



# Teachers Learning Pack



# **Woodland Management**

Activity plan Worksheets Resource Cards

www.owlscotland.org







### **Additional resources**

Forests for the future: www.forestsforthefuture.co.uk

**Forests for the Future** is designed for upper primary learners to explore the local and global issues surrounding climate change and sustainable development. There is a focus on the role that trees, forests, and people can play in reducing and/or mitigating any negative impacts.

The Forests for the Future resource seeks to encourage teachers and their learners outdoors – using local trees, parks and woodland areas (private and public) to help understand climate change issues, the value of trees in the carbon cycle, and what individuals and schools can do to make a difference.





Thank you to Natural Resources Wales for sharing this resource with Outdoor & Woodland Learning Scotland **www.owlscotland.org** 





## How a tree works

Curriculum for Excellence Level	Second, Third
Time needed for activity	20 - 30 minutes
Location	Indoors or outdoors

### Context

This activity plan highlights the importance of sustainably managing our natural resources focussing on trees and their systems function.

### **Curriculum links**

Sciences: Biodiversity and interdependence

Second • I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioral characteristics to their survival or extinction.

### SCN 2-01a

Third • I have collaborated on investigations into the process of photosynthesis and I can demonstrate my understanding of why plants are vital to sustaining life on Earth.

SCN 3-02a

### **Objectives**

### By the end of this activity learners will be able to:

- name different parts of a tree •
- describe the functions of different parts of a tree •
- explain what a tree needs to grow and survive

### **Equipment and resources**

- Poster: How a tree works (optional)
- Cross section of a tree (optional)



### What to do

Discuss with your group what they know about trees.

### Ask the group to name as many parts of a tree as they can.

The activity involves making a 'human model' of a tree to help understand how it works.

The number of learners needed for each tree part is listed below, however you can increase or decrease these numbers depending on the size of your group.

- heartwood = 1
- heartwood = 1
- taproot = 1
- lateral roots = 2 to 3
- xylem = 3 to 4
- phloem = 3 to 4
- cambium = 5 to 6
- outer bark = 6 to 8

### Heartwood

Most of the wood within a trunk of a mature tree is dead wood called heartwood.

The heartwood is old xylem that no longer transports water and minerals up the tree.

After a few years the sapwood in most trees gets filled in with resin like material and slowly changes into heartwood.

The new xylem is the only part of the wood that works as a transport system.

The heartwood is often much darker in colour than the sapwood.

The heartwood gives the tree support, strength and is the centre of the tree, but sometimes it rots away leaving a hollow, living tree.

### Action

Choose one learner to stand in the middle, acting strong and tall, and flexing their arm muscles,

chanting 'I am the heartwood, I am now inactive but give strength to the tree! Roar!'

### Roots

A tree's roots spread out underground to help anchor the tree and absorb water and nutrients from the soil.

Some trees have long taproots that reach straight down for 4 metres or more, anchoring the tree and finding deep water supplies.

Other trees have more shallow root systems (lateral roots) that lie closer to the surface of the ground. Large taproots and lateral roots branch into smaller and smaller roots.

An average tree has millions of these small rootlets, each covered with thousands of fine root hairs which soak up water and dissolved minerals.

### Action

Choose 1 learner to act as the taproot. To avoidwthe risk of the roots being accidently stood on ask the heartwood to stand on a piece of string or rope which is run from under their their foot to the taproot and on to the lateral roots.

The taproot should sit or lie on on the floor, holding onto the string and make a sucking noise to represent the taproot taking in water.

The lateral roots lie down on their backs spreading out from the taproot with their arms and legs outspread, making slurping sounds.





### **Xylem**

The tree layer next to the heartwood is called the xylem.

Each year the heartwood adds new layers of woody tissue; the xylem is made up of the youngest layers of wood.

The xylem is a network of thick-walled cells and forms a pipeline, carrying water and minerals up the trunk from the roots to the branches, leaves and other parts of the tree.

### Action

Acting as the xylem learners join hands to make a ring around the heartwood facing inwards. Representing the drawing up of water from the roots the xylem should raise their joined hands up and down chanting 'We are the tree's xylem. We carry water and minerals up from the roots to the branches and leaves. Whoosh, whoosh!'

### Phloem

The phloem acts as a food supply line from the leaves to the rest of the tree. The phloem moves food substances that the tree has produced by photosynthesis through it's channels both up and down the trunk to where they are needed for example, to support processes such as developing seeds. If you were to cut a band around the trunk through the bark and phloem, the tree would probably die as the phloem would be severed and food would no longer flow to the lower trunk and roots.

