Food and Agriculture Organization of the United Nations

THE STATE OF THE WORLD

DISCOVERING FORESTS

LEARNING GUIDE
(age 10–13)

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Food and Agriculture Organization
of the United Nations
Rome, 2018

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The State of the World publications cover important global themes that are core to the mission of the Food and Agriculture Organization of the United Nations (FAO) – eradicating hunger, food insecurity and malnutrition; eliminating poverty and driving forward economic and social progress for all; and ensuring sustainable natural resources management.
FAO is the UN agency leading international efforts to defeat hunger; it is also the international organization with the most comprehensive vision of the state of our world.

This learning guide draws from the FAO report *State of the World's Forests*.

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DISCOVERING FORESTS

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Introduction

When we drink a glass of water, write in a notebook, take medicine for a fever or build a house, we do not always make the connection with forests. And yet, these and many other aspects of our lives are linked to forests in one way or another.

But what exactly is a forest? Who do they belong to and what can we take from them? Should we worry about their future?

You cannot learn about forests just from a book. You have to investigate and explore. However, this booklet will help you answer some of these questions, backing up your observations, experiments, games, writing, artwork and other activities.

MODULE 1

What is a forest?

I wonder

Ask several people what a forest is: their answers will probably all be different.

That is because forests are busy and complex living worlds.

In this module, become a forest explorer and expert by carrying out experiments outside and inside the classroom and using the information that follows.

Investigate

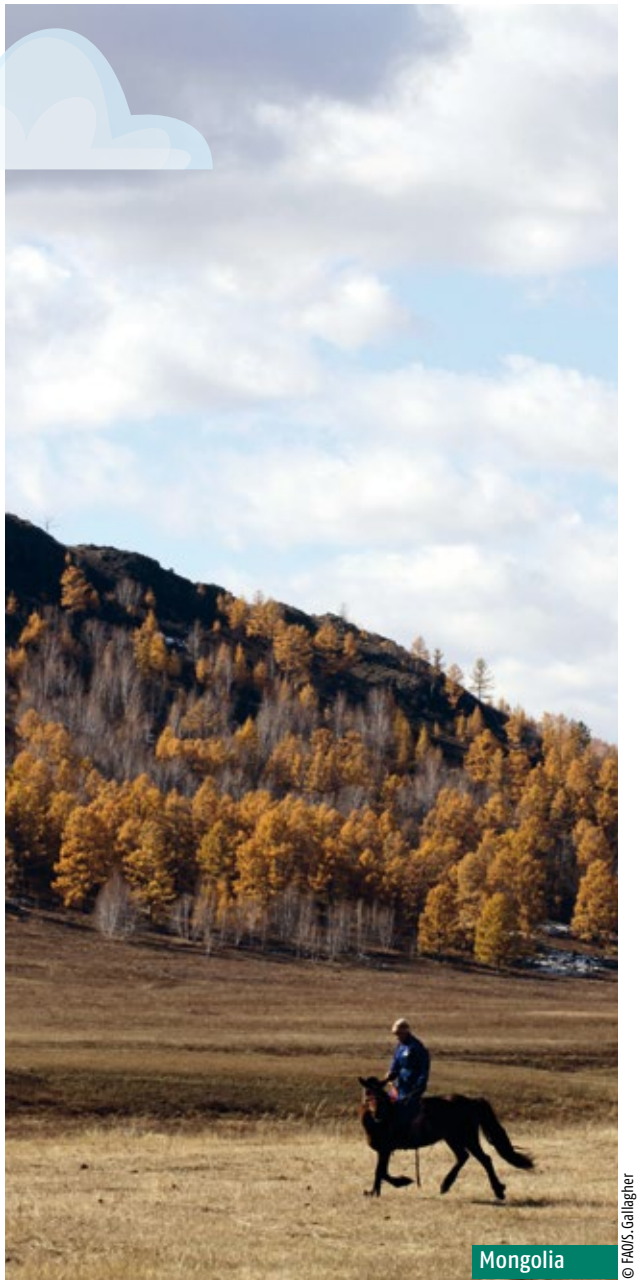
A world of forests

Let's travel. There are **so many kinds of forest** around the world: **tropical dry forests** (in regions with a dry season), **sub-tropical dry forests** (in places with mild winters and dry summers), **tropical rainforests** (in hot and humid tropical climates), **temperate broadleaved deciduous forests** (in milder humid climates like those of Europe and North America), **mountain forests**, **mangrove forests** (found along coastlines), **boreal coniferous forests** from cold climate lands and more.

Here are several landscapes from around the world. Are they all forests? Using tracing paper, draw lines over each photograph to help you think about your answer.

Niger

© FAO/G.Napolitano



Mongolia

© FAO/S.Gallagher

Thailand

© UN Photo/M.Wild

Philippines

© FAO/N.Celis

Democratic Republic of the Congo

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Tunisia

© FAO

Among the forests that you found, are they all the same? What makes them similar? Different?

Egypt

© FAO/R. Messori

Document it

Forest have different layers

Take a look at forest layers and their **diverse plants and animals**.

FOREST FLOOR: The largest forest animals often live at ground level. There, below grass and dead leaves is also the litter: it is a carpet on top of forest soils, where fungi, insects, worms and small organisms live and break down waste materials to create new soil. **UNDERSTOREY LAYER:** This darker and cooler environment is found under the leaves but above the ground. Plants in this layer have adapted to live in the shade of larger trees, and include shrubs, small and young (or sapling) trees. This layer may be very damp. Tree trunks pass directly through this layer. It can also be home to reptiles, insects and other small organisms. **CANOPY LAYER:** The upper parts (or crown) of the trees, with their leaves, provide protection and shade to the rest of the forest. This layer is usually full of life. In a tropical rainforest it includes: insects, birds, reptiles and mammals. It takes trees that can grow to at least 5 metres for a forest to be a forest, and the canopy must cover at least 10 percent of the surface. **EMERGENT LAYER:** Its giant trees poke out much higher than the trees from the canopy layer just below. It is usually home to many birds and insects.

Several combinations of layers are possible, leading to many **different types of forest ecosystems**.

Fill in the name of each layer.

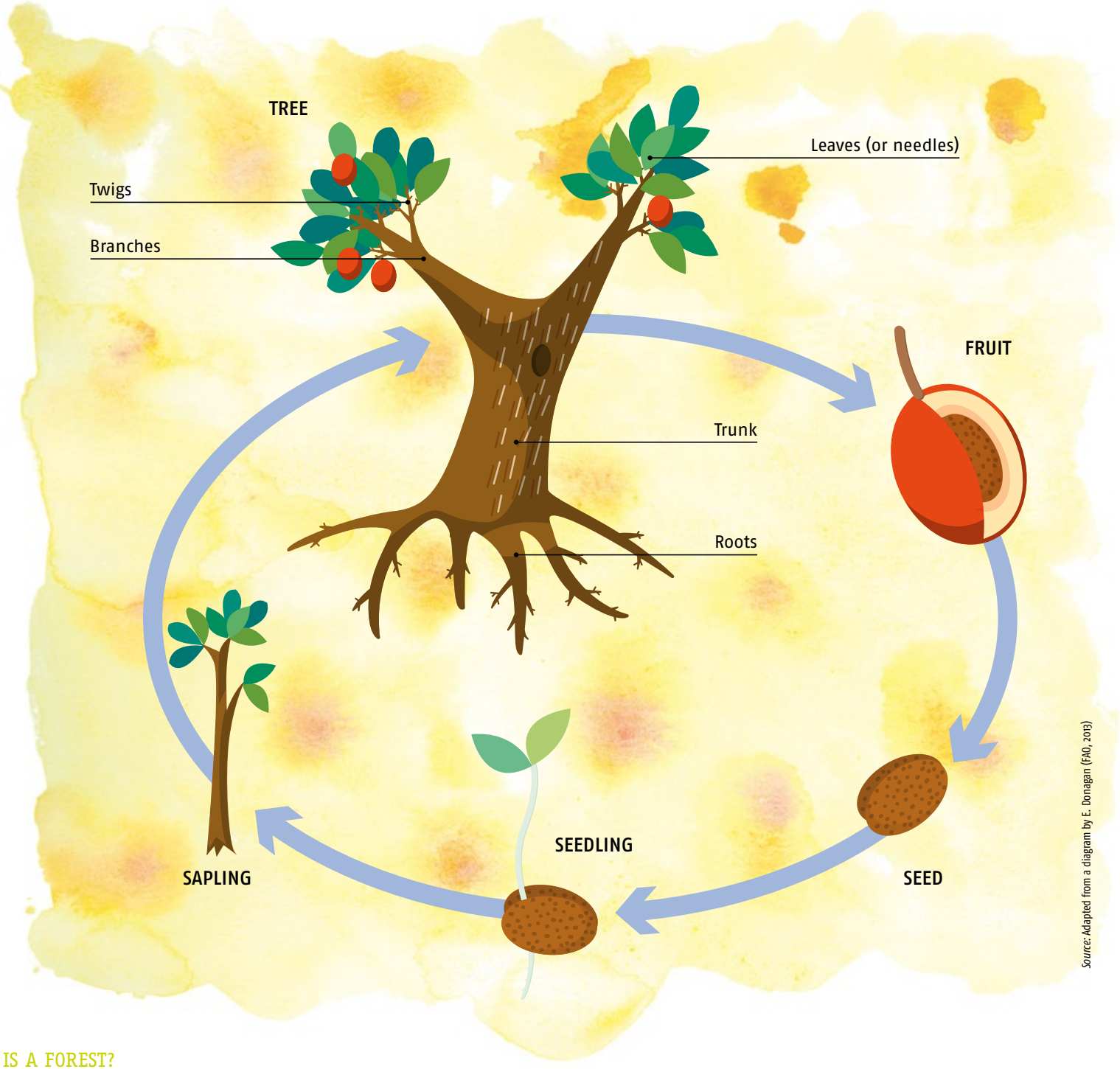
What would happen if a layer disappeared?

