



An Roinn Talmhaíochta,
Bia agus Mara
Department of Agriculture,
Food and the Marine

INVESTIGATE FORESTS Teacher Training



Introduction





Green-Schools Biodiversity Theme



LEAF Themes (Multifunctional Benefits)

- Forests & Biodiversity
- Forests & Climate
- Forests & Water
- Forests & Products
- Forests & Community



The following

- Discussions / Questions
- Videos
- Activities

Can all be done with / shown to your students.



<https://youtu.be/6xw4Gf44bPE>



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Do you know...

- ✓ How much of Ireland is under trees?
 - 11% (had been up to 80% in the past)
- ✓ How much of Ireland is under native trees?
 - Currently less than 2%
- ✓ How many kms. of hedgerow do we have?
 - 220 – 250,00kms – they are vital ecological/wildlife corridors, act like linear woodlands & some are part of our old forests
- ✓ Oldest tree in the world?
 - 5000+ years, Bristle cones in White Mountains, California
- ✓ Oldest trees in Ireland?
 - Yew tree growing in the Muckross Friary, Killarney National Park (670 yrs.), or Maynooth College (700-800 yrs.), Crom Castle, Fermanagh (800+ yrs.)





Why are trees
so important?



Trees are important because they....

- Help clean the air
- Provide oxygen
- Store carbon
- Cool our planet down
- Part of water & air cycles
- Store & recycle nutrients
- Defend us from flooding
- Provide shelter from wind & rain
- Provide home & refuge to lots of wildlife communities (animals & plants)
- Provide wildlife corridors, interconnectivity for genetic diversity



Trees are important because they....

- Beautiful landscapes & special places to visit
- Wellbeing
- Provide medicine & food
- Provide building materials (boats / houses)
- Provide fuel & charcoal
- Provide fibre
- Source of names of places & people
- Connected to our history (Brehon laws)
- etc....





What
native trees
do you
know?

Native trees of Ireland

- ✓ Alder
- ✓ Ash
- ✓ Aspen
- ✓ Birch (downy)
- ✓ Birch (silver)
- ✓ Cherry (wild)
- ✓ Cherry (bird)
- ✓ Blackthorn
- ✓ Crab apple
- ✓ Hazel
- ✓ Hawthorn
- ✓ Holly
- ✓ Juniper
- ✓ Oak (pedunculate)
- ✓ Oak (sessile)
- ✓ Rowan/Mountain ash
- ✓ Scots pine
- ✓ Strawberry tree
- ✓ Whitebeam
- ✓ Willow
- ✓ Wych elm
- ✓ Yew





What non-
native trees
do you know?



Non-native trees in Ireland

- ✓ Sweet chestnut
- ✓ Beech
- ✓ Sycamore
- ✓ Sitka spruce
- ✓ Norway spruce
- ✓ Douglas fir
- ✓ Larch
- ✓ Western red cedar
- ✓ Lodgepole pine



Forests & Biodiversity (Activity)

Planting individual acorns



LEAF Activity 
ACORN GROWING GUIDE

Suitable For ALL AGES

From little acorns grow great oaks!

A short guide to help schools successfully germinate and grow on their little acorns into oaks. Planting, germinating and caring for acorns / young trees is a fantastic educational experience for students of any age. Here are a few tips to achieve success in your school!

Important points

- Acorns can be collected from September through to October from underneath Oak trees
- Acorn can be green or brown when collected. It is really important that you keep them damp and do not let the acorns to dry out! Collect them in a bag and cover them with damp leaves until you are ready to plant them. They may already have a small shoot or sprout. Be careful not to damage this whilst planting.
- Put all acorns in a sink or basin of water. The ones that fall to the bottom can be planted as they are fit for food. The ones that float can be composted. They will not germinate.

