

# Theme 8: Trees

Teacher guide - Ages 11-14

## Preparation

Review the material and watch the videos. Do some preparation on the topic. For the Outdoor Experience some materials are required. Feel free to add any resources or materials you have available to enrich the lessons. Also check the Introduction lesson Teacher guide for useful tips and suggestions for preparing and giving the lessons within a theme.

## Learning goals

The students ...

- know how trees 'work'
- learn the function of trees and forests
- know how trees are a part of an ecosystem
- know what problems deforestation creates
- know why trees are important for our climate
- learn what they can do themselves to help the climate
- want to inform others about what they have learned

## Key vocabulary

- hectare
- evaporation
- the atmosphere
- carbon dioxide CO<sub>2</sub>
- needleleaf trees
- broadleaf trees
- forest fire
- deforestation
- recover
- burning / incineration
- cooling
- to recycle
- biomass
- palm oil
- photosynthesis
- the ecosystem
- biodiversity
- the organism
- erosion

## Introduction

[Slides 3-4]

Look at the picture. Ask who walks or cycles regularly in nature, for example in a forest, on the beach or in a park. What is their favourite spot?



One of the reasons why we enjoy walking in nature or a green environment, is that it gives us a positive feeling. This lesson is about trees and forests. *We are so used to trees that we often don't pay attention to them. Yet trees are important and special! Trees have a great influence on life on Earth.*

Allow the students to think of their own description or definition of a tree. A tree is also a plant. How are they different from plants? Inventory some ideas and discuss them together. After this, discuss the learning goals of this theme.

## Instruction

[Slides 5-10]

Look at the picture of the tree.

*Trees are woody plants with a crown (the branches with leaves). The crown is the whole set of leaves.*

Then let the students name the different parts of the tree anatomy. Click on the cards to show the answer.

Discuss with the students what a sprout and a seedling is. *Here you first see a sprout: a young plant, coming from the seed. As soon as the first leaf appears, you call it a seedling. A seedling is a miniature plant or tree grown from seed.*

Watch the video.

*When trees are mature, they have a minimum height of 5 meters. The maximum height depends on the type of tree, but also on the conditions in which the tree lives. There are trees that can grow as tall as 100-120 meters (for example, in North America).*

*Trees are not only the largest and tallest of the living organisms on Earth, but also the oldest.*

Complete exercise 1.

*This tree in California is almost 5,000 years old and is called Metusalem, named after a man in the Bible who is said to have grown very old.*

[Slides 11-14]

There are lots of different types of trees. What types of trees do the students know? Discuss the examples of needleleaf and broadleaf.

Many broadleaf trees lose their leaves in the fall. Almost all conifers keep their needles when it gets cold and thus remain green all year round.

*In temperate climates - winter not too cold, summer not too hot - some trees lose their leaves in the fall. In tropical areas, many tree species remain green, but some trees lose their leaves in the dry season.*

[Slides 15-20]

*What is the function of trees? Why are they so important?*

Look at the picture on the interactive whiteboard:

*The leaves of the tree absorb sunlight and CO<sub>2</sub>. Photosynthesis takes place in the leaves of trees. Water + carbon dioxide + light (energy) = glucose (sugar) + oxygen*

*The coarse roots spread out widely in the soil. The large roots make the tree stand firm. The network of finer roots (at the end of the coarse roots) take up water and nutrients for the tree.*



*The roots have to transport water from the soil all the way up to the leaves. That's against the force of gravity! The tree needs a lot of energy to transport the water.*

*Most of the energy is used to evaporate water through the leaves. Evaporation keeps the air moist. The leaves release oxygen into the air in the process. Trees are hard workers!*

Complete and discuss exercises 2 and 3.

[Slides 21-23]

*When is a forest actually a forest?* Complete and discuss exercise 4.