Source: Based on a diagram by E. Donegan (FAO, 2013)

Tree life cycle

Take a look at how trees grow and develop and new trees are formed.

Do all trees bear fruit? How can their seeds travel so that the new tree has enough space to grow?

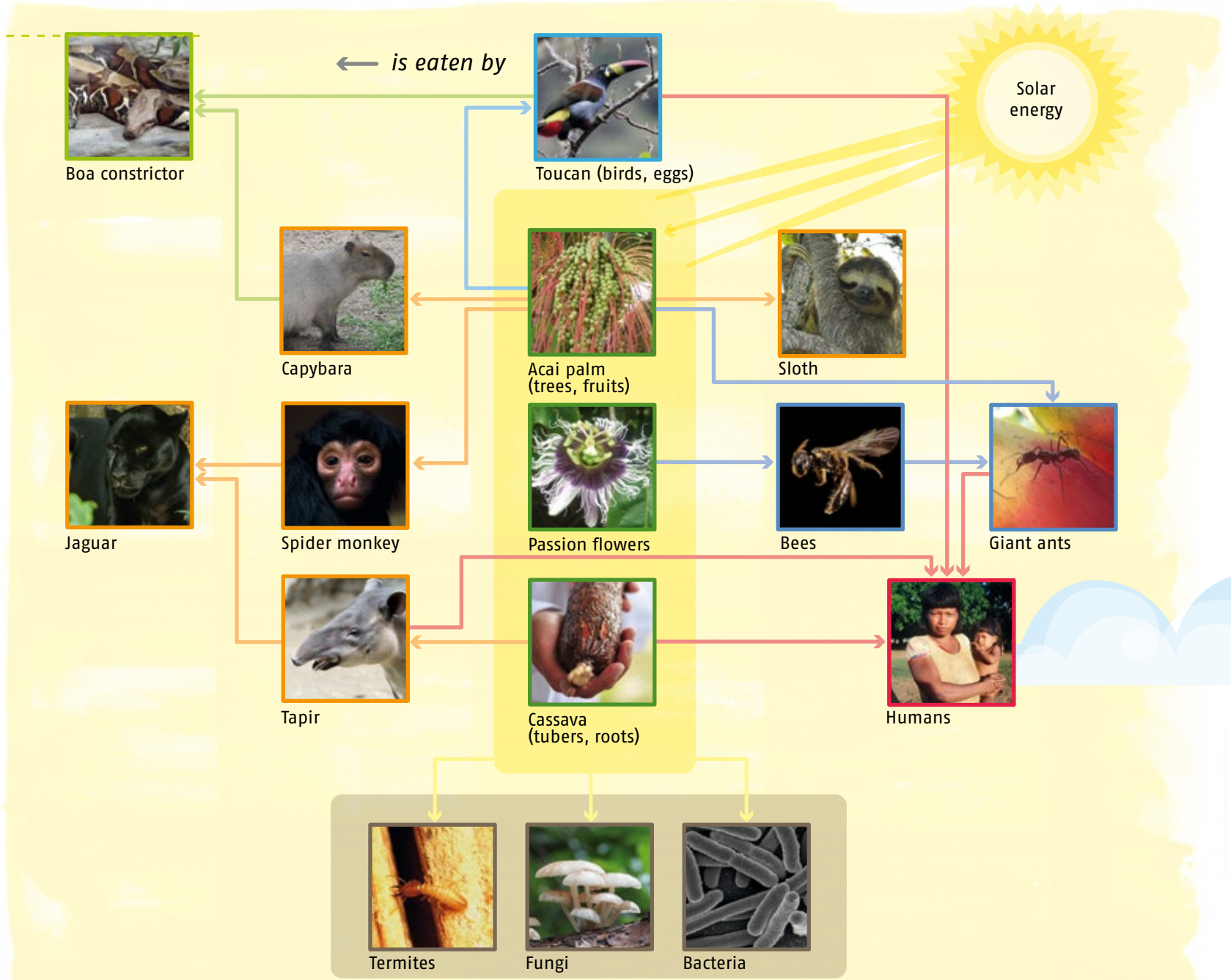


Source: Adapted from a diagram by E. Donagan (FAO, 2013)

The forest food web

Forest species all depend on one another.

What happens if one component of the web is missing?

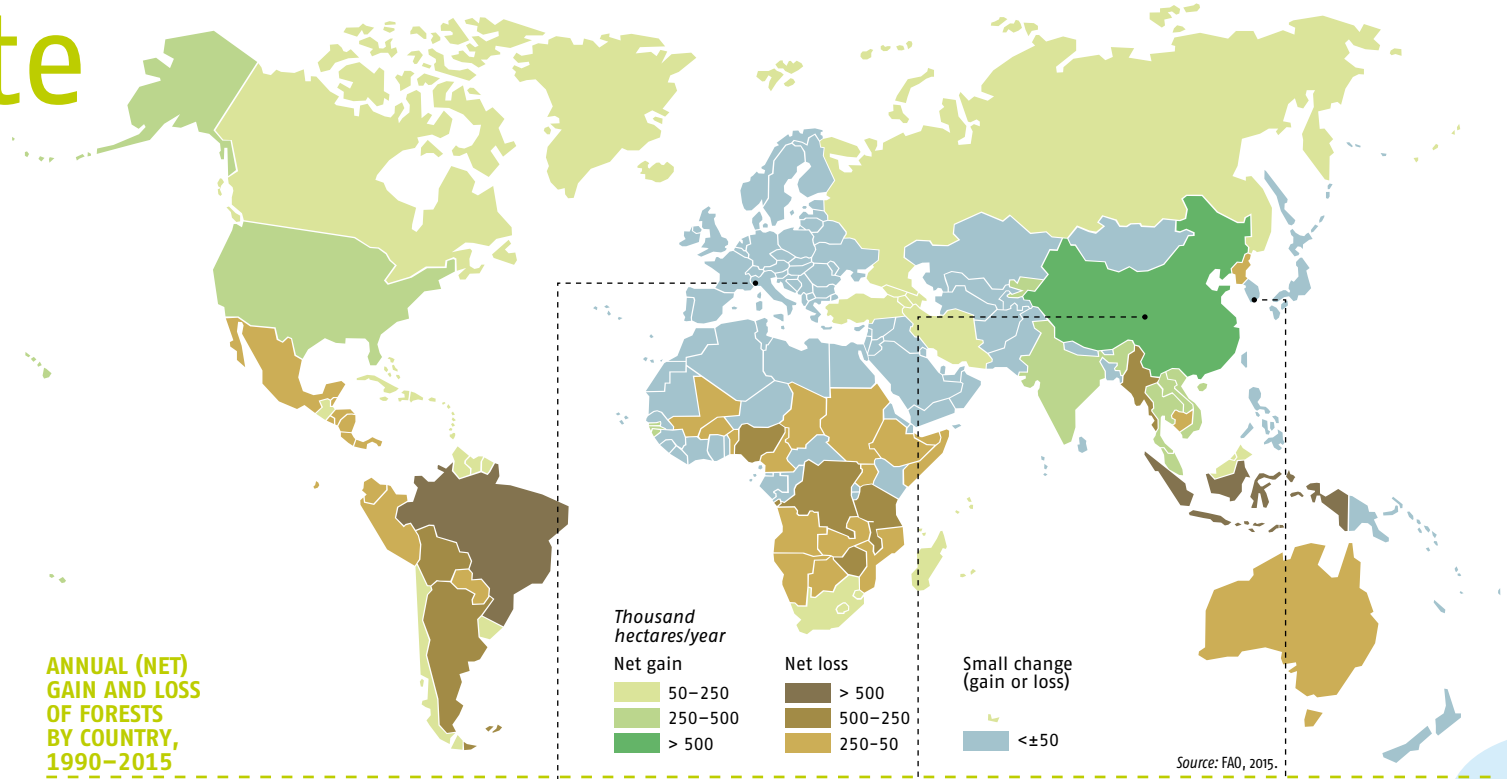


Investigate

Do forests change?

Take a look at the chart and photos below.

Are the forests near you changing? What makes them change?



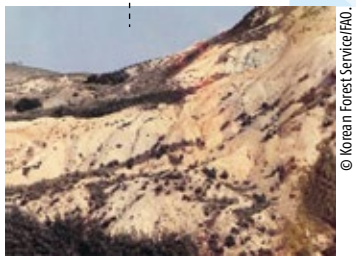
ANNUAL (NET) GAIN AND LOSS OF FORESTS BY COUNTRY, 1990–2015

Before reforestation

After reforestation

© Biogeoscience/R. Fuchs

© WRI Restoration Diagnostic/J. Liu & B. Hiller



© Korean Forest Service/FAO.

