



# FOREST EXPEDITION

EDUCATIONAL UNIT ON SUSTAINABLE FOREST MANAGEMENT  
IN BRAZIL & GERMANY

SECONDARY  
LEVEL  
**7-10<sup>TH</sup>**  
GRADE



GERMANY



LEGAL

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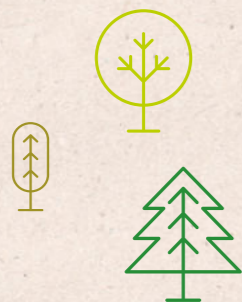
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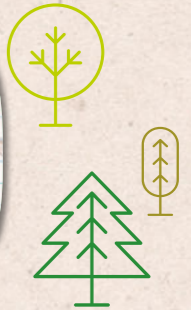
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**WELCOME**



**Dr. Wolfgang von Geldern,**  
State Secretary (ret.),  
SDW President

Forests are highly diverse and vary greatly around the world. All over the planet, intact forests fulfil vital functions for us humans. It is important for us to convey that intact forests can not only be preserved as nature reserves, but also through ecological and sustainable forest management. With the educational brochure "Forest Expedition!", we aim to provide teachers with support for going on a tour of discovery with their students, exploring the forest in the Amazon region and in Germany, and getting acquainted with authentic examples of sustainable forest use on site. Our goal is to demonstrate how important it is in Germany to support sustainable forest management in other countries as well, and how everyone can contribute to preserving the abundance of our forests.



**From left to right:**  
Laura Candelaria (FAS),  
Ulrike Schuth (SDW),  
Raquel Viaggini (FAS),  
Katharina Schlünder (SDW)

With "Forest Expedition!" we aim to spark enthusiasm for the forest in students, just like we experienced with the participants of the work camps in Brazil and Germany. Above all, this was thanks to the open, warm-hearted and informative encounters with people who are already consciously and carefully managing their local forests. This led us to develop the core concept of this educational brochure: an expedition trail focusing on the significance of the forest with reference to what was experienced on site. The resulting learning activities are designed to develop numerous skills and abilities in students to take action for the protection of forests – thereby educating them on sustainable development. We wish all participants great fun with the creative "harvest" from our work camps!



**Virgilio Viana,**  
President of Fundação  
Amazonas Sustentável  
(FAS)

Sustainability is a complex issue with differing perspectives. In order to broaden our knowledge and share experiences, we were very happy to be one of the organisers of the project "International Workcamp - Young Adults for Sustainable Forest Management". This project involved exchange visits by young people from the Amazon region in Brazil and various regions in Germany. As part of the project, teaching and communication outcomes were developed to encourage teachers to help their students connect with nature and share best practices for sustainable forest management. We hope that this experience will be replicated to build awareness that it is more valuable to conserve forests than to cut them down, as well as promote corresponding measures.



## 1.0

## INTRODUCTION

## FOREST

Forests are some of the most important habitats on the planet. A healthy forest, with its functions and mechanisms of action, significantly controls and influences global and local climate processes. Forests provide a habitat for animals, plants, fungi and other microorganisms, give us clean drinking water, fertile soils, protect us from avalanches, floods and noise, and filter pollutants out of the air. We can obtain numerous products from them, such as the renewable raw material wood, but also food and medicines. For us humans, they also bear a great cultural significance. The forest is an integral part of many myths and legends, which are a reflection of our values and identity. Some groups of people even live exclusively in the forest. For many, the forest is a source of jobs and the basis of their economic existence. Spending time in the forest contributes to health, well-being, and relaxation.

In light of the rising consumption of natural resources due to our current way of life, the forests on our planet are more threatened than ever before. Each year, intact stretches of natural forest are destroyed to the extent that vital forest functions are lost to us forever. With every encroachment upon forested areas, valuable components of the ecosystem are also lost. Above all, the loss of climate-relevant forests in tropical regions, which are home to a particularly large number of species, continues at an alarming rate. This is having an extensive global impact. The main reasons for the destruction of tropical forests are non-sustainable forest management and the conversion of these tropical forests to other forms of land use.

People utilise forest resources differently from region to region. The forest is often the sole source of income for the local population. At the same time, other stakeholders lay numerous claims to the forest, triggering complex conflicts regarding their use. Sustainable forest use attempts to meet these different demands while also taking into account global climate protection and development goals.

## THE PROJECT

For over 70 years, Schutzgemeinschaft Deutscher Wald (SDW) has been committed to protecting the forests and communicating their importance. The German government is also committed to forest protection and the promotion of sustainable forest management via national and international programmes.

In many countries, there is limited knowledge and experience regarding sustainable forest management. With its long-standing experience in sustainable forest use and dealing with conflicts of interest, Germany can support partner countries by sharing its expertise.

To date, people in Germany are often unaware of the usage conflicts in the forested regions of Brazil and the approaches taken to solving them. In many cases, any form of use of the tropical forest is considered incompatible with international environmental protection goals. However, in many tropical forest regions, people have already succeeded in exploiting the forest economically in such a way that it is able to continue fulfilling its ecological and social functions. There is still far too little knowledge about these positive examples of sustainable forest management in the tropics. It is important to develop an awareness of the special circumstances and mutual relationships regarding forest use among

HEALTH,  
WELL-BEING  
& RECREATIONSUSTAINABLE  
FOREST USE70  
YEARS OF  
COMMITMENT  
TO FOREST  
PROTECTION

the population, such that they can reflect upon and adapt their behaviour where necessary. The aim is to make an even greater contribution to the conservation of forest areas worldwide, even from Germany.

In order to promote environmental awareness and sustainable decision-making, the international community has considered a special form of education to be crucial since the Rio Conference in 1992. The UNESCO Global Action Programme on Education for Sustainable Development (2015-2019), a follow-up programme to the UN Decade of Education for Sustainable Development (2005-2014), aims to promote educational activities for young people in particular. There are high expectations that these "change agents" will drive the ecological, social and economic change of the future.

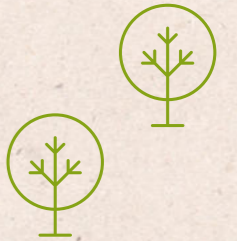
To this end, the project "International WorkCamp - Young Adults for Sustainable Forest Management", funded by the German Federal Ministry of Food and Agriculture (BMEL) under the leadership of SDW, was launched in August 2017. Fundação Amazonas Sustentável (FAS) was the cooperating partner from Brazil. The World Wide Fund For Nature (WWF) also supported the project. The aim of the project was to mutually introduce young people to the circumstances and aspects of sustainable forest use in selected regions in Brazil and Germany. In November 2017, the eight selected participants met up both in Brazil and Germany for a preparatory workshop. In March and April 2018, both interdisciplinary teams, bringing with them expertise in forestry, the environment, communication, media, education, journalism and marketing, set off for the host countries. In two 10-day work camps, the unique importance of the forest for the local population was experienced and discovered through lectures, excursions and workshops. The various excursion destinations in Brazil and Germany are shown on a map at the beginning of Chapter 4. Participants were able to experience first hand the challenges, opportunities and conflicts when dealing with forest land. These individual experiences were subsequently used to develop concepts for educational activities revolving around the forest in Brazil and Germany, both during and after the work camps.

This brochure is the result of this participatory process. It conveys knowledge about forests, their significance and how they are used in Brazil and Germany. It deals in-depth with the forest topics experienced on site through exercises, reports and activities. By personally addressing and presenting their individual experiences, the participants also hope to spark interest for these forest issues in other students and the general public. In doing so, the competencies described in Education for Sustainable Development (ESD) are not only promoted among the participants, but also among the students and teachers who work with "Forest Expedition!"

## COOPERATING PARTNERS

## SDW

Schutzgemeinschaft Deutscher Wald – Bundesverband e. V. is a community of committed forest conservationists who wish to preserve the beauty and health of the forest, but at the same time advocate forest-friendly use. It sees itself as an advocate for nature and wishes to preserve this natural basis of existence for humans, animals and plants. It aims to improve mankind's relationship with the forest, as people – especially young people – are becoming increasingly alienated from their natural environment. Since 1947, Schutzgemeinschaft Deutscher Wald's efforts have focused on the forest. Its 25,000 members are organised into approx. 400 SDW groups that actively carry out nature conservation work on the ground. SDW is a legally recognised nature conservation association. It is therefore permitted to participate in all planning activities that involve forests and nature. Through well-founded expert opinions, more forest-friendly solutions are worked out. Another one of its duties is to provide constructive input for the benefit of the forest in many important decision-making bodies, such as nature conservation, landscape protection and hunting advisory boards.

INTER-  
NATIONAL  
WORKCAMPEDUCATION FOR  
SUSTAINABLE  
DEVELOPMENT



(Photo: SDW)

**Participants and supervisors of the work camps:**  
 (Top, left to right) Ulrike Schuth, Lukas Wimmer, Winfried Bohle, Raquel Viggiani, Katharina Schlünder, Pedro Bremberger Pássaro, Sophia Puchner, Rebecca Wolfer, Carlos dos Santos Junior, (Centre, left to right) Maiara da Silva Goncalves, Michèle Fugmann, Lea Esser, (Centre, left to right) Nayandra Pereira, Odenilze de Souza Ramos, Nathan Carvalho Simões, Brenda Menezes Rodrigues, Anailson Ribeiro Batista, (Bottom, left to right) Thorsten Müller, Ha Linh Truong, Laura Candelaria de Mendonça Lima, Giovane Garrido Mendonça

SDW is not only interested in protecting the forest, but also in bringing people closer to the forest and the environment, thereby strengthening environmental awareness. In particular, its efforts are directed towards children and young people. What began with youth forest activities and the establishment of educational forests has now become a diverse and lively range of forest and environmental education activities.

**FAS**

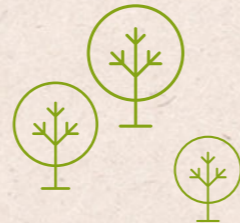
Fundação Amazonas Sustentável (FAS) is a non-profit, charitable, public-law Brazilian foundation (non-governmental organisation). It was founded on 20 December 2007 with the goal of establishing a collaborative partnership between the federal state of Amazonas and Bradesco Bank. Coca-Cola Brazil started supporting the foundation in 2009, followed by Samsung in 2010 and other partnerships as part of development programmes and projects.

The aim of FAS is to support sustainable participation, environmental protection, and enhancing of the quality of life for the riverine communities in the state of Amazonas. The initiatives and activities are primarily implemented via the Bolsa Floresta Programme, the Education and Health Programme (Programa Educação e Saúde-PES) and the Programme for Promoting Innovative Solutions (Programa Soluções Inovadoras-PSI) (see also fas-amazonas.org).

**WWF**

The World Wide Fund for Nature (WWF) is the largest environmental and nature conservation organisation in the world. The worldwide WWF network possesses long-standing experience and expertise in sustainable forest management and education for sustainable development.

WWF Education also has a high level of expertise in the conceptualisation and development of digital learning modules such as e-learning and Massive Open Online Courses. Reference projects include the e-learning course on "Meat and Land Consumption", which is now being made available to schools nationwide via the media centres, and the MOOC "Climate Change and its Consequences", which was developed in collaboration with the German Climate Consortium and had almost 6,000 participants last year (wwf.de/mooc).



SUSTAINABLE DEVELOPMENT GOALS



Copyright: United Nations (<https://www.un.org/sustainabledevelopment/news/communications-material/>)

**EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)**

At the Rio de Janeiro Earth Summit in 1992, almost all the countries of the world declared sustainable development to be a common guiding principle. Agenda 21 views education as a prerequisite for achieving sustainable development goals. The Sustainable Development Goals (SDG) (17ziele.de/17ziele) were revised by the global community in 2015 and their achievement by 2030 re-affirmed.

Both formal and non-formal education should contribute to the necessary change in terms of attitude and awareness. What is needed is education that develops and promotes special abilities and skills in people. It should enable every individual to understand the impact of their own actions on the world, thereby empowering them to make responsible decisions. ESD is more than just knowing facts. It aims to convey competencies; i.e. skills, abilities, and values. In Germany, the concept of competency for action (Gestaltungskompetenz) according to Gerhard de Haan serves as the model. It comprises 12 sub-competencies:

**EDUCATIONAL GOAL:  
 EVERY INDIVIDUAL IS TO UNDERSTAND THE IMPACT OF THEIR OWN ACTIONS ON THEMSELVES AND THE WORLD IN ORDER TO BE ABLE TO MAKE RESPONSIBLE DECISIONS.**

1. Acquiring knowledge in an open-minded way while integrating new perspectives
2. Being able to analyse and assess trends with foresight
3. Obtain insights in an interdisciplinary fashion and make decisions
4. Being able to recognise and weigh risks, dangers and uncertainties
5. Being able to plan and act together with others
6. Being able to consider conflicting goals when reflecting on strategies for action
7. Being able to participate in collective decision-making processes
8. Being able to motivate oneself and others to take action
9. Being able to reflect on one's own and others' guiding models
10. Being able to use concepts of justice as a basis for decision-making and taking action
11. Being able to independently plan and act
12. Being able to show empathy for others

# FORESTS

## DEFINITION OF THE UNITED NATIONS

The Food and Agriculture Organization of the United Nations (FAO) defines a forest as an area measuring at least 0.5 hectares (50 x 100 metres, slightly less than the area of one football field) covered with trees and with at least 10 percent of the ground located under the tree canopy. The trees must be at least five metres high.



**4**  
BILLION HECTARES OF FOREST CAN BE FOUND ON THE EARTH

## FEDERAL FOREST ACT

Section 2 of the Federal Forest Act (BWaldG) provides a legal definition of what a forest is. It stipulates that forests are areas on which forest plants such as trees and shrubs grow. Areas directly adjacent to the forest, such as forest trails, clearings, forest meadows or wood storage areas also count as part of the forest's area. Areas where there are no or only very few trees due to harvesting activities or natural phenomena, such as storms or damage from insects, are also considered as part of the forest.



**30%**

OF THE LAND SURFACE IS FORESTED

## ECOLOGICAL DEFINITION OF A FOREST

A forest is a form of vegetation where there is a special coexistence between plants and other living organisms. One typical characteristic of a forest are trees that occur close together in a group. When these are large enough and there are enough trees within a large area, this creates a special climate in the forest's interior. Hence, it is cooler and the air is fresher in the forest than on an open field, for example. Mutually influencing biological, chemical and physical components are what make up a forest.



**1.6** BILLION

HUMANS RELY DIRECTLY ON THE FOREST

<https://www.waldkulturerbe.de/den-wald-bewahren/der-wald-weltweit/waelder-als-lebensgrundlage>

## EXERCISE

As an introduction to forests and sustainable forest management, the students can collect statistics on their own class. For this purpose, various questions are distributed around the room on slips of paper. They can be answered by the students using sticker dots or dots made using felt-tip pens. Examples of questions:

- Were you in the forest over the past four weeks?
- Are you in the forest more than five times a year?
- Have you ever seen a tree being felled?
- Do you know more than five types of trees?
- Do you like being in the forest?

# 2.0 FORESTS IN GERMANY



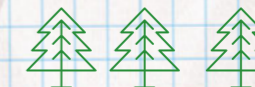
(Photo: SDW)



**11.4**  
MILLION HECTARES



I ♥ the forest



2.1

# FORESTS IN THE TEMPERATE ZONE

FORESTS ARE FOUND IN VARIOUS CLIMATIC ZONES. THEY ARE WELL-ADAPTED TO THE CLIMATE. THAT IS WHY FORESTS DIFFER GREATLY ACCORDING TO THE COUNTRY AND CONTINENT.

In Germany, forests grow in the temperate zone, where there are four seasons: Spring, summer, autumn and winter. Over the course of the year, there are warm and cool months, but extreme diurnal temperature differences, such as in Africa or at the North Pole, do not occur here. Approximately a third of the global population lives in the temperate climate zone.

Typical for the temperate climate zone are coniferous, deciduous and mixed forests. For the cold seasons, deciduous trees lose their leaves in autumn so that they do not freeze to death. In conifers, on the other hand, the leaves are protected against the cold by a thick layer of wax. This is why conifers can grow in colder regions, such as at higher altitudes in Germany. They are ideally adapted to the climate in these areas and do not have to compete with other trees for space.

Untouched nature and primeval forests are nowhere to be found in Germany. Every section of forest has been exploited in the past, or is still being used today. There exist numerous protected forest areas where they can develop with little human influence, such as the 16 national parks. Without intervention from humans, Germany would be almost entirely covered by forest. After the last ice age, these would have consisted primarily of beech forest communities. Particularly following industrialisation at the beginning of the 19th century and as a result of the two world wars, Germany's forests suffered. After the Second World War, a decision was made to counteract the loss of forest areas through reforestation with spruce trees. This species of tree grows relatively quickly and its wood is highly suitable as building material or for use as firewood. This is why there are still many spruce forests today in regions where beech forests would naturally have grown.

» REFORESTATION

PLANTING OR SOWING TREES SO THAT FORESTS CAN (RE)GROW.



"POTENTIAL NATURAL VEGETATION (PNV)"  
VEGETATION THAT WOULD DEVELOP IF INTERVENTION FROM HUMANS WERE TO STOP.

**4**  
SEASONS ARE EXPERIENCED IN THE TEMPERATE LATITUDES.



THERE ARE NO FORESTS IN GERMANY THAT WERE NOT INFLUENCED BY MAN.



(Photo: Lothar Gössinger)

SPRUCE IS A TREE THAT GROWS QUICKLY AND IS IDEAL FOR FIREWOOD AND BUILDING MATERIAL. IT IS ALSO CALLED THE "BREAD TREE OF FORESTRY".

2.2

# FOREST COMMUNITIES IN GERMANY



## LEARNING GOALS

Students learn about different forest communities in Germany and why they develop differently.

In Germany, there are many different types of forests, also called forest communities. They are distinguished by the species they consist of and are excellently adapted to their respective locations. The plant species of a particular forest community have similar requirements, which their habitat is able to fulfil. Other plants that are less well-adapted to the site are crowded out (principle of competition). Forest communities are systematised and given names according to the dominant plant species.