Steps to grow oak trees from acorns:

- Find coffee cups/cardboard milk cartons and cut them in half. Wash out and pierce bottom of container times with a pencil to ensure the seed does not get waterlogged. Or if you are feeling ambitious, you can use a few containers with a "viewing window/pane" in the side by cutting a hole in the side of the container replacing it with some transparent plastic from a soft drink bottle. Place the acorn right in front of panel so children will see it change as it germinates.
- Fill the containers with moist soil (you could also add compost/dead leaves)
- Place one acorn (or two depending on availability) in each pot around two inches from the surface. If the acorn has a sprout, make sure not to damage it and place the acorn on its side and gently cover it with compost/soil. Label and date them and record it in your LEAF project. Take photos and draw pictures of acorns.
- Place on a classroom windowsill which gets sun. Ensure soil is kept moist
- It is very important that the soil does not dry out at any point so check pots regularly.
- Within a few weeks the acorns will germinate, and small seedlings will be seen breaking the surface. At Christmas and Easter, the oaks should be put somewhere where they will definitely not dry out. The oaks should be a few inches tall by the summer time. At this point they can be planted in school grounds on a free bed or sent home with the students. The following autumn (once the leaves have fallen off) they will need to be transplanted into larger pots.

*"The best time to plant a tree was twenty years ago
...the next best time is right now!"*

Leaf Activity



Forests & Biodiversity (Activity)

Planting little woodlands in a box

Forests & Biodiversity (Activity)

Planting on

LEAF Activity  **LEARNING ABOUT FORESTS**
 PLANTING IRISH NATIVE BARE ROOT TREES

4 Hold the tree upright and gently push back the soil, pressing it down onto the roots. Don't compact the soil as this will stop water and air circulation, but make sure your tree is steady.

5 Put the turf back over the hole with the split either side of the young tree, grass side down. Trample down lightly with your feet.

6 For more effective weed control it is a good idea to place several layers of newspaper around your tree, wet them with the watering and cover with a layer of bark mulch to prevent it from blowing away.





Weeding
 If you have placed newspaper/mulch around your tree it could be topped up each spring in the first couple of years after planting.
 If you didn't place newspaper around your tree the vegetation should be cut or trampled down each year for the first couple of years.

Watering
 You should only need to water your trees after a very long dry spell. The trees should adapt to the site and shouldn't need additional water in normal conditions.

Tree guards
 If there are rabbits or hares in your area you may need to place a tree guard around your tree. Remove any grass growing inside the guard. Once the tree has grown to over 2m, remove the guard. If they remain intact, you can use these guards again to protect any more young trees you plant.

www.leafireland.org 

LEAF Activity  **LEARNING ABOUT FORESTS**
 PLANTING IRISH NATIVE BARE ROOT TREES

Bare root trees can be planted anytime between October and March. Before you start, take a look around your neighbourhood and work out which species of native tree are growing - this will give you an idea of what might do well in your soil. Most trees can grow in a range of soil types but some will not withstand certain conditions, the guide below will give you an idea of which trees are suitable for your site.

Damp Sites: Alder, Birch, Hawthorn, Poplar, Willow, Rowan
Capital Areas: Strawberry tree, Hawthorn, Ash, Holly, Oak, Willow, Whitebeam, Rowan, Poplar, Blackthorn
Cold, Exposed Sites: Ash, Birch, Hawthorn, Poplar, Oak, Rowan, Yew, Whitebeam
Shallow Soils: Birch, Hawthorn, Rowan, Crab, Whitebeam, Cherry, Yew
Industrial Areas: Alder, Birch, Hawthorn, Ash, Willow, Holly, Crab apple, Poplar, Rowan, Yew, Bird cherry
Heavy, Clay Soils: Alder, Birch, Hawthorn, Ash, Holly, Crab, Poplar, Blackthorn, Oak, Willow, Whitebeam, Yew
Urban Streets and Confined Spaces: Birch, Cherry, Rowan

Materials
 Native bare root trees, a spade, some newspaper, a watering can or container of water.

1 Use a spade to take a circular sod of turf out of the ground slightly wider than the roots of the tree, turn it over and split it almost in half.

