

STEM By Nature: Trees, Woods & Forests

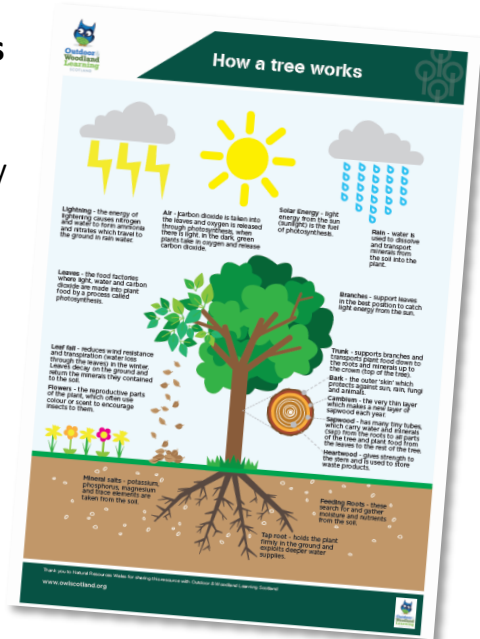
Resources & activities for learning

STEM By Nature - STEM learning in nature settings

Trees, Woods & Forests can offer a rich source of information, resources and activities for learning about Science, Technology & Engineering and Maths subjects. Explore this information resource, delve into the links.

You don't need to be an expert in STEM learning, or the outdoors, or trees. Adapt ideas to suit where you are, your own experience, what's available, who's doing the teaching and learning.

Make STEM connections with Curriculum for Excellence and National Curriculum, including Interdisciplinary Learning, 4 Contexts, equity and [work skills](#).



Background

Information, resources and activities relating to Trees, Woods & Forests are signposted throughout this resource. Take a broad overview of connections between STEM and Trees, Woods & Forests, or focus on a specific subject, theme or context.

Link to themes such as [Citizen Science](#) or creativity in STEM learning. [UN Sustainable Development Goals](#) can offer a context e.g. #13 Climate Action, #15 Life on Land, #4 Education, or other relevant Goals relating to ecological issues and sustainable systems.



There is a growing portfolio of **STEM By Nature guidance**, currently covering [STEM By Nature - An Introduction](#), [STEM By Nature & Citizen Science](#), [STEM By Nature & Sustainable Development Goals](#), [STEM By Nature & Climate](#). This resource is adapted from 'STEM By Nature: Trees, Woods & Forests' [Professional Learning session guidance](#).

You'll find a wide range of **tree-related and outdoor learning resources** via a [STEM By Nature Information & Resources padlet](#) and [Outdoor & Woodland Learning Scotland](#).



Take time to enjoy trees!

Wander – and wonder – in a woodland!

Get curious in a copse!

Find out things in a forest!

STEM-related outdoor activities – with a Trees, Woods & Forests focus

Learning about science outdoors can encourage deeper thinking about the use of resources and the impacts this might have. It can demonstrate the wonder and scale of the natural world. It can encourage curiosity and care, and promote interaction with the living world in a climate of safety and respect. Natural settings and resources can bring abstract science concepts to life, and explore their practical relevance.

Use Trees, Woods & Forest settings for contexts with meaning for learning, opportunities for discussion, and to help develop scientific and mathematical language.

You may want to select, plan and present activities to include:

- ways to build confidence and skills in STEM learning
- active, cognitive, creative approaches
- sustainability themes, progression in learning, and Interdisciplinary Learning (across subjects)
- Arts, Creativity & Literacy.



Ice-breaker Questions

“What’s your favourite tree, and why?”

“Can you identify some different types of tree? Does this matter?”

Science: Trees, Woods & Forests (link to Biodiversity, Biology, Chemistry, Geography)

- **Plant seeds/nuts, grow a tree, adopt a street tree**

Collect or give out a seed/nut. [Seed source guidance](#); [Collecting tree seeds](#); [Sowing tree seeds](#). Find out about [Street Trees](#).

Research, explore, discuss (as appropriate): growth stages, tree types, places to plant/right tree right place, biodiversity, carbon cycle, photosynthesis/chemical reactions, greenspace in town planning, landscape elements, ecosystem services, health & wellbeing, drawing/art, literature...



- **Tree identification**

Get to know some of [Scotland’s tree species](#) that make up our communities and forests. Learn their stories and find out about their many practical uses.

- **How a tree works**

Explore ‘[How a Tree Works](#)’, and how it is a function of its different elements – Roots, Trunk, Branches and Leaves - and their roles in making use of Soil, Air, Rain and Solar Energy.

