

River Trees & Woodlands

Discovering the River Tweed and its Tributaries





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SECOND LEVEL

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Introduction

Trees & Woodland Ecosystems

The activities in this section of the Education Pack explore a range of UK tree species, focusing on their characteristics, classification, and the benefits they provide to the river ecosystem. They will also cover the wider role of trees within different woodland ecosystems and their impact on soil, light and biodiversity.

By the end of this topic, learners will have developed and applied skills on identifying and grouping trees. They will have developed an understanding of the important role trees play in both the river ecosystem and the broader environment.

Additionally, learners can apply their survey skills to study and evaluate different types of woodland ecosystems. The lesson plans in this pack have been written with flexibility in mind. You can mix and match the activities that are relevant for your group or class, apply the techniques to any green space you have access to and carry out the activities over a timeframe that suits you.

Some of the activities are seasonal – check the top of a Lesson Plan for an icon that shows the ideal season for the activities. If there isn't one, it's suitable any time of year.

Introducing Riverside Trees & Woodland: Resource Signposting

Short Videos

Scottish Wildlife Trust: Creating Riverwoods: Riparian Planting

(5m) Learn about the importance of riverside woodlands to the river ecosystem.

BBC Bitesize: Forests (4m) Isla and Connor explore forests in Loch Lomond & the Trossachs National Park, comparing the differences between broadleaf and coniferous woodland.

Woodland Trust: A year in the life of an alder tree (1m) Watch an alder tree change throughout the seasons.



Picture Books

Who Makes a Forest by Sally Nicholls & Carolina Rabei:

The slow evolution of a woodland ecosystem, made up of a thousand tiny things. This story emphasises the importance and interdependence of all the things that make up a woodland.



Online Resource Signposting

Woodland Trust: Tree Tools for Schools

is a great resource for groups exploring trees and woodlands. You can find printable tree identification sheets and online games to test your learner's knowledge.

Outdoor & Woodland Learning Scotland:

Tree Stories is an online learning resource that features 12 stories for 12 Scottish trees. It was written by Claire Hewitt and inspired by the magnificent trees of Highland Perthshire.

Tree Guide UK: An excellent online resource that can support you with identifying trees.

The conifer tree ID by cone page is especially helpful when identifying conifer trees.

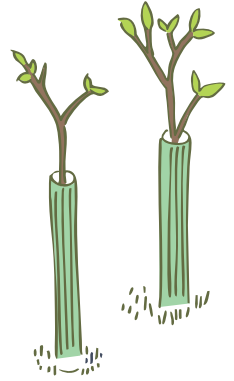


Check out the **TweedWATCH Education Pack Resource Signposting Padlet** for links to all of the resources referenced.

Creating Native Riparian Woodland in the River Tweed Catchment

Woodland Creation Programme

Tweed Forum has been helping farmers plant trees throughout the River Tweed catchment for over twenty years. The aim is to plant the right trees in the right place and at a scale that will have a real impact. These woodlands are instrumental in improving water quality, reducing flooding, capturing carbon, providing habitat for wildlife and improving the health of the river ecosystem. The woodland programme is made possible by working with partnership organisations including: Scottish Forestry, Woodland Trust Scotland, Scottish Wildlife Trust and Northumberland County Council.



Native woodland planted in the Dryhope Burn, Selkirkshire



Image: Colin McLean

More than two decades ago, Dryhope Burn near St Mary's Loch was a bare landscape, grazed by sheep. In 2001, Tweed Forum planted over 60,000 native broadleaf trees, in 55 hectares of land along the burn. The picture above shows Dryhope Burn in 2022. The trees have established, are growing well and have naturalised. This riparian woodland now provides habitat for a range of wildlife whilst acting as a corridor to allow movement between other habitats. The trees overhanging the burn will help cool the water, through shading. This will help fish species such as Atlantic Salmon.



Image: Airborne Lens Photography

Riverside Tree Study

Lesson Plan



Learning Objectives

- Identify the parts of a tree and their functions.
- Identify tree species based on some of their features.
- Learn about the importance of trees to the river.
- Define the differences between deciduous and evergreen trees.

Equipment & Resources

- Access to a woodland or a small group of trees, blindfolds, string, clipboards, pencils, paper, crayons

*Refer to specific activity instruction pages for more information on equipment needed.

Ideal for Spring/Summer 

Vocabulary

Species, broadleaf, evergreen, deciduous, bark cones, conifer, heartwood, taproot, catkins

Introduction

Take your group to an area with at least a small group of diverse trees. Set the boundaries of where your learners can wander and allow them a few minutes to explore alone. Ask them to take notice of the ground, trees, and canopy as well as how they feel walking amongst the trees. Gather back together and ask for feedback on anything your learners noticed.

Activities

Touch 3: (5 mins)

Play Touch 3 as a warmup to highlight some aspects of your surroundings. Ask your learners to find and touch three different things. They don't need to pick anything or bring items back. When they have found all three things, they should return and high-five you or another adult. Once everyone has gathered back, discuss the findings. Repeat several times, increasing the challenge with each round.

Example Touch 3 challenges:

- A root, a leaf and the bark of three different trees.
- Three trees that look different. Tell us how they look different.
- Three different places a woodlouse might live.
- Something brown, something green, and something yellow.
- Three things that have different smells.

Build a Tree: (20m)

Working together, your class will act out the different parts of an alder tree; a water-loving tree that is important to the river and other freshwater habitats. See the **Build a Tree Activity Instructions (p.12)** for details on how to play. Use the **Alder Tree Part Pictures (p.16-17)** as you explain the different roles. Explain that the alder tree is a deciduous, broadleaf tree and talk about what those words mean. Can they think of any other trees that are the same type? If we were to change our 'Build a Tree' species to an evergreen conifer, which parts of the tree would be different?



Activities

Species Spotlight: (1hr)

Show the learners the two species spotlight pages for alder, a deciduous, broadleaf tree, and Scots pine, an evergreen, conifer tree. Ask your learners to find the differences between the two species. How does each tree adapt to the cold and low light levels in winter?

Learners will then choose one of the trees in the area and use the **Species Spotlight Worksheet (p.28-29)** to guide them in creating a species spotlight study. Use the **Tree Identification Resource (p.22)** to identify the species and gather as much information as possible while near the tree. Include drawings, photographs, bark and leaf rubbings, or even pick a small selection of seeds or other parts if you can find them on the ground. Take the items back to class and continue any further research needed at school.

Meet a Tree: (20 mins)

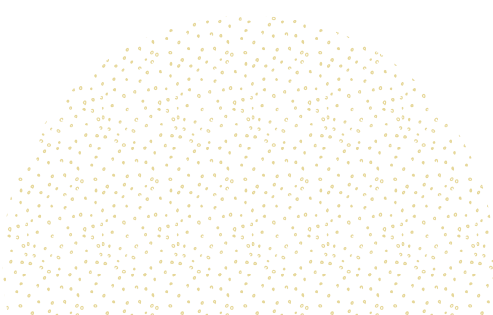
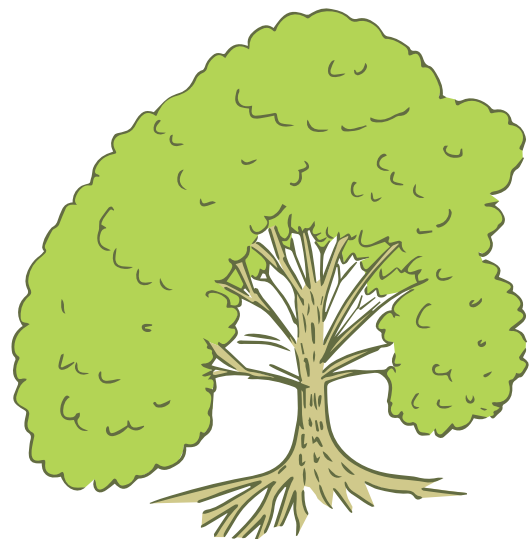
Much of the work so far in studying our trees has relied on sight and visually comparing different tree features. This game will direct learners to focus on their sense of touch and smell to figure out which tree they are investigating. See the **Meet a Tree Activity Instructions (p.14)** on how to play.