### Action

The phloem needs to be opposite the xylem. They should bend to the floor before standing tall with their arms up straight in the air again, repeating this action. The phloem should chant 'We are phloem, we transport food substances both up and down the trunk to where ever the tree needs them. Swish, swish!'

### Cambium

Next to bark is a very thin layer called the cambium.

It is often only one or two cells thick and can only be seen by microscope.

The cambium is a growth layer of the tree making new cells during the growing season that become part of the phloem, part of the xylem or more cambium.

The cambium is what makes the trunk, branches and roots grow thicker.

### Action

Learners stand outside of the xylem and phloem group and pretend to hold a hammer and a chisel. The cambium should chant 'This is the cambium layer. This is where new cells are formed and growth occurs.' Ask them to make 'banging' noises to go with the process of building new cells.

### Bark

Bark is the outer covering of a tree's trunk and branches. Its purpose is to conserve water and protect the tree's internal functions from temperature extremes as well as attacks from tree pests and diseases, animals and humans (lawnmowers, strimmers etc).

### Action

Learners form a circle around the entire "tree", facing outward and holding hands.

Acting as guards of the tree, stand with folded arms looking fierce, saying 'You are not coming in! Grrrr!'

The group leader, or any remaining group members can act as pests or diseases that endanger the tree, such as beetles trying to lay larvae inside the tree, or woodpeckers trying to peck their way through the bark, etc.

Once the "human model" is complete, the group leader can read out the parts of the tree with the participants acting out the functions through motions and sounds.



### **HEARTWOOD**

Stands in the middle, acting strong and tall, and flexing their arm muscles, chanting 'I am the heartwood, I am now inactive but give strength to the tree! Roar!'

### ROOTS

Taproot sits or lies on the floor, holding onto the string from the heartwood and makes a sucking noise. The lateral roots lie down on their backs spreading out from the taproot with their arms and legs outspread, making slurping sounds.

### XYLEM

The xylem should raise their joined hands up and down chanting 'We are the tree's xylem. We carry water and minerals up from the roots to the branches and leaves. Whoosh, whoosh!'

### PHLOEM

Bend to the floor before standing tall with their arms up straight in the air again, repeating this action. 'We are phloem, we transport food substances both up and down the trunk to where ever the tree needs them. Swish, swish!'

### CAMBIUM

Pretend to hold a hammer and a chisel and make building noises. 'This is the cambium layer. This is where new cells are formed and growth occurs.'

### BARK

Facing outward and holding hands the bark stand with folded arms looking fierce, saying 'You are not coming in! Grrrr!'



Activity plan







### **Key questions**

- What are the parts of a tree and how do they function?
- What do you think would happen if you cut a tree across the middle of the trunk?

Thank you to Natural Resources Wales for sharing this resource with Outdoor & Woodland Learning Scotland

Less able

- Why do trees need water, what happens to the water the tree collects?
- What does a tree need to grow?
- What pests and diseases could impact on the health of a tree?
- What happens during photosynthesis?

### Adapting for different needs/abilities

### Less able

- Show the 'How a tree works' poster and challenge the group to add new parts to their model of a tree. For example, flowers encouraging insects for reproduction, branches to support leaves, leaves catching energy from the sun.
- Investigate further how trees function.

### Follow up activity/extension

Try our other tree and woodland learning resources:

- Activities and games Seed dispersal
- Activity plan Carbon footprint
- Activity plan Treemendously thirsty

• Show the 'How a tree works' poster to learn about the parts of a tree and their functions before making the model of a tree.

Repeat each function from the start every time you add a new one to remind the learners of the different roles the tree parts have.



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Learning SCOTLAN

Lightning - the energy of

lightening causes nitrogen

and water to form ammonia

and nitrates which travel to

Leaves - the food factories

dioxide are made into plant

food by a process called photosynthesis.

where light, water and carbon

Leaf fall - reduces wind resistance

through the leaves) in the winter.

Leaves decay on the ground and

Flowers - the reproductive parts

of the plant, which often use

colour or scent to encourage

return the minerals they contained

and transpiration (water loss

to the soil.

insects to them.

the ground in rain water.

Air - carbon dioxide is taken into the leaves and oxygen is released

through photosynthesis, when

there is light. In the dark, green

. carbon dioxide.

plants take in oxygen and release

Solar Energy - light energy from the sun (sunlight) is the fuel of photosynthesis.

