Forestry England

Forests as a sustainable resource

This resource is split into three lesson plans to help you to teach your students how England's forests are used as a natural, sustainable resource. It covers the distribution of the UK's forests, how forests are used as a resource as well as a deeper dive into the timber industry. The final lesson covers how forests can be managed sustainably for the benefits of people and wildlife.

Lesson plans:

Each lesson plan is accompanied by a PowerPoint

1. Forests as a natural resource
2. Forests and timber
3. Sustainable forest management

KS3 geography curriculum links

- The interaction of geographical processes to create distinctive human and physical landscapes that change over time:
  - Understand how human and physical processes interact to influence, and change landscapes, environments and the climate
  - Understand how human activity relies on effective functioning of natural systems
- Weather and climate, including the change in climate from the Ice Age to the present
- The use of natural resources
- Economic activity in the primary, secondary, tertiary and quaternary sectors. *Note: Students will need to have prior knowledge of these as lesson 2 starts by recapping them and linking in the timber industry.*
- Develop geographical skills in analysing and interpreting different data sources

How to use this resource

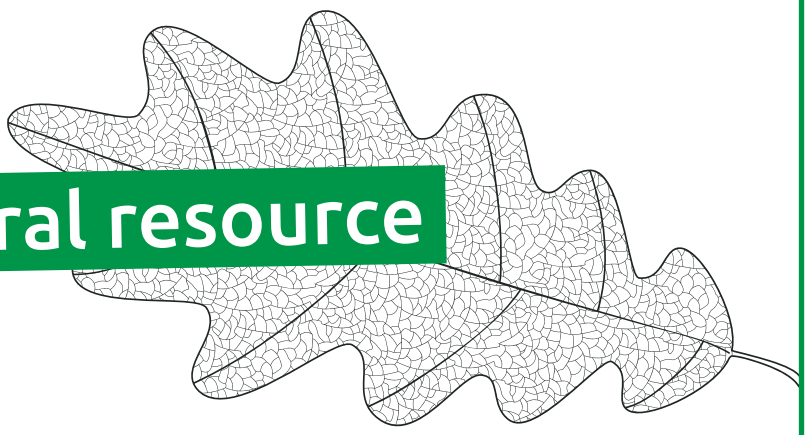
Each lesson plan has:

- Curriculum links and learning outcomes.
- A list of any equipment needed for the activities.
- A starter activity for students to start thinking about the topic independently or in pairs.
- Background information.
- Activities that engage students, encouraging their own reflection and investigation, including fieldwork and data exercises. There are some extension activities which require additional time, and some suggestions for homework activities.
- An accompanying PowerPoint with some key information, images and videos. The PowerPoint contains notes alongside the slides and there are indications on the lesson plan to show the corresponding slides.
- References – links on where to find out more information.

The lesson plans are designed to flow from one to the next and build up knowledge but are adaptable to meet your requirements and the needs of your students.

Forestry England

Lesson 1: Forests as a natural resource



Learning outcomes:

- To describe the woodland cover in the UK
- To understand how England's forests are a natural resource

Curriculum links:

- The interaction of geographical processes to create distinctive human and physical landscapes that change over time:
  - Understand how human and physical processes interact to influence, and change landscapes, environments and the climate
- Weather and climate, including the change in climate from the Ice Age to the present
- The use of natural resources
- Develop geographical skills in analysing and interpreting different data sources

You will need:

- Atlas or maps of the UK showing topography for activity B2
- Large sheets of paper for activity C1
- Enough copies of the climate change and forests cards (page 5) for one between two, cut out, for activity D1

Background information: Forests as a resource over time

Since people first settled in the UK, wood has been important for heating and cooking. It has been used for building houses and boats, fencing livestock, and converting into charcoal to generate heat. Wood was also used in early industry such as iron smelting. Throughout the Middle Ages and into the 20th Century, wood was used widely for shipbuilding, leather tanning and as pit props in coal mining. A huge amount of wood was used to support the First World War (1914-18).