## EXERCISE

- The teacher discusses the definition of a forest community with students using the examples on page 14. Subsequently, students form groups and use online resources or botanical books to research information about different tree species (European beech, common oak, spruce, fir, pine). Subsequently, all students are to fill out the "Tree profile" (WS 01).
- As an introduction to the lesson, videos can be shown that provide a first impression of the diversity found in German

forests. The videos "European Wilderness - Ancient Beech Forests of Germany" and "European Wilderness" show impressive images from European and German beech forests. Furthermore, they provide insight into the forestry industry, the functions of the forest, and the diverse uses of forest products.

**PLAYLIST**

- European Wilderness – Ancient Beech Forests of Germany
- European Forests

## FOLLOW-UP

- What conclusions can be drawn about a particular location from the tree species found there?
- What happens when the conditions at a particular site change?
- Why can some tree types which prefer the same habitat and growing conditions not be found in the same region?

## TIP

Wikipedia articles provide introductory information on tree species. You can use the literature references and internet sources to verify this information and obtain a more complete overview of the topic.

## ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Obtain insights in an interdisciplinary fashion



(Photo: wikipedia.org, CC-BY-2.5)

"Mother of the forest" is what foresters call the European beech. In forests where it is the predominant species, almost no other trees grow. The canopy of a beech forest blocks out so much light that most other plants have insufficient light to grow. A forest community is named after the plant species that most commonly occurs together with the European beech. One example is the woodrush-beech forest, in which European beech and woodrush (a species of grass) are found. Beech allows few other trees to grow, including the common oak and sessile oak or, in mountainous regions, fir and spruce. Despite this, the diversity of species is high. Approximately 7,000 species of fauna can be found in a beech forest, of which around 5,000 are insects. Rare species of fungi specialise in decomposing beech wood.

At high altitudes, i.e. in the mountains where the climate is significantly cooler, conifers predominate. Mixed fir forests dominated by silver fir occur at high altitudes in low mountain ranges and in the Alps. Deciduous trees such as beech, maple and oak are no longer able to establish themselves at these locations. It is simply too cold for them. Coniferous trees such as fir and spruce, on the other hand, are frost-hardy. The silver fir also grows sporadically in lower-lying areas, together with spruce and European beech. Fir forests have adapted to specific locations and account for merely 2 percent of forested areas in Germany.

In places where it is too moist or too dry for the European beech, the common oak or sessile oak is able to prevail. Depending on the location, other trees may also be found there, such as elm or ash in riparian forests. At warm and dry locations, oaks grow together with Scots pine, linden and hornbeam.



View into the crown of a European beech

(Photo: Katharina Schlünder)



View over mountain forests, where coniferous trees predominate.

(Photo: Pixabay)



Elongated sedge-alder carr wetland in the Darss, Germany

(Photo: Katharina Schlünder)



### LOCATION AND GROWING CONDITIONS

Where a plant grows is determined not only by the on-site conditions (relief, climate, water balance, light, wind, supply of nutrients, and soil quality), but also by competing plants, human influence, and wildlife.

(Source: Das Kosmos Wald- & Forstlexikon [The Kosmos Wood & Forest Lexicon])

## WS 01



# TREE PROFILE

**TASK 1:** In groups, research information on your selected tree. Fill out the tree profile completely and draw the outlines of its leaves and fruits on the rear. If there are trees near your school, you can collect leaves and perhaps also fruits directly from them. You can then show them to the class when you present your tree profile.

### COMMON NAME

### BOTANICAL NAME

---



---

### DESCRIPTION

(height, age, leaves, bark, fruit, typical identifying features)

---



---



---



---



---

### USE

(What is or was the wood of the tree used for?)

---



---



---

### LOCATION

(Where does the tree grow best? Where does it occur particularly frequently?)

---



---



---

### EXAMPLES OF FOREST COMMUNITIES WITH THIS TREE SPECIES

(Specify names)

---



---

### LEAF OUTLINE AND FRUIT

(draw/sketch/trace) – Use the rear of this sheet for this

**TASK 2:** Form new groups from the members of the old groups, such that each new group contains a representative of an old group. Present your profiles to the group, then discuss the differences and similarities. The following questions may be helpful when doing so:

**Which differences between the tree species are particularly striking? Are there trees that grow at the same locations? What are the differences in the way the trees are used? What could be the reason for this?**



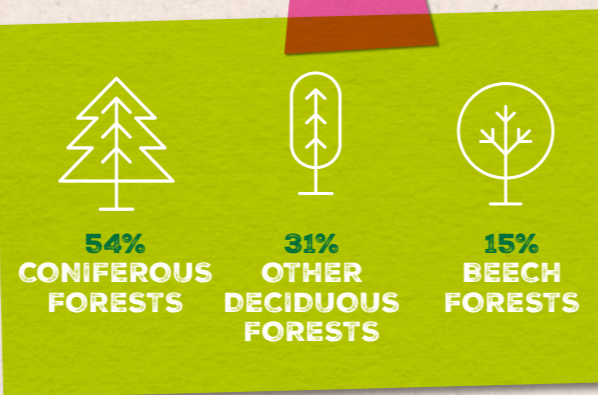
2.3  
**FOREST STATISTICS FOR GERMANY**



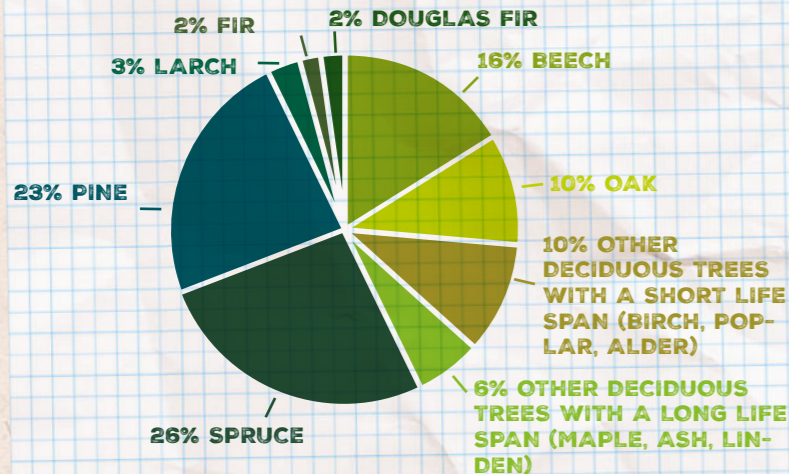
A MATURE EUROPEAN BEECH PRODUCES 1.7 KG OF OXYGEN PER HOUR. THE AMOUNT IT PRODUCES DAILY IS SUFFICIENT FOR 64 PERSONS.

- 77 NATIVE TREE SPECIES
- 116 SHRUB SPECIES
- 1020 HERBACEOUS PLANTS\*
- 140 VERTEBRATE SPECIES
- 100 FOREST-DWELLING BIRD SPECIES
- 5,000 SPECIES OF FUNGI

\*HERBACEOUS PLANTS DO NOT FORM WOODY STEMS OR STALKS.



**DISTRIBUTION OF TREE SPECIES**



**52**  
MILLION TONNES OF CO<sub>2</sub> EQUIVALENT ARE ABSORBED BY GERMAN FORESTS EACH YEAR.

CO<sub>2</sub> equivalent is a unit of measure that summarises the climatic impact of various greenhouse gases. Carbon dioxide (CO<sub>2</sub>) is the most important greenhouse gas, along with methane, nitrous oxide and others.

APPROX.  
**1,200**  
YEARS

ONE OF THE OLDEST TREES IN GERMANY: LARGE-LEAVED LINDEN (TILIA PLATYPHYLLOS) IN SCHENKLENGSFELD (HE SSE)

**66.58**  
METRES

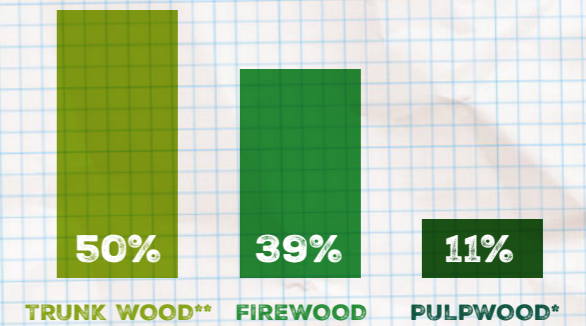
THE TALLEST TREE IN GERMANY IS "WALDTRAUT", A DOUGLAS FIR LOCATED IN THE FREIBURG STATE FOREST.



**16**  
NATIONAL PARKS

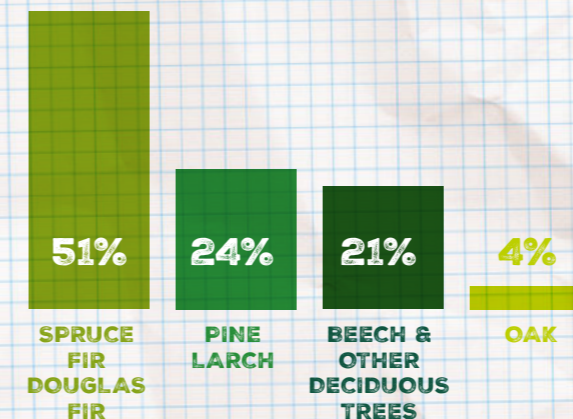
**0.6%**  
OF GERMANY'S LAND AREA IS WILDERNESS

**WOOD UTILISATION**

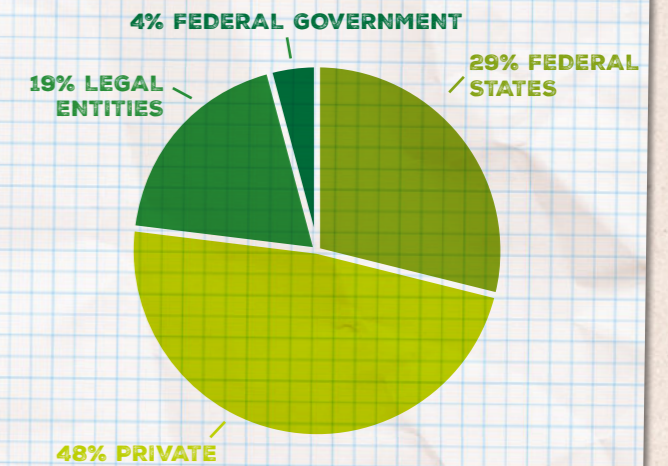


\*Pulpwood is wood suitable for manufacturing paper, cellulose pulp or fibreboard.  
\*\*Trunk wood refers to a tree trunk that is at least 6 meters long. The wood is used e.g. for furniture or building construction.

**IN 2017, 53 MILLION CUBIC METRES OF WOOD WERE FELLED**



**WHO DOES THE FOREST BELONG TO?**



**1.1**  
MILLION PEOPLE WORK IN OR FOR THE FOREST

## 2.4 FOREST FUNCTIONS



### LEARNING GOALS

First, students will establish a personal connection with the forest through creative writing. In their texts, they are to present their personal experiences and relationships with the forest. Subsequently, the functions of the forest and conflicts related to it will be discussed using WS 02.

Forests in Germany fulfil various important functions. They can be subdivided into the following three: Protective functions, utilitarian functions, and recreational functions. These functions comprise the following aspects:

#### PROTECTIVE FUNCTIONS

- Drinking water provision
- Protection against debris and avalanches
- Climate protection
- Air purification
- Soil protection
- Noise protection
- Immissions protection and filtering dust
- Landscape
- Protecting biotopes and species
- Flood protection
- Cultural heritage (monuments, burial mounds, ...)
- Nature conservation areas
- etc.

#### UTILITARIAN FUNCTIONS

- Firewood and timber, wood for biofuels, bioplastics
- Income for forest owners
- Jobs (foresters, forest workers, hunters, wood processing, environmental education)
- Non-timber products (fruits, herbs, nuts, mushrooms, game meat)
- Wood for paper, furniture, and wooden toys
- Clothing (viscose, modal)
- etc.

#### » GAME MEAT

refers to meat from wild animals such as wild boar, roe deer, and red deer.

#### RECREATIONAL FUNCTIONS

- Sports (mountain biking, cycling, hiking, jogging, climbing, ...)
- Going for walks
- Health (e.g. bathing in the forest)
- Experiences in nature
- Environmental education and forest pedagogy
- Geocaching
- Riding
- Tranquillity and relaxation
- Holidaying
- etc.

### EXERCISE

The students receive three different starting prompts which will help them write a text of their own. They should write a text that reflects what they have personally experienced as realistically as possible.

#### Examples of sentence prompts:

1. I am standing in the forest, and between the trees...
2. The forest path that I am walking on...
3. When I look upwards...
4. I close my eyes and hear...

**The following questions may help them with this task:**  
Think of a situation that matches one of the sentence prompts. Something you have experienced before, or how you might imagine a situation in the forest. Put yourself in that situation and ask yourself the following questions: What can you hear? What can you feel? What can you smell? What appears familiar to you? What appears strange to you?

#### Recommended literature:

Kreatives Schreiben: 111 Übungen. [Creative writing: 111 exercises.] Reclam-Verlag (Publisher)

### FOLLOW-UP

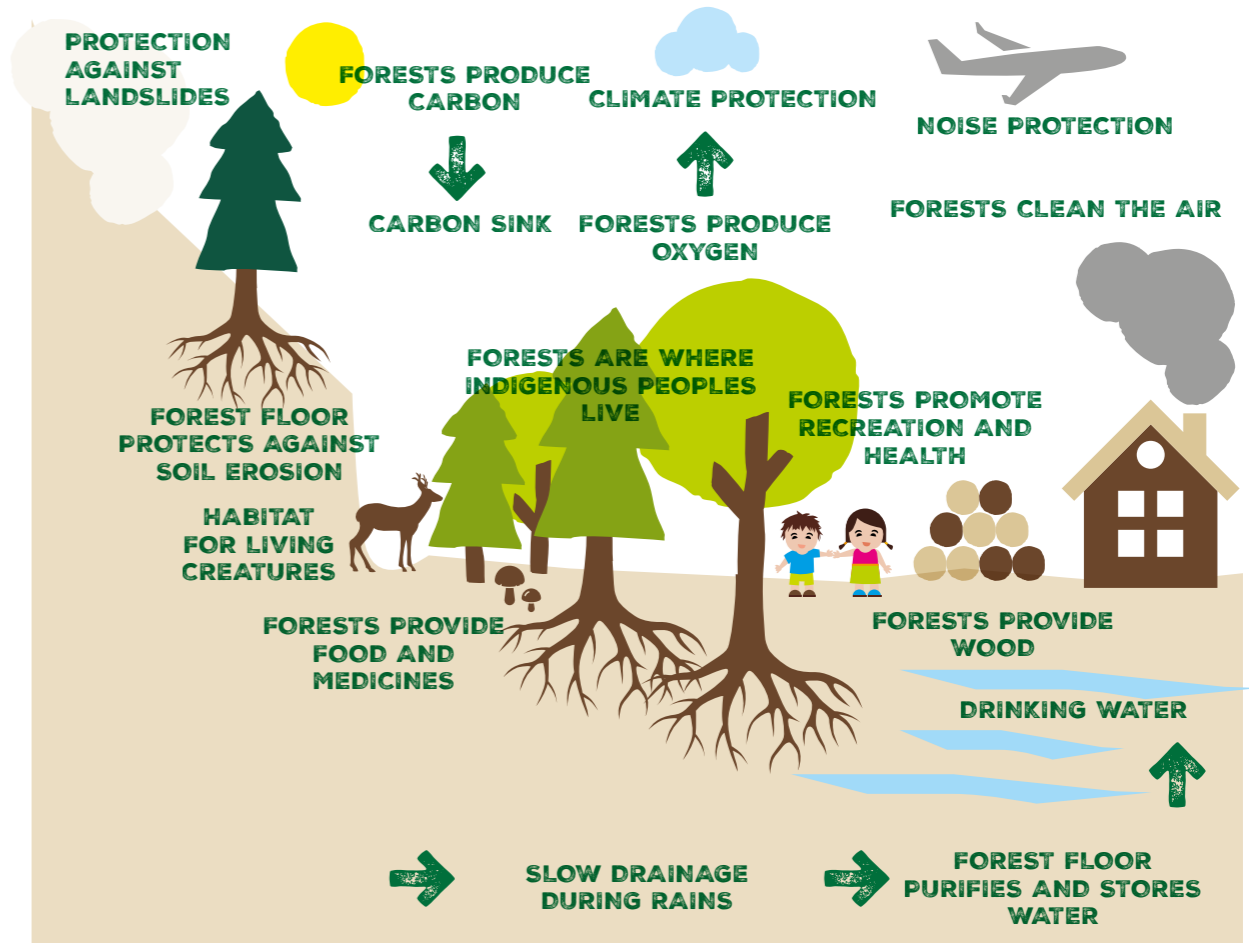
After the students have completed the worksheet WS 02, they are to reflect on the lesson by briefly summarising it using key points. They are to identify the information that was new for them and what they already knew, as well as which information surprised them. For this part, the teacher can write a few questions on the board for guidance.

### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Obtain insights in an interdisciplinary fashion



## THE MULTI-TALENTED FOREST



1. Have a look at the diagram depicting the functions of the forest around the world. Which did you already know about? Which were new to you? Which of these functions do you encounter in your daily life, and how?

2. Draw a table with three columns (Protective functions, Utilitarian functions, Recreational functions) and lots of rows. Sort the forest functions from the diagram into these categories:

PROTECTIVE FUNCTIONS	UTILITARIAN FUNCTIONS	RECREATIONAL FUNCTIONS

3. Discuss the results with your class. Have you understood all the functions? For example, why the forest serves to protect the climate?

4. In which cases might there be conflicts between the functions? Read the article in WS 03. Which interest groups are speaking about the issue? Which opinions are represented, and which are not? What would you say if you were a mountain biker? Discuss the text in your class.

5. Discuss in groups: What do you think would change if these forest functions were no longer being fulfilled? Briefly note down two aspects for each forest function in the diagram.