Reforestation in Europe, southern France

Reforestation in China 2000–2008

Reforestation in Republic of Korea 2001–2008

THAT'S SERIOUS

Understanding and keeping track of the ways that forests change

Forests give us **clean water and air, plus healthy soils**, which are all important for our environment. They are also important for the things they can provide [products], such as wood, foods and medicines, as well as for other ways in which people use them, for example as places to play, run or relax during their free time. That is why we need to make sure forests stay healthy and sustainable so that we can continue to use and enjoy them in the future.

To do this, we have to **measure how they are changing** and why. Every five years, scientists from the Food and Agriculture Organization of the United Nations (FAO) work with people all over the world to study forests and publish their results in a report, the *Global Forest Resources Assessment*. In 2016, FAO found that the area covered by forests in the world was still going down but more slowly than before – and in some parts of the world forest area was even increasing.

FAO also publishes the *State of the World's Forests* every two years, a report that takes a close look at a specific theme or problems, to help people, such as politicians, take the right decisions for the health and sustainability of the world's forests. *State of the World's Forests 2016* gives **ideas and examples about how to manage forests and agriculture together**, so that people all around the world can grow the food they need without destroying forests.

What did we learn?

Forests are organized into **layers**, dominated by larger **trees**. All living forest species **depend on each other**, but animals and plants are also influenced by non-living (or abiotic) elements like light, wind and water. Because they are all connected, they form a system (called the **ecosystem**). Forest ecosystems are home to many diverse species (this diversity is known as **biodiversity**). The balance between these species can be fragile – when visiting a forest you might upset it if you collect things without thinking. Forests change over time and for many reasons, including human activities. They are an important part of life on Earth, and the people who manage trees and forests – and in fact everyone who uses them – must to make the right choices so that they can continue to support life – plant, animal and human – now and in the future. This is called "sustainable forest management".

Optional

Expert activity – Tree inventory

➽ On forest plots of 85 x 85 cm, locate trees bigger than 10 cm in diameter (width) and identify tree species.
Fill in the table and compare the richness in species (how many different species are present) and their evenness (i.e. a comparison of the numbers of individuals for each species) with other plots nearby – and then with plots from two types of temperate forests included on the next page.

➽ Which forest has more diversity? What would happen if there was only one type of forest?

1A

FOREST DIVERSITY DATA SHEET

Which plot are you studying? _____

SPECIES DIVERSITY

Tree species	Number of trees more than 10 cm in diameter

Total number of trees _____

Richness: A measure of the number of tree species in an area.

More tree species = Greater richness

How many species of trees?

1 2 3 4 5

Evenness: A comparison of the number of trees of each species.

Equal numbers of each species = Greater evenness

Even | | | | | | | Uneven

Structural layer	Is the layer present?	List wildlife, signs of wildlife, habitat, food sources.
1. Overstorey	Yes No	
2. Understorey		
A. Trees	Yes No	
B. Shrubs	Yes No	
C. Forbs	Yes No	

Forest diversity data sheets are adapted from: LEAF Wisconsin. LEAF Guide 7-8 Unit, Field enhancement 3: Forest diversity in LEAF Wisconsin K-12 Forestry Lesson Guide. © University of Wisconsin-Stevens Point. USA. (available at https://www.uwsp.edu/cnr-ap/leaf/SiteAssets/Pages/7-8-Wisconsin-Forestry-Lesson-Guide/7-8FE3.pdf)

2A

FOREST DIVERSITY DATA SHEET – PINE PLANTATION

SITE DESCRIPTION

Imagine tall red pine trees towering 10 metres above your head. You can hear the wind rushing through the needles in the tops of the trees swaying above you. All around you are straight tree trunks that are nearly all the same size. You notice that there aren't many branches around you; most of them are high up in the trees. On the forest floor is a thick, soft layer of pine needles with cones and twigs scattered around. In patches of scattered sunlight, there are a few small pines growing. You are in a 25- to 35-year-old pine plantation.

SPECIES DIVERSITY

Tree species	Number of trees more than 10 cm in diameter
Red Pine	13

Total number of trees 13

Richness: A measure of the number of tree species in an area.

More tree species = Greater richness

How many species of trees?

(1) 2 3 4 5

Evenness: A comparison of the number of trees of each species.

Equal numbers of each species = Greater evenness

(Even) | | | | | | Uneven

3A

FOREST DIVERSITY DATA SHEET – MIXED FOREST

SITE DESCRIPTION

All around you are plants of various heights. It is hard to see all the tree trunks clearly through the green leaves around you. High above your head are white pine and red maple trees. One of the maples is dead and still standing, providing a nesting area for wildlife. In one corner is a big, old hemlock tree. A breeze rustles the leaves of shrubs around you. They are about your height, and on some of them are sharp thorns. A few pine seedlings are growing on the forest floor among wild strawberries and other forbs. There are twigs, leaves, maple seeds, and pine cones on the ground around your feet.

SPECIES DIVERSITY

Tree species	Number of trees more than 10 cm in diameter
White pine	2
Red Maple	4
Hemlock	1

Total number of trees 7

Richness: A measure of the number of tree species in an area.

More tree species = Greater richness

How many species of trees?

1 2 (3) 4 5

Evenness: A comparison of the number of trees of each species.

Equal numbers of each species = Greater evenness

Even | | | | | | (Uneven)

MODULE 2

Forests and water

I wonder

When we think about why forests are important, we think about how they are home to many different species, that they provide wood and food, or maybe that they are wonderful places to play in. But not so many people know exactly how important forests are for the Earth's water resources. In this module, learn how forests play a major role in water's journey on Earth, using class experiments and the documents that follow.

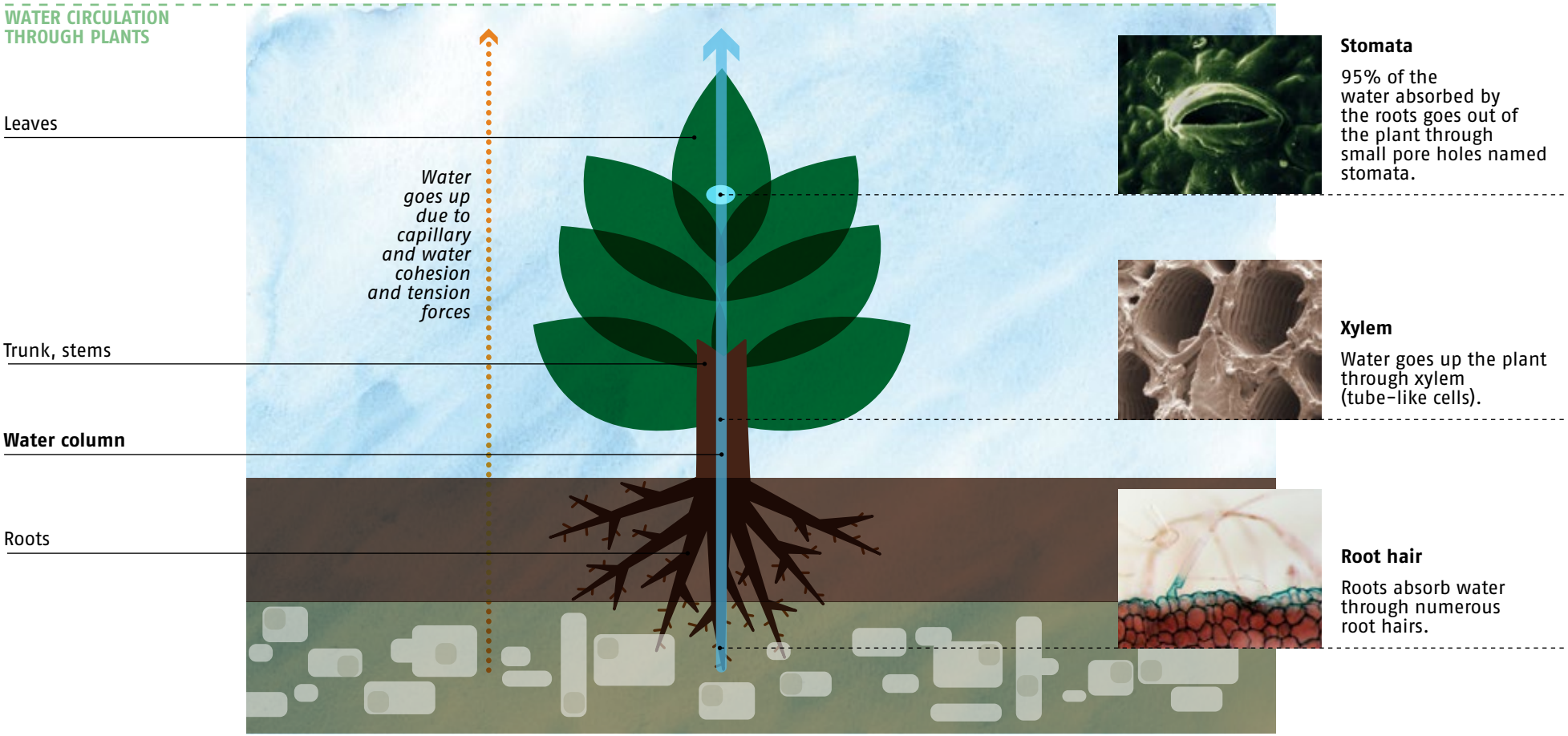
Document it

Trees redistribute water

See how transpiration works.