2 Loosen the soil in the hole to a depth of about 15cm.

3 Look for the "collar" - the mark on the tree from where it originally started to grow above ground. This should be level with the top of the soil. If a tree is planted too deep the stem may rot; too shallow and the roots above ground will die. Put the tree in the hole and check the depth.

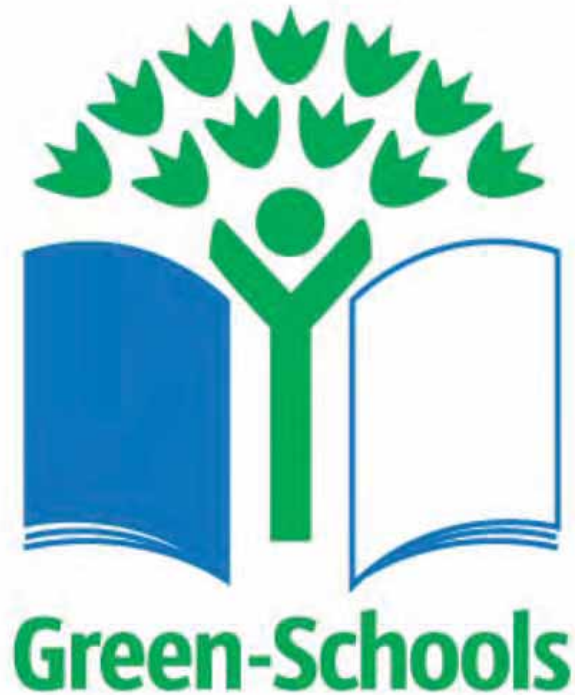




www.leafireland.org 

<https://youtu.be/lmIKtlb3yIs>

Acorn Planting & Woodland in a Box – SDG 15: Life on Land



Forests & Biodiversity (Activity)

Estimating & measuring the Age & Height of a tree

TREE HEIGHTS

Note: Most trees will only attain the maximum height in ideal conditions - this is unlikely in most cases.

| SPECIES | LATIN NAME | HEIGHT RANGE |
|-------------|---------------------------|--------------------|
| Alder | <i>Alnus glutinosa</i> | 10-20m |
| Ash | <i>Fraxinus excelsior</i> | 30-40m |
| Aspen | <i>Populus tremula</i> | 20-30m |
| Bird cherry | <i>Prunus padus</i> | 5-15m |
| Blackthorn | <i>Prunus spinosa</i> | 1 to 5m |
| Crab apple | <i>Malus sylvestris</i> | 5-10m |
| Dog rose | <i>Rosa canina</i> | 1 to 3m (rambling) |
| Downy birch | <i>Betula pubescens</i> | 5-15m |
| Elder | <i>Sambucus nigra</i> | Less than 5m |
| Goat willow | <i>Salix caprea</i> | 3-10m |

LEAF Activity

HEIGHT & AGE OF A TREE

Suitable For
AGES 10+

LEARNING
ABOUT
FORESTS

NAME: Student 1: _____
Student 2: _____

Exercise 1: Measuring Approximate Height of a Tree

Instructions:

- Student 1 stand with your back towards a tree, bend over and look between your legs, move back or forth, till you can see the top of your tree.
- Student 2 measure the distance between student 1 and the tree = (____)
Your biggest step is approximately 1 meter - count your steps from student 1 to the tree.
- Student 2 measure the length of one leg of the student 1 = (____)
- Add to the two measurements together.