# FOREST FUNCTIONS & FOREST USE CONFLICTS



Article source: Echo Online, Lokales Südhessen, 2018

## 50 ILLEGAL FOREST TRAILS IN SOUTH HESSE

BY RAINER H. SCHLENDER

**Regional Council:**  
Specialist Authority of the State of Hesse

**Trails:**  
Mountain bike trails

Darmstadt – There are no less than 50 prohibited trails for mountain bikers in the forests of southern Hesse. This figure was determined by foresters and reported to the Regional Council in Darmstadt. A Regional Council spokesperson also emphasised that riding on these illegal trails is a misdemeanour and offenders are liable to be fined 1,000 euros.

The forest is generally open to everyone. "Hessian forests are recreational areas that are available to everyone free of charge," reminded District President Brigitte Lindscheid (Greens). However, the Hessian Forest Act stipulates rules of conduct that walkers, hikers, joggers and cyclists must adhere to – also for the protection of animals and plants. According to this law, mountain biking on paved forest paths is generally permitted, provided that the cyclists can safely pass other bikers or pedestrians.

Lindscheid also points out the "Forest and Sports Agreement", which was signed by 28 associations and institutions with the aim of "supporting recreation and sporting activities in the forest and helping to avoid conflicts".

According to the Regional Council, however, illegally created mountain bike trails are a growing problem. The foresters are aware of around 50 illegal trails. However, they suspect that there are even more. In some cases, said the RC spokesperson, bikers even used a saw to clear a lane through a patch of young forest. Legally speaking, this is property damage, but above all it disrupts the lives of the animals living in the forest. Foresters also caution against the danger of hazardous situations and collisions with other forest visitors due to the often steep, confusing trails and the high speed at which mountain bikers travel. Although the foresters have made it impossible to ride down many illegal trails, they report that this has not led to a decrease in such aggressive use of the forest by mountain bikers. In order to offer mountain bikers an alternative, the team at the Unesco Bergstrasse-Odenwald Nature Park in southern Hesse has designed and signposted a total of 39 trails that can be ridden by sports cyclists.

In addition, four bike parks have been created in the areas managed by the Hessian forestry offices, including one in Beerfelden. Persons wishing to ride there must wear a helmet and back protectors; however, this is also recommended on all other bike trails.

Above Bensheim-Hochstädten, a private association operates the "Fuchstrail", which is described as a short but challenging freeride trail with a gentler flowride addition. These trails were once created illegally. According to the association, they can now be used legally by members of the association with the approval of the Hessen-Forst forestry authority.

Source: [https://www.echo-online.de/lokales/suedhessen/mountainbiker-forster-zahlen-mehr-als-50-illegale-strecken-in-sud-hessischen-waldern\\_18142347](https://www.echo-online.de/lokales/suedhessen/mountainbiker-forster-zahlen-mehr-als-50-illegale-strecken-in-sud-hessischen-waldern_18142347), last accessed on 28/01/2019



Foresters in the Odenwald are constantly discovering illegal mountain bike trails.

Photo: RC Darmstadt

**RC spokesperson:**  
Spokesperson of the Regional Council

**ADDITIONAL INFORMATION**

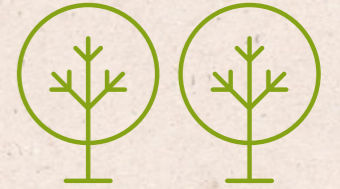
[www.tourismus-odenwald.de](http://www.tourismus-odenwald.de)  
[www.bikepark-beerfelden.de](http://www.bikepark-beerfelden.de)  
[www.fuchstrail.de](http://www.fuchstrail.de)

**Freeride trail:**  
Trail with high jumps

**Flowride trail:**  
Trail without jumps

## 2.5

# FOREST THREATS



### LEARNING GOALS

Students will learn what dangers threaten the forests in Germany and what effects they have on humans and animals.

**INFOGRAPHICS**  
are used to efficiently convey facts. They depict e.g. proportions, figures, locations, involvement, modes of action, and sequences.  
Source: Wikipedia

Scientists distinguish between two main categories of forest threats: anthropogenic and natural factors. The former, which are effects caused by humans, include air pollution from car exhaust fumes, soil degradation from road construction, and the use of fertilisers and pesticides. Natural factors include weather phenomena such as storms, heavy rainfall or thunderstorms, but also when animals gnaw on plants or insects infest trees in large numbers and damage them.

### EXERCISE

For a multi-medial introduction to the topic, students can watch the YouTube video "Curse or blessing? Sudden forest owners" [Fluch oder Segen? Plötzlich Waldbesitzer | Unser Land | BR] from the Bavarian Broadcasting Agency [Bayrischer Rundfunk]. It tells the story of two persons, a woman and a 13 year old boy who suddenly became forest owners. Together with the students, the various types of hazards are discussed. Students will be prompted to name some

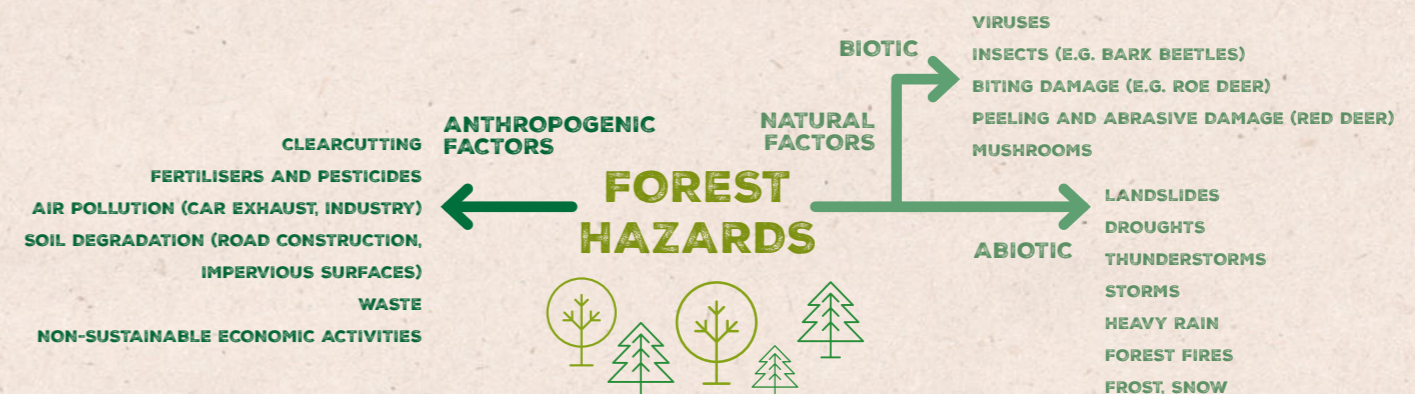
of these hazards. Mind maps can be used to record the results and visualise them, sorted according to category (either on the board or an online mind map). Subsequently, the class is split up into groups (max. 4 students). Each group is to research information on one forest threat. The flashcards on page 23 will serve as aids for this activity. Students then visualise their results in the form of an analogue or digital (infogram.com, PowerPoint) **infographic**. Finally, they give a short presentation to the class.

### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Obtain insights in an interdisciplinary fashion

### FOLLOW-UP

What did the students notice during their research? Where did they find information? Was it easy to filter the information? What difficulties were encountered during the search? Which forest threats did they already know? Which ones were new? What particularly impressed them?



WS 04

# FOREST DAMAGE & FOREST THREATS



Working in groups, research information on one forest threat. Focus on the consequences and effects, as well as the causes if necessary.

Present your results in the form of an infographic poster. Agree on what information is the most important and present it using texts, but above all by using infographics.

In your group, discuss how you can present the most pertinent information. You may find posts on social media helpful in this regard (e.g. Twitter, Instagram, Facebook), or articles from news agencies or forestry authorities (e.g. try searching for #kyrill and #friederike)

**Important: Document the sources of your information and graphics.**

Give a presentation on your topic using your infographics poster.

**Places where you can search for information:**

- Wikipedia (provides an initial overview and lists additional sources)
- Forest lexicons, biology and geography books
- Websites of state forestry agencies
- Waldwissen.net
- sdw.de

**Here are some sources for illustrations and images:**

- Satellite images: [nasa.gov/multimedia/imagegallery/](https://nasa.gov/multimedia/imagegallery/)
- Pixabay.com
- Wikimedia Commons
- Pexels.com

## ABIOTIC AND BIOTIC FOREST THREATS

"Abiotic" means "inanimate nature", nature without living things

"Biotic" means "animate nature"

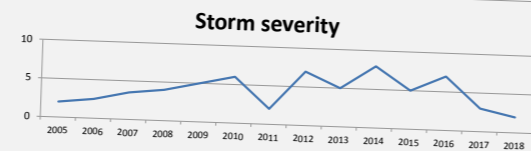
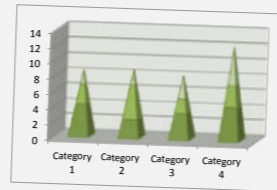
**ANTHROPOGENIC FOREST THREATS** refer to forest threats that are caused by humans

## STORM DAMAGE IN THE FOREST

Causes, consequences, and examples

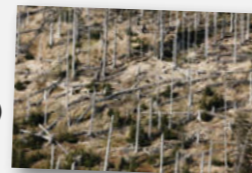


**Causes**  
Give a brief explanation of how/why the respective forest risk occurs. Are the causes natural or caused by human influence?



### Consequences and effects

- You can use various elements to present the consequences and effects:
- Diagrams (column charts, bar charts, pie charts, and line graphs)
  - Thematic geographical maps
  - Plans
  - Organigrams
  - Cross-sectional diagrams



### MAP OF GERMANY

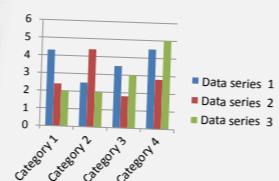
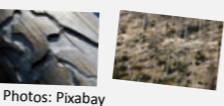


Photos: Lencer/wikipedia.org (CC BY-SA 3.0)



**Examples**  
Research whether there were cases in the past which received particular media attention.

**800ha** of forest area damaged



WS 05

# INFO TEXTS FOREST DAMAGE & FOREST THREATS IN GERMANY



This page is to be photocopied, after which the cards are cut out and distributed to the respective groups of students. The information on the cards will aid the students with their online research for creating the infographics.

## AIR POLLUTION

Search terms that may be useful:

- "Acid rain"
- "Immissions + forest"
- "Air pollution + forest"

Research the "causes of air pollution in the forest". Search for "effects of immissions on the forest". Search for diagrams (e.g. via Google image search) which clearly explain the problem of air pollution in the forest.

## INSECTS (USING BARK BEETLES AS AN EXAMPLE)

Search terms that may be useful:

- "Bark beetle"
- "Forest pests"
- "Bark beetle + protection"

First, give a brief introduction to the bark beetle. Research why the bark beetle can become a problem for the forest. Under what circumstances will the bark beetle become dangerous for the forest? Are all forests and trees equally affected?

## SEVERE WEATHER EVENTS (USING STORMS AS AN EXAMPLE)

Search terms that may be useful:

- "Kyrill 2007", "Friederike 2018"
- "Storm + forest damage"
- "Windthrow in the forest"

The storms Kyrill and Friederike are ideal for showing and explaining the dangers storms pose. Which areas in Germany were particularly affected? What impact did this have on the forest and people?

## UNSUSTAINABLE EXPLOITATION (USING ILLEGAL LOGGING AS AN EXAMPLE)

Search terms that may be useful:

- "Land use and forest"
- "Impervious surfaces and biodiversity"
- "Wildlife corridor"

The increasing use of land areas in Germany for settlements, commercial areas, and roads is having an impact on the forest. Which forest functions are negatively affected?

## CLIMATE CHANGE

Search terms that may be useful:

- "Climate change + forest"
- "Spruce + climate change"

For the causes, you can note down brief key points, as the topic is an extensive one. Try to research information on what climate change means for the forest. What specific problems does climate change cause for the forest? What will foresters have to consider in the future?

## FOREST FIRES

Search terms that may be useful:

- "Forest fires + Germany"
- "Forest fires + causes"
- "Forest fires + fighting"
- "Forest fires + prevention"

Forest fires occur relatively frequently in Germany. However, they are usually extinguished very quickly so that they do not develop into larger fires. Also find out about how you should behave in the forest when it is particularly hot and dry there.

## 2.6 SUSTAINABLE FOREST MANAGEMENT



### LEARNING GOALS

Students learn what sustainable forest management is and how they themselves can contribute to it.

The forestry industry is an extremely large and significant sector in Germany. Although it is not usually the focus of attention, more than 1.1 million people are employed in the "Forest and Wood" (Ger.: Wald und Holz) cluster.

In Germany, statutory regulations apply for the management of forests. The Federal Forest Act (BWaldG) lays down the basic principles which apply throughout the country, while state-specific forest laws adapt the BWaldG to the differing regional circumstances in each federal state. For example, the BWaldG stipulates that the forests must be managed "properly and sustainably". This means that the forest functions, which are also described in the BWaldG, must not be negatively impacted. Instead, they are to be protected. Several other laws also influence the protection of the forest and forest management. These include the Federal Nature Conservation Act (BNatSchG), the Federal Hunting Act (BJagdG), the Regional Planning Act (ROG), the Waste Management Act (AbfG) and the Water Resources Act (WHG).

Forest owners are obligated to take care of their forests in a certain way. They are permitted to use the wood, but must ensure that none of the other forest functions are negatively impacted. They are not permitted to place unnecessary strain on the soil with heavy machinery when collecting timber, and must not damage any other trees when felling trees. New trees must be replanted for the ones they cut down. Basically, this corresponds to the original core statement of sustainability. When planting new trees, foresters are to ensure that these trees can cope well with the conditions at that particular site.

**FOREST & WOOD CLUSTER**

FORESTRY, PAPER INDUSTRY, PRINTING, ENERGY USE, SAWMILLS, FURNITURE INDUSTRY, CONSTRUCTION, ETC.



### EXERCISE

Students are to complete four learning stations on the topic of sustainable forest management, where they will be working with different forms of media (see WS 06).

**Station 1:** Laptop, tablet, PC with internet access  
YouTube video: "Sustainable Forestry" (Nachhaltige Forstwirtschaft) by Wald und Holz NRW

**Station 2:** Slips of paper and pens to compose short analogue messages (such as tweets). Downloading of Carlowitz

quotes from bildungserver-wald.de

**Station 3:** Caricature "This is how we live, how we live, and this is how we will always live." by Jupp Wolter. Print it out in DIN A4 format [http://www.politikundunterricht.de/4\\_99/lokaleagenda4.htm](http://www.politikundunterricht.de/4_99/lokaleagenda4.htm)

**Station 4:** Print out a large version of the diagram "Dimensions of sustainability" <https://media.diercke.net/omeda/800/12676E.jpg>



### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Obtain insights in an interdisciplinary fashion



WS 06

## SUSTAINABLE FOREST MANAGEMENT

### STATION 1

Watch the video by the state forestry authority Landesforsten Wald und Holz NRW (play it 2x). Answer the following questions using key points:

- What does sustainable forestry mean?
- Who decides which trees are felled?
- What is the key difference between natural and managed forests?

### STATION 2

Hans Carl von Carlowitz lived in Freiberg (Saxony) from 1645 to 1714. He was the first person in Europe to write down the term "sustainability". Read the quotes by Carlowitz from his book "Sylvicultura oeconomica".

How would you explain and present Carlowitz's exhortations in a modern context? Write short messages about his statements (such as tweets) which contain attractive texts and images. You have space for approximately 140 characters in each message for getting your point across. Remember that your readers do not yet have any knowledge about the topic.

A forest harvester or harvester is a machine used to harvest timber in the forest. With a gripper arm, the machine holds the entire tree in place and saws it off close to the ground using an integrated saw. The tree is then pulled through the gripper arm, during which the branches are removed. In this manner, a lush leafy tree firmly rooted in the ground can be turned into a bare log within seconds. Ready for transportation.

### STATION 3

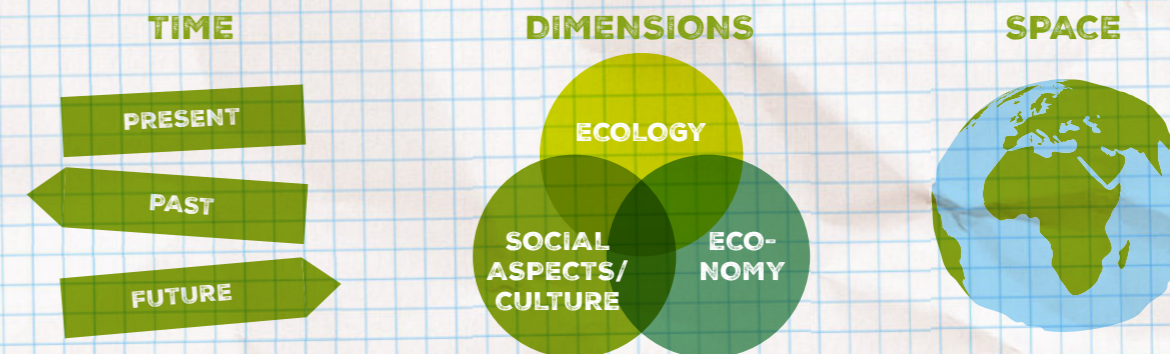
Have a look at the caricature. Firstly, use keywords to describe what you see. What does the content of the illustration have to do with sustainability? What does the artist Jupp Wolter wish to convey?



### STATION 4

The diagram describes the term "sustainability". Look at it carefully and try to describe what you see bit by bit. In your group, discuss initial ideas of what the diagram might be conveying.

### WHAT ASPECTS DOES OUR UNDERSTANDING OF SUSTAINABILITY HAVE?



The past and the present are examined in order to be able to develop ideas about the consequences of human actions.

The causes, connections to, and effects of human actions on the ecological (nature), economic (economy), social and cultural spheres are considered.

By making sustainable decisions, the aim is to provide people everywhere on the planet (between the countries of the world) and within a society (in a country) with equal opportunity for a good life.