Plenary

Grouping Quiz: Broadleaf or Conifer? (10m)

Quiz your learners on different types of trees using this active question and answer game. See the **Grouping Quiz: Broadleaf or Conifer Resource (p.25-27)** for answer signs and a question sheet. If you have enough helpers, ask them to hold up one of the four answer signs (broadleaf, conifer, evergreen, and deciduous) and spread out across the area. Alternatively, you can add some string to the answer signs and hang them from the trees. Make sure there is enough room for your learners to run to the different answer signs without bumping into anything.

Select the questions you'd like to ask from the question sheet, and ask your learners to run to the answer they think is right. Some learners might be tempted to hang around the middle if they are unsure; encourage them to take a guess and not to worry about getting it wrong. Once you have revealed the answer, ask the group standing under the right sign to explain why it is correct.



Benefits of Trees to the River Ecosystem

Background Notes



Why are trees so important to the river?

Trees are essential to the world in a whole host of ways: removing carbon from the atmosphere, boosting biodiversity, reducing air pollution and improving physical and mental health.

When it comes to the river, trees are especially vital, providing benefits that maintain the health of the whole river ecosystem.

This includes the water, soil, plants, animals and even the air and the temperature.

Water Quality

Trees along a riverbank can be referred to as a riparian buffer zone. This is due to their natural ability to filter out pollutants and excess nutrients carried into the river following heavy rain.

The buffering protection provided by trees reduces water pollution which could lead to unsafe conditions for humans and wildlife.

Reducing erosion

Riverbank erosion can occur due to heavy rainfall, flooding, livestock trampling or a lack of plants growing year-round. The eroded soil falls into the river and a build-up of sediment in the water can reduce water quality and harm aquatic life.

The extensive root system of trees can help bind loose soil and stabilise riverbanks, reducing erosion and the amount of sediment washed into the river.

Shade and cool water

The canopies of overhanging trees provide shade to the river, keeping the water cool on hot and sunny days. This keeps the water oxygenated, as cooler water holds much higher levels of dissolved oxygen. Cool water is vital for many of our freshwater species including Atlantic salmon.

Natural flood management

A tree's root system creates space in the soil for water to soak into during heavy rainfall. It also absorbs water from the soil, leaving even more space. This reduces the amount of water flowing into the river, slowing it down and reducing the risk of flooding. The tree canopy will intercept rain as it falls. This water will either evaporate into the air or trickle to the ground, slowing water entering the river even further.

Biodiversity

Trees provide habitat for a diverse range of wildlife, including birds, mammals and invertebrates. When deadwood falls into the river it can provide shelter, food and a place to lay eggs for fish and invertebrates.

Ecological connectivity

Riparian woodlands play a key role in enhancing the health of ecosystems, especially in areas that have been fragmented due to human activities. They serve as wildlife corridors, allowing animals to move and plants to be dispersed freely between interconnected habitats like wetlands and grasslands.

Carbon storage

Trees absorb carbon dioxide from the atmosphere and store it in their leaves, trunks and roots. This reduces greenhouse gas levels and mitigates global warming. The long-term impact of tackling climate change (e.g carbon storage) will help to keep river water cool and reduce the chances of extreme weather events that lead to flooding or drought.





Image: Airborne Lens Photography

Build a Tree

Activity Instructions



Description

This activity uses role-play to enthuse learners about trees and to highlight a tree's basic parts and what they do. We focus here on a native, water-loving tree: the common alder. A tree you would likely come across whilst exploring the River Tweed and its tributaries. Many parts of this species bring benefits to the river ecosystem. This game can easily be adapted to role-play any type of tree or a different species.

What you'll need

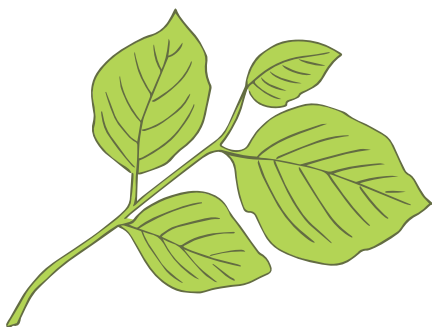
- A large space – if playing outdoors, the ground should be soft enough to lie on.
- A large blanket or tarp.

Instructions

These instructions are written with a class of 30 learners in mind, but can easily be tweaked to your group size as long as you have at least one volunteer for each role. **Any information in green is specific to the alder tree and may apply to other species, but not to all trees.**

Introduction

Let your group know that they will be working together to build an alder tree. An alder tree is a water-loving tree that is native to the UK and can be found growing next to rivers, lakes and ponds.



Trunk

The trunk is made up of different layers, each with a job that helps the tree survive.

- (1 volunteer) Your first volunteer will represent the **heartwood layer** at the centre of the tree. This section is no longer alive, but it is strong and supports the tree to stay upright. Their sound is to shout 'I am strong'.
- (4 volunteers) Ask your next group of volunteers to make a circle, facing toward the heartwood. They will represent the **sapwood** layers in the tree that transport water and nutrients taken in by the roots and food made by the leaves. Their sound is to make a gurgling noise like bubbling water.
- (5 volunteers) The next group will be the bark outer layer. The volunteers should make a circle around the **sapwood**, facing out. The bark's job is to protect the tree from damage and disease, as our skin does for us. Their sound is to roar like a protective lion.

Roots

- (4 volunteers) If you're outside and the ground is a little wet, then you may want to spread out your blanket in front of your 'tree trunk' for your volunteer roots to lie on.
- Ask your roots to lie on the ground in front of your tree trunk and imagine they are growing deep down vertically into the soil. They are the tree's taproot, the main body of the root system.
- Now they should imagine there are lots of much smaller roots growing horizontally from this taproot, spreading out across the soil. These are the lateral roots. Their job is to anchor the tree and take in nutrients from the soil.

Roots (continued)

- **The alder tree has very long taproots that can grow up to 1.5 metres down into the soil.**
- **These roots are extra important as they have special bacteria contained in little nodules that convert nitrogen in the air into a form that plants can use in the soil.**
- The root volunteers are to imitate a sucking noise like they are sucking up spaghetti.
- Bonus river benefits: the deep roots help to keep the soil stable, preventing the soil and silt from being eroded into the river. This helps keep our river water clean from pollutants.

Leaves

- (8 volunteers) This group will be the leaves, **which for an alder tree are broad and flat.** They are to spread out around the trunk with their arms outstretched and hands spread out.
- Their job is to sunbathe, making food for the tree through photosynthesis. Their noise is to make the sound 'ahhhhh' as they enjoy their time in the sun.
- Bonus river benefits: the broad leaves let enough sunlight through so that the river plants can survive, but block enough light to help keep the water from getting too warm for wildlife to survive and thrive. The leaves also slow down heavy rain, helping to reduce flooding.

Flowers

- (4 volunteers) **Flowers on an alder tree take the form of catkins, and all alder trees have both male and female catkins.** The male catkin's role is to produce pollen. This is carried by the wind to the female catkin to develop seeds through fertilisation.
- **Male catkins are sausage-shaped, and the female catkins are green and oval. They are pollinated by the wind.**

- Ask your volunteers to find a spot near a leaf and to either make a sausage or an oval shape with their arms. Whenever the wind blows, they are to wiggle their arms whilst making a wind noise (a whistle or a whoosh).