Age & Height of a Tree



Forests & Biodiversity (Activity)

Sound Mapping



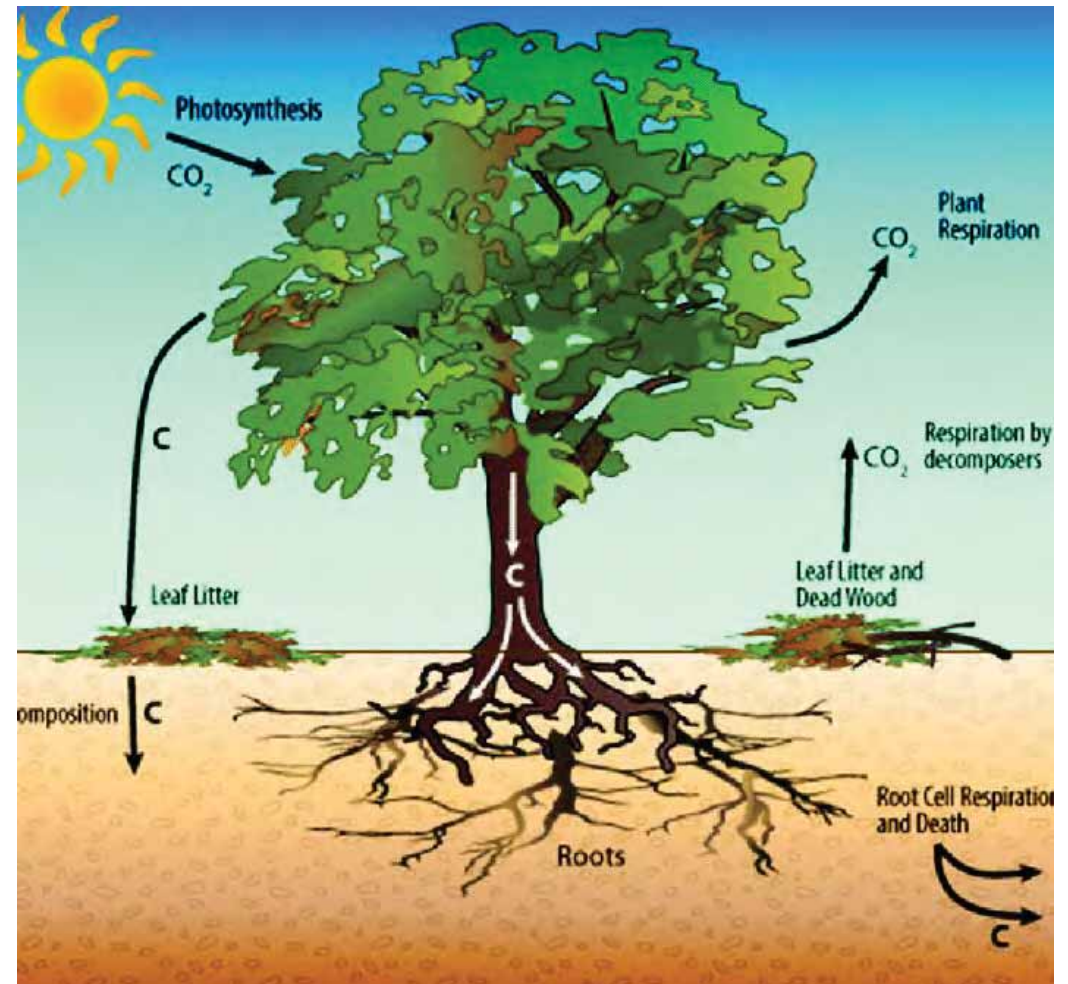
Forests & Climate

Carbon Cycle

- Carbon is constantly exchanged between different carbon sources / sinks (trees, dissolved in water, bodies of plants & animals, in the atmosphere a CO_2 , rocks, soil, fossil fuels)

Greenhouse effect

- Deforestation & burning of fossil fuels during the last 100 yrs, has increased the amount of CO_2 in the atmosphere, this extra CO_2 is trapping heat & causing the temp. to rise (0.7°C)
- Scientists say this could rise a further $1.5\text{-}6^\circ\text{C}$ in the next 100 yrs



Forests & Climate

Planting tree is one way to counter Climate Change

- Trees remove CO_2 through the process of photosynthesis & store carbon as wood & organic matter in the soil / around roots
- As long as trees grow they absorb more CO_2 than is released. When fully grown it reaches a stable level, as it deteriorates it will release more CO_2 , when completely decayed all is returned to the atmosphere – *Carbon Cycle*

Forestry & Carbon Storage

- Trees are harvested when they are mature & absorb less carbon
- Trees are planted as trees are cut down – CO_2 neutral
- Trees that are felled for wood products contain a lot of carbon, only if it is burned will the carbon be released (1m³ of wood contains carbon from about 1 tonne of CO_2)

N.B. Must be sustainably managed to be part of the solution!