Source: Forest Expedition!, Schutzgemeinschaft Deutscher Wald Bundesverband e. V. (SDW) 2018

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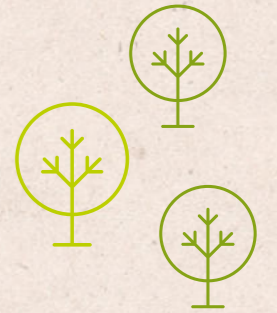
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3.0

FORESTS IN BRAZIL



### 3.1 INTRODUCTION

MEASURING OVER 850 MILLION HECTARES, BRAZIL IS THE LARGEST COUNTRY IN SOUTH AMERICA AND THE FIFTH LARGEST IN THE WORLD. MORE THAN HALF OF ITS LAND IS COVERED BY FOREST (460 MILLION HECTARES), MOST OF WHICH IS TROPICAL RAINFOREST.

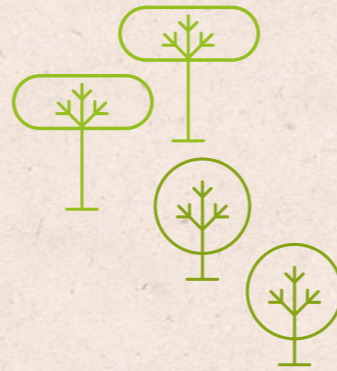
Forest is defined as areas consisting mainly of woody plants whose treetops touch each other and form a leafy canopy. There are various definitions based on those of the FAO (Food and Agriculture Organization).

Brazil covers large sections of the South American continent. Hence, very different landscapes have developed under different local conditions, such as rainforests, savannas, grass steppes and wetlands. These different segments of the landscape are called biomes.



- AMAZON RAINFOREST
- ATLANTIC RAINFOREST (MATA ATLÂNTICA)
- CAATINGA
- CERRADO
- PAMPA
- PANTANAL

Biomes in Brazil (Source: Oliveira-Ferreira et al. Malaria Journal 2010, 9:115)



#### BIOME

A biome is a community in a macroclimatic area that contains typical flora and fauna. It is named after the predominant vegetation (flora) (e.g. European deciduous forest, rainforest).

Based on STINGLWAGNER et al. (2016): Das Kosmos Wald & Forst-Lexikon [The Kosmos Wood & Forest Lexicon], 5th edition

#### THERE ARE SIX BIOMES IN BRAZIL:

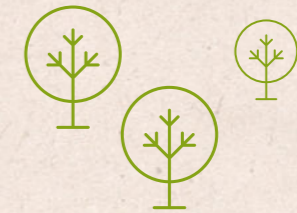
- Amazon (mainly rainforest)
- Cerrado (mainly savanna)
- Atlantic Forest (Atlantic rainforest)
- Caatinga (desert-like region)
- Pampa (grass steppe)
- Pantanal (wetlands)

#### EXERCISE

Students will examine the importance of forests in their lives and in the lives of others. They are to interview different people (parents, neighbours, friends) and document their answers in writing or as an audio recording (e.g. smartphone). Questions they might ask: Are forests important to you? Do you talk to other people about forests? What do you know about the Brazilian rainforest? Students are to compare the answers with those they themselves would have given. The results of the survey are then presented to the class. Alternatively, the program GrafStat (funded by the Federal Agency for Civic Education) can be used. It is used to create and evaluate questionnaires.

#### PLAYLIST

As an introduction, students can listen to the song "Floresta Amazônica" from the SDW playlist.



#### WARM-UP

Based on the interviews from the first task, students will form groups and write down three to five true and/or false facts about the Brazilian rainforest. Each group then challenges the next to guess which statements are true or false. This activity can also be played as a "four corners" game.

The groups are split up into the corners of the classroom. With each correct answer, the group is permitted to move to the next corner. The first group to visit all four corners wins.

#### FOLLOW-UP

After the interview results have been presented and the game has been played, students are to reflect on which information about the rainforest was new to them and whether this raised further questions. Working individually, they write down key points. Subsequently, these answers are collected in class and pinned to a notice board as cards or written on the blackboard. Classmates may also be able to answer some of these questions. Questions that have not been answered are documented so that they can be clarified as part of the lesson unit.

#### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Being able to reflect on one's own and others' guiding models
- Obtain insights in an interdisciplinary fashion



Boat trip through the floodplains (Igapó) of the Rio Negro rainforest (Photo: SDW)



Rainforest giants tower above the treetops (Photo: SDW)

### 3.2 THE AMAZON RAINFOREST

#### AMAZON BASIN

The Amazon Basin is the name given to the region measuring almost 800 million hectares which is drained by the Amazon River and its tributaries. It is also referred to as the "hydro-geographic Amazon basin". It extends into neighbouring countries, such as Peru where the Amazon originates, high in the Andes.

#### AMAZON BIOME

The Amazon biome refers not only to the areas directly bordering the river. In addition to 500 million hectares of rainforest, it also includes 28 million hectares of montane forest, 47 million hectares of floodplain, 32 million hectares of savanna and 9.6 million hectares of sand forest. The Amazon biome extends into Brazil's neighbouring countries.

#### AMAZÔNIA LEGAL ("LEGAL AMAZON")

This is the name given to the region of the Amazon basin that lies within Brazil's borders. It covers slightly more than 500 million hectares and extends across all federal states. This makes it the largest socio-geographical unit in the country.

**6,400**  
 KM - THAT'S HOW LONG THE AMAZON IS.  
 IT IS THE SECOND LONGEST RIVER  
 IN THE WORLD.

The Amazon rainforest is located in the Amazon basin, which is the name given to the area influenced by the Amazon River and its tributaries. The largest section of the Amazon basin, approximately 66 percent, is found in Brazil. The rest is distributed over a total of eight other countries in South America, namely Peru, Colombia, Venezuela, Ecuador, Bolivia, Guyana, Suriname and French Guiana. In total, the Amazon basin covers an area of 780 million hectares, making it larger than Australia. The climate is tropical, with little variation in annual temperature. There are no seasons like in Germany, only rainy and dry seasons. All the plants are evergreen – they do not lose their foliage at a certain time of the year. Precipitation is usually brief, but heavy.

Brazil is considered the most biodiverse country on earth. The Brazilian rainforest is one of the largest and last primeval forests on the planet – forests that have never or hardly been exposed to human exploitation.

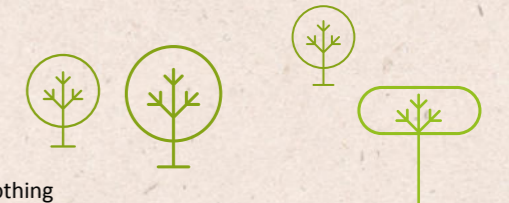
In the Amazon region, the areas along the river are flooded during the rainy season. These flooded areas are called "Várzea" (for whitewater rivers) or Igapó (for blackwater rivers). Extending further inland from these areas are the "Terra firme". This is the land that river floods no longer reach. The soils of the Amazon rainforests are very poor in nutrients. For diverse rainforests to grow despite this, nature has developed strategies. On the one hand, the rivers wash up suspended matter from the mountains in the west, which increases the fertility of the soils of the Várzea. On the other hand, a dense network of mycorrhizal fungi (symbiosis of fungi and plants) in the soil ensures that all nutrients falling to the ground in the form of leaves, dead wood or rain are immediately absorbed and stored.



Boat trip through the Igapó forest on the Rio Negro (Photo: Katharina Schlünder)

**PLAYLIST**  
 Boat trip through the Igapó forest on the Rio Negro

If the forest is cut down, thereby also destroying the mycorrhizal fungus, nothing but infertile sandy soil remains. Researchers have also discovered that desert dust from the Sahara is transported to South America by trade winds over the Atlantic. When it arrives, it serves as additional fertiliser for the rainforest. More than 200 million people live in Brazil, over twice as many as in Germany. Most of them live in big cities such as Manaus, Brasilia or São Paulo. They speak Portuguese. However, it differs somewhat from European Portuguese and even within Brazil, there are different dialects. More than 160 indigenous peoples live deep in the rainforest, some of whom speak their own languages. Some of these peoples have never had contact with other people. They receive special protection from the government to prevent diseases from being brought into the highly isolated villages. In the Amazon basin, 1 million km<sup>2</sup> are designated as indigenous territories. Around 7 million people live in the entire Amazon region. Their livelihood depends mainly on the harvesting of timber, fishing, cultivation of cassava or collecting Brazil nuts. For a few years now, tourism has also played a role as a source of income.



**PLAYLIST**  
 In this video, FAS (Fundação Amazonas Sustentável) shows how people along the Rio Negro live. You will also see the village we visited and some of the inhabitants, such as Roberto.

FAS trailer



Jean Sena is a wildlife biologist and responsible for monitoring the animals in the rainforest (Photo: SDW)



Alberta Pacheco is an FAS employee and coordinator for conservation and sustainability in Tumbira (Photo: Ha Linh Truong)



Roberto Mendonça shows how to open a Brazil nut (Photo: Katharina Schlünder)

There are three main river types in Brazil. They differ because their sources are located in different regions, and hence also have different soil characteristics.

#### WHITewater RIVER

Whitewater rivers contain particularly high levels of suspended mineral sediments, such as the Rio Solimões or the Rio Branco. They are particularly rich in nutrients and hence exhibit a high level of biodiversity.

#### BLACKwater RIVER

Blackwater rivers such as the Rio Negro contain high levels of dissolved humic and fulvic acids. This turns the water a dark brown, much like coke. These rivers are very poor in nutrients and acidic. As a result, only few plant and animal species are able to survive in them.

#### CLEARwater RIVER

This type of river can only be found in South America. The water is clear, but poor in sediments and nutrients. The rivers usually flow over sand or rocks. Due to their low gradient and thus low flow velocity, they carry hardly any sediments. The Rio Xingú is a well-known clearwater river in Brazil.

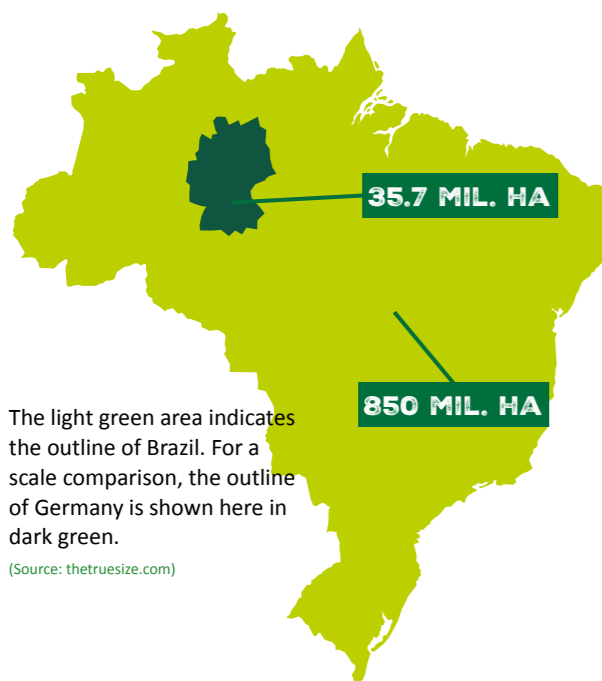


WS 07

# THE AMAZON RAINFOREST



The Brazilian Amazon forest alone is 29 times larger than Germany's forest areas and nine times larger than Germany itself. One way you can illustrate this relationship graphically is by colouring in the corresponding number of boxes on a piece of squared paper.



The light green area indicates the outline of Brazil. For a scale comparison, the outline of Germany is shown here in dark green.

(Source: thetruesize.com)

	FOREST AREA (HA)	% FOREST COVERAGE
<b>BRAZIL</b>	<b>493,538,000</b>	<b>59%</b>
<b>GERMANY</b>	<b>11,400,000</b>	<b>32%</b>

Have you ever visited the tropical greenhouse in a zoo or botanical garden? The air there is very hot and humid – just like in the Brazilian rainforest. Perhaps you could organise a class outing to one and take a closer look at the plants.

## ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Obtain insights in an interdisciplinary fashion
- Being able to plan together with others

### ESTIMATED SIZE OF FOREST AREAS IN BRAZIL

FOREST TYPE	2015 (HA)	% OF FOREST AREA	% OF COUNTRY'S AREA	1990 (HA)	% OF COUNTRY'S AREA
<b>NATURAL FORESTS</b>	<b>202,691,000</b>	<b>41.1</b>	<b>23.8</b>	<b>218,240,000</b>	<b>25</b>
<b>REGENERATED FORESTS</b>	<b>283,111,000</b>	<b>57.4</b>	<b>33.3</b>	<b>323,481,000</b>	<b>38</b>
<b>FOREST PLANTATIONS</b>	<b>7,736,000</b>	<b>1.5</b>	<b>0.9</b>	<b>4,984,000</b>	<b>0.58</b>
<b>TOTAL FOREST AREA</b>	<b>493,538,000</b>	<b>100</b>	<b>58.0</b>	<b>546,705,000</b>	<b>64.3</b>

(Source: FAO 2015)

## EXERCISE

Work in groups. Compare the two countries. Obtain an overview of the geography, infrastructure and cities, forest cover, agricultural land and water bodies. You can use programs such as Google Street View to explore various areas in both countries from the street-level perspective. Focus on the Amazon region for Brazil.

Write down your findings using key points. The following questions may be helpful for this task:

- How are the towns and cities distributed? How close are they to each other?
- What do you notice when you compare the rivers in the two countries?
- In which direction do the rivers flow? In which direction do the mountains extend?
- Which types of vegetation (forest, meadow, pasture, desert,...) can you recognise in the areas you are looking at from a street perspective? And where are they? Is the region flat or mountainous?

Source: Forest Expedition!, Schutzgemeinschaft Deutscher Wald Bundesverband e. V. (SDW) 2018

3.3

# LAYERS & STRUCTURE OF THE RAINFOREST

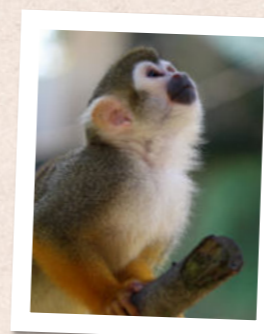
## A LITERARY STROLL

"I am awake. My short nap is over. Before I open my eyes, I hear parrots screeching while flying away in the distance. Cicadas chirp loudly. They are all around me in the meadows. I sit up in my red hammock. The old beams of my wooden house creak. From my hammock, I look down at the Rio Negro. The water is dark and calm. The other riverbanks are far away and the surrounding land is carpeted with rainforest. Slowly, I climb out of the hammock. The sun burns hot on the open meadows and grasslands of our village. I am sure to find a cool spot in the forest. At the edge of our village, a dirt trail leads into the rainforest. We have no paths or roads here cars could drive on. I have to walk carefully on the narrow trails. Tarantulas or snakes could be anywhere, and I don't want to startle them. I take a deep breath. Then another. The air tastes humid. It is hot and humid. It smells of soil and plants. One bird call stands out above the rest - the "Capitão do Mato", the captain of the forest. Not only does it sound like a car alarm, it actually is the forest's alarm system. It announces my visit to all the other animals. I have to concentrate on the path. It is very narrow and if I lose sight of it, I might get lost. Everything looks the same in the rainforest. Even experienced hunters have strayed so far that they were never seen again. I come to a sort of clearing. There are no trees here within a radius of 10 metres. I still can't see the sky. But now I can see the tops of the tallest trees, the giants of the jungle, from below. They are 60 metres tall and their crowns tower above all the other trees. At this height, monkeys, eagles, bats and butterflies can conceal themselves perfectly. I see a small group of squirrel monkeys on the highest branches. They watch me intently.

**PLAYLIST**  
Listen to what the "Capitão do Mato" sounds like in the SDW playlist.



Layers of the rainforest (Source: Elke Freese, Wikimedia)



The squirrel monkeys are well-hidden in the high crowns of the trees. (Photo: Pixabay)



You can't see far in the rainforest. (Photo: Katharina Schlünder)

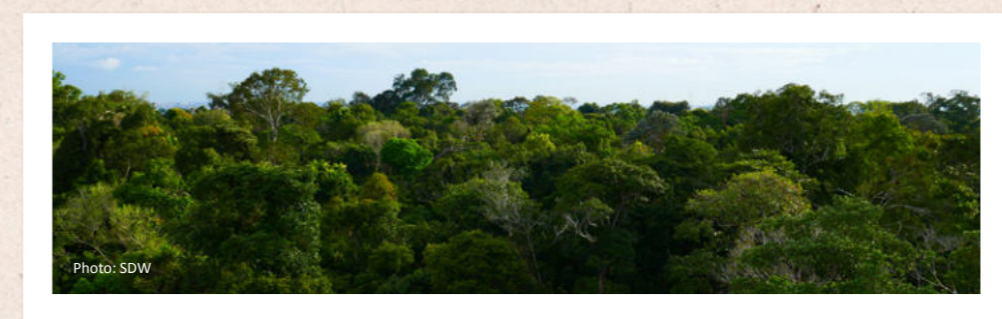


Photo: SDW

One storey below, the canopy becomes denser. I can not only make out the leaves of the trees, but also lianas, orchids and ferns growing in the treetops. From above, the sun must shine really strongly onto the trees. The canopy of leaves is so dense that only a small percentage of the sunlight reaches me. I look around at the many shrubs and young trees growing in the shade of the forest. Their trunks are strikingly slender. Mosses and algae grow on their bark, creating unique patterns in different colours. At a spot where a few rays of sunlight shine through the forest canopy onto the ground, a few ferns grow. I also notice that the plants here in the rainforest have particularly large leaves. Are they trying to get as much of the sparse light as they can? I look down at my feet. The ground around me is damp. Brown leaves are everywhere. I notice that there are many old tree trunks and branches, and am sure they have already been here for a long time. There are many mushrooms growing on the old wood. If I stay still and am very observant, I might be able to see a salamander or a frog. They are very well camouflaged on the foliage. I observe snails, ants and beetles. They scurry through the foliage. By eating the old leaves and wood and helping to decompose them, the nutrients from the dead plants can be released back into the soil. These are then absorbed by the surrounding living plants. A few small plant seedlings are trying to penetrate the carpet of leaves. Hardly any sunlight reaches the ground and if there is no gap in the dense canopy from a tree that has fallen over, the seedlings will not be able to survive longer than a few weeks. But I am sure that there will be space again for a big new tree eventually."