In 1919, the Forestry Act established the Forestry Commission to restore the nation's woods and forests which, after the war, had declined to cover just 5% of the UK's land surface. In the following years, vast areas were planted with mostly fast-growing conifer trees. These trees provide valuable timber for use in construction (roof joists, flooring, doors), paper making, fencing and furniture.

As well as providing wood for timber, forests are extremely important for people and for wildlife. Many people access forests for walking, cycling and horse riding. Forests are being valued more for improving people's mental health and wellbeing. Forests also provide a wide range of natural habitats, supporting hundreds of species of plants, animals and fungi.

A Starter activity - England's forests

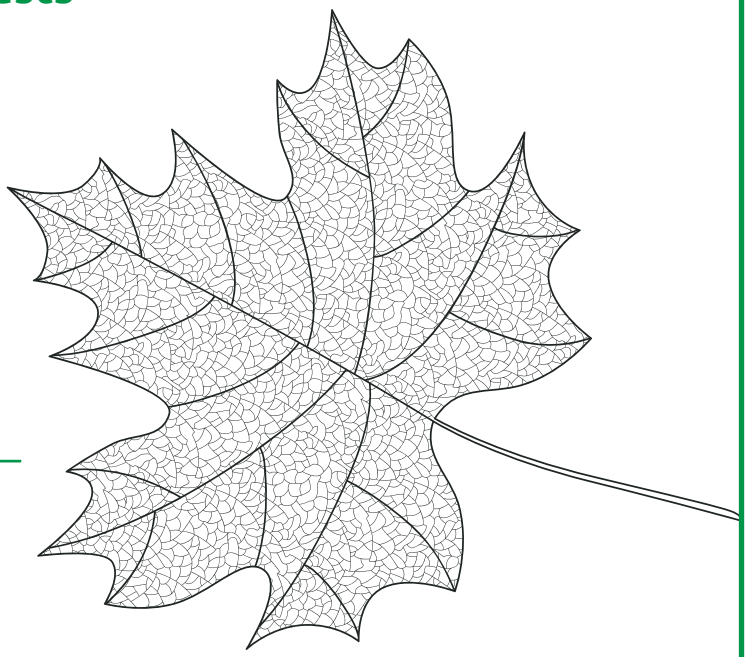
Slide 2

Use these questions to get your students thinking about their perceptions of forests in England.

A1 When did you last visit a forest?

A2 What do you think of when you think about forests in England?

A3 What percentage of England do you think is covered in forests?



B Today's forests

Slide 3

Discuss:

The distribution of woodland in the UK, using the map and data on the slide.

Activities:

B1 Describe the distribution of woodland in the UK. Which areas have the densest coverage and which the least dense?

B2 Look at an atlas map showing the relief of the UK and compare it with the map showing woodland coverage. Are most woodlands located in upland or lowland parts of the UK? Suggest reasons for your answer.

B3 Use the data in the table to draw a divided bar graph to show the area of coniferous and deciduous woodland in England, Wales, Scotland, and Northern Ireland.

C Forests as a resource

Slide 4

Discuss:

What is a resource?

Activities:

C1 In pairs/groups draw a big picture of a tree and label how the different parts of a tree can be used as a resource, including all of the things that trees and forests give us. You can also think about how they might have been used differently in the past.

Click on the link to see all the possible sources of income from planting trees. This poster, created by the Forest Commission, encourages landowners to plant and sustainably manage their forests. How many of these did your students think of? Which is the most surprising?

D Climate change and forests

Slide 5 & 6

It is predicted that the changes in our climate will have significant impacts on forest plants and wildlife. Different management techniques are being used to increase the resilience of our forests to enable them to survive or even thrive in the future climate.

Activity

D1 Hand out the pre-cut cards. In pairs, ask your students to match up the different factors to the predicted impacts and the potential management measures.