Did you know?

Trees keep very little of the water they draw from the soil for themselves, redistributing up to 95 percent.



Exposed roots on a mango tree. Tree roots can reach as deep as many metres. They may cover a larger area underground than the area the trunk and branches take up above ground.

© Aaron Escobar

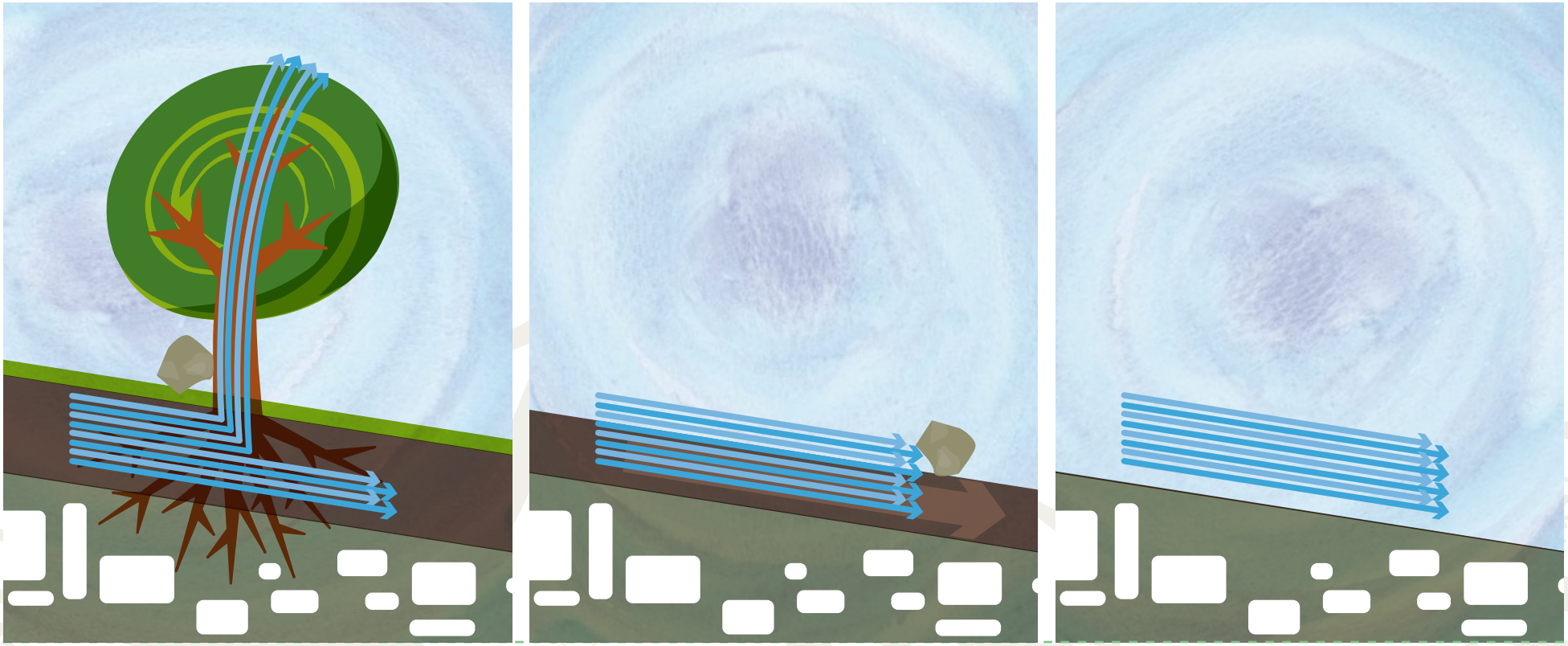
Water and soils

Forests help to prevent problems caused by too much water. If the soil has absorbed too much water, it cannot take in any more: it becomes saturated (full) and **waterlogging** occurs. This can be a problem for farming and for plants, and may lead to **floods**.

Trees catch rainfall in their canopy leaves, which means that less rain reaches the ground. They also **store water in their roots**, so there is less water in the soil, and **produce organic matter**, which **increases the water storage capacity** of soil. Tree roots, as well as forest floor plants and **litter (fallen leaves, twigs, bark, mushrooms...)**, also help to **hold the soil together**. This prevents **soil erosion** (where soil is for example washed away by rain or blown away by wind), and can even help prevent landslides.

Water and soils

Trees balance water in soils in different ways: learn how by studying these diagrams.



EROSION MECHANISM

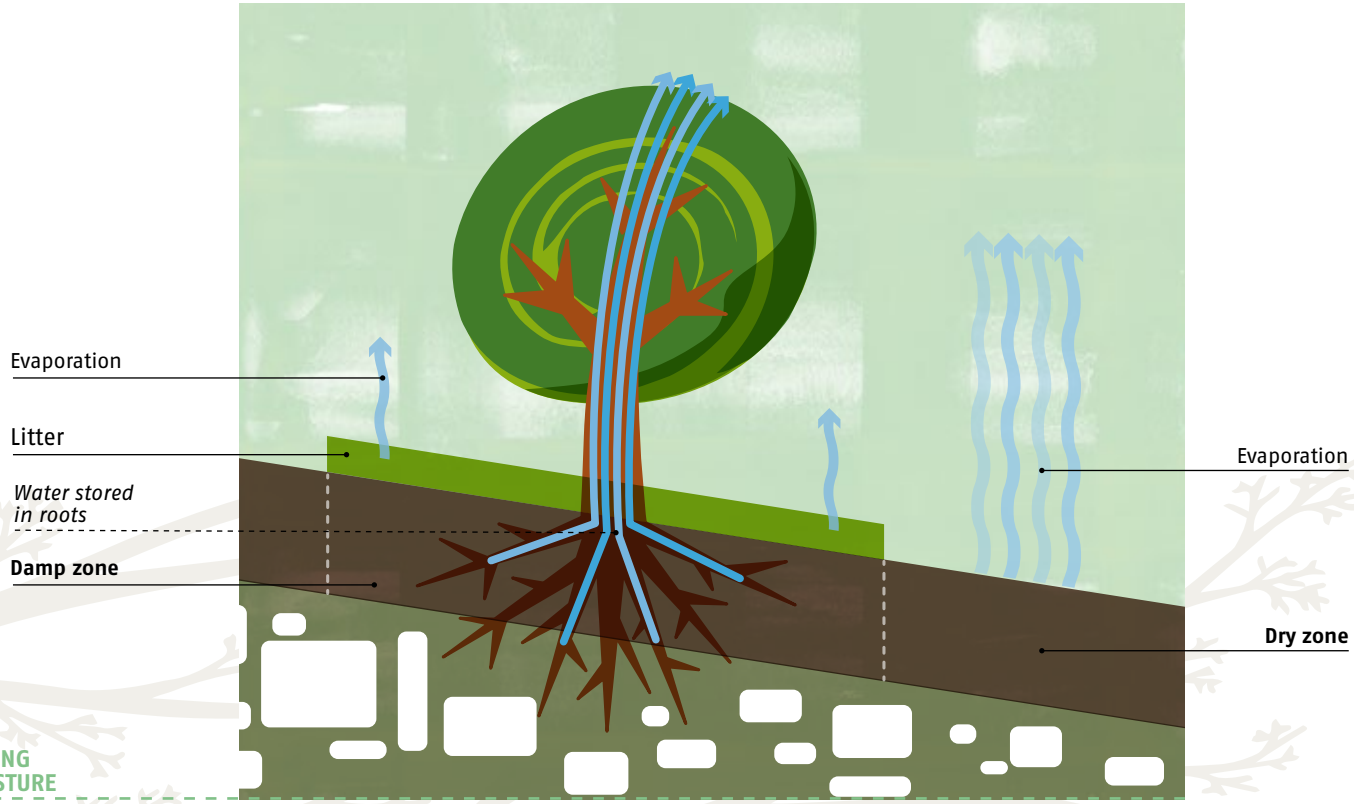
A
Land with forest
Roots keep soil together. Roots and litter maintain moisture levels.

B
Destruction of the forest
Soil is saturated with water, resulting in waterlogging. Without roots, soil can slide. Without tree trunks, rocks may fall and provoke landslides.

C
Desertification
The soil has disappeared. Farming becomes impossible and reforestation is difficult. Floods become frequent.

Where there are forests, why does the soil not become soaked or waterlogged when there is heavy rain? Why does it not get flooded? What can happen to soil and water if too many trees are removed?

Why does the soil stay moist even when there is little rain?