### **D D** D D D b D b D D D D DD D b D Ь **D D** D D D D

Rain - water is used to dissolve and transport minerals from the soil into the plant.

Branches - support leaves in the best position to catch light energy from the sun.

Trunk - supports branches and transports plant food down to the roots and minerals up to the crown (top of the tree).

Bark - the outer 'skin' which protects against sun, rain, fungi and animals

**Cambium** - the very thin layer which makes a new layer of sapwood each year.

Sapwood - has many tiny tubes, which carry water and minerals (sap) from the roots to all parts of the tree and plant food from the leaves to the rest of the tree.

Heartwood - gives strength to the stem and is used to store waste products.

Feeding Roots - these search for and gather moisture and nutrients from the soil.

Tap root - holds the plant firmly in the ground and exploits deeper water supplies.









## The woodland management tree cycle

Curriculum for Excellence Level	Second	
Time needed for activity	20 - 30	
Location	Indoors	

### Context

This activity plan highlights the importance of sustainably managing our natural resources, focusing on the life cycle of trees and the cycle of sustainable woodland management.

### **Curriculum links**

Social studies:People, place and environmeSciences:Planet Earth		
Second	<ul> <li>I can describe the major characteristic features of Scotland's landscape and explain how these were formed.</li> <li>SOC 2-07a</li> </ul>	<ul> <li>I c ma fea lan ex we</li> <li>SC</li> </ul>
Third	<ul> <li>By comparing settlement and economic activity in two contrasting landscapes, I can reach conclusions about how landscapes influence human activity. I can explain my findings clearly to others.</li> <li>SOC 3-13a</li> </ul>	

### Aim

By the end of this activity learners will be able to:

• Understand and describe the cycle of sustainable woodland management



### Additional resources

Looking for more learning resources, information and data? Please visit: https://www.owiscotland.org and www. outdoorlearningdirectory.com Alternative format, large print or another language, please contact:

Scottish.Forestry@forestry.gov.scot

### www.forestsforthefuture.co.uk

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Activity plan



	Third	
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minutes

or outdoors

ences

can describe the aior characteristic atures of Scotland's ndscape and xplain how these ere formed. OC 2-07a

• Through carrying out practical activities and investigations, I can show how plants have benefited society.

SCN 2-02b





### **Equipment and resources**

- Resource cards Tree cycle
- PowerPoint presentation The woodland management tree cycle
- Glossary game Trees and woodlands
   Calculators
- Tree ID sheets, books or apps

### What to do

Encourage the learners to look at and read the resource cards carefully, before arranging them into the correct chronological order. Ask questions to promote discussion, including:

- What can you see?
- What is happening?
- What are they doing?
- Why are they doing that?
- What will happen then?

Supporting information can be found in the Tree cycle PowerPoint presentation.

There are many different ways in which the activity can be carried out to best suit the age and ability of the group. For example:

- Small groups of learners can be given the cards to re-arrange into the correct order on the floor or table.
- The cards can be ordered and attached to a tree or hung on a line as a whole group activity.
- Learners can, individually or in groups, cut up and glue the cards onto paper in the correct order.
- Learners can be put into groups of 13 (or remove cards for a smaller number of learners) and each one has a card. The learners then hold their card and arrange themselves into a circle or line in the correct order.

Give learners the opportunity to explain the order they put their resource cards in and compare with other groups.

### Follow up activity/extension

- Give further information on each step in the process by going through the Tree cycle PowerPoint presentation.
- Try out the Tree Planting Activity Plan.

Thank you to Natural Resources Wales for sharing this resource with Outdoor & Woodland Learning Scotland



### **Forest designer**

A forest designer uses maps to plan where the trees will be planted.



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**Resource cards** 

# **Preparing the ground** Sometimes large machines are used to prepare the ground ready for the saplings to be planted.

### **Planting saplings**

The saplings are planted using a spade or by machine.



O









### **Protecting saplings**

Once they start to grow, the young trees need to be protected from weeds growing around them and from animals which may eat them.

### **Thinning trees**

After approximately twenty years some of the trees will be cut down to allow more sunlight in. This is called thinning.

### Forwarding

The timber is taken from the forest by a machine called a forwarder.







### **Preparing the ground** L Sometimes large machines Т Т are used to prepare the I. ground ready for the Т saplings to be planted. 1 Т 1 **Planting saplings** Т Т The saplings are planted Т I. using a spade or by Т Т machine. Т Т **Ancient woodlands** and veteran trees 1 If trees are not felled, they 1 can grow into a veteran 1 tree. This tree is over three 1 hundred years old.













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