See ‘[How a Tree Works Activity Plan](#)’.

- **Forest cycle**

Explore the ‘forest cycle’ of ‘plant, grow, fell, replant, grow, fell’ with [The Woodland Management Tree Cycle](#) Resource Cards.



- **The world beneath our feet**

Use a series of [activities to investigate soil](#), one of the world's most precious and overlooked resources, to connect soils and curriculum.



- **Life in a forest**

Find out about [Animals & plants in a Scots pine forest](#).

Explore [The web of life in a Scots pine forest](#).

- **Leaf looking, Tree naming**

Encourage curiosity, enquiry. Pick up a leaf. See how many words can be associated with it – individually and/or collectively.

See [Leaf](#) by Steve Smart.

As this short [Lost Spells: Silver Birch](#) film plays, note down tree parts mentioned, habitats, nature associations. (Use as an indoor option, or with phones/tablets outside; find a birch tree, stand touching it as the spell is read).

Leaf

tip
apex
blades
edge serrated
silk on silk swept skin
smooth down hair tickles or
torture spike, moisture store and
cool condenser, gaseous swap meet
carbon car boot, cusped cup convoluted
venous checkerboard, minuscule patchwork
field, fractal growth grown a thousand formed
autumn shed or evergreen never only green
but red and orange and pink and yellow and
blue-gum blue plus any shade of petal a bee
might long for, a giant hand, a tiny heart,
sweet layered succulence, desert thorn plush,
an oleagenous fire starter, paper, reed, lamp
victor's garland, shield for knowing shame,
dinner plate, salad snack, spongiform
variagated mottled perforated,
round swelling needle-sharp
sweet smelling herb and
poisoned dart, stalk
and stem and
stipulated,
oh! so
many
leaves
sighed
the
tree

- **Record and Survey forest sounds**

[Sounds of the Forest](#) is collecting sounds of woodlands and forests from around the world, creating a growing soundmap and open-source library of aural tones and textures from the world's woodlands.

- **Tree health, pests & diseases**

The [Tree Pest and Disease Information Series](#) – with a scene-setting Introduction and 8 information sheets - can be used in schools and learning settings to raise awareness about tree health. Also see [Tree Alert](#) (and its poster of priority pest and diseases) and [Observatree](#).

Science & Climate: Trees, Woods & Forests

See a [STEM By Nature & Climate Action](#) companion session.

- **Nature's Calendar**

See phenology - the study of cyclic and seasonal natural phenomena - in action. [Track effects of weather and climate change on trees](#) (and wildlife) from leaf buds bursting to first ripe fruit to leaves falling.



Technology, Engineering: Trees, Woods & Forests

Trees feature in the earliest constructions and are part of modern engineering. Make connections between our past, present and future; reflect on designs and materials; explore [biomimicry](#), “the science and art of emulating Nature's best biological ideas to solve human problems”.

Discuss how trees, through technology and engineering, influence all our lives.

Consider work-related learning and tree-related careers, links between consumption and forestry resources, natural regeneration and principles of sustainability.

- **Build a structure/den**

[Build a structure](#) one metre high from natural materials. Agree criteria such as accuracy of height, purpose of the structure/den, load-



bearing capacity and structural strength. Explore techniques and ideas used in historical and modern buildings. See [Woodland Hideaways](#), too.

- [Wood survey](#)

Investigate what kind of products are made from wood, how many are used in our everyday lives, and explore different types of products derived from trees. Represent data in different ways.

- [Where does our wood come from?](#)

Explore the global dimension of the wood we use; stimulate awareness and discussion about ethically and sustainably sourced wood products.

- [The Story from tree to table](#)

Study the process of producing a table from a tree. Put the sequence in the correct order.

Maths: Trees, Woods & Forests

Look at a tree and you're facing a maths resource. Stand in a forest and you're surrounded by opportunities for measuring, surveying, counting, sequencing, and exploring shape/size/age/patterns/symmetry...all of which can help build mathematical skills.

- [Mathematics & Numeracy booklet](#)

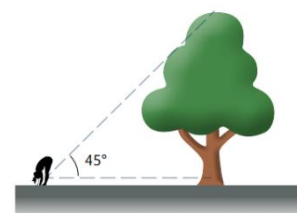
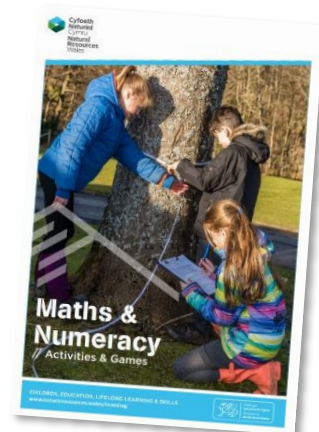
From Natural Resources Wales, this resource includes a range of tree-based maths activities. Invite participants to select and run their own mini-session (manage according to time available).