<https://youtu.be/GZi-xa3Ed9E>

What Trees are Made of – SDG 13: Climate Action



Forests & Water

Trees have a cooling effect on the environment (sit under a tree)

- Shade & water transpired cools the air nearby
- ~70% of the atmospheric moisture generated over land comes from plants (as opposed to evaporation from rivers / lakes)
- Deforestation impacts rainfall patterns – air that passes over extensive vegetation produces at least twice as much rain as air that passed over little vegetation.

Trees help to make clouds

- Tiny particles like fungal spores, pollen, dust rise from the forest with the transpired water vapour. These particles are swept into the atmosphere, & make the process easier by providing surfaces for the water to condense onto. Rain can only fall when water vapour condensates into water droplets, which gather together as clouds.



Forests & Water

Forests & the Water Cycle

- The process by which water moves from the roots to every part of the is transpiration. The greatest driver of transpiration is evaporation

Trees increase the amount of water in the soil & reduce flooding

- Rain that falls on non-forested areas, flows straight into rivers, causing erosion, loss of nutrients & flooding downstream.
- Trees & their roots allow more water to drain into the soil & can help with flood defence (releasing water more slowly & absorption)
- Trees also help filter pollutants

Forests and Water

LESSON PLAN

INVESTIGATE FORESTS

Experiment 2: Investigating how trees prevent flooding and pollution

Aim:
To introduce students to the important role trees and forests play in the water cycle.

Curriculum Links:
Living Things
Environmental awareness and care

Global Goals/SDG Links:
Goal 3 – Good Health & Wellbeing
Goal 6 – Clean Water & Sanitation
Goal 11 – Sustainable Cities and Communities
Goal 13 – Climate Action
Goal 14 – Life below water
Goal 15 – Life on Land

Skills:
Research; Observing; Recording;

Background Information:
This Lesson Plan introduces teachers/facilitators to the connection between Forests & Water.


Support Sheet 1 will equip you with an understanding of how trees and water interact, with some age

Equipment:


- ✓ Experiment 2: Student Activity Sheet per group
- ✓ Experiment 2: Answers for teacher/facilitator
- ✓ Clipboards/Pencils
- ✓ Tablet/Camera to record work
- ✓ A well rooted pot plant (this represents a tree)
- ✓ A pot filled to the same height with compost/soil
- ✓ Two white basins or trays to collect the runoff from the two pots
- ✓ Measuring jug
- ✓ Stopwatch

Methodology:

- 1 Place the potted plant and the pot of compost/soil in trays/basin to catch water runoff