Cones and seeds

- (4 volunteers) **The alder tree doesn't bear fruit; instead its female catkins turn into miniature cones after they have been pollinated. They hold the seeds, which are dispersed by wind or carried away by water in search of a spot where they can germinate and grow into a new tree.**
- Ask your volunteers to join up with a partner, one will play the cone and the other a seed. They are to hold hands or link arms. When the wind blows, they will spin and detach from each other, and the seed will twirl away. They will make a 'weeeeeeee' sound when this happens.

Once everyone has a role to play and knows what sound to make, tell the group that the wind has started blowing, and they are to play their tree parts together.

Reflection questions

- We talked about some of the ways that this tree benefits the river ecosystem. Are there any other ways that it is important to this habitat? (e.g. home for wildlife, deadwood, provides food and shelter, captures carbon).
- What might be the benefits of having a diverse range of trees near the river? (e.g. different size roots keep more of the soil stable, trees provide homes for more types of wildlife, different tree heights can intercept heavy rainfall at a range of levels).

Meet a Tree

Activity Instructions



Description

This sensory activity will aid in developing a young person's connection to trees and nature in general. It encourages them to take notice of the texture of different tree types and to observe, through touch, many of the features we'd normally overlook.

This activity is also a good opportunity to develop teamwork skills and empathy as learners guide each other around a space safely. It will also help to develop their tree identification knowledge as they learn about some of the similarities and differences between different trees.

What you'll need

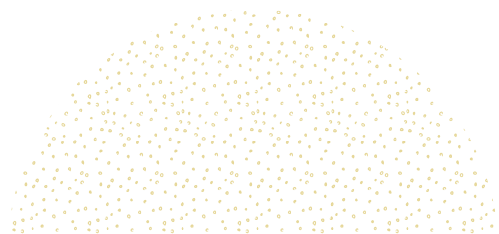
- Blindfolds (enough to share 1 between 2 or 3 learners),
- Woodland space or a patch of trees

Image: Phil Wilkinson



Instructions

1. To demonstrate how the activity is played, you'll need to ask for a volunteer from the group.
2. Ask your volunteer if they are happy to be blindfolded, then gently wrap the blindfold around their head and secure it in place.
3. Ask the group to pick a tree by pointing to it, without giving any audible clues.
4. Notify the volunteer about your next steps, then proceed to turn them around on the spot a couple of times before leading them to the nominated tree. You can make this walk as challenging as you like by changing direction or looping around other trees before arriving at your destination.
5. Advise the group that if they are leading a blindfolded teammate, it is their responsibility to keep them safe, as they won't be able to see where they are walking. They should keep an eye out on the ground for them and guide them around any obstacles.
6. Once at the tree, ask your volunteer to use their hands to work out what characteristics it has. What does the texture feel like? Does it have branches or knobby bits? Can they fit their arms around it?
7. Lead them back to their original spot, take off the blindfold and give them three tries to work out which tree they were investigating.
8. Ask your group to either get into pairs or into groups of three to have a go themselves.
9. Whilst reflecting on the activity, talk about what aspects they found most challenging. What were the best things to feel for when it came to gathering information about the tree? What were the best ways to make it challenging for your blindfolded teammate? Did they try to use any of their other senses to find clues? Did the trees smell different?



Alder: Trunk



Alder: Roots



Alder: Leaves



Alder: Flowers



Alder: Cones & Seeds

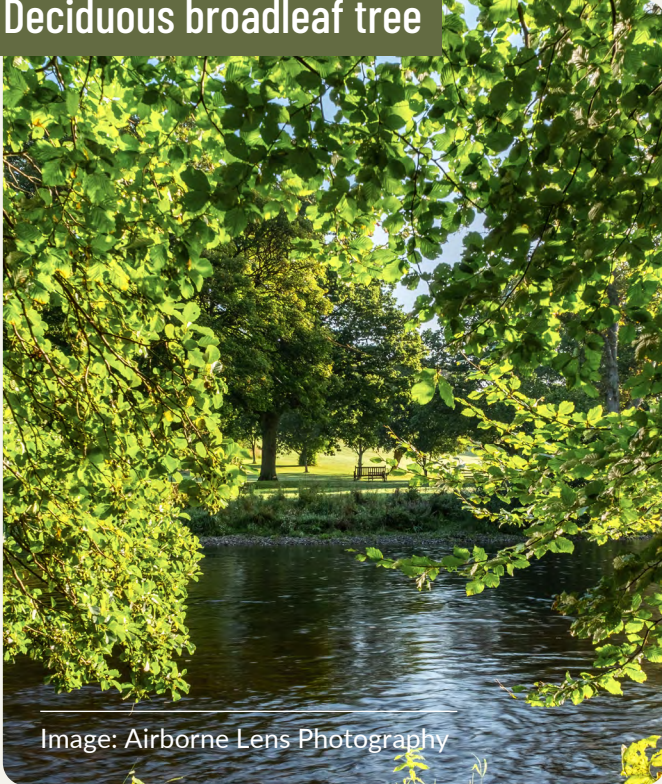


Alder: Bark



Species Spotlight: Alder

Deciduous broadleaf tree



Also known as common alder or black alder
(Scientific name: *Alnus glutinosa*)

Identification Tips

- Alder is the only broadleaf tree that grows cones.
- The top of the tree (its crown) is rounded.

Folk Tales & Legends

Many people in the past saw the alder tree as sacred and mysterious. When cut, its pale bark turns a dark orange colour, looking almost like blood. Many believed it would bring bad luck to anyone who cut it down.

In Celtic tree lore, the alder was associated with the river goddess and spirits of the water.

Bark



Ashy
coloured

Buds



Round,
purple buds

Flowers



Female
Catkins

Male
Catkins

Leaves



Dark
green

Serrated
edge

Round or indented tip

Fruit/seeds

Female catkins turn into
cones once pollinated by
the wind.

Seeds dispersed
by wind or water.



How People Use This Tree

- Alder wood stays strong while wet. It can be used to make items used in water, like rafts or canal lock gates.
- In the past, it was believed that alder bark could help ease inflammation. It was also used for treating wounds, ulcers and problems with digestion.
- Dyes can be made from the brown cones and the green catkins.

Habitat

Alder trees like to grow where it is cool and damp. You'll often find them growing on river banks, in floodplains, or next to lakes or ponds. They are common in North America, Europe and Asia.

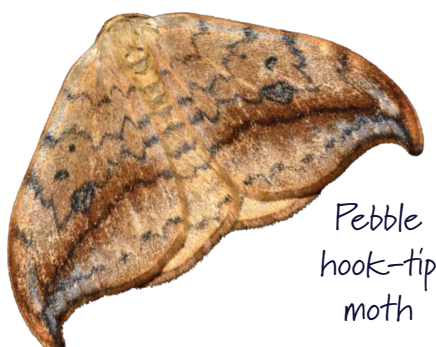
Adaptations

- Alders drop their leaves in the autumn to reduce water loss during the colder months.
- They go dormant in the winter when light levels and opportunities to produce food are low.
- Alder bark is thick and can protect the tree from low temperatures.
- Their roots are adapted to survive in waterlogged soil.

Threats

Disease: A fungus called *Phytophthora alni* threatens the health of alder trees by causing root rot. It spreads along rivers and streams from sites that have been infected. Alder was originally resistant to this disease, but a new hybrid strain is impacting the survival of these water-loving trees. The warming water temperatures and increased rainfall from climate change could mean this fungus will thrive, meaning our alder trees might be in trouble.

Water pollution: Pollutants such as fertilisers, pesticides and chemicals can contaminate the soil and water, damaging an alder's health and growth.



Pebble
hook-tip
moth

Interesting Facts

- Alder is the food plant for several moth caterpillars, including the pebble hook-tip moth.
- Otters like to make their holts amongst the roots of alder trees.
- Alder trees are a pioneer species. This means they can grow in nutrient-poor soil where many other plants can't. They help to enrich the soil with nutrients, allowing other plants to grow in the same area, increasing biodiversity.
- Alder roots help to stabilise the soil of the riverbank. This helps to reduce erosion.