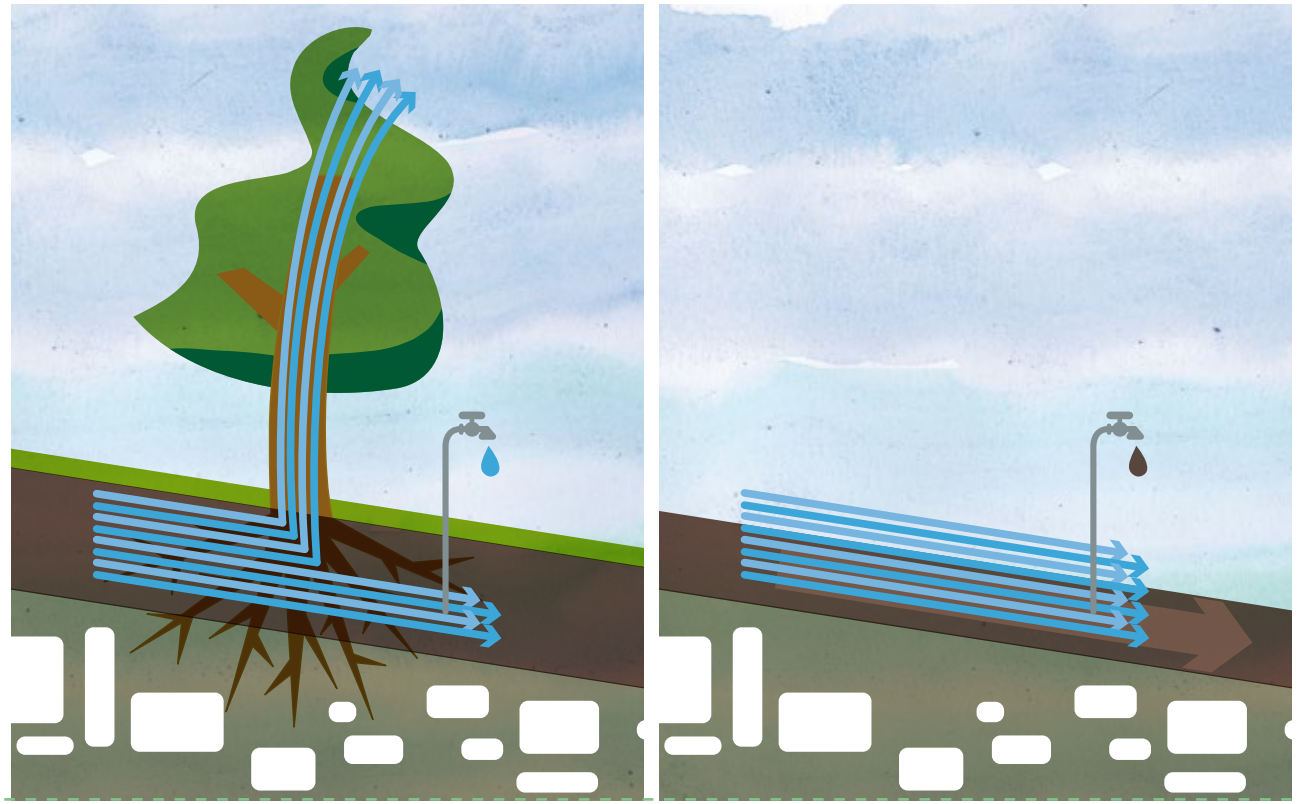


Investigate

Water filtration

Compare the two figures below.

Do you notice any change in the water dripping from the tap? Why did that change happen? Describe the role of the forest. (The forest acts as a...) Do you know if any of the water you drink has been filtered by forest soil?



WATER FILTRATION

What did we learn?

Forest trees and plants transpire most of the water that their roots take in: water goes up the xylem and then out of the leaves through stomata. That is why, thanks to the trees, a part of the water that is rained onto the ground goes back into the atmosphere and will later turn into rain once again. That is how forests help to prevent the weather from becoming too dry or too hot. Another part of rainwater is filtered by forest soils, and in this way becomes cleaner – it is thanks to this that people have access to clean water to drink, cook and water crops. Trees in forests also help prevent waterlogging and soil erosion, and their litter keeps forest soils moist enough for life to keep growing. For all these reasons, forests play a very important role when it comes to water.

MODULE 3

What can we take from forests?

I wonder

What parts and how many of our everyday products come from the woods? How do you tell the difference between these products? Can we make things from what we find in the forest? Can we take as much as we want or need?

In this module, you will make discoveries in class and explore different forest materials and foods, including insects. You will also learn about fascinating forest resources, such as honey, rubber and medicines.

Document it

Honeycomb – Apiculture

© FAO/M. Marzot

Bees make forest honey

Have you ever seen a honey bee at work on a flower? Here's what they're doing: bees are attracted to a **sweet fluid called nectar, which comes from flowers**. The bees absorb this nectar through a tube-like part of their body called the proboscis, before storing it in their honey sac. On the hairs of their legs they also collect pollen, a yellowish powdery substance. Back at the hive, honey bees mix the pollen and nectar together to feed their young, known as larvae (not yet fully-formed bees).

The bees also need to save some food for times when flowers might not be in bloom. This is where honey comes in: the bees first ingest the nectar then regurgitate it several times in and out of their honey stomach, where a natural conservation agent known as an enzyme is produced. Once this process is complete, the product goes into the honeycomb. At this point the honey is almost ready, so the bees fan the comb with their wings to evaporate any moisture and close off each honey cell with beeswax.

Bees therefore need flowers for food, but the system is a two-way one: flowering plants and trees also rely on bees and other creatures for their survival. These trees and plants generally depend on animals, called **pollinators**, to carry their pollen to the pistil of other flowers. Honey bees are important pollinators, as they are numerous and not overly selective in their choice of flowers. So bees help to feed humans, both directly with honey and indirectly by allowing plants to reproduce and provide us with food.

Have you ever eaten honey?
Do you know if it came from a forest?
Are bees important for life?

Eating insects?

Forest animals such as deer, rabbits and wild pigs are sometimes hunted for food, but the woods are also full of many smaller creatures: insects. Already consumed in different countries across the world, insects may well be the staple meat of tomorrow. Healthy and nutritious, edible insects are high in protein and contain important vitamins such as calcium and iron.

Rearing insects is also good for the environment. First, as they do not require large areas of land for grazing, they are less likely to cause deforestation. Second, eating insects instead of other forms of protein, such as shrimp, could help conserve the Earth's biodiversity as it would help to reduce overfishing in our seas and oceans. Last but not least, they are relatively easy to raise and economical to feed (crickets, for example, require six times less feed than cattle). All in all, insects can be beneficial as food for other animals, for us to eat directly or in protein-rich animal feed prepared with insect extracts.

Madagascar: These locusts for sale at the market are dangerous for crops, but nutritious when cooked and eaten.

© FAO/Y.Chiba

Do you know what an insect is? Which foods do you eat for protein? What do you think about eating insects, would you like to try them? If not, why not?

Do you eat anything that others in your class or in another part of the world would find surprising?

Document it

Medicine grows in the forest

From insect repellents to painkillers, around 70 000 plant species are used as medicine around the world. In fact about **a quarter of all modern medicines come from tropical forest plants**!

Two-thirds of all cancer-fighting drugs come from rainforest plants, and many new medicines could still be awaiting discovery in forests. These plants are worth a lot, both for human lives and in money, about US$ **108 billion a year**.

It is therefore understandable that pharmaceutical companies do **bioprospecting** to find new products in forests. The companies often ask the help of indigenous people, who are experts in natural cures and herbs that grow in remote places known only to them. Some companies may patent these discoveries to make them legally theirs, so that they can earn a profit from the sale of medicines made from these products. However, this is unfair if no credit or money goes to the indigenous community that originally discovered the products. This is called exploitation, or more specifically **biopiracy**.

Explain in your own words what biopiracy is. Do you think this is a fair practice? Explain why or why not.

A BIT OF HISTORY

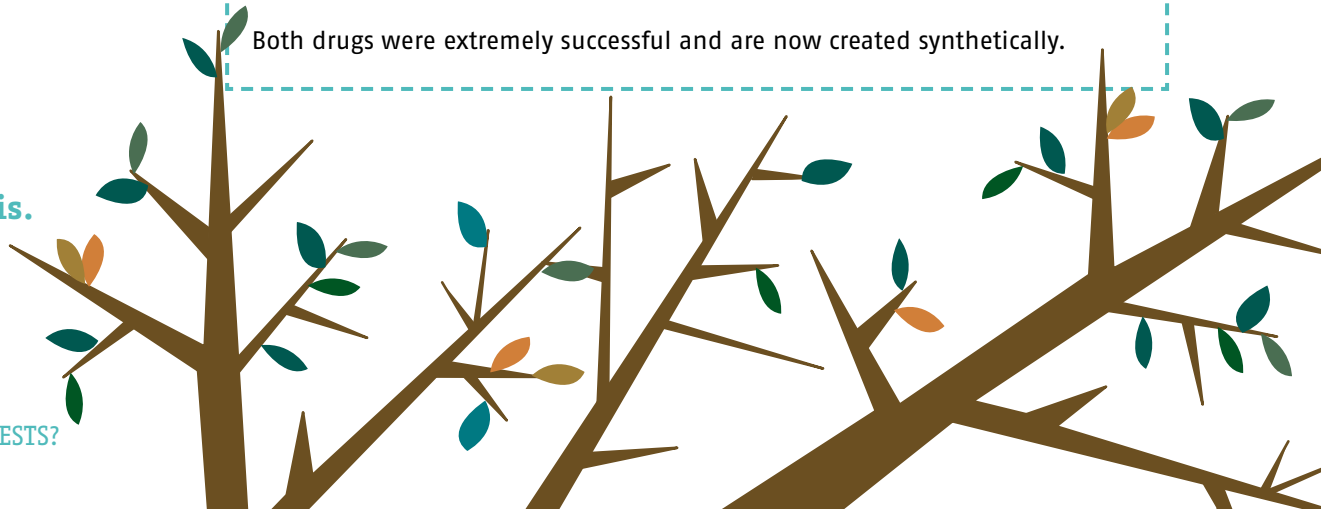
How are medicines discovered?