Mosses form colourful patterns on bark. (Photo: Katharina Schlünder)

**EXERCISE**

All students now close their eyes and imagine they are in the rainforest. The teacher reads the text out loud. Subsequently, students are to draw a picture to depict their impressions and what they imagined. The following questions might help them with this:

What did you see? What colours did you see? What did the leaves look like? What did you see when you looked up? What animals did you see?

They should draw/paint everything that comes to mind and that they remember from their imaginary journey. Following this, the storied structure of the rainforest is discussed in class. It can be shown schematically on the blackboard or on the SMART Board and compared with illustrations of the layers in German forests.



Newly grown leaves stand out in an otherwise green forest. (Photo: Katharina Schlünder)

**ESD COMPETENCIES**

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Obtain insights in an interdisciplinary fashion
- Being able to show empathy for others

**BONUS**

Students visit a nearby forest. They are to take photos with their smartphones. On their smartphone or on a PC/tablet, they then indicate the various forest layers they previously learned about on the photos. Subsequently, they compare the photo with their drawing. What are the differences?

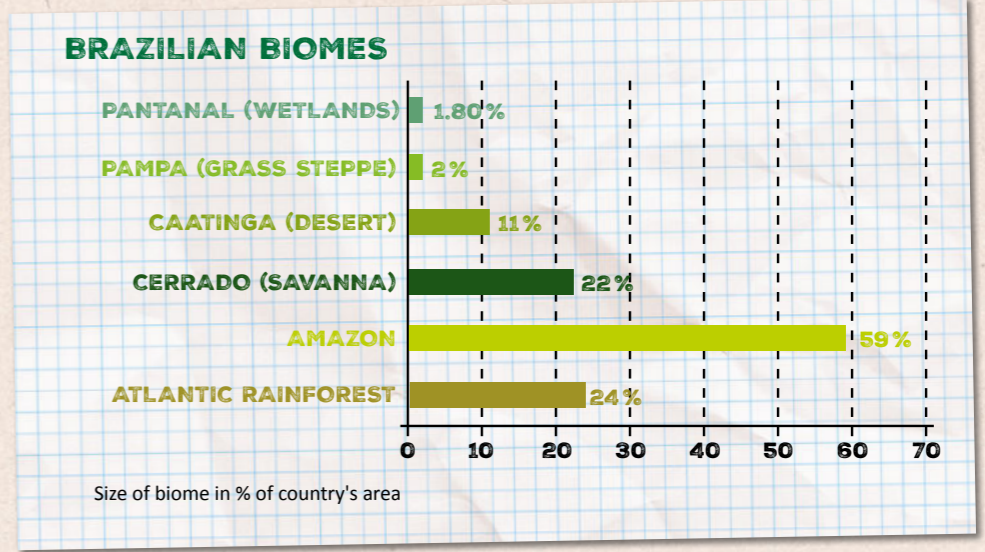
**3.4 FOREST STATISTICS FOR BRAZIL**

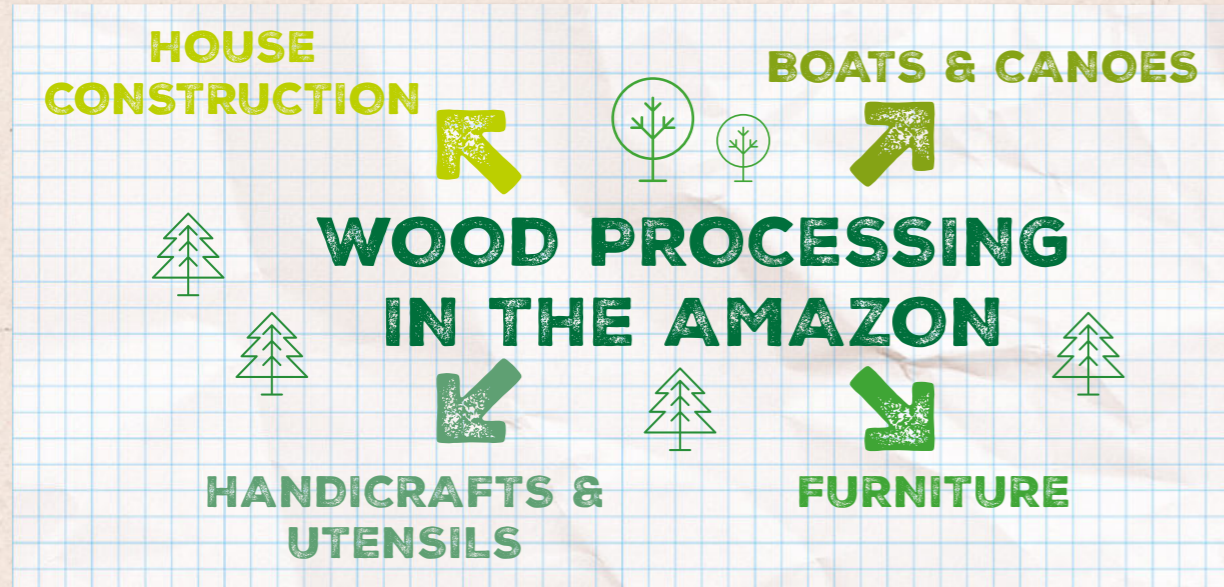


- 100,000 INVERTEBRATES
- 14,000 PLANTS
- 3,000 FISHES
- 1,294 BIRD SPECIES
- 1,000 SPECIES OF FUNGI
- 427 MAMMALS
- 400 AMPHIBIANS
- 378 REPTILES
- 160 INDIGENOUS PEOPLES

**250**  
NEW SPECIES  
ARE DISCOVERED EACH YEAR IN THE RAINFOREST, ABOVE ALL NUMEROUS INSECTS AND FUNGI

**80 BIL.**  
TONNES OF CARBON  
ARE ABSORBED BY BRAZILIAN FORESTS ANNUALLY. THIS CORRESPONDS TO 30% OF THE WORLD'S CARBON STORAGE.





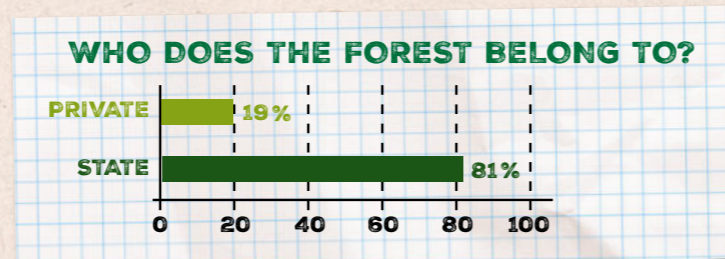
**494 MILLION HA OF FOREST CAN BE FOUND IN BRAZIL - THIS CORRESPONDS TO 59% OF THE COUNTRY'S AREA.**



**SOME FOREST REGIONS HAVE BEEN SEVERELY DAMAGED BY DEFORESTATION. THESE INCLUDE THE THREE LARGEST BIOMES IN BRAZIL:**

- MATA ATLÂNTICA - 93 %**
- CERRADO - 67 %**
- AMAZON - 15 %**

**54%**  
OF THE FOREST ARE DESIGNATED NATURE CONSERVATION AREAS



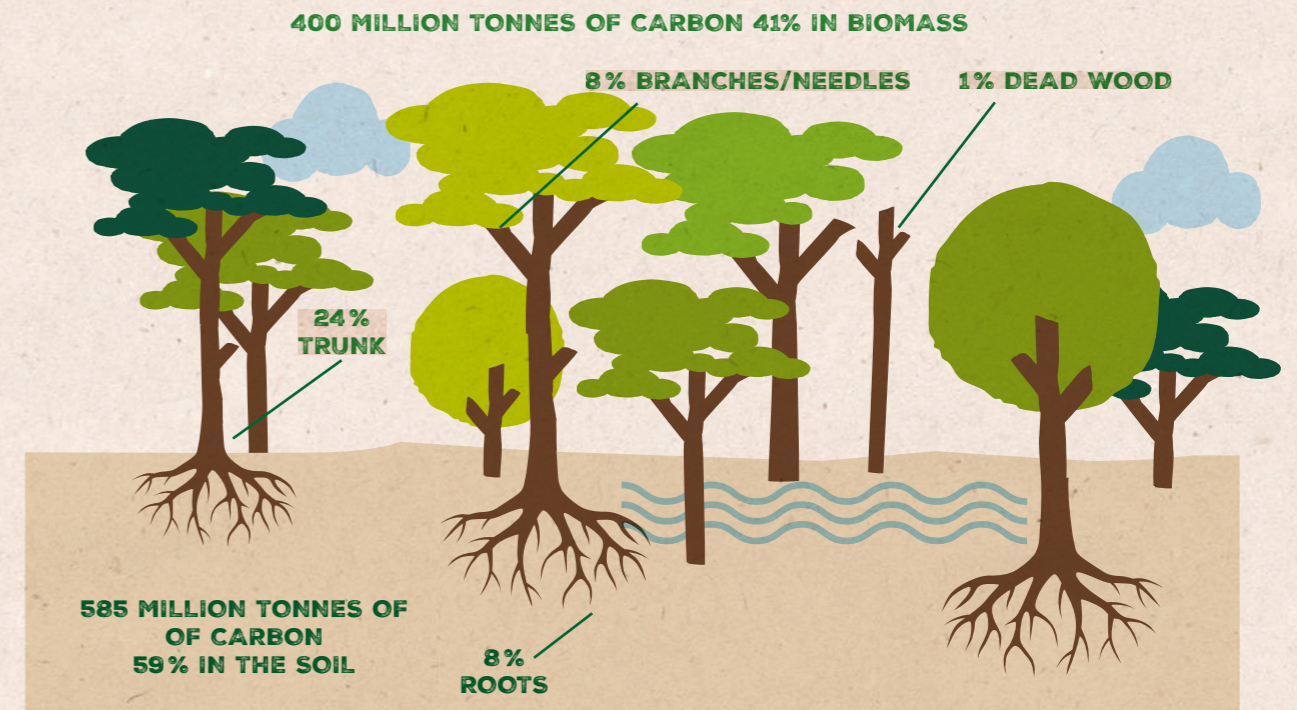
**ONE NATIVE CONIFER SPECIES IN BRAZIL IS ARAUCARIA ANGUSTIFOLIA, WHICH IS HIGHLY ENDANGERED.**

### 3.5 FOREST FUNCTIONS

The forest performs a wide range of functions (cf. Chapter 2.3). These functions and mechanisms of action are also fulfilled by the Brazilian forest. From an international perspective, however, it plays a very special role, particularly in global climate protection. Tropical rainforests are seen as an important element in the regulation of the entire global climate, above all as a vast carbon sink. The Amazon rainforest stores approximately 20,000 tonnes of carbon (C) per square kilometre. In total, that adds up to 85 billion tonnes of C. For comparison: German forests store 12,000 tonnes of C per square kilometre, which adds up to a total of 1.1 billion tonnes of C. This makes it clear how important the Amazon rainforest is for the world's climate. When we talk about C storage, it also raises the question of where and how carbon is stored. The figure shows that the largest percentage is stored in the soil. But this requires the soil and its functions to be intact. In areas where the forest has been cleared, intact forest soil is damaged and the stored carbon is released into the atmosphere. Just under a quarter of the carbon is stored in the tree trunks. This remains the case even when the wood is turned into furniture, for example. The carbon that is in the leaves and branches ends up on the ground sooner or later. There, this biomass is decomposed by microorganisms, thereby returning nutrients and carbon to the natural cycle.

Compared to German forests, the recreational aspect is less important in Brazil. Forests have not been made accessible for hikers or cyclists, for example. The network of trails is much smaller. The trails that do exist were created mainly for economic purposes. On the other hand, the forest plays an important spiritual and religious role for the people living in the rainforest, and it is often their only source of livelihood.

### THE FOREST AS A CARBON SINK - HOW MUCH CARBON IS STORED, AND WHERE?



(Source: Federal Forest Office; [https://www.bmnt.gv.at/forst/klimafitter\\_wald/klimaschuetzer-wald/der-wald-als-klimaschuetzer.html](https://www.bmnt.gv.at/forst/klimafitter_wald/klimaschuetzer-wald/der-wald-als-klimaschuetzer.html))

### 3.6 FOREST THREATS

There are still over 200 million hectares of intact primeval forest in Brazil. But the forest is still disappearing too quickly. From 2010 to 2015, around 1 million hectares of primary forest were destroyed each year. Since 1990, a total of 53 million hectares have been cleared. An area roughly the size of France. The Atlantic rainforest (Mata Atlântica) has been particularly impacted. It once stretched across practically the entire east coast of Brazil and covered 16 percent of the country's surface. Today, only 1 percent of it remains. Forests are cleared mainly for large-scale soya cultivation, pastures, harvesting timber, and road construction, but also for excavating mines.

Illegal logging is particularly problematic. In areas where forests are not managed sustainably, but instead completely cleared, this gives rise to a series of negative effects. Habitats for animals, but also the livelihoods of the people living there – mostly indigenous peoples – are impacted. This is accompanied by a loss of biodiversity and genetic diversity. Furthermore, if cleared areas subsequently lie fallow or are converted to agricultural land, this also results in the loss of all forest functions. The forest as a carbon sink and source of oxygen is lost. In turn, this has an impact on the climate, not only locally, but globally. It is estimated that slash-and-burn methods of clearing tropical forests account for around 20 percent of the global greenhouse effect. In addition, water is no longer stored in the soil or transpired by the plants. The affected areas dry out and become infertile. In the case of illegal logging, there are also socio-economic side effects such as financial and economic losses due to smuggling and tax fraud, as well as the loss of cultural spaces.

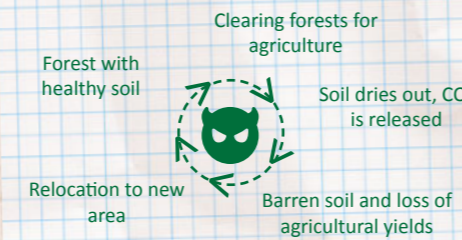
The various Brazilian governments have been able to reduce annual deforestation over the years. Gradually, they introduced more sustainable forest management, established protected areas and made an effort to raise awareness among the population on the importance of their forests. Despite this, the loss of forests is still progressing too rapidly.

#### ILLEGAL LOGGING

- Felling without a permit
- Felling in protected areas
- Felling protected tree species
- Harvesting more wood than permitted
- Felling in forests owned by others
- Illegal timber exports
- Issuing forged customs documents

(Source: WWF, Hintergrundinformation Illegaler Holzeinschlag [Background information – Illegal logging], May 2008)

#### VICIOUS CYCLE IN BRAZIL



In the foreseeable future, no forests will be able to develop on their own on the abandoned land. Once the soil has dried out and the mycorrhizal fungus has disappeared, the soil will only consist of nutrient-poor sand.

#### FOLLOW-UP

Each of the groups presents their results. The presentation format can be agreed upon with the teacher beforehand or chosen by the students. Afterwards, the class discusses ways in which the students themselves can contribute to the protection of the rainforest.

# 1 HA

OF BURNT-DOWN RAINFOREST RESULTS IN 220T OF CO<sub>2</sub> EMISSIONS

A FLIGHT FROM BONN TO NEW YORK RELEASES 2.2T OF CO<sub>2</sub> PER PERSON

#### EXERCISE

The students divide themselves up into six groups. Each group then draws a card containing products that come from the rainforest (see WS). They then go online to research answers to the following questions:

- What do I have to do with the rainforest?
- What does the product shown have to do with me?
- What does the product shown have to do with the rainforest? What is it made of?
- How is the product made?
- What impact does the consumption of this product have on the rainforest?

#### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Obtain insights in an interdisciplinary fashion
- Being able to recognise and weigh risks, dangers and uncertainties
- Being able to reflect on one's own and others' guiding models
- Being able to use concepts of justice as a basis for decision-making and taking action
- Being able to consider conflicting goals when reflecting on strategies for action
- Showing empathy for others

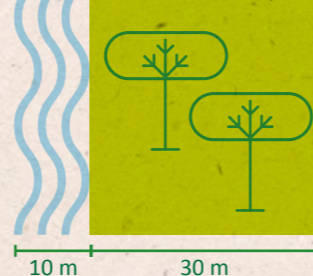


WS 08

## WHAT DOES THE RAINFOREST HAVE TO DO WITH ME?

Source: Forest Expedition!, Schutzgemeinschaft Deutscher Wald Bundesverband e. V. (SDW) 2018

A belt of natural vegetation at least 30 metres wide must be preserved when the river's width is 10 metres or more.



### 3.7 SUSTAINABLE FOREST MANAGEMENT IN BRAZIL

#### LEARNING GOALS

Students learn how forest management is regulated in Brazil, and which protected areas and legal infrastructures exist for the protection of the rainforest.

#### INFO

Sustainable forest use in the Amazon rainforest is of crucial importance worldwide due to its special significance for the climate and biodiversity. The history of environmental and forest protection measures in Brazil shed light on measures taken by the government to protect the rainforest.

- 1930S** First forest and water protection law
- 1960S** National wastewater programme, national council against environmental pollution; areas are placed under protection for the first time (growing industrialisation in Brazil)
- 1989** Founding of the Brazilian Institute of the Environment (IBAMA) to monitor and manage environmental protection, as well as the conservation and sustainable utilisation of natural resources.
- 1995** Establishment of the Ministry of Urban Development and Environmental Protection
- 1988** Addition of the chapter "Environmental protection" to the constitution
- 1992** United Nations Conference on Environment and Development (Rio Summit) in Rio de Janeiro; recognition of the guiding principle of sustainable development by almost all countries in the world; in Brazil there is still no standardised system for protected areas (no clear objectives and responsibilities)
- 2000** National Forest Programme
- 2002** Law on the possible categories of protected areas
- 2006** Introduction of a national reserve strategy

In Brazil, forest management is primarily regulated by national laws. One such law is the Forestry Act, but there are also other environmental laws. They stipulate how much of the forest is protected against logging. In particular, forests on steep riverbanks are under special protection to prevent landslides. There are a total of 62 national parks in Brazil, but also other protected areas. In some national parks, entering the forest is prohibited, while some are open to the public and tourists. There is often a huge disparity between legislation to protect nature and reality. Illegal logging is a major problem in some parts of Brazil (see chapter 3.6 Forest threats). Ever since there have been considerations concerning forest protection in Brazil, there has also been a debate on whether to close off the forest for people or to allow sustainable use. Depending on the requirements of the protected area, sustainable forms of use are often allowed.

