

How much carbon have the trees on the school site sequestered?

Context	Trees capture (or sequester) carbon from the air through the process of photosynthesis. Yet different trees will sequester different amounts of carbon, depending on their species and their size. Students can calculate how much carbon is (roughly) held in trees on their school site and to what extent this offsets the carbon footprint of the school.		
Length of time	1 lesson	Suitable locations	School grounds
Equipment needed	Tape measure; clinometer		
Suggested delivery			Objectives and Key Skills
A number of measurements are needed to be collected in the field before carbon content can be calculated. Tree type or species Students should ideally be able to identify the species of tree they are measuring. However, if the fieldwork is taking place in winter or if students are not confident in this aspect, they can more simply record whether the tree is coniferous or deciduous. Tree height Students should stand at a distance from the tree and measure the angle from their eyeline to the top of the tree using a clinometer. Without moving, the distance between their feet and the base of the tree should also be measured and recorded. Using these two measurements (along with knowing their own height) students can calculate the height of the tree. Tree size Using a tape measure, students should measure the circumference of the tree's trunk at chest height. This allows them to find the radius (radius = circumference/2π). The tree is assumed to be the shape of a cone for the purpose of carbon content calculations, so the volume (V) of the tree is calculated as $V = \pi r^2 \times (\text{height}/3)$. Tree biomass and carbon content The biomass of the tree relies on knowing a measure of organic density known as the tree's specific gravity. The specific gravities of different species can be found in the link below or students can use the following values: Coniferous trees = 0.39 Deciduous trees = 0.53 The biomass value (in dry tonnes) is the volume x the specific gravity value. Carbon makes up roughly half of the biomass value, so the biomass value is divided by 2 to find the carbon content.			- Understanding the many assumptions made about tree structure in the tree calculations – appreciating that the figures produced will only ever be a rough indicator of carbon content. - Understanding the complexity of off-setting and whether this is a valid activity. - Mapping the school site using GIS to show where the greatest carbon storing trees are.
Potential risks to consider	- Some students may have adverse reactions to certain plants they come across in wooded areas (such as bracken / ferns) - Avoid doing this kind of activity in high winds as dead branches or low hanging branches may become hazardous as they move around.		
Possible follow-up activities	It may be possible to find out how much energy the school site uses in a year and the carbon footprint of providing this energy. Students can then work out how much of the school site would need to be forested (and how large those trees would need to be) in order to offset the school's energy usage.		
Useful links	The Island Geographer - Specific Gravity of different tree species Woodland Trust Tree identification app		