This is the story of two famous medicines that come from trees and have helped people around the world:

QUININE: found in the bark of the cinchona (quina-quina) tree in Peru, quinine cures malaria. There are two legends about its discovery. One is a native story in which a feverish man lost in a jungle accidentally cured himself by drinking from a bitter-tasting pool of water surrounded by quina-quina trees. The other is a European legend that tells of the Countess of Chinchon who brought the powerful bark from Peru back to Spain, where a botanist named the tree "Cinchona" in her honour. We do not know which, if either, of these tales is true, but we do know that European people who travelled to Latin America in the 17th century used the tree bark and brought it back to Europe.

ASPIRIN: created gradually thanks to the work of many scientists over centuries, aspirin is composed of salicylic acid, which is found mostly in willow trees. The Greek physician Hippocrates first wrote in the fifth century B.C. about willow bark and leaves relieving pain and fevers. Native Americans are also said to have used it, and after an 18th century clergyman named Edward Stone rediscovered its effects, researchers across Europe experimented with salicylic acid during the 19th century. They eventually found a way to make it less of an irritant, and it was patented in Germany as aspirin in the 1890s.

Both drugs were extremely successful and are now created synthetically.



Investigate

Rubber: where does it come from?

Latex is dripping off this *Hevea brasiliensis* tree.
Try to find out what latex is and how it helps the tree.

What exactly is leaking out of the tree? Is it dangerous for the tree if we collect latex in this way? Look at the image and try to draw some conclusions.

A rubber tree dripping latex into a collection cup beneath a tap, Democratic Republic of the Congo.

© FAO/G.Napolitano

What did we learn?

Forest products are everywhere in our lives and we depend on them for food, health, employment – even clothing, free-time activities and art. But there is more to the forest than just how it can be useful for humans. All forest products were originally part of a system in which each element of life depended on the others. We must therefore not take our forests for granted, but rather learn to use only those parts that will not endanger life now or in the future: we should only harvest or buy renewable forest products, and rules should be in place to make sure we do not damage the forest by taking too much. We can see that forests are a great source of many products, a sort of natural market, but we must remember that their resources are not unlimited and many are important to sustaining life on Earth!

MODULE 4

Whose forest is it?

I wonder

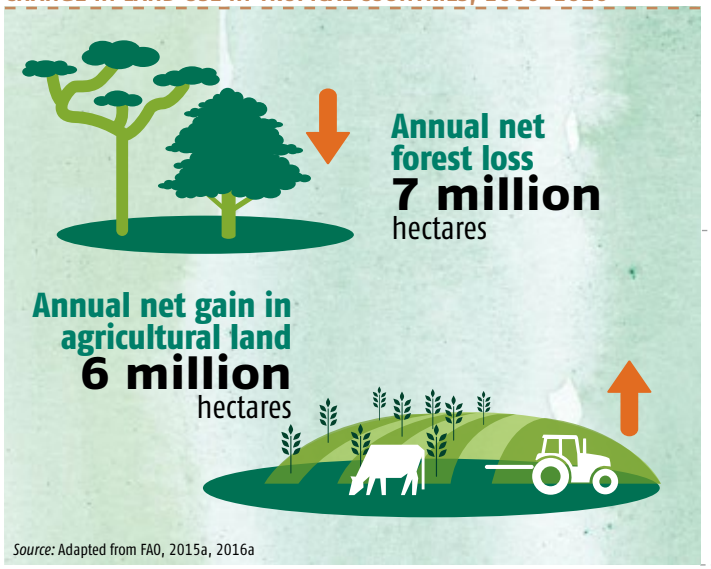
What do forests give us? How important are they? How are they doing? Are they growing or disappearing, here and elsewhere in the world? Who makes decisions about them? How can they make the right decisions? What can you do? This module will help you explore these questions in class, through artwork and by studying a nearby forest. Find more information below on the state of the world's forests and ideas for roleplay to understand how decisions are made.

Document it

Hundreds of millions of people in the world depend on forests for food, energy and income.

© FAO/S.Mukhopadhyay

CHANGE IN LAND USE IN TROPICAL COUNTRIES, 2000–2010



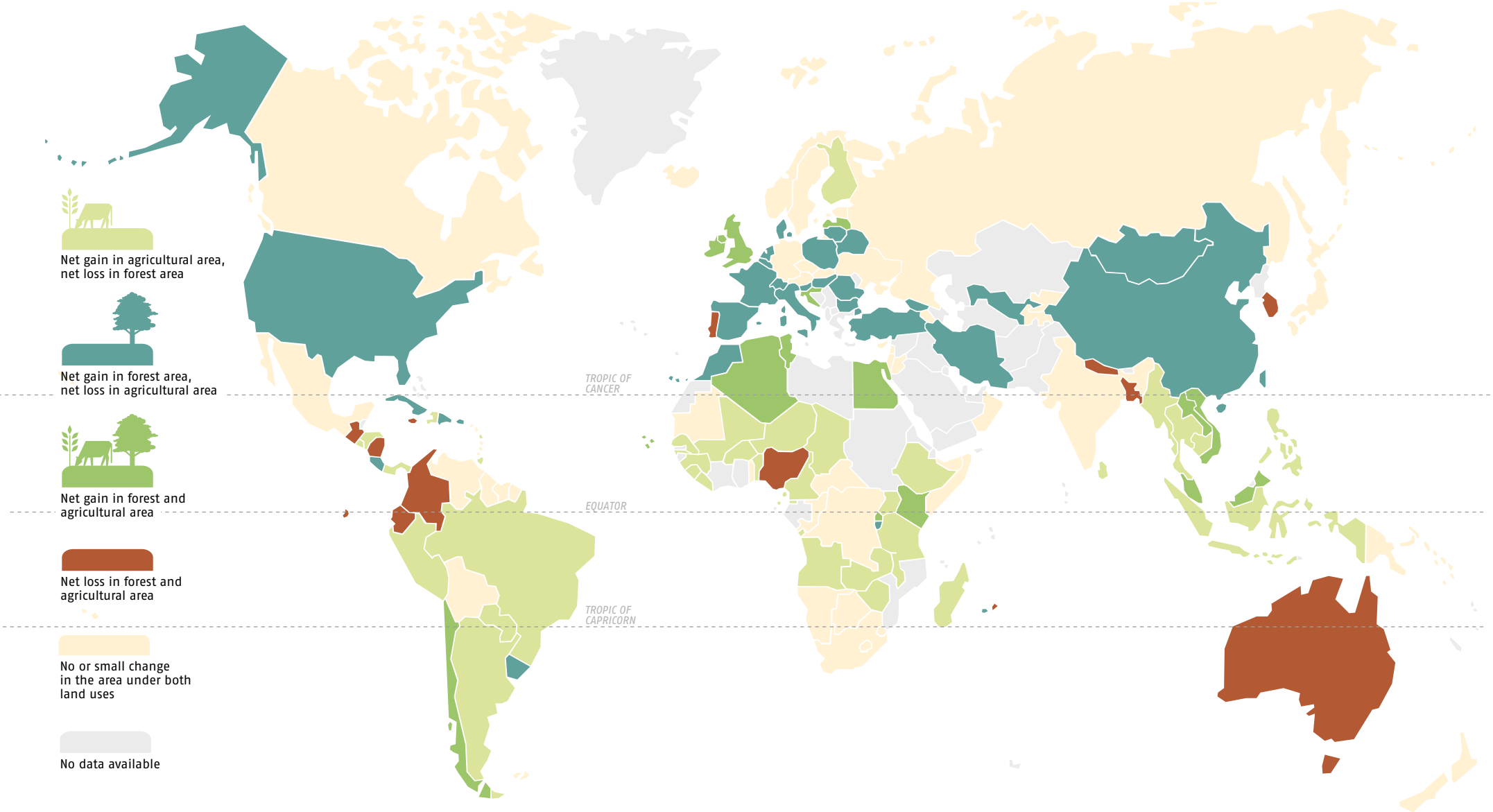
Source: Adapted from FAO, 2015a, 2016a

What is the state of the world's forests?

From 1990 to 2015, almost 130 million hectares (about 3 percent) of the world's forests were destroyed, leaving us with just under 4 billion hectares of forest.

Forests and trees are important for farmers as they help protect water, soil and air quality, but also because they shelter animals that humans need. Yet agriculture is the main cause of deforestation, which mostly occurs in countries with tropical climates.

Forested areas are not decreasing everywhere. In fact, some countries with temperate climates have even seen an increase recently! Still, deforestation is a worrying trend.



TRENDS IN LAND-USE CHANGE Net changes in agricultural and forest areas, by country/territory, 2000–2010

Source: Adapted from FAO, 2015a, 2016a

Where are the temperate areas? And where is the climate tropical? Where is the forest surface increasing? Where is it decreasing? What is happening in your country? What is the trend globally?