*In addition to trees, the forest is home to plants and flowers, animals and insects. Trees stand alone or in groups. But a group of trees is not automatically a forest! A forest covers at least half a hectare of land (the size of an entire football field) to be called a forest.*

Complete and discuss exercise 5.

*In Europe most of the forests have been planted and very few primeval forests left.*

[Slides 24 & 25]

*An ecosystem is made up of all of the living and nonliving things in an area. This includes all of the plants, animals, and other living things. And also includes nonliving material, for example: water, rocks, soil, and sand. A swamp, a prairie, an ocean, and a forest are examples of ecosystems.*

Discuss the question in exercise 6 and inventory the answers.

[Slides 26-29]

*A city with more greenery provides cooling, shade and is healthier for the people who live there. People often get a positive feeling from having green around them.*

Watch the film.

*Trees provide oxygen, cooling and biodiversity. They take in CO<sub>2</sub>. In addition, trees capture fine particles and create a healthy atmosphere!*

Complete and discuss exercise 7. Then complete exercise 8.

[Slides 30-33]

*People cut down and burn forests, for example, for agriculture or to build houses. This is necessary but as a result, too many forests are disappearing. Why is that bad?*

*Burning fossil fuels is the biggest problem with CO<sub>2</sub>. Because of deforestation more CO<sub>2</sub> remains in the air and the Earth warms up even more.*

Trees and forests are good for the Earth. But there is a big problem:

*there are fewer and fewer forests on earth. Nearly half of all primeval forests on earth have already disappeared!*

*Too many forests close by and far away (like the Amazon forest) are being cut down or disappearing due to forest fires (like in Australia and California). Forest fires and logging releases a lot of CO<sub>2</sub>. This is a big problem for the whole world.*

Watch and discuss the news video.

[Slides 34-36]

*Why are so many forests in the Amazon being cut down? Who pays the price for this?*



*One of the problems is that animal species are threatened when forests disappear. As a result, there is less biodiversity. Biodiversity is about the variety of living organisms (for example, animals and trees) found in a particular area.*

Discuss the different reasons for deforestation.

- *As the world's population continues to grow, there is an increasing demand for wood and products made from wood, such as paper.*
- *Another major cause of deforestation is the greater need for agricultural land (for example, for livestock).*
- *There is also an ever-increasing demand for food, which must be produced in the cheapest way possible.*
- *Other reasons for deforestation are mining and plantations (e.g., soya to make animal feed) and recreation.*

*According to WWF, 95% of wildfires in Europe are caused by negligence. In (sub)tropical areas, fires are often the result of slash and burn: a method of agriculture in which land is set on fire to make it fertile.*

### **A solution**

[Slides 37-39]

The fewer forests there are, the more CO<sub>2</sub> that remains in the air and therefore a greater risk of global warming.

- *We should therefore all emit much less CO<sub>2</sub>: use the bicycle more often, fly less, avoid wasting food and buy fewer items.*
- *But we must also take better care of the forests and plants in our environment: cut down fewer trees and restore forests.*

Watch and discuss the video.

*Planting trees is one of the solutions to combat climate change. Of course, planting trees is fine. But, you must not see planting a tree as compensation for your own energy consumption. Above all, we must emit less CO<sub>2</sub>. And of course there are rules. You can't just plant a tree anywhere. Planting trees is good, but it has to be the right tree in the right place!*

### **What can you do?**

[Slide 40]

*A greener neighbourhood is healthy!*

*How can you make your neighbourhood (schoolyard, home, street) greener?*

The students write down and exchange their ideas. For example, plants on your balcony, in the garden or by your front door.

## **Suggested related themes**

The lessons can be used independently of each other. Preferably, the lesson on climate change should be done prior to this lesson.

The theme of trees and forests ties in with the theme of climate change: trees help combat climate change. The lesson also connects to other themes such as water, air, waste and recycling. A follow-up is the theme 'Planting trees' in the final lesson.