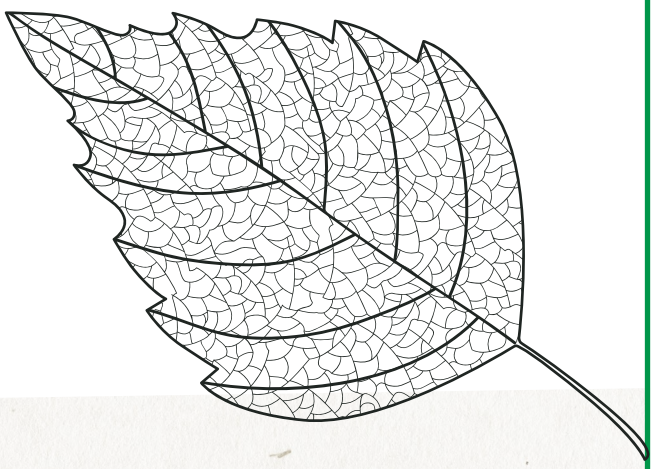
Extension/homework

E History of England's forests

Activity

E1 Carry out some research to find six key events that helped to change and shape England's forests and then plot them on a timeline. These could involve how the climate has changed (for example since the last ice age), historical events or changes in law or forestry practices.

Your students can refer to Forestry England's timeline to get them started. This shows how things have changed since 1919 when using wood during the First World War had depleted forest cover to just 5%.



For more information:

Forestry Commission's Managing England's woodlands in a climate emergency

England's Tree Action Plan

You can find more forestry statistics on the forest research website

Forestry Commission's poster: Grow your income using every part of a tree

100 year timeline of forestry

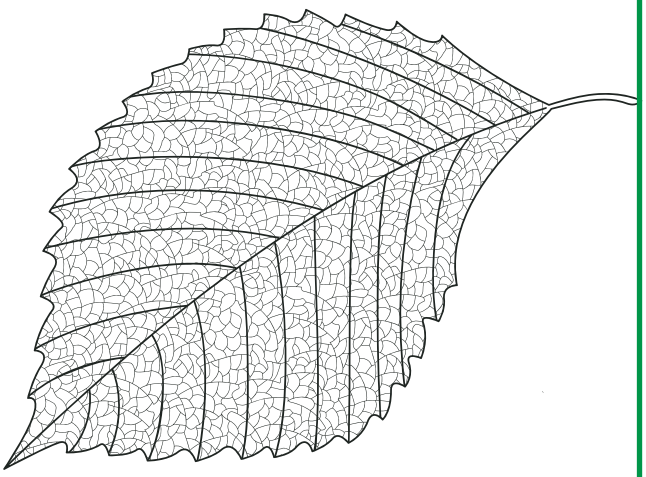
Climate change and forests cards

These are adapted from Forestry Commission's Managing England's woodlands in a climate emergency

Factor	Predicted impact	*Potential measures*
Longer growing season	• We are already seeing buds bursting earlier in the year. These buds are formed at the end of summer while they have energy to grow before the days get cooler and shorter. The buds then lie dormant over the winter, waiting for spring to arrive. • Increased breeding of insect pests.	• *Encourage natural regeneration (when trees self-seed) as lots of our trees will be able to adapt to the changing conditions.* • *Select seeds from further south as they already have our future climate, but it's good to have a mix as frosts can still be an issue.* • *Increase tree species diversity.* • *Increase monitoring of tree health and intervene where necessary.*
Warmer growing season due to increased CO_2 concentration	• Increased growth rate, if trees are able to adapt and use the extra CO_2. • Increase in woodland mammal populations. • Increases in tree pests and diseases. • New invasive tree species.	• *Choose tree species that will grow better in a warmer climate but beware of frost sensitive species.* • *Increase deer/squirrel management to prevent damage from grazing and bark stripping.* • *Increase monitoring of tree health and, where necessary, intervention.* • *Increase tree species diversity.*
Reduced summer rainfall	• Drier summers can lead to reduced growth and increased drought stress. This stress also makes trees more vulnerable to pests and disease. • There is likely to be an increase in occurrence and spread of forest fires.	• *Choose drought tolerant species.* • *More thinning so there are fewer trees in an area, reducing the demand for moisture.* • *Educate public about forest fires.* • *Fire breaks built into management plans to reduce spread.* • *Planning and training for forest fires.*
Increased winter rainfall	• Waterlogged soil which means that roots can't access oxygen in the soil. • Increased wind damage due to unstable roots. • Increased soil erosion and slope failure as they are washed away. • Increased waterborne diseases.	• *Shorten rotations – fell trees earlier to minimise the impact.* • *Choose species tolerant to wet soil.* • *Smaller crop plots.* • *Limit forest operations after heavy rain when ground is unstable and trees vulnerable.*
Increased wind	• Increased wind damage – branches breaking, hanging dangerously and trees being uprooted. • Increase in bark beetle outbreaks and fungus as they can attack damaged trees.	• *Shorter rotations – fell trees earlier to minimise the impact.* • *Early thinning or no thinning to minimise impact.*