Wildlife

- An alder's exposed roots protect river wildlife like invertebrates, fish and small mammals.
- When leaves fall into the water, they provide food for river fly larvae.
- The seeds are eaten by siskins, a small bird with a black cap and a yellow face.
- Alder catkins provide an early source of pollen for bees in the spring.
- During the winter, it provides important habitat for tree creepers.



Tree creeper

Species Spotlight: Scots Pine

Evergreen conifer tree



Also known as **European red pine (in Europe)**
Scientific name: *Pinus sylvestris*

Identification Tips

- As a Scots pine tree grows and matures, it usually loses its lower branches.
- Its shape is tall, with a cone shaped crown.

Bark



Orange upper bark

Buds



Orange/brown buds covered in a white resin.

Flowers



Male flowers

Leaves

Needles grow in pairs



Slightly twisted needles

Fruit/seeds

Female flowers develop into cones when pollinated by the wind.

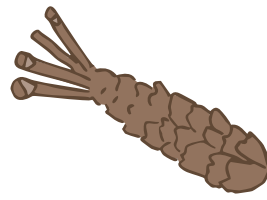
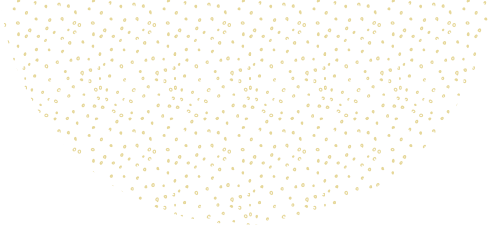


Folk Tales & Legends

The Scots pine's hardiness and ability to grow in poor, rocky soils and cold conditions led to it becoming a symbol of strength and resilience. In some Celtic beliefs, it was associated with the Green Man, an ancient guardian of nature. Scots pine was burnt by druids in huge bonfires during the winter solstice to invite back the sun.

How People Use This Tree

- Scots pine wood is known for its strong and durable timber. It is often used for building materials like flooring and roofs as well as for furniture.
- It is used for firewood. You can even use the dry cones as kindling for a campfire.
- Its oil is believed to have antiseptic properties.



Habitat

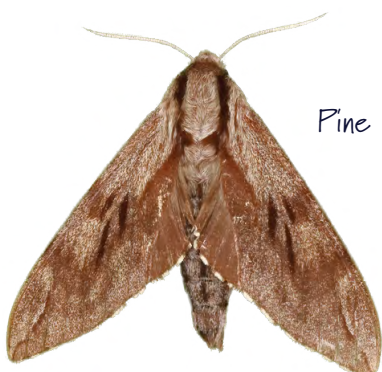
Scots pine has the largest range of any conifer in the world. It can be found in Scandinavia, Spain, Siberia and Scotland, and many places in between. You will find Scots pine growing in heathland, woodland, parks and gardens. It can grow in a variety of soil types that other plants can't survive in, including nutrient-poor, sandy, rocky, shallow and dry ground.

Adaptations

- Long, needle-shaped leaves with a waxy covering that stops water loss.
- The needles produce a natural antifreeze that stops them from freezing when it is very cold.
- Growth is reduced over winter, but the needles can still make food if the conditions are mild.

Threats

- A fungal disease called red band needle blight. Serious infections can damage the needles and stop the tree from photosynthesising.
- Overgrazing by deer.
- Competition from non-native species.
- High populations of the pine tree lappet moth can cause a lot of damage to the Scots pine's needles. The moth's caterpillars can strip the tree of its leaves, leaving it weakened or even killing it.
- Scots pine thrives in cooler conditions. As temperatures rise with global warming, it struggles to grow and thrive.



Pine hawk moth

Interesting Facts

- A Scots pine tree can live for up to 700 years!
- It can grow to a height of up to 35 metres.
- It was voted Scotland's national tree in 2014.
- It is one of only three native conifer trees in Britain, along with yew and juniper.
- Scots pine is native to Scotland, but is considered an invasive species in North America.

Wildlife

- Wildlife that benefits from the Scots pine includes mammals such as the red squirrel, roe deer, pine marten and Scottish wildcat.
- The Scots pine is home to birds like the iconic capercaillie and Scottish crossbill as well as woodpeckers and siskins.
- Its flaky bark provides shelter for a range of invertebrates. Its needles provide food for the larvae of the pine hawk moth.
- The understory of a Scots pine forest is home to fungi, heather and mosses.



Red squirrel

Broadleaf Trees



Oak



Horse chestnut



Hazel



Evergreen
Holly



Beech



Hawthorn



Rowan



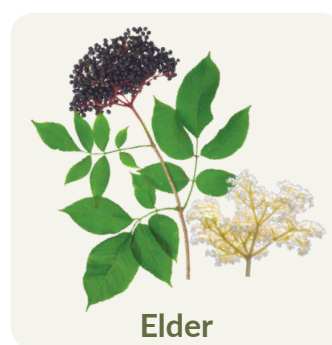
Common alder



Silver birch



Ash



Elder

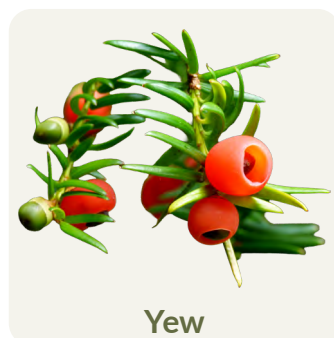


Sycamore

Conifer Trees



Needles
grow in pairs
Scots pine



Yew



Non-
native
Sitka spruce



Berries instead
of cones
Juniper

Tree Identification Guide



Native

Oak

Deciduous broadleaf
Leaves: Deeply lobed
Flowers: Yellow catkins
Fruits: Acorns



Non-native

Horse Chestnut

Deciduous broadleaf
Leaves: Palmate, 5 or more lobes
Flowers: White & pink
Fruits: Conkers



Native

Hazel

Deciduous broadleaf
Leaves: Hairy with a pointy tip
Flowers: Yellow catkins
Fruits: Hazelnuts



Native

Holly

Evergreen broadleaf
Leaves: Prickly & waxy
Flowers: White with 4 petals
Fruits: Red berries



Native

Beech

Deciduous broadleaf
Leaves: Oval with a pointed tip
Flowers: Catkins that look like tassels
Fruits: Beech nut



Native

Hawthorn

Deciduous broadleaf
Leaves: Toothed lobes
Flowers: White and scented
Fruits: Red, round haws



Native

Rowan

Deciduous broadleaf
Leaves: Paired leaflets, serrated & feather-like
Flowers: White petals that grow in clusters
Fruits: Red berries



Native

Alder

Deciduous broadleaf
Leaves: Oval shape, sometimes indented at tip
Flowers: Yellow catkins and oval green catkins
Fruits: A woody cone

Types of Tree

Broadleaf

Trees that have broad, flat leaves.

Conifer

Trees that grow cones and have needle shaped leaves.

Deciduous

Trees that shed their leaves in the autumn.

Evergreen

Trees that keep their green leaves/needles year round.