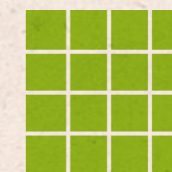
19 percent of Brazil's forests are privately owned. Nevertheless, forest owners still have to comply with national forestry and environmental laws. They require a management plan for their forest. This is submitted to the environmental authorities, who must approve it. In the plan, the status of the forest is recorded, i.e. every tree exceeding a certain size is entered into a plan. Trees that are not economically viable, such as hollow or rotten trees, thus remain in the forest and fulfil important ecological functions as a habitat or as food for animals and insects.

Due to the size of the country and the lack of infrastructure in some cases, it is often impossible to carry out regular inspections to ensure compliance with forestry laws. One success is the decrease in dramatic deforestation over the past 15 years. Nevertheless, efforts must continue to ensure sufficient environmental protection.



## RIO NEGRO SUSTAINABLE DEVELOPMENT RESERVE

There exist projects for sustainable forest management in Brazil, such as in the municipality of Iranduba east of Manaus. Here, a 100,000 hectare reserve has existed since 2008, which stretches across the municipalities of Manacapuru, Iranduba and Novo Airão. The largest section is located in Iranduba, a municipality east of Manaus, whose villages are spread along the banks of the Rio Negro and its tributaries. In Manaus, the two rivers Rio Negro and Rio Solimões, which is what the upper stretches of the Amazon are called, slowly flow into each other.



Management plan for 500 hectares of forested area divided into 16 plots for forest use in the reserve.

This protected area is covered by tropical rainforest. The aim is to conserve nature while also protecting the living conditions of the local people. Working with the local communities, plans for sustainable forest management are developed and environmentally friendly forest management techniques are taught.

The inhabitants of the three Rio Negro communities are permitted to harvest timber for their own use. For this purpose, management plans are drawn up that define exactly which trees may be taken from the forest. Each plan covers around 500 hectares with management plans. This area is divided into plots measuring approximately 25 hectares. This division is valid for 20 years. The rights of use for working in the forest are reissued to the inhabitants every year.



Except for the tree trunk, all parts of the plant remain in the forest. By doing so, the nutrients contained in the leaves and roots remain in the nutrient cycle of the forest. At sites where trees have been removed, regeneration is left to nature. There are already younger trees in the lower layers, which can grow upwards with the light that can now penetrate the canopy.

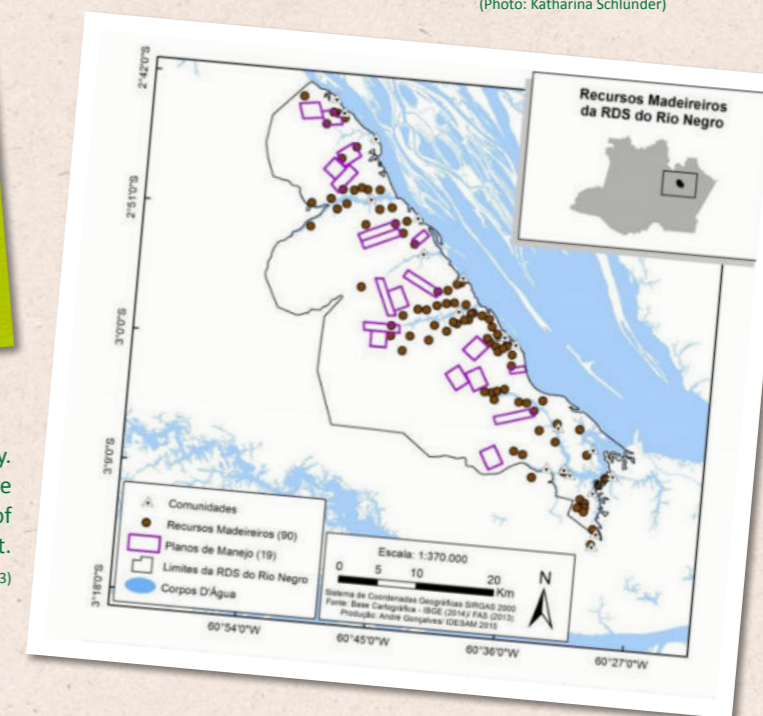
"Encontro das águas" – The Meeting of Waters: The water masses of the dark Rio Negro and the pale sand-coloured Rio Solimões gradually flow into each other near Manaus. This natural spectacle stretches over several kilometres.

(Photo: Katharina Schlünder)

**TIMBER STOCK**  
THE TOTAL VOLUME OF WOOD FROM TREES STANDING IN A FOREST.

Management plan for sustainable forestry. The plots where harvesting takes place are shown in purple, and the timber stocks of the protected areas are shown as a dot.

(Source: Management Plan of Rio Negro Protected Area - Map 33)



WS 09.1

# SUSTAINABLE FOREST MANAGEMENT IN BRAZIL



Felipe is a forester near Manaus. He has lived his whole life in a small community to the east of Manaus, on the Rio Negro. He works together with his father and son in the forest. The forest is located in a protected area (reserva). Felipe explains how sustainable forest management works here.



The rainforest canopy is so dense that it is impossible to see through it. (Photo: SDW)

Felipe, how does forestry work in the "Rio Negro Sustainable Development Reserve"? Do you get to choose the trees you want to cut down and sell?

No, it is not that simple. There are strict regulations from the government. First of all, a comprehensive forest inventory is performed. We walk through the rainforest plots where we are currently working, record every tree above a certain size on maps, and also mark it.

And this is done with every single tree?

With the trees that are economically relevant, i.e. trees that can be sold for a good profit. Hollow or rotten trees are not marked. We leave them in the forest so that animals and insects can find food and shelter in the dead wood.

What happens with the plan you have drawn up?

We examine the plan carefully and check how many trees are available in total. We then calculate how many cubic metres of wood we are permitted to harvest. This is calculated anew each year and depends (among other things) on the structure of the forest. What is important is that we do not negatively impact the ecosystem. We work in a plot for one year. We then leave it to regrow for 30–50 years while working in other forest plots.

Are you allowed to fell all species of trees or only certain ones?

When we draw up the plan, we make sure that all tree species are protected. Biodiversity is a highly important aspect in our forests. If focus on just a few species when harvesting, it puts too much strain on the population of that species. Hence, we fell different tree species so that the mix of species is preserved in that area.

What is the three-generation rule?

It refers to three generations of a particular tree species. For each tree that is included in the harvesting plan and subsequently felled, there must already be a younger tree (daughter tree), and in the shrub layer an even younger tree (grand-child tree) of the same species within the harvesting area. This compensates for the loss. This guarantees that a large tree always grows back within a rotation period of 30–50 years. There are also what are called "seed trees". These remain standing because they serve to guarantee the propagation of their respective species.

Are there areas that are not utilised at all?

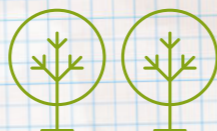
Yes, there are! There are always small areas which serve to protect sensitive and shy animals. No motor saws and axes are used to fell trees in these areas. Animals can find a place to hide and retreat in these areas at any time.



This is what fresh latex (rubber) looks like when it flows out of the tree. (Photo: SDW)

### MAIN TREE SPECIES

Abacurrana, Abiurana, Amarelinho, Angelim, Aritu, Catamala, Cedrinho, Cumaru, Cupiúba, Itaúba, Louro-Preto, Louro-Abacate, Pau Amarélo, Roxinho, Tanibuca, Tauari and Tintarana.



WS 09.2

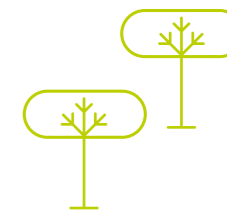


Isn't the forest also used by other people?

Yes, of course. After all, the forest is our most important source of food, wood and medicine. If several forms of use occur in a forest area, for example timber harvesting, harvesting of Brazil nuts, planting cocoa or coffee trees, then all uses are included in the harvesting plan and taken into account equally.

The rainforest is extremely dense. How do you decide where to harvest?

For this purpose, we look at the management plan with the trees to harvest and plans on which roads, paths, but also water sources or streams are indicated. We look at where the nearest settlements and properties are, because we want to affect them as little as possible. Then we choose a path that will have the least impact on animals, plants and people.



What happens next in the field?

The trees that are to be felled are already marked. We need to plan the exact direction in which the tree should fall. It must not damage any other trees or plants. Sometimes, for example, we have to carefully take down vines that are growing on the tree so that they are not damaged when it falls. When the trunk is lying on the ground, it is marked using a number. This is entered in a log. The number on the log is checked at the sawmill. It must match the approved harvesting plans. By doing this, the timber can be traced from the forest to the processing plant and we can prevent illegally felled timber from being processed in the sawmills.



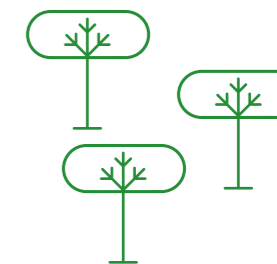
The tree trunks are sawn into boards while they are still in the forest. This makes them easier to transport. (Photo: SDW)

The trees that are felled are huge. What happens in the forest when the tree is gone?

Where the tree crown previously was, a lot of light is now able to penetrate through the gap in the canopy. This ensures that the younger trees can now grow tall. Seeds on the ground will now also receive enough light to sprout. These will eventually become daughter trees. The gap will be closed quickly. The branches, crown and roots of the tree that was felled, which contain many nutrients, remain in the forest. This maintains the nutrient cycle.

And then the forest plot is left alone for 30–50 years?

Yes, precisely. But we will monitor the area. We will check whether the gaps are regenerating and closing well. We also check whether the daughter and grand-child trees are doing well. We do not want our utilisation of the forest to result in long-term damage.



## EXERCISE

1. In your own words, explain how sustainable forest management in the protected area along the Rio Negro works.
2. How is it guaranteed that no illegal wood is shipped to Germany, for example as a piece of furniture?
3. How does sustainable forest management work in Germany? In small groups, perform research using the brochure "Forests Around the World" (Mit den Wäldern um die Welt) or online using the internet. Present sustainable forest management in Germany and in Brazil using a conventional poster or an interactive poster.

## ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Obtain insights in an interdisciplinary fashion
- Being able to recognise and weigh risks, dangers and uncertainties
- Being able to reflect on one's own and others' guiding models
- Being able to use concepts of justice as a basis for decision-making and taking action
- Being able to consider conflicting goals when reflecting on strategies for action
- Showing empathy for others

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(Photos: SDW)





4.1

### WELCOME AND INTRODUCTION

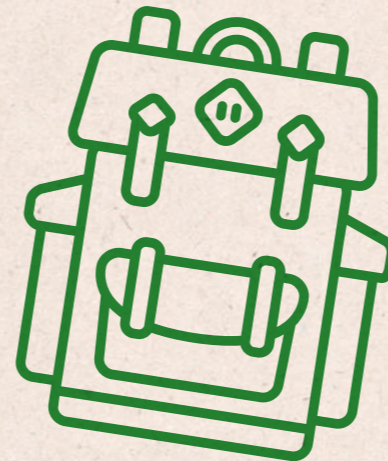
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4.2

### FORESTS AND THE ECONOMY

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4.0

# FOREST EXPEDITION!

## EXPEDIÇÃO FLORESTA



4.3

### FORESTS AND WATER

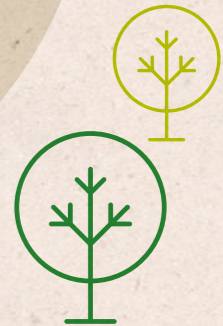
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4.5

### FORESTS AND INFRASTRUCTURE

ROLE PLAY PAGE 92



4.4

### FORESTS AND BIODIVERSITY



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EDIBLE PLANTS	PAGE 84
FOREST APOTHECARY	PAGE 88



## 4.1 WELCOME & BEM-VINDO!

WE'RE TAKING YOU ALONG ON A SPECTACULAR EXPEDITION! WE ARE A GROUP OF SIXTEEN PEOPLE FROM BRAZIL AND GERMANY. WE HAVE SHOWN EACH OTHER OUR COUNTRIES AND THEIR DIVERSE FORESTS. AND NOW WE WOULD LIKE TO SHARE OUR EXPERIENCES AND IMPRESSIONS WITH YOU.

**Michèle:**  
"Hi there! My name is Michèle! I was in Brazil on the Rio Negro together with seven other Germans and the SDW. There, we met up with eight young Brazilians and representatives from the FAS. We lived together with them for a fortnight in a small village community in the Amazon rainforest. During our stay, the locals taught us a great deal about the forest, the rivers and the communities. It was my first time in a tropical country. My experiences in Brazil were breathtaking. But have a look for yourself!"



### MICHÈLE FUGMANN, 25 YEARS OLD

**Lives in:** Saarbrücken  
**Occupation:** Student (Environmental Biosciences)  
**Hobbies:** Travelling, hiking, reading, dancing with friends, nature conservation projects in my home country



### BRENDA MENEZES RODRIGUES, 17 YEARS OLD

**Lives in:** Nova Esperança  
**Occupation:** Having finished school, she currently helps out on her family's farm  
**Hobbies:** Reading, playing games

**Brenda:**  
"Oi! Como está? O meu nome é Brenda! I am 17 years old and live in Nova Esperança, near Tumbira. 80 people live in my village. We have no cars and no roads. But we don't need them – there is no road through the rainforest to the next town. Which is why we perform all our errands by boat. The Rio Negro is a vital means of transport between all the villages and towns here. I even go to school by boat in the morning. Our houses are often built on stilts. That's because the water level of the river fluctuates frequently. Which is why we prefer to sleep a little higher so we don't get our feet wet during floods. We don't have solid walls made of thick concrete with insulation. It is always hot on the Rio Negro. The humidity is so high that only extremely well-ventilated rooms don't get mouldy. Villages are mostly situated directly along the river. It provides us with a means of transport, water and food. The dense rainforest begins right behind our village."

### PLAYLIST

WE FILMED OUR JOURNEY THROUGH BRAZIL AND GERMANY IN THE FORM OF TWO TRAILERS. YOU CAN WATCH THEM IN THE SDW PLAYLIST.



<https://www.youtube.com/playlist?list=PLUbtn94iffu6blt2a5DSB6yS-oPZ0q38>

## THE EXPEDITION – A PECHA KUCHA PRESENTATION

### LEARNING GOALS

Students will be taken on an exciting journey through Germany and Brazil by the participants of our project. In the introduction to the expedition, Michèle and Brenda introduce themselves and the travel stops of the project group.

When our German and Brazilian groups got to know each other, we introduced ourselves using pecha kucha presentations. It was highly entertaining and we learned directly from the other party what was most important to us. We, Michèle and Brenda, prepared two exemplary presentations about ourselves and our project.

### PECHA KUCHA

is a special presentation technique in which slides with images are shown, accompanied by oral comments. What is unique about it is that each slide is only shown for 20 seconds. After that, it automatically moves on the next one. The presentation time is hence very limited and presenters need to think carefully about how they want to present their topic in this short time.

### EXERCISE

The teacher can read out the welcome texts of the two young women to the class. These presentations are shown to the students while the teacher reads out the matching text. Alternatively, they can present them using a pecha kucha presentation. The presentations can be downloaded from [www.bildungserver-wald.de](http://www.bildungserver-wald.de).

#### Pecha kucha by Michèle:

1. This is me
2. Here's where I studied
3. Group photo
4. Tumbira
5. Hammock camp
6. Rio Negro and river confluence
7. Rainforest
8. Tree harvesting and wood processing
9. Biodiversity
10. Fishery

#### Pecha kucha by Brenda

1. This is me
2. My home village
3. Freiburg
4. Wood processing in Freiburg
5. Impressions of Germany
6. Oberammergau
7. Hainich National Park
8. Raft trip in Lychen
9. Tree planting in Templin
10. Berlin



The map shows the location of Tumbira in a branch of the Rio Negro. Outside the map: Manaus is at the bottom right, in the southeast.

(Source: Google Earth)

### BONUS

Students can watch the film "Once upon a Forest" by Luc Jacquet. You will find the link in the SDW playlist. However, it currently needs to be purchased (approx. 3 euros). It shows impressive footage from the rainforest. There are also free study materials for school classes from "Abenteuer Regenwald" (<https://www.abenteuer-regenwald.de/materialien/tipps/geheimnisdarbaeume>).

# OUR TRIP TO BRAZIL

Tumbira is a village of around 140 inhabitants. It is part of the municipality of Iranduba and is located to the east of Manaus. For ten days, our group lived as part of the village community. You can see a small selection of photos here.



**PLAYLIST**

TO GET AN IMPRESSION OF WHAT LIFE ON THE RIO NEGRO IS LIKE, YOU CAN WATCH THE FILM "FUNDAÇÃO AMAZONAS SUSTENTÁVEL - FAZENDO A FLORESTA VALER MAIS EM PÉ DO QUE DERRUBADA".

This is the village of Tumbira on a branch of the Rio Negro as seen from the air. You can see the Rio Negro on the horizon.

In this building were the hammocks we slept in.



This is the path to the bathing spot along the Rio Negro.

Tumbira's coordinates are:

**2°56'48.4"S 60°40'26.6"W**

You can use Google Street View to pay Tumbira a visit and look around using the street perspective.

This was our classroom on the edge of the rain-forest.



# OUR TRIP TO GERMANY



(Photo: SDW)



(Photo: SDW)



(Photo: SDW)

4.2

# FORESTS & THE ECONOMY FLORESTA E ECONOMIA

## LEARNING GOALS

Students work out similarities and differences between forestry in Germany and Brazil and deepen their knowledge of forestry terms. From Lukas and Giovane, who report on their work in the forest, students will also become acquainted with different professions in the forest.