Forestry England

Lesson 2: Forests and timber



Curriculum Links

- Economic activity in the primary, secondary, tertiary and quaternary sectors
- The use of natural resources

Learning outcomes

- To be able to describe how forestry fits into the four industrial sectors
- To learn how forests are managed sustainably for timber production in England including the lifecycle of trees used for timber

You will need:

- Big sheets of paper

Background information

What do your students know about using wood for timber in the UK? Often students learn about deforestation in the Amazon rainforest but how much do they know about timber production closer to home?

Wood for timber is an important forest resource. For hundreds of years, trees have been felled to provide wood for timber used in the construction of houses and boats, and for fencing livestock. Today in the UK, some forests are managed to produce a sustainable supply of timber for a wide range of products in the construction industry. This lesson plan follows the journey from a seed and includes the processes involved to get quality timber for sustainable wood products.

A Starter activity - The industrial sectors

Slide 2

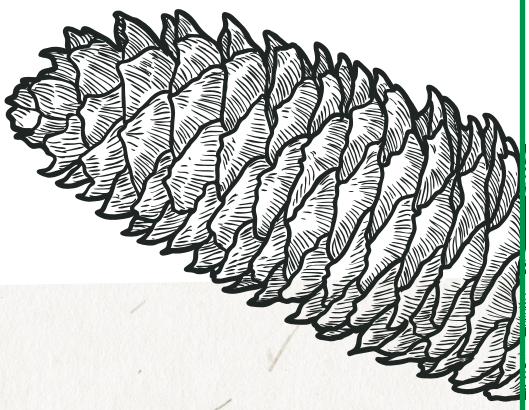
Use this starter activity to see if your students can remember the different industrial sectors.

A1 Work in pairs to name and describe the four industrial sectors.

B Forests from seed to timber

The management of commercial forests to produce timber involves a series of stages carefully managed by experts. There are a series of short videos in the PowerPoint and below are some question suggestions that can be used to engage students with the videos.

Please note these videos are streamed from YouTube and may automatically play another film afterwards.



Primary industry

Growing future forests from seed to timber

Slide 3: Video

Watch the video to find out how seeds are collected from the best quality trees and sown in glasshouses at nurseries. They become established as small saplings, in the outdoor standing area, before being planted in their final growing positions.

Questions

1. Where do the tree seeds come from?
   The nation's forests or seed orchards.
2. Why is the glasshouse a 'huge step forward'?
   It provides a controlled space to ensure the right conditions.
3. What happens to the plants after year one?
   They get moved outside into the standing area.
4. How old are the plants when they are transplanted to the forest sites?
   Two years old.
5. What are the two main threats to plants in the nursery?
   Weeds and biosecurity.
6. How many trees are produced in the glasshouse each year?
   3.5 million.

Planning - right tree in the right place

Slide 4

Trees and forests give us many benefits and so are planted for many different reasons. There are many complex factors involved which need to be considered. Complete activity B1 before talking through the slide.

Activity

B1 In pairs, think about what factors need to be considered when planting which tree species where. Can you rank them in order of importance?

Planting the next generation

Slide 5: Video

Watch the video to find out more about how saplings are planted.

