Cyfoeth Naturiol Cymru
Natural Resources Wales

Activity plan

Treemendously Thirsty!

Key Stage/Age group	**KS2/3**
Time needed for activity	**30 minutes**
Location	**Outdoor environment with available trees**

Context

This activity plan highlights the importance of sustainably managing our natural resources, focusing on how much water trees need to live and grow.

Natural Resources Wales' purpose is to pursue the sustainable management of natural resources in all its work. This means looking after air, land, water, wildlife, plants and soil to improve Wales' well-being, and provide a better future for everyone.

Curriculum links

	ESDGC - Natural environment	Geography	National Literacy and Numeracy Framework
KS2	• Develop respect for landscapes, habitats and living things • Develop a fascination with and respect for the natural world	• Investigating - measure, collect and record data through carrying out practical investigations and fieldwork	**Please note this activity will also help you deliver multiple aspects of the national Literacy and Numeracy Framework and Digital Competency Framework**
KS3	• Show informed concern for the quality of the natural environment near and far • How human activity changes local and global environments	• Investigating - observe, measure, extract and record data through carrying out practical investigations and fieldwork • Fieldwork to observe and investigate real places and processes	

Objectives

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

- work out the daily water needs of a chosen tree using measurement and calculations
- explain how trees take in water and lose water into the environment

Equipment and resources

- **Worksheet – Treemendously thirsty!**
- **Clipboards**
- **Pencils**
- **Tape measures**
- **Calculators**

What to do

- As a group discuss what trees need to stay alive, thrive and grow. Like most species on earth, trees need water to live, with more than 50 percent of a tree being made up of water.
- Consider how trees take in water. Trees drink water by using their tiny hair-like roots to carry water from soil. Water enters the root loaded with minerals from the soil and is carried up the tree's trunk through the inner bark's xylem, all the way up to the leaves. Trees supply leaves with water because of a decrease in water pressure at the upper, leaf-bearing parts called crowns or canopies. This difference in water pressure "lifts" the water through the tree.
- Discuss how trees use the water they take in. Ninety percent of the tree's water is eventually dispersed in to the atmosphere through leaf stomata as water vapour, but water is also lost through stems, flowers and roots. The evaporation of water from trees out into the Earth's atmosphere is called transpiration.
- Discuss what variables may impact on how much water a tree needs to "drink" in a day and during the year ahead. The amount of water a tree needs to drink depends on a range or things including:
    - Species
    - Location
    - Space
    - Soil
    - Seasons
    - Temperature
    - Weather

For example, on hot, dry days a tree needs to drink more. Trees drink and lose virtually no water on wet, cold, winter days, so water loss is directly related to temperature and humidity. The tree only needs to keep about 10% of the water it drinks to ensure its health and growth.

- In pairs or small groups ask your learners to calculate how much water a chosen tree needs to drink using the Worksheet - Treemendously thirsty!

Measure circumference

1. First, measure the circumference of the tree trunk at chest height (1.3 metres or 130cm up from the ground). Place your finger on the tree next to the 1.3 metre or 130cm mark.
2. Circumference is the measurement of distance all the way around a circle. To measure the circumference of the tree, use the measuring tape to measure around the tree trunk at the 1.3m mark.

The circumference of the tree is: _____ **cm**

Calculate the water the tree drinks per average day.
(40 litres per 2.5cm of trunk diameter)

Circumference	÷ 2.5cm	x 40	Litres per day

Key questions

- **What do trees need to stay healthy and grow?**
- **What do trees use water for?**
- **What might affect how much water a tree needs to drink in a day/during the growing season?**
- **How does a tree's water uptake effect flooding?**

Adapting for different needs/abilities

Less able

- Go through the worksheet step by self demonstrating what to do on a given tree before giving out the worksheets to learners.
- Go through worksheet as a group, leader to fill it in.
- Break down each stage of the worksheet and check results and understanding before moving on to next stage.
- Use calculators.

More able

- Complete a sheet for several different trees in the locality and discuss findings and differences.
- Students to work through worksheets independently.
- No calculators to be used.

Follow up activity/extension

- Discuss possible impacts that humans could have on the water uptake by trees.
- Discuss the additional information below.
- Investigate how transpiration and other tree related processes work.
- Explore how trees support water quality, soil quality and flood prevention.

Try our other Trees and Woodlands activity plans:

- Activity plan - Seed dispersal
- Activity plan - Carbon calculator
- Activity plan - How a tree works

Additional information

A mature oak tree can absorb 227 litres of water in a day, or the equivalent of 689 cans of cola!

Transpiration cools trees and the organism around it. Transpiration also helps to cause that massive flow of mineral nutrients and water from roots to shoots which is caused by a decrease in hydrostatic (water) pressure. This loss of pressure is caused by water evaporating from the stomata into the atmosphere and the cycle continues.

A large oak tree can transpire 151,000 litres per year.

Useful terms

- **Condensation** - the process of changing water vapor in the air to a liquid form
- **Transpiration** - the way a tree breathes through gas exchange and beneficial loss of water
- **Evapotranspiration** - movement of water from plants or from soil by both evaporation and transpiration
- **Groundwater** - any water naturally found under the ground
- **Infiltration** - the process of water soaking into the soil
- **Photosynthesis** - the process plants use to make their food
- **Leaf stoma** - an opening or pore on the underside of leaves that is used for gas exchange
- **Interception** - precipitation/rain that does not reach the soil, but is instead intercepted by the leaves, branches of plants, leaf litter and the forest floor.

Looking for more learning resources, information and data?

Please contact: **education@naturalresourceswales.gov.uk** or go to **https://naturalresourceswales/learning**

Alternative format; large print or another language, please contact:
enquiries@naturalresourceswales.gov.uk
0300 065 3000