wetlands

- **Ponds** have still water and are home to many types of floating plants and animals. Some ponds are seasonal, appearing in wetter weather and drying out at other times. The animal communities of these seasonal ponds often have quick life cycles or the ability to go dormant when conditions aren't right.
- **Rivers/streams** have flowing or moving water. Things that live here need to be strong swimmers or be able to cling to rocks or gravel at the bottom of the river. Streams, or sections of streams, can be further categorised by the substrate at the bottom.
- **Bogs** have waterlogged soil or shallow standing water. They are usually characterised by having very little oxygen in the soil and acidic conditions. These conditions slow the decay of organic matter and allow the development of peat.



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