Questions

1. What type of tree is Ben planting?
   Broadleaf species.
2. When during the year does planting take place?
   Just before Christmas until April.
3. Why does it take place during this time of year?
   So that the ground is moist.
4. Why does an ecologist check the site before planting?
   To see what animals are in the area as this will affect what trees are planted.
5. How many trees can a planter plant in a single day?
   1500.
6. Why are trees planted by hand?
   They are delicate, due to the root systems.
7. Suggest why Ben finds his work hugely satisfying.
   Trees are a valuable resource, important for biodiversity, and each sapling could be used to construct many different things. Also lots of care is needed to ensure a sustainable crop for the future.

Caring for trees

Slide 6

Explain to your students that it is important that trees are monitored and looked after during their growth, to ensure they stay healthy.

Sustainable timber production

Slide 7: Video

Watch the video to see how the trees are felled, using harvesters before the cycle starts again.

It is important to note, areas are not always clearfelled. Sometimes, continuous cover is maintained by leaving some larger trees and underplanting saplings around them. Allowing natural regeneration, where seeds fall from the trees and start growing into saplings, is another method used to ensure a mix of ages of trees.

Questions

1. How old are the trees that are being harvested?
   60-years-old.
2. Apart from growing timber, why else is the forest important?
   People can explore it, home for wildlife.
3. What will happen to the site when the trees have been harvested?
   It will be cleared and planted again.
4. What will the timber be used for?
   Building houses, flooring, kitchen worktops, fencing.
5. Describe how the harvester machine cuts down and prepares the trees for transport.
   The head grabs the tree at the base and the chainsaw cuts through the trunk. The knives then take off any branches and the chainsaw cuts it into logs of the right size.
6. Why is it important not to approach a harvester machine?
   They are dangerous due to the knives and chainsaws, and they are cutting trees which could hit you.
7. Suggest in what ways this forest is managed sustainably.
   It's a forest for people, wildlife and timber. More trees are planted when areas have been cleared. It is managed so there are some open areas and different densities of trees.

Secondary industry

Nothing is wasted

Slide 8

Discuss:

What do your students think the different components of a tree are made into?

All of the different components of a tree can be used so that nothing is wasted - wood fibre forms a circular sustainable economy.

In the PowerPoint notes of slide 8 there are some suggestions of videos which you may wish to show to your students to illustrate the processing of timber at a sawmill.

Slide 9

Timber, in the form of tree trunks, is processed in sawmills and the best wood is used as sawn timber in the construction industry and for making furniture. The external parts of the trunk are used for pulp production to make paper and board. Some is burned as a source of renewable energy.

C Summary

Activities

C1 In groups, draw your own forest cycle to show the journey of a tree from seed to a wood product. For each stage note down three key points that need to be thought about.

Extension/homework.

C2 Identify examples of forestry or timber production that fit into each industrial sector.

Sector	Forestry example
Primary	The growth and harvesting of trees for timber
Secondary	Timber processing and manufacturing of products in sawmills (furniture and construction materials) and pulp mills (paper and board). Tree bark can be used as chippings in playgrounds. Sawdust and wood shavings can be compacted into wood pellets to generate energy or used for animal bedding.
Tertiary	Forestry and timber require banking and insurance services and there are also links with education, health and wellbeing
Quaternary	Timber industries such as sawmills and pulp mills require IT support in the form of website construction as well as research to develop new products.

For more information:

Timber and the uses of wood

The forest's lifecycle

Different trees and their uses



Forestry England

Lesson 3: Sustainable forest management

Curriculum links:

- Understand how geographical processes interact to create distinctive human and physical landscapes that change over time:
  - Understand how human and physical processes interact to influence and change landscapes, environments and the climate
  - How human activity relies on effective functioning of natural systems
- Develop greater competence in using geographical knowledge and geographical skills in analysing and interpreting different data sources

Learning outcomes:

- To understand sustainable forest management and the factors involved
- To understand all of the benefits of forests

You will need:

- Section C includes extension activities involving ICT and also fieldwork, so will need some preparation. If you are unable to do these activities during school time, some aspects could be given to the students as homework.