Investigate

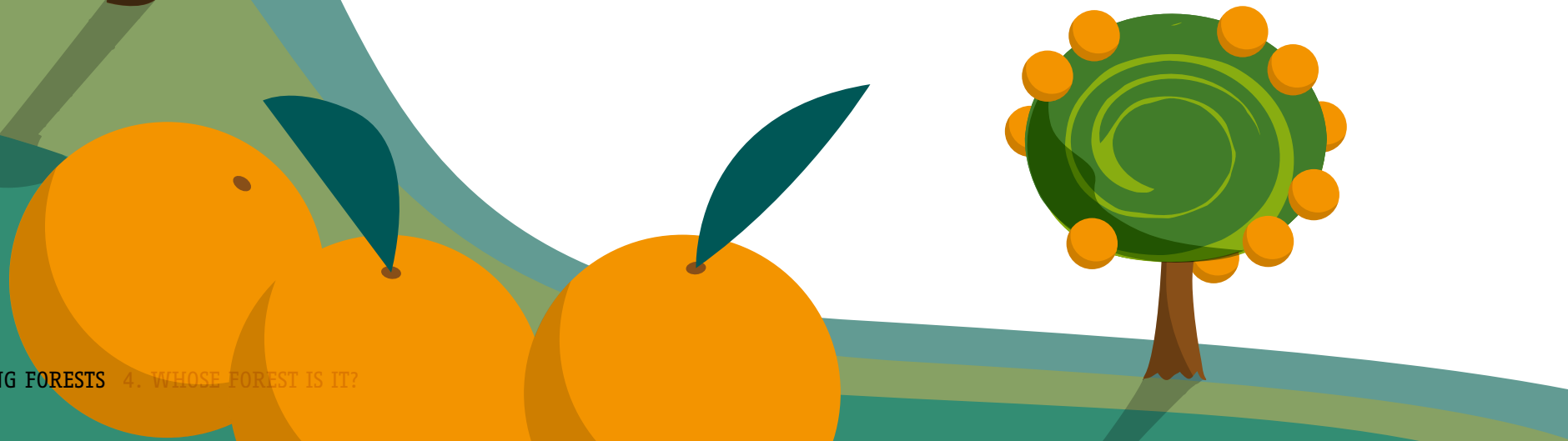
Story one:
An orange-growing company in the forest

Read the story, write out the position of the group you are assigned to and present your arguments.

A big company wants to grow oranges in large quantities for sale on the international market. The company has found out about a forest lot that does not seem to have a legal owner, which presents a good business opportunity.

The company has informed the local village council and is speaking with the with authorities to obtain a legal document of ownership, as well as the right to clear the forest area to plant an orange grove.

However, it seems that not everyone agrees that their project is a good one. Therefore, in order to avoid bad publicity the company has agreed to a hearing of spokespeople representing the various groups involved.



1. *Role:* **Environmental activists**	*Description:* Young students from a nearby town.	*Motto:* Keep it green.	*Objective:* To conserve all forest biodiversity as it is.
2. *Role:* **Forest rangers**	*Description:* They live in the nearby community but have travelled to a bigger town for training.	*Motto:* Forests must be managed sustainably.	*Objective:* Work with all actors to: • Maintain a reasonable forest surface area • Conserve key samples of biodiversity
3. *Role:* **Local farmers**	*Description:* They were born and grew up here. They depend on their fields and certain forest products to feed their families.	*Motto:* The land is fine the way it is.	*Objective:* • Keep the forest benefits they see as necessary for them (wild fruits and mushrooms, some shade for their crops, wood for the kitchen fire) • Possibly sell land to make a profit
4. *Role:* **Gig Oranges Inc. board members**	*Description:* They live in a large Western city; they have studied economics.	*Motto:* Oranges are juicy.	*Objective:* • Make a maximum profit for the company • Grow large quantities of very juicy oranges, as fast as possible
5. *Role:* **Political decision-makers**	*Description:* They are from a nearby town; they studied administration or law.	*Motto:* Our region needs a boost.	*Objective:* • Develop the region (create jobs) • Maintain the region's budgetary balan • Respect laws and policies • Be re-elected
6. *Role:* **Indigenous people**	*Description:* A tribe that has lived in the forest for generations, using its plants and animals for food.	*Motto:* This forest is our homeland.	*Objective:* • Remain in the forest • Show that the forest is theirs, though they have no legal papers proving this
7. *Role:* **Animals and plants**	*Description:* Trees, bushes, fungi, pollinators, mammals, birds, and so on.	*Motto:* The forest is life.	*Objective:* Survival *Note:* Though they cannot communicate, their absence would have serious consequences, such as a lack of shade, water and pollinators. Consider the benefits of forests that your class identified and decide which of these are important to your community. Explain what would happen if they disappeared.
8. *Role:* **Pharmazonic Inc. researchers**	*Description:* They come from a large Western city, but some have been working in the forest for the last six months. They have studied science or medicine.	*Motto:* Rainforests hold the key to the medicines of tomorrow.	*Objective:* • Make a maximum profit for the company • Develop new medicines based on forest products, with the help of indigenous peoples and their knowledge

Story two: Small farmers need grazing land

➽ Read the story, write out the position of the group you are assigned to and present your arguments.

A poor farming couple want to clear a local forest so that they can grow some grassland for their three cows to graze on. They already cleared a forest two years ago, but the land there is now dry and the grass no longer grows. They are afraid their family will not be able to eat any more if they lose the money they make from selling their cows' milk.

They are asking the village community to approve their request.

1.	*Role:* **Farming family 1**	*Description:* They grew up here and have been struggling to survive on the dry land.	*Motto:* **Work hard and hope.**	*Objective:* • Clear the land for grazing • Feed their family
2.	*Role:* **Farming family 2**	*Description:* They grew up here and have been struggling to survive on the dry land.	*Motto:* **Work hard and hope.**	*Objective:* • Log a little every day to have wood for their kitchen fire • Keep some shade from the forest for their crops to grow
3.	*Role:* **Political decision-makers**	*Description:* They are from a nearby town. They have studied administration or law.	*Motto:* **Our region needs a boost.**	*Objective:* • Develop the region • Maintain the region's budgetary balance • Respect laws and policies • Be re-elected
4.	*Role:* **Furniture maker**	*Description:* Born into local farming family, now makes furniture in a nearby town. Only has one employee at the moment, but thinks that a good source of cheap wood could create many more jobs.	*Motto:* **Good wood for good jobs.**	*Objective:* • Develop his or her company • Help the local community to make more money
5.	*Role:* **Forest rangers**	*Description:* They live in the nearby community but have travelled to a bigger town for training.	*Motto:* **Forests need to be managed sustainably.**	*Objective:* Work with all actors to: • Keep a reasonable forest surface area • Protect native species that are important for biodiversity • Get rid of an invasive tree species
6.	*Role:* **Scientist representing animals and plants**	*Description:* This biologist researches ecosystems and how they are balanced. She was studying nearby forest bees when she heard about the farmer's intentions. She went to the village council following the meeting but only managed to speak after the decision had been made.	*Motto:* **Knowledge rules: no decision without information.**	*Objective:* Make it known that if this wood is cleared: • Bees will disappear – their population has decreased all over the region already. This would pose a major threat to plant life, including all farmers' plantations, as they would not be pollinated and would therefore not reproduce, meaning that farmers will run out of fruit and vegetables. • The soil around the village is at risk of drying out completely: desertification is not far away.

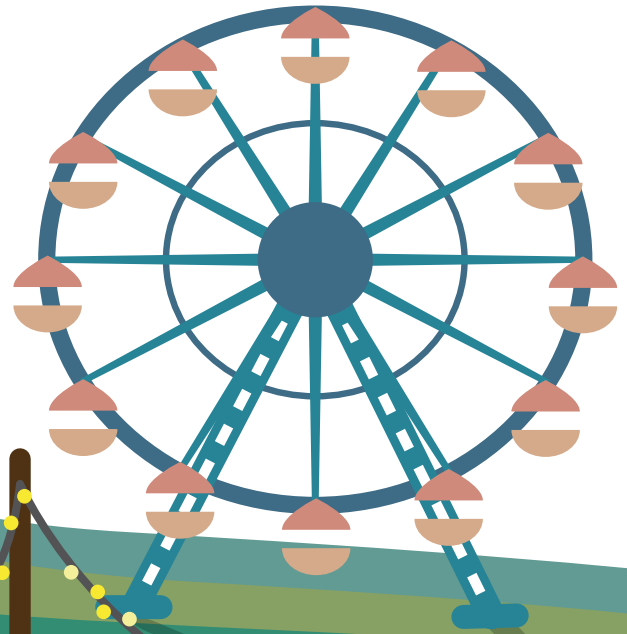
Story three:
Would you choose an amusement park or the forest?

➽ Read the story and write down your arguments for or against the project, depending on which side you are given. Debate.

A local forest belongs to the town. It is mostly unmanaged and therefore not used much. It houses a rare biodiversity system.

An investor has offered to buy the land at a good price and remove the forest to build an amusement park, with attractions and rides that would be used by local people. This could also draw large crowds of tourists from all over the world.

Should the town council vote *yes* or *no* on the project?