- [Tree measuring resource](#)

Make Curriculum for Excellence links with varied activities for Early/First Level (P1/P2-P4), Second Level (P5-7), Third/Fourth Level and Senior Phase (S4-6), reflecting Education Scotland's guidance across learning and numeracy and mathematics benchmarks.

- [The Deadwood Survey](#)

Is the deadwood in your wood dead good?
Find out with this simple survey from TCV.



Arts, Creativity & Literacy: Trees, Woods & Forests

Bring tree-based creative approaches into STEM learning.
Explore STEAM – STEM plus Arts.

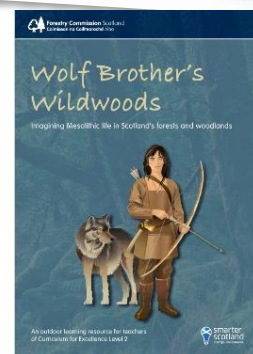
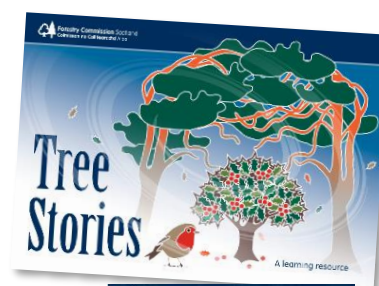
- [Tree Stories](#) (and [Tree Stories](#) in [Gaelic](#))

Read and discuss any of the monthly stories about a Scottish tree.

Use supporting information, folklore, recipes and facts about each tree to highlight seasonal patterns and their role in our lives.

- [Wolf Brother](#)

A [Wolf Brother Wildwoods](#) resource brings the Mesolithic period to life through a series of woodland and classroom learning activities.

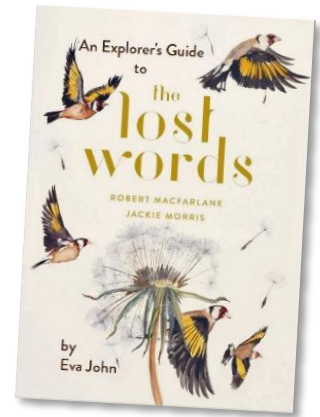


- **Literacy & Nature**

A John Muir Award [Literacy & Nature Resource Guide](#) highlights how nature and the outdoors can inspire and support literacy skills, and can easily be adapted for a STEM learning context.

- **[The Lost Words](#)**

Information & resources include a free [Explorer's Guide](#) download (and [The Lost Spells Explorer's Guide](#) for Heartwood, Beech and other links) plus [posters](#) of Conker, Bramble. There's a [Lost Words padlet](#) for sharing creative outputs. See [#TheLostWords](#).



Local Learning Task suggestions (if suitable)

- Get outside in local settings.
Walk for 10 minutes from your home or school setting. What variety of trees do you see? Try out some of the activities and resources relevant for your location. Think about learner needs, their progression in learning, and outdoor opportunities for cognitive and emotional engagement.
- Explore other STEM By Nature sessions, and the [Information & Resources padlet](#).
- Create a Trees, Woods & Forests-focused Interdisciplinary Learning project.
Encourage learners to transfer skills and knowledge between discipline areas through:
 - short-term one-off projects linked to an event, such as an open/parents' evening
 - medium-term shared units of work focused on a local place or residential trip
 - long-term projects such as school grounds or local community greenspace developments; seasonal monitoring; achieving awards such as John Muir Award, Junior Forester Award.
- Attend or set up a virtual 'any time, any place' [Working in Wellies Careers Event](#).

Resources: Trees, Woods & Forests

[Outdoor & Woodland Learning Scotland Resources](#) Learning resources including project reports, guidance notes, research can be searched using keywords, by topic, or age and stage.

Scotland's [Outdoor Learning Directory](#) A portal to services supporting outdoor learning provided by organisations that are part of the Scottish Government.

[Natural Resources Wales: Trees & Woodlands](#) A range of resources to help find out about woodlands and trees.