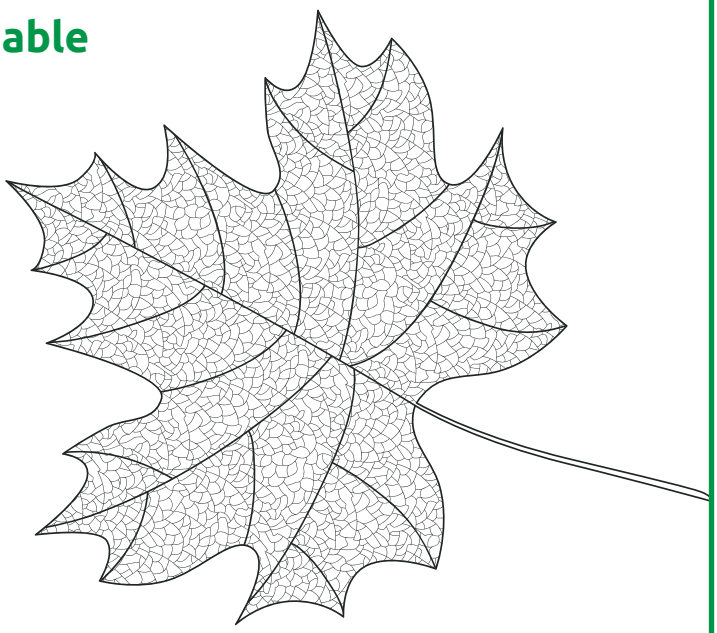
Background information

Sustainable management involves balancing social, economic, and environmental demands, with different land managers favouring different priorities. Forestry England welcomes millions of visitors to the nation's forests each year to enjoy many recreation activities as well as the health and wellbeing benefits that forests offer. But we also manage the forests for wildlife and are working hard to increase biodiversity, as well as producing a sustainable supply of timber.

Most forestry landowners seek certification from UKWAS (UK Woodlands Assurance Standard) to verify that woodlands are being managed sustainably. People buying wood are encouraged to only buy timber from certified growers. Other organisations offering certification worldwide include the Forest Stewardship Council ® (FSC®) and the Programme for the Endorsement of Forest Certification (PEFC). When you shop for wood or paper products, look out for the FSC® or PEFC logos which means they come from well-managed forests, like Forestry England's.

The UK's woodlands are home to a wealth of wildlife, from shade-loving plants and delicate fungi, to ground nesting birds, elusive mammals and rare insects. Ancient woodland supports more species than any other land-based habitat in the UK. However, we are in a global biodiversity crisis and the UK's woodland coverage is one of the lowest in Europe and much more needs to be done to protect wildlife and increase biodiversity. Currently, 1/3rd of all woodland wildlife species are in decline and 1 in 10 woodland wildlife species are threatened by extinction. But there are lots of things that can be done, so there are lots of reasons to be positive.

A Starter activity - What is sustainable forest management?



Slide 2

Challenge your students to think about what is meant by sustainable forest management.

A1 What are the differences between a sustainably managed forest and a poorly managed one?

Slide 3

Sustainable management involves balancing social, economic, and environmental demands, with different land managers favouring different priorities.

B Sustainable management for timber

Slide 4

Recap the forest cycle from lesson two and the importance of using wood as a sustainable resource.

Slide 5

We can all help, when you shop for wood or paper products, look out for the FSC® or PEFC logos which means they come from well-managed forests, like Forestry England's. Something else to look out for is the Grown in Britain logo. This is the only certification scheme that provides assurance of homegrown timber and timber products from the UK.

Activity

B1 Create an argument on why the use of sustainable timber should increase. Are there any counter-arguments?

C Sustainable management for biodiversity

Slide 6

Discuss:

What is biodiversity and why is it important?

The value of veteran and ancient trees

One way that we can help to increase biodiversity is by protecting veteran and ancient trees.

Slide 7

Watch the video on veteran trees, which was filmed at Wych Lodge Woods on the Blackdown Hills in Somerset.