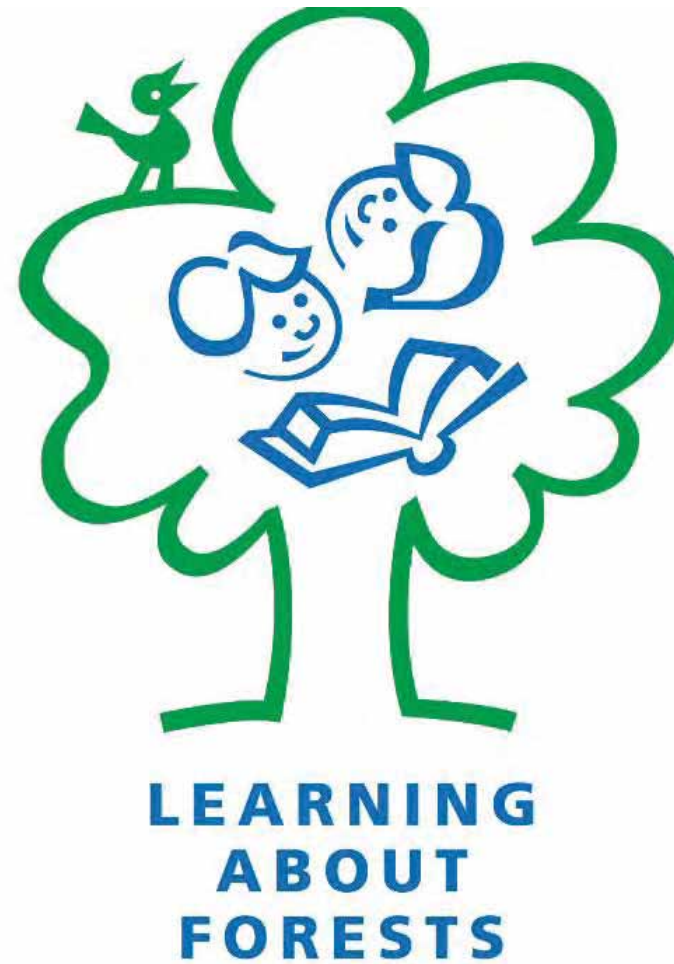
Potted Plant



Pot with Compost

https://youtu.be/Bbt_xaKKnZw

How Trees Help Prevent Flooding & Pollution – SDG 6: Clean Water



Forests & Products

- Ireland has a good climate for growing trees
- Forestry is valued at €2 billion (inc. grants, jobs, harvesting, sales etc.)
- Most of products are exported (sawn timber for construction & composite products)
- Currently, 12,000 people employed in the sector
- Softwoods can mature & be harvested in 40 yrs
- Hardwoods are harvested by 80 yrs
- Main species: Sitka, Norway Spruce, Lodgepole Pine, Larch & Douglas Fir
- Native trees are also used: Oak, Alder, Hazel, Willow, ash (Chalara)
- 3.3 million cubic metres per yr
- Irish forest plantations make up the same size as 1.6 million football fields



Discussion points

- Importing timber v's growing our own
- What species to plant & where
- Benefits of Spruce over hardwoods
- Drawbacks of Spruce over hardwoods
- Danger of monocultures
- Qualities & drawbacks of wood
- Carbon sink rather than carbon source

SEE FORESTS & CLIMATE RESOURCE SUPPORT SHEET 1



Forests & Products (Activities)

- **Activity 1:** Brainstorm what trees do & how we benefit from trees?
- **Activity 2:** Brainstorm what is made from wood in the classroom / home
- **Activity 3:** Brainstorm what jobs / careers depend on trees / wood?
- **Activity 4:** Get your students to design their own product – what tree would they use / what would it look like (draw) / how much would it cost / what would it be used for?



Forests & Community

- Forests have always been of great importance to people & their communities. Our ancestors got their food by hunting & gathering plants from the forests.
- Before people began to clear forests for farming & for land to build on, forests covered about 60% of the Earth's surface area. Today, forests only cover about 30%.
- Despite the developments of civilisation, people still depend on forests for their survival.
- Forests are of huge importance economically & environmentally.



Forests & Community

- Communities around the world are linked to forests through products and associated livelihoods, we encourage schools to explore these links.
- Engage with local communities & share their knowledge and expertise. Find out about your local forest / history.
- We also encourage schools to examine the communities at risk of losing their homes due to illegal logging & agriculture. Investigate ways of alleviating poverty through sustainable forestry, while improving livelihoods & creating green jobs.
- Finally, remember that the natural beauty of the forest offers a special source of enjoyment to all communities.



Forests & Community (Activity)

Investigate how we benefit from forests in our daily lives

- **Curriculum Links:** Living Things & Myself and the Wider Community
- **SDG - 11, 13 & 15**
- Find out where your local woods is & carry out some research, ask grandparents / local heritage specialist about the woods (e.g. some woods were cut for charcoal and / or ship building)



Questions?