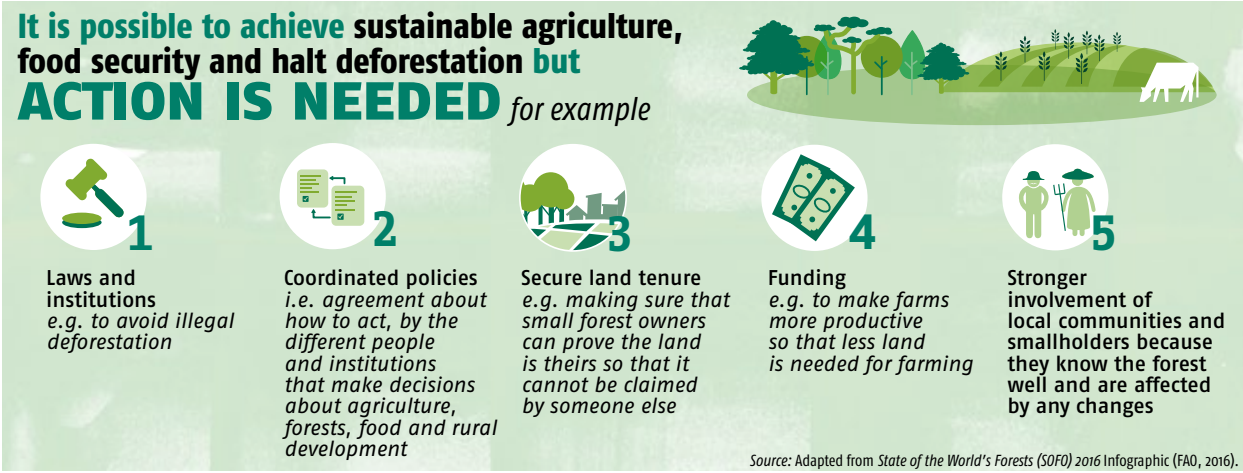
THAT'S SERIOUS

Action is needed!

The Food and Agriculture Organization of the United Nations (FAO) makes recommendations for people who make decisions (for example, politicians) so that forests will be well-managed.

What is a well-managed forest? It is one that is not damaged, but used carefully and in a sustainable way so that plants, soil, water and wildlife can stay healthy. Managing forests sustainably means making thoughtful decisions about the benefits that forests provide, so that they can be used safely now and in the future.

Here is an extract showing a few of the recommendations FAO has made for sustainable forests.



Do you think these recommendations will work? Why/why not? Provide an answer for each recommendation.

What did we learn?

Forests provide for many of our needs: from water, air and healthy soil, to food, a home for animals and humans, and wood for housing. They are also a source of energy, for example to build fires for cooking or heating homes. And that is only the beginning. Not to mention their uses for health (medicine) and leisure (free-time activities) too! These resources are not infinite, though. It takes knowledge, willpower and coordination to manage them well so that they stay in good shape and we can enjoy and benefit from them for many more years to come.

Glossary

Abiotic: non-living.

Absorption: to absorb is to take in or soak up, e.g. a liquid or heat from sunlight.

Agriculture: the practice of growing crops and raising animals to obtain food, animal feed and other useful products like cloth and fuel. For FAO, agriculture includes fishing, fish farming and forestry.

Annual: yearly.

Bacteria: single-celled micro-organisms that interact with other organisms in many different processes and chemical changes, such as decay.

Biodiversity: the diversity of plant and animal life forms, sometimes measured as the number of existing species in a certain place.

Biome: a geographic area that can be classified according to the plants and animals that live in it.

Capillarity: the action of a liquid in a small passage or tube being raised or lowered. This depends on the attraction between the molecules on the surface of the liquid and those of the solid surface it is touching.

Cohesion: the state or action of staying or sticking together, in particular for molecules of a specific body or substance.

Deforestation: the action or result of removing forest (e.g. by cutting it down) to use the land for something else.

Desertification: the process of becoming desert.

Ecosystem: a community of living things that interact with each other and their physical environment as a system.

Energy: the capacity to produce physical change; for example wood gives out energy when burned, which people can use to cook or heat their houses.

Evaporation: when a liquid turns into a gas (water vapour is an invisible gas).

FAO: the Food and Agriculture Organization of the United Nations. FAO's areas of expertise include food science, nutrition, crops and animal husbandry, soil and water conservation, fisheries and forestry.

Filtration: to pass something (e.g. a liquid, air or light) through a partial barrier (filter) to remove unwanted components.

Food web: a system of interdependent food chains.

Forest: an area of trees that may be planted or natural. FAO defines forests as land with trees higher than 5 m and a canopy cover of at least 10 percent – but not if that land is mainly used for farming or buildings (like a town).

Funding: money provided to pay for something.

Fungus (pl. fungi): an organism that grows in the soil, on dead matter or on other fungi by decomposing organic matter. Mushrooms are the fruits of certain kinds of fungi.

Global, globally: worldwide.

Infiltration: when a fluid passes into or through a substance through tiny openings.

Layers: forest layers are levels that host different living creatures, ranging from the soil to the top of a forest; the main layers are the floor, then the understorey, the canopy (upper parts or crown of the trees), and the emergent layer on top.

Litter: dead plant material, such as leaves, bark, needles, and twigs, that has fallen to the ground and forms a recognizable layer above the soil.

Reforestation: to cover land with forest once more by planting and/or seeding.

Rural development: improving conditions in rural areas (in the countryside) so that people have a better life.

Sapling: young tree.

Seed: the fertilized, ripened ovule of a flowering plant, containing the beginnings of a new plant.

Seedling: very young plant or tree grown from a seed.

Smallholders: people who own a small area of land or forest.

Soil erosion: the wearing away of soil through the action of rain, wind and other natural processes, or by human activity.

Stomata: pores (small openings) found in the epidermis of leaves, stems, and other plant organs, that control the exchange of gases between plants and the air outside.

Sustainable forest management: managing forests in ways that benefit people and the environment, both now and for future generations.

Temperate: the type of climate that can be found between Earth's tropics and its polar regions where the temperatures are relatively moderate and with few extremes in winter and summer.

Tenure: a contract that says who does what; land tenure is the system of rules about who can use what part of the land, for how long and to do what.

Trend: a general tendency or course of change.

Tropics: the areas around the Equator, which have a very warm climate and about 12 hours of daylight throughout the year.

Twig: a thin shoot of a tree or other plant, or a small offshoot from a branch or stem.

Waterlogging: when land becomes soaked because there is too much water for it to absorb or drain away.

Xylem: a type of transport tissue in vascular plants. The basic function of xylem is to transport water from roots to shoots and leaves, but it also transports some nutrients. In addition, it helps to support the structure of the tree.

Quiz – What did you learn about forests?

What is a forest?

1. How do you know if something is a forest?

- ☐ If I see trees, it's a forest.
- ☐ If I see several layers of plants with many tall trees, it's a forest.
- ☐ If it looks natural, it's a real forest.

2. When you are in a forest there are rules to respect.

- ☐ True.
- ☐ False.

3. What can make forests change?

- ☐ Human actions and natural causes.
- ☐ Nothing.

4. For a forest to exist, it takes:

- ☐ Non-living things.
- ☐ Plants and animals.
- ☐ Both and more.

5. All forests in the world have the same level of diversity.

- ☐ Yes, if it doesn't have much diversity it's not really a forest.
- ☐ No, each type of forest will have a different level of diversity, and diversity changes over time.

Forests and water

1. Where does water go when we water plants?

- ☐ It all evaporates.
- ☐ Most of it travels through the plant and then returns to the atmosphere.

2. When it comes to water, both plants and trees:

- ☐ Act similarly because trees are plants.
- ☐ Are not the same at all: plants give water back to the atmosphere and trees keep it to themselves.

3. Water goes into forest plants:

- ☐ Mainly through leaves.
- ☐ Mainly through roots.

4. Trees send water back into the air:

- ☐ Through pores called stomata.
- ☐ Through their pores called stomach.
- ☐ Through their xylem.

5. Forests and trees also play an important role for water because they:

- ☐ Help filter water, keep soils from eroding, and maintain water levels in soils.
- ☐ Clean water in their xylem before returning purified water to the atmosphere.

What can we take from forests?

1. What kind of things can be found in a forest?

- ☐ Food.
- ☐ Medicine.
- ☐ Food, medicine and other products.

2. What is honey?

- ☐ A mixture of nectar and pollen.
- ☐ A mixture of nectar and enzymes.

3. Around 70 000 plant species are used as medicine around the world.

- ☐ True.
- ☐ False.

4. Natural rubber latex is:

- ☐ Plastic made from petrol.
- ☐ A plant sap.
- ☐ A fluid produced by the plant to protect itself.

5. Can we take all the products we want from forests?

- ☐ Yes.
- ☐ No.

Whose forest is it?

1. Forests are important because:

- ☐ There are wild plants and animals in them.
- ☐ They help fulfil many humans needs.
- ☐ Both.

2. Forest area is changing. It is:

- ☐ Decreasing worldwide faster and faster.
- ☐ Decreasing worldwide, but slower than before, and increasing in some places.

3. Managing forests sustainably means:

- ☐ Doing nothing: forests should be left untouched and natural.
- ☐ Using and taking care of forests so that they stay healthy and we can use them for our different needs now and in the future.

4. Only a few people can decide about the future of our forests.

- ☐ True.
- ☐ False.

5. What should we do to manage our forests sustainably?

- ☐ Have proper laws to help make sure they are not destroyed.
- ☐ Encourage everyone to work together.
- ☐ Both and more.

These teaching materials were prepared by Elsa Rattoray with input from Pierre-Yves Coat on diagrams and other scientific aspects.

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What exactly is a forest? Why are forests important for us? What role do they play in giving us the water that we use to drink, cook and water our crops? What are the many products that forests give us? Who can use forests and who do they belong to? Should we worry about their future?

The modules in this booklet will help you to answer these questions and many more. They will give you useful background information as you explore and learn about forests with the guidance of your teacher.

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