It's not just wood for timber, but the whole forest ecosystem that is an important resource, including sections of open habitat and veteran trees, which are vital for biodiversity. The decaying wood provides rich habitats for many animals, including some rare invertebrates, lichen and fungi. They are also cherished for their beauty, their cultural and historical value. Forestry England manages veteran trees across the country including the ancient parks and forests of Savernake in Wiltshire, Sherwood Forest and The New Forest.

Extension activities

The Woodland Trust hosts an inventory of ancient trees in the form of an interactive map. Members of the public are encouraged to identify and submit information about ancient trees in their local area which have not yet been identified on the inventory. This is a good example of Citizen Science, where the general public support the collection of scientific data.

C1 Use the Woodland Trust's inventory of ancient trees to find out about ancient trees in your local area. Take a few moments to explore the menu, the map key, and the base map options (such as satellite and OS map). Click on a selection of tree icons to find out more about the ancient trees near you.

C2 Write a short report on ancient trees in your local area. Include a screen shot of your choice - decide which base map you wish to use and your level of zoom. Select and write about one or two trees located close to your home or school.

Fieldwork

Locate and record information about an ancient tree in your local area, such as a public park.

Find out how to identify veteran trees.

Use the Woodland Trust's recording form to complete measurements and other details for your chosen tree.

Be a Citizen Scientist and upload this information to the Woodland Trust's inventory.



D Natural capital and resilient forests

Slide 8

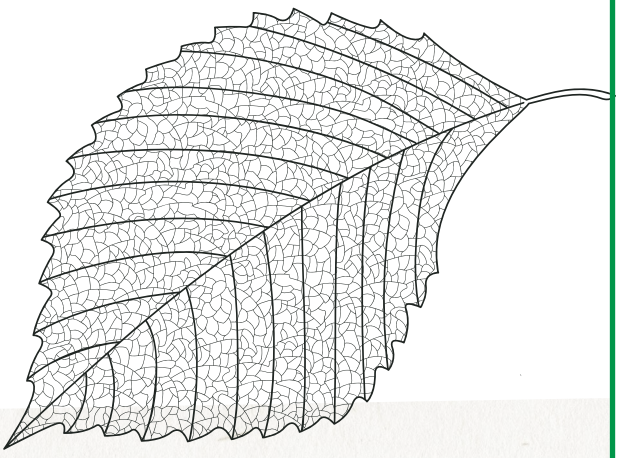
Forestry England uses a natural capital approach to help understand the value to society of the various benefits that come from the nation's forests.

Ask your students if they can remember back to lesson one and the benefits that we get from trees and forests as a resource, and also what threats and pressures the forest ecosystem faces. The icons on **Slide 9** may help.

E Case study of sustainable forest management: Rushy Knowe

Slide 10

Watch the video 'A forest for the future' to find out about Rushy Knowe in Northumberland. This is a case study of sustainably managed woodlands, demonstrating how you can balance the economic benefits of timber production with the social needs of people and the benefits to wildlife and biodiversity.



Activities

E1 Write your own definition of sustainable forest management. You could illustrate your definition with an annotated photo or sketch identifying aspects of sustainability.

E2 *This could be done individually/in groups/as homework. It also could be done in a different format to PowerPoint.*

Create your own PowerPoint presentation (maximum of 6 slides) to describe a sustainably managed forest of your choice. Consider how your chosen case study aims to balance economic, social and environmental demands through sustainable management.

There are several case studies on the Forestry England website including the following:

Managing new woodland – Pleasant Forest, Kent

York community woodland

Sence Valley, Leicestershire – turning brownfield sites green

Rushy Knowe, Kielder

Managing peatlands (Delamere Forest, Kielder Forest, New Forest)

References/ For more information:

Natural capital

Timber and the uses of wood

Why forests are important to wildlife | Forestry England

Creating new woodlands

Woodland Trust's ancient tree inventory

Protecting veteran trees | Forestry England

State of Nature 2023 - report on the UK's current biodiversity

For more resources:

Learning resources | Forestry England