Tree Identification Guide



Native

Silver Birch
Deciduous broadleaf
Leaves: Triangular
Flowers: Long, yellow catkins & short green catkins
Fruits: Green catkins turned brown



Native

Ash
Deciduous broadleaf
Leaves: Paired, oval shaped leaflets
Flowers: Clusters of tiny purple flowers
Fruits: Green keys



Non-native

Sycamore
Deciduous broadleaf
Leaves: Palmate with 5 lobes
Flowers: Green, hanging bunches
Fruits: Winged samaras



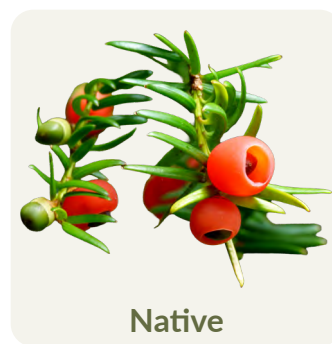
Native

Elder
Deciduous broadleaf
Leaves: Feather like, oval leaflets
Flowers: Fragrant smelling cream flowers
Fruits: Purple berries



Native

Scots Pine
Evergreen conifer
Leaves: Blue/green needles grown in pairs
Flowers: Clusters of yellow anthers
Fruits: Grey/brown cones



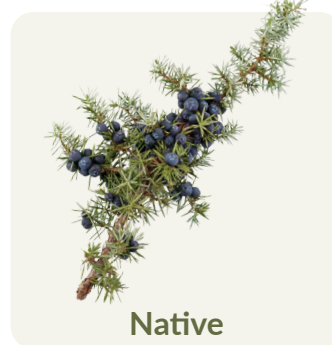
Native

Yew
Evergreen conifer
Leaves: Small, flat needles on a stem
Flowers: White globes & scaly buds
Fruits: Red, fleshy capsules with open top



Non-native

Sitka Spruce
Evergreen conifer
Leaves: Straight, sharp needles
Flowers: Yellow ovals & red ovals
Fruits: Light brown cones



Native

Juniper
Evergreen conifer
Leaves: Small, spiky needles
Flowers: Small & yellow
Fruits: Purple cones that look like berries

Words to describe leaves

Lobed
 Indentations around the edges



Toothed
 Edges look like teeth



Palmate
 Looks like a hand



Leaflets
 Leaf is split into smaller leaflets



Trees: Broadleaf or Conifer?

Grouping Quiz Questions

Definitions:

This type of tree...

- Keeps its leaves all year round. **Evergreen**
- Has broad, flat leaves that come in many different shapes. **Broadleaf**
- Grows cones instead of fruits. **Conifer**
- Drops its leaves in the winter to preserve energy and water. **Deciduous**



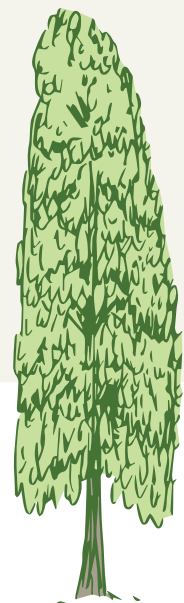
Is this tree... Broadleaf (B) or Conifer (C)

- Oak (B)
- Alder (B)
- Larch (C)
- Hazel (B)
- Scots Pine (C)
- Yew (C)
- Birch (B)
- Willow (B)
- Holly (B)

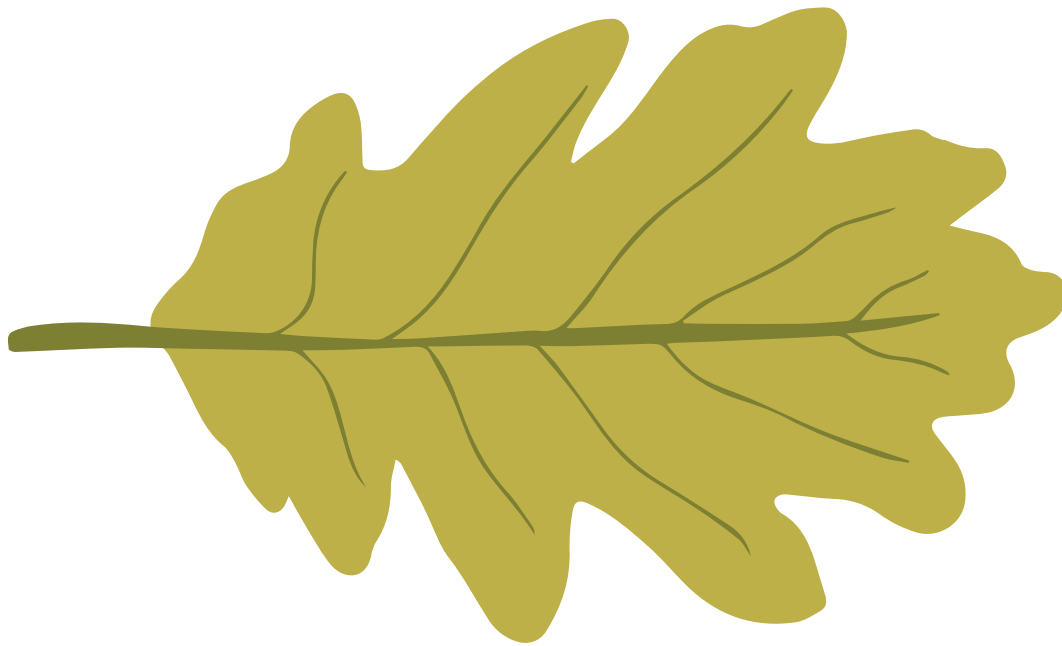


Is this tree... Deciduous (D) or Evergreen (E)

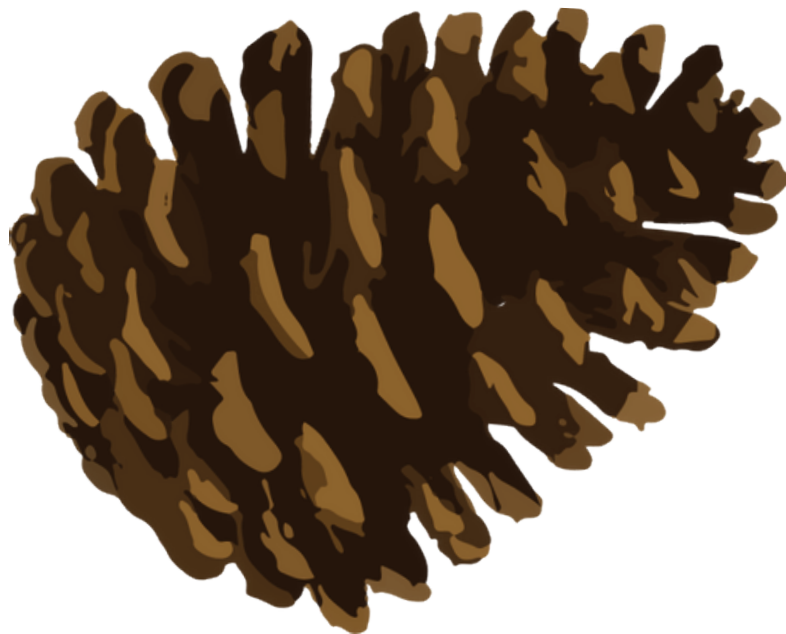
- Oak (D)
- Alder (D)
- Larch (D)
- Hazel (D)
- Scots Pine (E)
- Yew (E)
- Birch (D)
- Willow (D)
- Holly (E)



Broadleaf



Conifer



Evergreen



Deciduous



My Riverside Tree



Bark:

My Name Is: _____

Tree Species: _____

A Picture Of My Tree:

Leaves:

Flowers:

Buds:

Fruit/Seeds:

Identification Tips:

Folk Tales & Legends:

How People Use This Tree:

My Riverside Tree



Threats:

A Home For Wildlife:

Interesting Facts:

What I Like About My Tree:

Learning Objectives

- Develop tree identification skills against a range of tree species.
- Consider the impact of broadleaf and conifer trees on the biodiversity of a woodland and its wildlife.
- Learn what an ecosystem is and consider the living and non-living factors that make up a woodland.

*Refer to specific activity instruction pages for more information on equipment needed.