[The Woodland Trust](#) Educational resources to help plan and deliver outdoor learning. Its online learning hub [Tree Tools for Schools](#) supports its free tree packs (with all you need to plan, plant and care for your trees), includes Nature Detectives activities, tree ID sheets, a range of interactive activities and printable worksheets for classroom or outdoor use. Resources link to the KS1 and KS2 curriculum but are suitable for Scotland and searchable by keyword, topic or curriculum area.

[Nature's Calendar](#) Record details of plants, animals and fungi to help understand how nature is affected by weather and climate change.

Juliet Robertson/Creative Star Learning Website includes a comprehensive [Index](#) of ideas and articles; author of 'Dirty Teaching: a beginner's guide to learning outdoors', and 'Dirty Maths'.

John Muir Award [Surveys Resource Guide](#) An overview of surveys, and useful websites.

John Muir Award [Sustainability Resource Guide](#) An overview of Sustainability, and associated resources.

John Muir Award [Literacy & Nature Resource Guide](#) Highlights how nature and the outdoors can inspire and support literacy skills, and integrate with other subject areas.

[FSC guides](#) A range of highly respected guides, charts and handbooks from Field Studies Council Publications.

[Tree Pest and Disease Information Series](#) 8 information sheets (& a scene-setting Introduction) highlight key pest and disease threats to Scottish trees.

[Tree Alert](#) Its poster of priority pest and diseases, and **[Observatree](#)**, help to look out for unusual **[pests and diseases](#)**, and are a way to report unusual sightings.

[Our Forest Our Future](#) Explore the interdependence of people and forests and the vital role forests play in sustaining our environment.

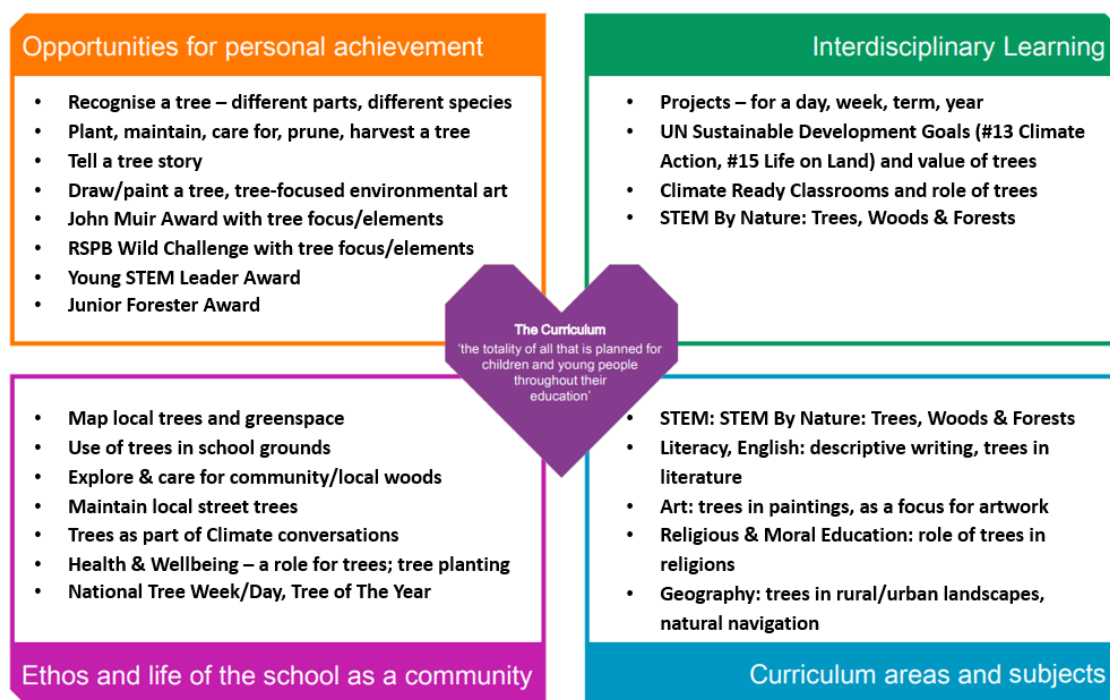
[Benefits of Biodiversity](#) Find out more about how biodiversity underpins all our lives and contributes to our wellbeing, culture and economy.

[Beyond your boundary: easy steps to learning in local greenspace](#) A resource and supporting documents to help you to find, access and use your local greenspace for learning.

The 4 contexts for learning: Trees, Woods & Forests

[Scotland's curriculum](#) can be planned for and experienced by learners across **four contexts**: Curriculum areas & subjects, Interdisciplinary Learning, Ethos & life of the school, Opportunities for personal achievement.

Learning across the four contexts with Trees, Woods & Forests



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