Extra info: *What is CO<sub>2</sub>?*

*The layer around the Earth consists of greenhouse gases. Such as CO<sub>2</sub>, but also methane*



*and water vapour. These gases keep some of the heat from the sun within the atmosphere. Without these gases, it would be much too cold on Earth. But mankind also emits greenhouse gases, for example from factories and cars. And that's where things go wrong. More and more CO<sub>2</sub> is being released into the atmosphere and this is causing the Earth to warm up too much.*

## Worksheet

[Slide 41]

Students complete the worksheet. Note: A forest does not work exactly as a pair of lungs, but the comparison is often made (oxygen).

## Practical assignment

[Slide 42]

Write a blog or make a vlog about everything you have learned about trees and climate change. The following points must be included:

- Why are trees (and forests) so important?
- What is the problem?
- What are the possible solutions?

Students share their vlog (blog) with friends and family.

## Closing

[Slide 43]

Discuss the worksheet and the learning goals. Let the students show their photosynthesis drawing to each other and explain their drawing. Make an appointment with the students about how and when they can continue working on their practical assignment.

## Outdoor experience

[Slide 44]

Nature is everywhere. Go outside, in your garden, in your neighbourhood or to a forest or park. Stand still by a tree. Take notes or a photo:

- *What kind of tree is it? (Look at the leaves. )*
- *What does the bark look like?*
- *What kind of leaves does the tree have?*
- *What else do you notice?*

Collect as much information as possible about this tree species.

Have the pupils share their findings with their classmates.

## Extras

[Slides 45 - 53]

**Hangman:** Tree vocabulary

**Game:** Tree tag



You can play this game in an area with some trees, e.g. a park or a wood. Depending upon the number of trees, agree upon the number of students that can stand by a tree. It is important that each student can touch the tree trunk with at least one hand. Then choose who is 'it'. Explain that the signal that everyone has to change trees is when you clap or whistle. You are only safe when you are touching a tree. If the maximum number of students is standing by a tree, the student has to find another tree. The student who is 'it' tries to catch all the students who are not standing by a tree. Students who have been tagged come and stand by you.

When the students have grasped the game, you can add the following variations:

- Variation 1: start with more than one 'it' (tagger)
- Variation 2: Students that have been tagged, become 'it' too
- Variation 3: When a maximum of three students is standing at a tree, if a fourth student arrives, the student who has been standing there the longest needs to find another tree.

### Exercise 1: Statements

Students respond to statements:

- I am happier with new things than with a green environment.
- Tree hugging reduces stress.

### Exercise 2: Paper

*It seems as if we use our tablets and smartphones more. Yet, we still use a great deal of paper. How can you reduce your paper use?*

Discuss some examples with the students. For example, using less paper, printing on both sides, using recycled paper, sending a digital card - even though a 'real' card is considered nicer and more personal. It is realising that the small changes that you make do count. Tip: do you have to cover your school books? Use 'used' paper, such as magazines.

*Fun fact: Have you heard of elephant grass? It is a grass that is planted to make paper, among other things.*

### Exercise 3: (used paper) recycling (papier mâché)

Some people go the extra mile. Watch the film. Can the students think of useful things they could make with papier mâché? Why not let the students go to work making things with paper-mâché? Have them use bowls or other shapes on which they can make the paper-mâché.

Extra films and songs (in the interactive whiteboard lesson).

## Materials Required

You could bring along various leaves, twigs and so on to examine and compare them with the students. The additional game task is best done in a place in the park or forest. For the extra task 3 you might need things to make papier maché from, for example containers or shapes to stick the paper maché onto.



# Theme 8: Trees

Answer key - Ages 11-14

## Exercise 3

Write down at least 3 problems.

*CO<sub>2</sub> problem, the forests and trees that form them, important because they are home to many sorts of organisms, both plants and trees.*

## Exercise 4

What is said about forests?

*A. They are the lungs of the Earth.*

Why do you think that?

forests and primal forests are called the lungs of the Earth: without lungs - therefore without forests - life would not be possible!