Ideal for Spring/Summer 

Equipment & Resources

- Access to a woodland space
- A medium-sized piece of cloth & brightly coloured ribbon/string
- Tree ID resources

Vocabulary

Ecosystem, woodland, deciduous, conifer, biotic, broadleaf, evergreen, abiotic, living, non-living, species, biodiversity, food web, tree

Introduction

Start by recapping your tree study. What did your pupils do, and what did they learn? Pair and share with a partner some of the highlights of your learner's chosen trees.

In this session, we will be exploring a woodland ecosystem. An ecosystem is an area where all of the living things (biotic) like plants and animals, along with the non-living things (abiotic) like the weather and the soil, all work together in harmony. Ask your group to list some of the things that are important to a woodland and describe their role. Then, group these things into living and non-living categories.



Image: Phil Wilkinson



Activities

Duplication Game (15m)

Gather up seven woodland objects from the surrounding area and place them under a piece of cloth. Try to include a mix of different tree parts found on the woodland floor. Gather your group in and unveil your seven items. They have one minute to observe and remember the objects before they are covered back up. The more details they can remember about each object, the better. Give your learners some time to search and collect items, then call everyone back in. For each correct item, learners gain one point. Whoever has the most similar item gets an extra point. For example, an oak leaf of a similar size and the same number of holes. Whoever has the most points at the end is the winner.

Hapazome Woodland Craft (20m)

In this activity, learners can create a fabric picture of the local woodland using the hapazome technique. Ask your group to discuss what they feel are your woodland's special qualities. Their answers will be used to help inspire them to create their picture. For example, learners might have noticed that their woodland has a wide range of tree species and decide to include a leaf from each type of tree.

*See the **Hapazome Activity Instructions (p.34)** for step-by-step instructions.



Woodland Study (1 hour)

In this activity, learners will investigate a local woodland and discover some of the things that make up a harmonious and healthy ecosystem. This survey will have your learners looking at the soil, light, plants and wildlife and evaluating what type of woodland you are studying. See the **Woodland Study Activity Instructions (p.36-37)** for details on how to carry out this activity, and use the **Woodland Study Worksheets (p.40-42)** to record your results.

Reflection:

Reflecting on your results back at class:

Each group can share their findings with the rest of the class. Was the woodland made up of mostly broadleaf or conifer trees? How do they think this may have affected the non-living (abiotic) factors of the woodland? How would this have impacted the plants and wildlife found in the woodland? Use the **Background Notes: Types of Woodland (p.32)** to help explain the results.

Plenary

Habitat Hoops:

Threats To Woodland Ecosystems (15m)

Finish off your session with a game of habitat hoops. Learners will consider what types of threats our woodland ecosystems are facing, what the impacts might be if we lose them and some of the ways we can help protect them. See the **Woodland Habitat Hoops Activity Instructions (p.38)** on how to play.

Background Notes

The lesson plans in this topic focus on classifying woodlands based on the types of trees present. This has been simplified into three main categories: broadleaf, conifer, and mixed. Based on the tree species present, these woodland types can also be classified as native or non-native. In addition to the types of trees present, woodlands can be defined by their dominant tree species, e.g. oak woodland, their location, e.g. riparian woodland or other key characteristics, like their soil or geology.

Broadleaf Woodland

- Broadleaf woodland is made up of broadleaf and mostly deciduous trees that drop their leaves in autumn. The leaves are broad and flat and vary in shape and size.
- The soil in a broadleaf woodland is dark, loamy and rich in nutrients. The decomposing ground layer of leaves creates a fertile soil with lots of organic material.
- The seasonal range of conditions, along with the leaf litter layer and fertile soil, allows this type of woodland to support a high and diverse number of species.

Conifer Woodland

- Conifer woodland is made up of (mostly) evergreen trees with needle-like leaves and cones. They do not drop their leaves in autumn.
- This type of woodland is commonly found in colder areas and at higher altitudes.
- Although needles don't drop every year, they will drop eventually. When they do, they decompose into an acidic soil. Conifer trees thrive in this soil type, as do ferns and mosses, but it does not support a wide range of plant species.
- The soil is too acidic for earthworms, so leaf litter is broken down at a slower rate by fungi and invertebrates.
- The biodiversity supported in this type of woodland is much lower than in a broadleaf woodland. The conditions do not change throughout the year, the soil is more acidic, and the light levels are lower due to the dense canopy.
- The plants and animals that do live here are specially adapted to survive in these harsher conditions.
- Most conifer woodlands in the UK are non-native plantations where trees are planted as crops to provide timber and pulp.
- Native conifer woodland (like the Caledonian pine forest) is not as common.
- These forests support rare and specialised species, like black grouse and capercaillie.





Mixed Woodland

- Mixed woodland is made up of both broadleaf and coniferous trees.
- They support a high level of biodiversity, combining the habitats of both broadleaf and conifer woodlands. The diverse range of trees provides nesting and food for many types of animals.
- The layered structure of the woodland is more complex due to the combinations of different tree species. For example, some areas of the canopy may be dense and dark below, in other parts, there may be openings that let through high levels of light to the woodland floor.
- The ground layer is covered in leaf litter made up of broadleaf leaves and conifer needles. The soil profile will depend on the proportions of each type of tree, but will likely be a blend of characteristics from broadleaf and conifer woodlands. This means that the pH, nutrient and organic material content will vary with each mixed woodland.
- The high level of diversity means this ecosystem is more resilient to damage from pests and diseases, and extreme weather events. These issues are made worse by global warming.

Native Woodland

- Native woodland is made up of trees that are native to the UK. These species arrived here after the last ice age 10,000 years ago.
- Native trees have spent 10,000 years evolving alongside other native species of plants and animals in the UK. Over time, ecosystems were formed. Plants and animals adapted to each other as well as their physical environment, developing a balance where many types of species could thrive.
- In comparison, non-native trees have only spent 2,000 years or less here. In terms of evolution and adaptation, this is a very short amount of time. This means that non-native species cannot support as much biodiversity as native trees.

Riparian Woodland

- Riparian woodland grows along the banks of rivers, streams and other aquatic ecosystems.
- This woodland can be any of the three main types: broadleaf, conifer, or mixed.
- There is increasing interest in planting native trees along riverbanks to help native wildlife.
- Woodlands along riverbanks help cool the water down, which helps aquatic wildlife such as fish.

Images: Airborne Lens Photography

Description

This creative activity will have your learners exploring their green space, looking for leaves of all different kinds. It's an ideal craft for those who love art and playing with colour and shapes. It's also great for those who like to use tools.

What you'll need

- Light-coloured fabric like calico
- Pebbles/small stubby hammers
- Wooden boards
- Collected leaves

Instructions

1. Gather your learners and take them through the steps of creating a hapazome before they try it for themselves.
2. Spread out the fabric on one of the wooden boards (a log might also work if your group are in the woods) and arrange a couple of leaves on one side. Fold the other side over to cover the leaves. Show your group the outline of your leaf through the fabric.
3. Take a pebble in one hand and use your other hand to hold the fabric near to the leaf outline. Instruct your learners that they are to keep their fingers out of the way and safe. Bash the pebble onto the fabric covering the leaves, keeping it close to the board.
4. Show the fabric to the group, they will start to see the colours from the leaves spreading onto the fabric.
5. Once happy with the result, open up the cloth and remove any crushed leaf material left over. Only one leaf is needed to demonstrate the activity, learners can keep adding leaves to their own hapazome until they have a pattern they're happy with.
6. You could give your learners an extra 'practice piece' so they can experiment with different woodland items before making their finished picture. Many things come out as unexpected colours once bashed, and some things won't come out at all. Half of the fun is working out which is which.

Environmental Considerations

When collecting items to use for the hapazomes, it is important to keep these guidelines in mind to limit our impact on the environment.

- Don't uproot whole plants.
- Pick flowers and leaves in moderation. They are important for a plant's survival and life cycle, as well as sources of food for wildlife.
- Stick to the 1 in 20 rule. If there are twenty flowers, only take one (as long as it's not a threatened species).
- For more information about picking wildflowers, you can read the code of conduct on the BSBI's website.