Forest workers from the villages along the Rio Negro are exclusively men. Most of them have handed down their craft from generation to generation. But it is also possible to train as a forest engineer. A forest engineer assesses the potential of sections of forest and plans their utilisation. Like foresters in Germany, a forest engineer is responsible for selecting tree species while taking into account the existing conditions and usage. In Brazil, it takes five years to obtain this qualification.

## EXERCISE

Students read the interview with Lukas and Giovane. They complete the worksheets WS 10.1, 10.2 and 11. The teacher discusses what other jobs there are in the forest.

## FOLLOW-UP

The popular game "Who am I?" or "Quem sou eu?", as it is called in Portuguese, is used to deepen the students' understanding of professions in the forest. Students draw folded slips of paper with job titles written on them, which others students then stick on their backs for them. Everyone then walks around the classroom and asks other students questions which are answered using either "Yes" or "No". The aim is to find out which profession they have drawn. Prepared cards with occupations and brief descriptions can be found on WS 12.

## BONUS

Students try their hand at how foresters map a forest by doing some mapping of their own in the forest. Should you plan to leave the paths in the forest, please contact the forester in charge before you do so. Foresters are well-acquainted with their own forest, and may even be able to personally accompany the class.

Furthermore, foresters also know where they will cause minimal disturbance in the forest. All findings are to be recorded graphically on a map (see WS 13).

### INFO

In Germany, there are various options for those who are interested in working in the forest. These include a job as a forester, forest manager, or forest superintendent. In addition, there are also other professions which involve working in or with the forest, such as forest educators, nature conservationists, and hunters.

### FOREST RESTRUCTURING

This is the term used to describe the "reconfiguration" of a forest. The age structure and composition of tree species are changed. In order to adapt to climate change, many spruce forests have been converted into mixed forests in recent years to make them more resistant. Spruce forests usually consist entirely of spruces of the same age and size. Mixed forests comprise different tree species with different sizes and ages.



Wood is one of the most important sustainable raw materials. (Photo: Ha Linh Truong)



The Brazilian participants also learned a great deal of new things about the rainforest. Nathan had never been this deep in the rainforest before. (Photo: Ha Linh Truong)

### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Being able to reflect on one's own and others' guiding models
- Being able to independently plan and act
- Being able to plan and act together with others



4.2.1

# FOREST PROFESSIONS OCUPAÇÕES NA FLORESTA

## WS 10.1



ON THE FIRST LEG OF OUR JOURNEY, WE MEET LUKAS (23 YEARS OLD) AND GIOVANE (21 YEARS OLD). BOTH OF THEM WORK IN THE FOREST. HOWEVER, LUKAS WORKS IN BAVARIA, AND GIOVANE IN THE BRAZILIAN RAINFOREST ON THE RIO NEGRO. THE TWO OF THEM LIVE 9,000 KM APART AS THE CROW FLIES.

(Photo: SDW)



### LUKAS WIMMER, 23 YEARS OLD

**Lives in:** Vilsheim  
**Occupation:** Forest manager with the Bavarian state forests  
**Hobbies:** Ice hockey, football

### GIOVANE GARRIDO MENDONÇA, 21 YEARS OLD

**Lives in:** Tumbira / Iranduba  
**Occupation:** Forest technician  
**Hobbies:** Football, going to the beach, helping the family at their small hotel



(Photo: SDW)

Lukas and Giovane both have the same job and are about the same age. However, their lives differ greatly. They got to know each other during our exchange and learned a great deal from each other. They gave us an exclusive interview on what the exchange was like for them and what they learned from each other. They also answer some questions about their everyday lives in Germany and Brazil and their profession.

**Lukas and Giovane, could you tell us briefly about your professions? What qualifications and training did you receive? What do you do? Whom do you work with?**

**Lukas:** I am a forest manager. During my apprenticeship, I learned how to use a chainsaw, how to fell trees, build fences, hunting and recreational facilities, as well as how to establish, protect and maintain forested areas. I also learned about the forest ecosystem, nature conservation and the different species in the forest. I work together with a group of other forest managers and the responsible district manager in a forest district.

**Giovane:** I received training in forestry technology at a vocational school and work together with my family in sustainable forest management. We make sure to have as little impact as possible on the forest when harvesting and pay attention to which trees we are allowed to take. I also help with the processing of wood into furniture.

Part of our job is also to create a monitoring trail where we study plants and animals. I have learned a lot about the biodiversity of the forest.

**What do you like best about your job?**

**Lukas:** Working out in the fresh air, being physically active and observing nature and how the forest changes along with the seasons.

**Giovane:** I like the woodworking part the most, in particular where I polish the wood at the end. A lot of time and care is required before you have a finished and high-quality wood product.

**Lukas, what particularly amazed you in Brazil? And you, Giovane, in Germany?**

**Lukas:** The vastness and pristine state of the forest, the biodiversity and the relationship between the river and the forest.

**Giovane:** I made numerous surprising discoveries in Germany. One of them



The tree trunks are sawn into boards on site in the protected area on the Rio Negro. (Photo: Katharina Schlünder)



We visited a small workshop where the wood from various tree species is processed to make different products. (Photo: Katharina Schlünder)

WS 10.2

was that there is no virgin forest left in Germany, and compared to Brazil, there are only a few different tree species. The situation is quite different back home. Lukas showed us a video of the forestry machines (harvesters, forwarders). I was really amazed by them! We don't have machines like that on the Rio Negro. But Lukas explained that the machines are very practical in Germany for performing forest management.

**What does a typical workday look like for you? What are your main duties? What tools do you work with?**

**Lukas:** In winter, we harvest timber. I fell trees with a chainsaw. I also require an axe, wedges, a spring tape measure and a cant hook. In summer, we take care of the planted areas (weed removal), maintain younger stands, search the area we are responsible for several times for bark beetle infestations and prepare the harvesters for deployment later on.

**Giovane:** I perform all the work steps necessary to turn a tree into a wood product. To do so, I work with various tools, such as a chainsaw or a wood turning lathe.

**What kind of a forest do you work in?**

**Lukas:** I work primarily in the Isarauen, along the river Isar. The forest there has a high species diversity and planting takes place almost exclusively with deciduous trees. It is particularly valuable for nature conservation and yields less timber. There is more coniferous wood in our deciduous forest. Mainly spruce. However, due



to the forest restructuring to create a mixed forest, these areas are currently experiencing huge changes.

**Giovane:** I live and work in the Amazon rainforest along the Rio Negro, to the east of Manaus. The municipality of Iranduba is located in a large protected area for sustainable development.

**Who decides which trees you cut down? What does this decision depend on?**

**Lukas:** In summer, spruce trees infested with bark beetles are cut down. I identify this infestation myself. The forester plans where we cut down fresh wood in winter. He marks the trees that are to be felled. When doing so, he chooses future trees. For each future tree, one or two competing trees are usually felled in order to take away competition from the future tree. The goal is to have a future tree that is healthy, straight and free of branches as possible.

**Giovane:** Forest engineers decide which area is to be approved for forest use and draw up a plan, on which all the trees are entered. According to various criteria, such as the age of the tree or the quality of the wood, they then select individual trees that may be felled. Before harvesting, we still need all the documents and papers to prove that we have made the selection properly before we then fell the trees.

In addition to bowls, table and chair legs, handles, cups and candlesticks are also made using the wood turning lathe.

(Photo: Ha Linh Truong)



Giovane's grandfather shows us in the forest how he saws a log into boards. This is an extremely strenuous task. It is very hot and humid.

(Photo: Ha Linh Truong)



WS 11

FOREST PROFESSIONS  
OCUPAÇÕES NA FLORESTA



1. Read the interview with Giovane and Lukas. What do you notice? What are the differences and similarities?
2. There are some technical terms in the interview. Working with your teacher, try to understand what they mean. Use the descriptions on this page to help you.
3. What is forest restructuring? Why is it done? Collect your ideas on the board.
4. Working in small groups of three to four persons, create a crossword puzzle using (technical) terms from the interview. Think of short, suitable descriptions for the terms. There are several websites on the internet you can use to create crossword puzzles.

[WWW.XWORDS-GENERATOR.DE](http://WWW.XWORDS-GENERATOR.DE)  
[WWW.SCHULRAETSEL.DE](http://WWW.SCHULRAETSEL.DE)  
[WWW.KREUZWORT-RAETSEL.COM/SELBST-ERSTELLEN](http://WWW.KREUZWORT-RAETSEL.COM/SELBST-ERSTELLEN)  
[WWW.RATEHASE.DE/KREUZWORTRAETSEL-GENERATOR](http://WWW.RATEHASE.DE/KREUZWORTRAETSEL-GENERATOR)

Subsequently, all groups are to exchange their crossword puzzles and attempt to solve those of other groups.

BONUS

In the SDW playlist, you will find a video that shows Lukas and Giovane's father at work. It is called "Baumernte in Brasilien und Deutschland" [Tree harvesting in Brazil and Germany].



Winfried with an insect guest  
Photo: Ha Linh Truong



"For me, the forest is life"  
(Photo: Ha Linh Truong)

Winfried:

I found it highly fascinating that timber harvesting in protected areas in Brazil is done using only simple means. Forest workers along the Rio Negro cannot enter the forest with heavy machinery. The soil is far too muddy. Hence, they only drive a light excavator. Although the trees are considerably thicker and taller than in Germany, the forest workers fell and cut them up by hand using a chain saw. They saw them into boards that are easy to transport and which are all identical in terms of length, thickness and width. In Germany, this is only done at the sawmill.

Odenilze:

In Germany, we didn't get to see in person how trees are felled, but Lukas told us a lot about his job and showed us videos. I am familiar with the use of chainsaws from working in our protected area. It was exciting to see a video of Lukas cutting down a tree with a chainsaw. In Germany, forest workers need to wear a lot of protective clothing. Our forest workers, like Giovane's grandfather, have worn helmets for a few years now.

EXPLANATION OF TERMS

**Hunting and recreational facilities:** e.g. raised hide, lookout platform, benches, educational trails, refuges.

**Reforestation:** Creation of a new forest.

**District:** Defined area of forest which the forester is responsible for.

**Cant hook:** A pole with a hook for rotating logs lying on the ground.

**Weed removal:** In areas where the trees are still very small, shrubs such as blackberries are mowed to remove them. This ensures that the young trees have sufficient space and light to grow.

**Harvester:** All-in-one timber harvesting machine that grabs the tree using a gripper arm, saws it off at the bottom, and then strips off all the branches.

**Isaraue:** Area that lies along the Isar river.

**Forest restructuring:** Modifying the composition of tree species and age ranges. For example "reconfiguring" a spruce forest to create a mixed forest.

**Fresh wood:** Wood from standing trees that are felled. Does not refer to: Dead wood or trees that have fallen over due to storms or insect infestations.

**Competing tree:** Trees that are growing too close to a future tree and robbing it of light and nutrients.

**Future tree:** A tree that is given special care so that it grows straight and thick, making it valuable for the wood industry.

FOREST FLORESTA

THE FORESTER PROFESSION IS NO LONGER TYPICALLY FOR MALES. THERE ARE AN INCREASING NUMBER OF FEMALE FORESTERS. SOME OF THEM REPORT ON THEIR WORK IN BLOGS, DOCUMENTARIES OR ARTICLES. IN GERMANY, GIRLS' DAY IS A GREAT OPPORTUNITY TO EXPERIENCE WHAT IT IS LIKE TO WORK AS A FORESTER.

WS 12

# FOREST PROFESSIONS - SHORT DESCRIPTIONS



The class can be divided into groups, each playing amongst themselves. This way, everyone gets their own role in each game. The names of the professions can all be written on the board to make it easier for students to guess their own role.

<p><b>FORESTER</b> I have a degree in forestry and am responsible for taking care of the forest. I am responsible for the sustainable management of my forest and plan exactly which trees are harvested and when, as well as which ones are left standing.</p>	<p><b>FOREST MANAGER</b> My apprenticeship training lasts for three years. During this time, I learn to identify trees, harvest them, assess wood, engage in nature conservation and protect the forest. I work closely with the forester, who assigns me my tasks.</p>
<p><b>FOREST EDUCATOR</b> Nature is my passion. And I wish to share this passion. I organise activities in the forest for children, young people and adults. It is important to me to convey knowledge and relationships concerning nature, thus demonstrating the importance of the forest.</p>	<p><b>HUNTER</b> The great outdoors is where I work. I keep track of wild animal populations and intervene when necessary. I shoot sick or injured animals. Where there are no predators, such as wolves, we have to shoot deer to maintain the balance in the forest and protect other species.</p>
<p><b>WILDLIFE FILMMAKER</b> I move as invisibly as possible in nature. Ideally, animals don't notice I'm there, or at least don't feel disturbed by my presence. From a concealed spot, I do my best to capture good pictures and videos of them and to inspire other people with my images and videos of nature.</p>	<p><b>ANIMAL RIGHTS ACTIVIST</b> I am involved in a non-profit group. We want animals to be able to live undisturbed in nature. We advocate for animals in Germany as well as in other countries. We are particularly concerned about endangered species such as the wildcat, rhinoceros or tiger.</p>
<p><b>TREE SURGEON</b> I usually work in towns or villages. I inspect trees to see how healthy they are and remove dead branches from high treetops, for example, so that they don't fall down and injure people. I wear climbing harnesses when I work and am often up in high branches.</p>	<p><b>WOOD SCIENTIST</b> Wood is one of the most important sustainable raw materials for the future. Every day, I research how we can process wood in a meaningful manner. We can now even make bioplastics from wood. I also perform research on which products made from oil can be replaced by wood.</p>
<p><b>NATIONAL PARK RANGER</b> I work in a national park, which I know like the back of my hand. I regularly organise guided tours on various topics for visitor groups. Furthermore, I make sure that visitors follow the rules in the forest.</p>	<p><b>FOREST KINDERGARTEN TEACHER</b> I spend almost the entire day with children in the forest. We usually have a construction trailer for the groups of children, where we take refuge when the weather is bad. Other than that, we are always outside exploring nature. Children here don't need plastic toys, because they have the forest.</p>
<p><b>LANDSCAPER</b> My workplaces are the forest and the office. In places where construction is planned, such as roads or wind turbines, I first examine the animals and plants in the forest in detail and write an expert report on the effects of the planned construction measures.</p>	<p><b>CARPENTER</b> Strictly speaking, I don't work in the forest unless I'm collecting my own wood directly from the forester. However, I work with wood every day and am familiar with the characteristics of every tree. In addition, the pieces of furniture I make serve as carbon sinks.</p>

WS 13

# MAPPING THE FOREST



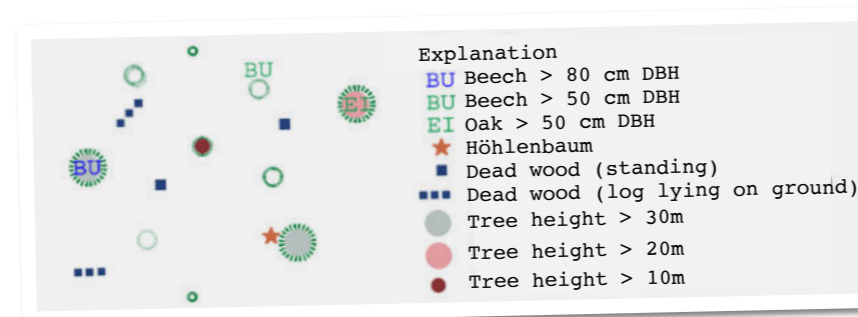
Each group is to stake out an area of forest measuring 20 x 20 metres or 20 x 20 large steps. The areas should be as square as possible and adjacent to each other. Your task is to carry out a small forest mapping exercise. This is similar to what a forester would do. Mapping means transferring information about your forest plot onto a map. You might need to come up with symbols and abbreviations and create a legend, such that the map can also be read by others.

Obtain information on the following in your plot and record it on the map:

- Tree species
- Height of trees (using ranges where applicable "up to 5 metres", "5–10 metres"; represent the various ranges differently)
- Diameter at breast height (diameter of the trunk measured at a height of 130 cm)
- Tree cavities (these are often located quite high up)
- Nests
- Dead tree trunks (still standing or lying on the ground)

When collecting this information, the following resources may be helpful:

- Botanical identification books
- Apps: Pl@ntNet (plant identification), Theodolite (for measurements) and Easy Measure (for measurements)



Only those who look closely notice interesting phenomena in nature. An old bird's nest has been taken over by a plant in this tree cavity.

(Photo: Katharina Schlöder)

## SUPPLIES

Barrier tape or similar to mark the corners of the plots, pieces of paper, pens, smartphones + apps if necessary, botanical identification books, yardstick, binoculars if necessary.

YOU MAY NOTICE THAT SOME TREES IN THE FOREST HAVE BEEN SPRAYED WITH SYMBOLS. THESE ARE NOT STANDARDISED NATIONWIDE, BUT THE FOLLOWING VIDEO EXPLAINS SOME OF THEM:  
[HTTPS://WWW1.WDR.DE/KINDER/TV/WISSEN-MACHT-AH/AV/VID-EO-BAUMMARKIERUNGEN-102.HTML](https://www1.wdr.de/kinder/tv/wissen-macht-ah/av/vid-eo-baummarkierungen-102.html)

## BIOTOPE OR HABITAT TREES

Trees that are not economically profitable, but are valuable as habitats for fauna and microorganisms. They include trees that have cavities, are hollow inside or exhibit crooked growth. They are left standing in the forest to increase biodiversity.

A future tree, or an **F-TREE**, on the other hand, is a selected tree that will be sold for money. It needs to grow straight, tall, and thick. Hence, foresters try to care for it by e.g. removing competing trees so that the future tree has sufficient light, space, and nutrients.

# DID YOU KNOW?

A HUNDRED-YEAR-OLD BEECH CAN PRODUCE UP TO 50,000 BEECHNUTS, AS THE FRUITS ARE CALLED.