What you'll need

- Brightly coloured ribbon or string
- Clipboards, pencils, and extra paper
- Woodland study worksheets
- Sensory mirrors or reflective cards
- Tree identification resources

Optional

- Thermometers, light meters, trowels
- River wildlife topic: **Animal survey resources**

Overview

Woodland ecosystems can be grouped in different ways. We will focus on identifying the woodland by surveying its tree types. In addition to trees, this study will highlight the importance of other plants and wildlife as the ecosystem's living components. As an introduction to non-living factors, learners will be encouraged to explore light levels, soil, and the weather.

Setting up

You'll need access to a woodland space or a small patch of trees. Set up the physical boundaries for your study area by tying brightly coloured ribbons to trees.

If you'd like to involve your group in this process, hand the ribbons to some volunteers. Ask them to run for 5 seconds in different directions and to tie the ribbon to the nearest tree. Adjust the time accordingly based on your group and your woodland.



The Woodland Study Survey

The survey can be carried out individually, in pairs, or in small groups. The first page of the worksheet shows guidance that learners can follow to gather information for each section on the following worksheet pages.

1. **Temperature:** Air temperature can influence the growing seasons within the woodland. It gives context to the plants and animals recorded during your visit. Learners can measure temperature using a thermometer, an app, or they can describe how the temperature feels to them.
2. **Soil Profile:** If the ground is compacted, you may need to provide child-friendly trowels for learners to dig up a small soil sample. Remember to refill any holes afterwards and leave no trace. Ask your learners to hold the soil and check the colour, texture, and moisture. These characteristics give us clues about how acidic the soil is and how nutrient-rich it might be. Remind learners to wash their hands after the activity
3. **Canopy Map:** The tree canopy is made up of the tops of the tallest trees. They either block or filter sunlight reaching the lower layers of the woodland. The amount of light reaching the woodland floor depends on how dense the trees are, the size of the leaves and whether the trees are broadleaf or conifer. The light is also affected by the season, increasing when deciduous trees lose their leaves in autumn. To encourage learners to observe the canopy, they can draw a canopy map. Choosing a sit spot, learners can view the canopy with a mirror or reflective card.

Canopy Map (cont.)

Maps should show the shape of the canopy and the areas where light enters the woodland. Check out the examples on the worksheet instruction page for inspiration. Learners can also use a light meter app to measure this more accurately in lux units.

4. **Food Webs:** This section on the worksheet shows a selection of the living components of a woodland ecosystem grouped according to their roles in the food web. If you'd like to include a more in-depth survey of the wildlife and plants, you can find survey worksheets in the Riverbank Plants and River Wildlife topics of the education pack. Lichen is classed as both a producer and a decomposer as it is a partnership between algae and fungi. The algae produce food via photosynthesis, and the fungi provide structure while breaking down dead material.

5. **Types of Trees:** Learners should use tree identification resources to identify the tree species in the woodland. They should include details about how they identified the trees, whether they are broadleaf or conifer and if they are native or not.

6. **Woodland Type:** Using the information gathered in the 'types of tree table', learners should decide what type of woodland their study area is. If you are near a river, your woodland is also classed as a riparian woodland. Riparian woodland is vital in keeping a river healthy by reducing flooding and water pollution.

Extension ideas

Choose two woodlands and predict ways that the ecosystem might be different based on their different characteristics.

For example:

- Does the proximity to the river change the moisture of the soil and the wildlife found?
- Do conifer plantations have different levels of light than a mixed woodland?

Alternatively, you could repeat the study in the same woodland in a different season to see how the living and non-living factors change throughout the year.

Reflection questions

- How do humans impact woodland ecosystems?
- In what ways can global warming damage the delicate balance in an ecosystem?

Global warming can change the seasonal timings of plant growth, with knock-on effects on the food web. It can encourage more pests, diseases, and invasive species, as well as cause droughts or heavier rainfall.

- What can we do to help woodland ecosystems thrive?

Follow the 'leave no trace' principles, don't litter, and reduce our impact on climate change by recycling, walking more and thinking more about what we buy.



Habitat Hoops

Activity Instructions

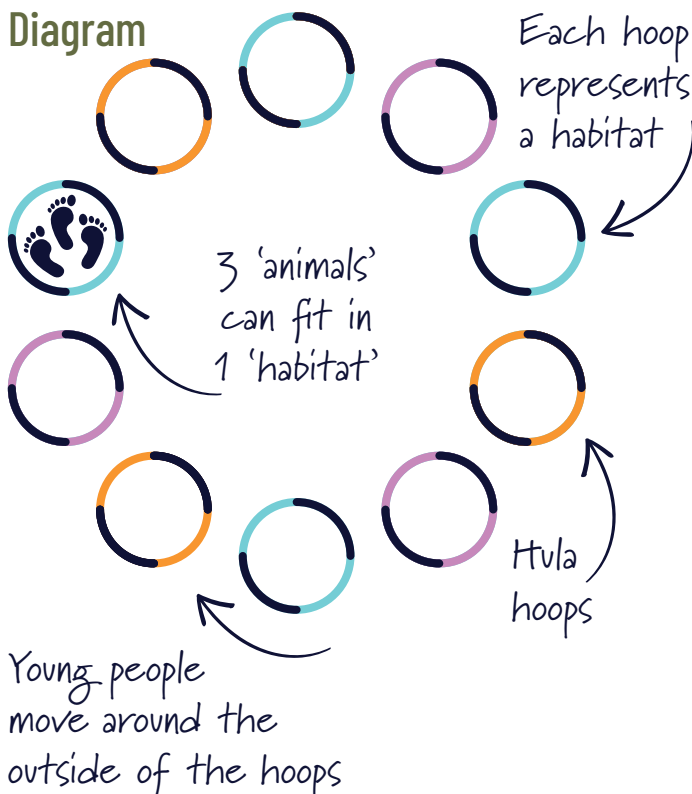
Setting up

Set the hula hoops out in a circle formation (adjust the number of hoops to your group size). Each hoop represents a patch of woodland. If you don't have hula hoops, you could use chalk, string circles or carpet tiles. Just ensure that the items you choose will not be a slip or trip hazard on the surface you're playing on.

What you'll need

- Hula hoops (10 for a class of 30)
- Habitat Hoops cards
- A whistle
- A large indoor/outdoor space

Diagram



How to play

The goal of the game is to find a woodland habitat to call home.



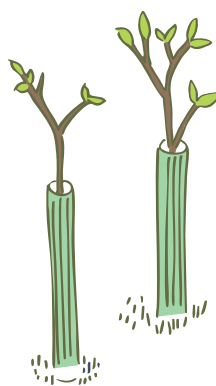
- Choose a woodland animal for your class to imitate as they move around the outside of the hula hoop circle.
- When the whistle is blown, or when you shout 'find a home', they need to find a habitat hoop and jump in (or place one foot in to avoid collisions). Each woodland habitat hoop can only sustain three animals. During the first round, everyone should be able to find a home.
- Before starting the second round, ask someone to choose a Habitat Hoops Threat Card from the **Habitat Hoops Woodland Game Cards Resource**. Read out the scenario and take away some of the hoops.
- Ask your learners to move around the outside of the circle again before blowing your whistle after a minute or two. Some will not be able to find a home and will stand in the middle. You can decide whether they can join in the next round or if they are 'out'.
- Continue the rounds like this until there are only a few habitat hoops left. The final round will show that although we are losing these habitats to a variety of threats, there is something we can do about it.
- Ask the children if they know how we can get these habitats back. For any right answers, replace one of the hoops. Use the Habitat Hoop Action Cards to replace the remaining missing habitat hoops and play one last round where everyone finds a home again.

Reflection questions

- What can we do to stop habitat loss?
- What would happen if we couldn't reverse woodland habitat loss?
- Could losing our river woods impact our river?
- What would you miss most about your local woodland if it were to be threatened?

Woodland Study

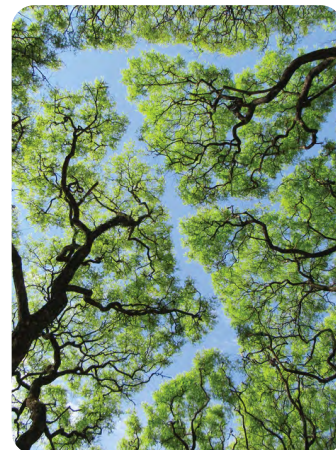
Woodland Ecosystem Study: Instructions



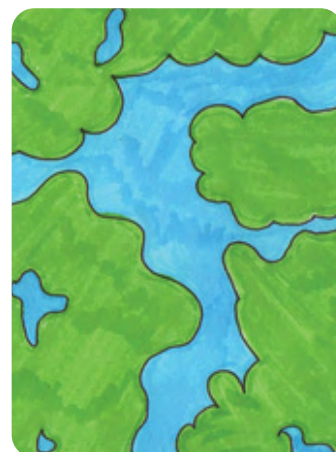
Page 1: Living & Non-Living Things

1. **Write the location of your woodland, the weather and the season.**
2. **Soil: non-living:** Soil is formed from rock minerals, decomposed plants and animals, water, and air. Pick up some of the soil in your hands and check its colour, texture and how much moisture you think it has. Darker soil usually contains more broken down leaves and nutrients than light brown soil, which is drier and feels sandier.
3. **Light: non-living:** The amount of light reaching the woodland depends on how much light the canopy (the tops of the trees) allows through. Choose a spot in the woods to sit and view the canopy. Draw your canopy in the map box on your worksheet, or a separate piece of paper, showing where the light shines through the tree cover. Using a mirror or a piece of reflective card can help.
4. **Food web: living:** Tick off any living things you see in your woodland listed in box 4. They have been grouped based on their role in a food chain and how they get their energy. Producers make their energy from the sun. Consumers eat plants, other animals or both. Decomposers break down dead plants and animals, recycling nutrients into the soil. You will notice that lichen is in two groups, this is because they are both producers and decomposers. Write down any animals not listed on a separate piece of paper.

Tree canopy map examples



Photo



Felt tip drawing

Page 2: Types of Trees

5. **Trees: living:** Explore the trees in the woodland and use the identification resource to work out what species the trees are. For each species record its name, whether you think it is broadleaf or conifer, how many trees of that species you found and how you could tell it was that species.
6. **Choose the woodland type you think best fits with the types of trees you found.**



Line drawing

Woodland Study

Name: _____



Living & Non-living Things

1

Location: _____

Weather: _____

Season: _____

2 Soil Profile



Soil colour

Dark brown Light brown Yellow/brown

Soil texture

Loam: Soft, smooth & crumbly Sandy: Rough & grainy

Soil moisture

Dry & crumbly Damp Wet & Sticky

3 Canopy Map

4 Living things and their role in the ecosystem



Grass Lichen



Woodland floor plants Moss



Ferns Trees

Producers



Fox Deer

Butterflies/caterpillars Jay



Frog Spider



Robin Birds

Consumers



Millipede Earthworm



Beetles Woodlouse



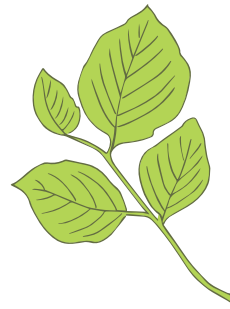
Lichen Fungi

Decomposers



Image: Pixabay

Woodland Study



Woodland Ecosystem: Types of Trees

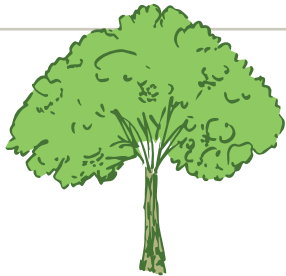
5

Tree species name?	Broadleaf or conifer?	Native or non-native?	How did you identify the tree?	No. of trees?

6 Woodland Type

Broadleaf

.....
Most of the trees are broadleaf.



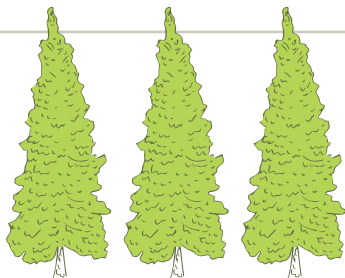
Conifer

.....
Most of the trees are conifer.



Plantation

.....
Conifer trees planted in rows



Mixed

.....
A mix of broadleaf and conifer trees



Can you see or hear a river nearby?

Yes No

(If Yes your woodland is also a **RIPARIAN** woodland)





Image: Airborne Lens Photography

River Trees & Woodlands: Glossary

Broadleaf

Trees that have broad, flat leaves.

Deciduous

Trees that drop their leaves in the autumn.

Riparian Woodland

Woodland that grows along the banks of a river or other water body.

Canopy

The top layer of a woodland including the leaves and branches of the tallest trees.

Producer

A living thing that makes its own food and is the first stage in a food chain.

Decomposer

Breaks down dead plants and animals.

Ecosystem

An environment where living and non-living things interact e.g. plants & animals interact with weather & soil.

You can use this page for reference or print & cut out the rectangles for a plenary game of mix and match.

Conifer

Trees that have thin, needle like leaves and cones.

Evergreen

Trees that keep their leaves all year.

Plantation

A conifer woodland that has been planted by humans to provide lumber.

Native Species

A species that is found naturally in any given area.

Consumer

Living things that get their energy by eating other living things.

Alder

A water loving, native tree. The only UK broadleaf tree with cones.

Species

A group of living things that share the same characteristics and can produce offspring.

Curriculum Links

Curriculum for Excellence

CfE Experiences & Outcomes	Tree Study	Woodland Study
SCN 2-01a: Classify living things and explain adaptations.	X	X
SCN 2-02b: Benefits of plants to society.	X	X
SOC 2-08a: Environmental impact of human activity.		X
HWB 2-23a: Working with others.	X	X
TCH 02-02a: Using digital technology to access information.	X	
EXA 2-05a: Express thoughts and feelings through art/design		X

National Curriculum

KS2	Tree Study	Woodland Study
SCIENCE		
Yr. 3: Identify/describe parts of flowering plants	X	
Yr. 3: Explore plant requirements for life and growth	X	
Yr. 3: Explore the role of flowers in a plant life cycle	X	
Yr. 4: Recognise things can be grouped in a variety of ways	X	X
Yr. 4: Identify and classify living things	X	X
Yr. 4: Potential threats of changing environments	X	X
Yr. 5: Describe life process of reproduction in plants	X	
Yr. 6: Describe grouping living things by characteristics	X	X
Yr. 6: Explain reasons for classifying plants/animals	X	X
Yr. 6: Identify plant and animal adaptations	X	X

Sustainable Development Goals (SDG)



Tree Study: This lesson supports SDG 15 by helping learners explore the role of trees in healthy river and woodland ecosystems and appreciate their value for wildlife as they identify and research different species.

Woodland Study: This lesson supports SDG 15 by helping learners understand how living and non-living parts of a woodland depend on each other, and how human activities such as air pollution can upset these relationships and harm the ecosystem.



Project Delivery Partners



Project Funders



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Tweed Forum: At the heart of land and water management on Tweed.

Destination Tweed: Destination Tweed is a unique project which aims to celebrate and share the nature, history and stories of the River Tweed and deliver significant economic, environmental, educational and social benefits to the South of Scotland and North Northumberland.

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