## 4.2.2 FOREST PRODUCTS & CERTIFICATIONS



(Photo: SDW)

### ODENILZE DE SOUZA RAMOS, 21 YEARS OLD

**Lives in:** Carão  
**Occupation:** Student  
**Hobbies:** Photography, writing

### WINFRIED BOHLE, 27 YEARS OLD

**Lives in:** Bergisch Gladbach  
**Occupation:** Student (Forestry Sciences)  
**Hobbies:** Hunting, fishing, smoking (his own food), mountain biking



We are Odenilze and Winfried and got to know each other at the German-Brazilian work camp. During our time together in Tumbira and in Germany, we took a particular interest in everyday products from the forest. It is surprising how often you only realise at second glance that a product comes from the forest. Sometimes, it is not that easy to find out where the items we use come from.

**Odenilze:** What particularly surprised me in Germany was that it is actually not common for children and young people to work with wood. In the community where I live on the Rio Negro, we work with wood a lot. We not only create beautiful decorations for ourselves, but also bowls and dishes, cooking spoons and even furniture such as cupboards or tables.

**Winfried:** It is amazing how much the rainforest has to offer. If you know your way around a bit, you can find fruits and nuts to eat, colourful blossoms and fruits to paint with, or lianas and palm trees to weave baskets or hats – all within a very small area. And of course wood. We made handicrafts in Tumbira using pink roxinho wood. I've never seen anything like that in Germany.

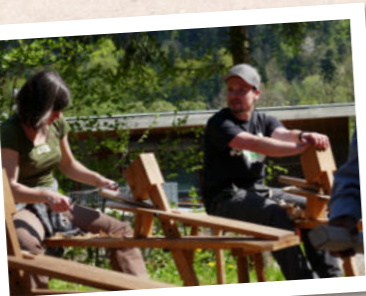


Wooden handles made of Roxinho wood

(Photo: SDW)

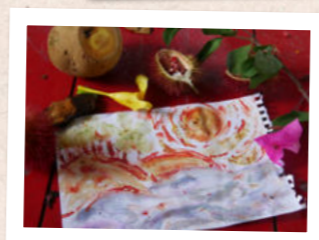
### FOREST DIVERSITY

Furniture | Construction timber | Firewood | Wood chips | Wood wool for litter in horticulture | Packaging | Firelighters | Playgrounds | Mulch | Floor coverings | Round and sawn timber | Paper | Chestnuts | Mushrooms | Nuts | Herbs | Medicinal plants | Meat | Pellets | Cellulose | Turpentine | Fruits | Viscose | Biofuel | Plastics | Rubber | Musical instruments | Consulting | Chocolate



In Freiburg, we worked with old carving stools and made a Viking chess game for the whole group.

(Photos: SDW)



Many different colours can be obtained from fruits in the rainforest. Can you find plants or parts of plants in our forests that you can paint with?

(Photo: Ha Linh Truong)

## LEARNING GOALS

Students learn about the versatility of forest products. In addition, they also learn how they can contribute to protecting the forest and the environment.

The significance of the economic sector "Forest and Wood" for our day-to-day lives becomes clear when we focus our attention on it. It makes us realise how many products from the forest are integrated into our everyday lives. Forest products play a key role when it comes to climate change. Wood is a renewable resource that can replace many petroleum-based products such as plastic.

## EXERCISE

To prepare for the lesson unit, students are asked to create an "inventory list". They are to look around their homes for products from the forest. They then sort their finds, such as wood products, food, furnishings and decorative items. It is best to have different and unusual products, and no more than 10 pieces in total. Students then document their forest products along with the information found on them. Subsequently, they are to complete the worksheet WS 14.

To set the mood for the lesson, they can watch the music video "Ich und mein Holz" [Me and my wood] from the 257ers (<https://www.youtube.com/watch?v=wjXUBG15eZ8>) or the cover from the Draufgänger (<https://www.youtube.com/watch?v=-jFhc001H8>). Please watch these videos beforehand.

## FOLLOW-UP

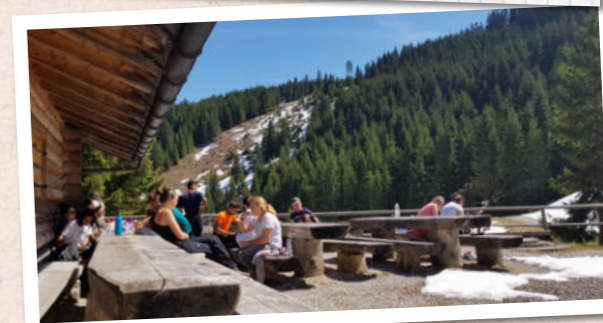
Students are to write a letter to young people living in the Amazon rainforest. They are to tell them about what they have learned about tropical forests so far. They are also to reflect on which goods and services from the rainforest they are familiar with, and which ones they themselves use. Students subsequently consider what they can do to help protect tropical forests, or are already doing to protect them.

## BONUS

Students organise a flash mob at school to increase awareness among their classmates of forest products and their importance as a renewable resource. The song "Ich und mein Holz" [Me and my wood] by the 275ers can be used as musical accompaniment. They can include wood and forest products in their show. The flash mob then takes place in the schoolyard. Such events are very effective in the media. The press has already reported several times on flash mobs at schools.

## FLASH MOB

In a flash mob, a group of people meet, usually in a public place. All of them performs certain actions together, such as dancing or singing. One to five people usually get the mob going, and more join in as the song progresses. The event lasts a few minutes, after which everyone goes their separate ways.



The mountain forests which we visited in Oberammergau are PEFC-certified. (Photo: Katharina Schlünder)

## ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Being able to reflect on one's own and others' guiding models
- Being able to recognise and weigh risks, dangers and uncertainties
- Being able to plan and act together with others
- Being able to consider conflicting goals when reflecting on strategies for action
- Being able to motivate oneself and others to take action
- Being able to reflect on one's own and others' guiding models
- Being able to independently plan and act



Forester Anton Burkhart gave us a detailed explanation of sustainable forest management in mountain forests. (Photo: SDW)

WS 14

# FOREST PRODUCTS



(Photos: pixabay.com)

Which of the items you use every day come from the forest? Do you like honey? Is your bed made of wood? How about the pencil you're using? And your notebook? Are your eraser and the tyres of your school bus made of natural rubber? Where does rubber come from?

Working in twos, compare your inventory lists. Are there products which are on both your lists? From both lists, choose five products you find the most interesting. Then work together with another pair. Present the five selected products to the other pair and discuss them. Agree on the three products all of you find the most fascinating.

During this activity, answer the following questions using keywords:

1. What kind of a product is it and what is it used for?
2. Where does the product come from? Where is it produced and where is the wood from?
3. How was it made?
4. What are the advantages of products made from wood?
5. What products would a student from Brazil have found at their home?
6. In your group, think about how you want to structure your presentation for the class.



A woman in Tumbira weaves baskets using lianas. (Photo: Ha Linh Truong)

## HOME ASSIGNMENT

When you are at home, write a letter to a young person living in the Amazon rainforest. Tell them what you have learned about tropical forests and think about what goods and services from the rainforest you know of. Which ones do you use? In the letter, tell them what you have learned about rainforest conservation and how you would like to contribute to it in the future.

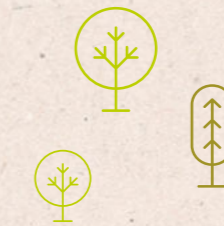
## BONUS

Raise awareness among your schoolmates! Show them how versatile and important products from the forest are for all of us. Organise a flash mob in your schoolyard. Agree on a song and discuss in class how you intend to choreograph the flash mob and what materials you will need.

## DID YOU KNOW?

In the temperate climate zone, trees have annual rings. They are formed by fluctuating growth spurts during the different seasons. In the tropics, the temperature remains approximately the same throughout the year. Despite this, there are trees that develop annual rings. This is because they grow in areas that flood and receive different amounts of water during rainy and dry seasons. This leads to differences in growth rates and hence annual rings.

Source: Forest Expedition!, Schutzgemeinschaft Deutscher Wald Bundesverband e. V. (SDW) 2018



## CERTIFICATIONS – FSC, NATURLAND AND PEFC

CERTIFIED FOREST AREAS:

	PEFC	FSC
BRAZIL	3.8 MIL HA (0.8 %)	6.7 MIL HA (1.4 %)
GERMANY	7.3 MIL HA (67%)	0.9 MIL HA (8.7 %)

## LEARNING GOALS

Students will learn about different certification systems for sustainable forest management and products from sustainable forest management. At the same time, they learn how they can contribute to the conservation of forests through their own consumption.

There are three certification systems in Germany specialising in forest management and wood processing: FSC (Forest Stewardship Council), PEFC (Programme for the Endorsement of Forest Certification Schemes) and Naturland. Each has certain specifications regarding forest management, wood processing and working conditions, which are usually higher than the legal requirements.



In the Lychen pine forest, forester Hilmar Alexandrin explains important aspects of sustainable forest management. (Photo: SDW)

## EXERCISE

As an introduction to the lesson, a class survey is conducted. The teacher puts up posters with the certification logos (seals) of PEFC, FSC and Naturland. Posters with various questions on them are also put up in the class. Students are to answer them using sticker dots or hand-drawn dots. Examples of questions: "Who looks out for these labels when shopping?", "Put a dot next to the logos you are familiar with", "Who can name at least three products they have at home with one of these logos on them?" Digital surveys can be conducted using the following media: Classflow.com, SMILE, Instagram, Hotpotatoes and GrafStat (also see page 102). In the classroom, three info points are set up on the PEFC, FSC and Naturland certification systems. Students walk around and look at the information. The results are compiled in groups and transferred onto profiles, which are then hung up as posters. Products featuring the seals can be displayed for viewing. The info points are to be equipped with different materials.

## FOLLOW-UP

Students will act as influencers for friends, family members, and fellow classmates. Via social networks (or alternatively via posters in the school), they inform each other about certifications for wood products and their impact. They should explain why sustainable forest management is important and how each of us can contribute to it.

## YOU WILL FIND MATERIALS FOR THE INFO POINTS HERE:

**Forests Around the World (Mit den Wäldern um die Welt)** – SDW educational unit [www.bildungsserver-wald.de](http://www.bildungsserver-wald.de)

**Infographic on sustainable forest management** – <https://generation-m.migros.ch/de/nachhaltig-leben/infografiken/nachhaltige-waldwirtschaft.html>

**Forestry certificates** – <http://www.oeko-fair.de/clever-konsumieren/wohnen-arbeiten/holz-und-holzprodukte/umwelt-und-sozialvertraegliche-waldnutzung/zertifikate-fuer-die-forstwirtschaft/zertifikate-fuer-die-forstwirtschaft2>

**Forest certifications by waldwissen.net** – [https://www.waldwissen.net/waldwirtschaft/fuehrung/lwf\\_pefc\\_fsc/index\\_DE](https://www.waldwissen.net/waldwirtschaft/fuehrung/lwf_pefc_fsc/index_DE)

**Naturland** – [https://www.naturland.de/images/Naturland/Richtlinien/Naturland-Richtlinien\\_Waldnutzung.pdf](https://www.naturland.de/images/Naturland/Richtlinien/Naturland-Richtlinien_Waldnutzung.pdf)

As well as on the websites of the respective certification providers FSC, PEFC and Naturland.

## ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Being able to reflect on one's own and others' guiding models
- Being able to think and act with foresight
- Planning and acting together with others
- Being able to motivate oneself and others to take action
- Being able to use concepts of justice as a basis for decision-making and taking action

WS 15

# CERTIFICATIONS - BECOME AN INFLUENCER FOR THE FOREST!



Many products that you can buy have seals on them. These are small symbols that represent certification. This means that certain rules for forest conservation were complied with during the manufacture of the products. In Germany, there are three seals for certifying wood products. These three "certifiers" stipulate rules which forest owners and companies which process wood must adhere to. Such sustainable forest management contributes to the protection of forests around the world.

The PEFC, FSC and Naturland certificates will be explained in greater detail at the info points. Using keywords, write down the information that you consider important. Feel free to visit info points more than once. Attempt to find the differences between the various certificates. Find out which criteria forest owners and wood-processing companies must adhere to.

### CERTIFICATE

From the Latin words  
**certus = certain**  
**facere = to make = to make sure, attestation**

**@INTERNATIONALWORKCAMP**  
**@FASAMAZONAS**  
**@SCHUTZGEMEINSCHAFT-DEUTSCHERWALD**  
**#SDGACTION #SDGCHALLENGE**  
**#SUSTAINABLEFORESTMANAGEMENT**

## EXERCISE

Become an influencer for sustainability. Raise awareness among your friends, family and classmates on the importance of using sustainable and certified products for the environment – and hence also for your future. Promote the forest, forest products and buying certified products. Use social media such as Instagram, Facebook or Twitter for this purpose. Set up a class account. First of all, think about what you want to communicate with your post.

Why do you think people should buy products with these labels? What is particularly important to you when it comes to forest protection? What would you like to point out in particular?

Now think about how you can convince your followers. What do you want to show in your photo? Bear in mind that it is not about promoting a specific product. For example, you can take photos of certificates and products during your next shopping trip, and then explain why you decided to buy them. You are free to choose which products and certificates you wish to feature. Decide what you personally like. It is not about the particular brand of the product. Take a picture showing just the seal and call the product "handkerchiefs", for example.

## FOLLOW-UP

Discuss all the results in class. What are the main differences between the three seals? Can you assign the criteria for forest management to the dimensions of sustainability (economic, ecological, social and cultural)? Why are certificates important?



Protecting nature and the environment is certainly not boring! Motivate others to take action! This selfie was taken during our planting project in Brazil, where we planted young cocoa and cassava plants.

(Photo: Ha Linh Truong)



Let your followers see the world through your eyes and show them what you particularly like. (Photo: SDW)

# SUMMARY/SAMPLE ANSWERS FOR PROFILES

	FSC	PEFC	NATURLAND
<b>WHEN?</b>	Founded in 1993 by environmental organisations (WWF, Greenpeace, Robin Wood, BUND and NABU), internationally active	Founded in 1999 by forest owners, internationally active	Founded in 1982 by environmental organisations; only active in Germany; guidelines on ecological forest use since 1995
<b>WHO?</b>	Three chambers have voting rights · Economic (represented by the forestry industry, timber industry,...) · Ecological (environmental associations) · Social (representation of indigenous peoples, for example)	50 % voting rights for forest owners 50 % voting rights for environmental associations, timber industry, professional associations	Association with focus on organic agriculture; one sector => forest
<b>WHO DECIDES?</b>	International board appoints FSC certification bodies	PEFC has independent certifiers, including some from outside the forestry industry, such as TÜV-Nord or Landesgewerbeamt (State Trade Institute)	Independent certifiers, recognition commission consisting of 20 members
<b>USE</b>	In state and municipal forests (if > 1,000 ha), 5 % must be excluded from use.	PEFC does not require exclusion of use; nature conservation is integrated into forest management	Ecological farming (focus on agriculture)
<b>SELECTION OF TREE SPECIES</b>	Over the long term, forest owners should choose native tree species; "foreign", non-native species such as Douglas fir may only be planted when mixed with native species.	PEFC permits the mixing of site-appropriate species.	Continuous effort towards achieving natural communities, planting of species native to a particular location
<b>DEAD WOOD</b>	Forest owners must develop a dead wood management strategy	Dead wood and trees with cavities must be protected to a suitable extent	10 % biotope wood (natural ageing and dead wood)
<b>HOW MUCH?</b>	Approx. 200 million ha worldwide	Approx. 300 million ha worldwide	Germany: 53,000 ha

### What are forest standards?

Forest standards are rules according to which forested areas must be managed. Working conditions are also defined, as are specifications for the processing of the products.

### EXAMPLES OF FOREST STANDARDS:

- Mixed forests with native tree species appropriate for a particular location
- Prioritisation of natural tree regeneration
- Trees of different ages
- No genetically modified organisms
- Driving over large areas and soil cultivation not permitted
- Clear-cutting and use of whole trees prohibited
- Permanent logging trail network
- Use of biodegradable chainsaw oil
- Use of pesticides as a last resort
- Promotion of rare tree species and old wood/dead wood areas
- Preservation of tree monuments



### 4.2.3 RELATIONSHIPS BETWEEN THE FOREST AND HUMANS



**NAYANDRA KELLEN PEREIRA,  
25 YEARS OLD**

**Lives in:** Manaus  
**Occupation:** Environmental engineer  
**Hobbies:** Singing, reading, watercolour painting, being in nature

(Photos: SDW)



**LEA ESSER, 26 YEARS OLD**

**Lives in:** Duisburg  
**Occupation:** Student (Social Pedagogy)  
**Hobbies:** German Forest Youth (DWJ), calligraphy, hiking

Hi there! We are Nayandra from Manaus and Lea from Duisburg. It was interesting for us to discover what connection people in Brazil and Germany have with the forest. The forest serves more than just an economic purpose. From time immemorial, it has had a mystical effect on people. Sometimes it is a feeling of unease, sometimes of security. Both in Germany and Brazil, there are many myths and fairy tales surrounding the forest. We would like to explore these fairy tales with you.

**Nayandra:** Lea! Do you remember the story Roberto told us by the fire in the evening? He said we need to "know about it" before we go into the forest alone. The story about the Curupira. This legend is very, very old and it is always passed on from parents to children. There are now numerous different versions of the story. This one comes from Tumbira, from Roberto.

*The Curupira is a creature that lives in the forest. He is considered particularly bold, but also fair, because he protects the forest from danger. The word Curupira means "body of the child" – it is from the Tupí-Guaraní language, a language spoken by indigenous peoples of South America. The name refers to the appearance and shape of the Curupira – it is small and thin. Curupira is always watching over the forest. He keeps a close eye on who is taking things from the forest, such as fruit, nuts or game meat. If he sees someone taking more from the forest than they need or harming the forest or its animals, Curupira gets angry. It is said that he will seek revenge and may even lead poachers or vandals to their death. Curupira lures those who harm nature into the forest. He makes sure that they get lost. They cannot follow the Curupira because its feet point backwards. These tracks deceive pursuers and they lose him. He can also confuse people by imitating sounds from nature, but also human voices with his whistle. It is said that the Curupira also transforms itself into an animal in order to confuse, distract or even attack people. Anyone who is friendly towards nature has nothing to fear from Curupira. It is a kind of supernatural force that protects plants and animals from harm.*



In Brazil, we sat by the fire at night, at the edge of the rain-forest, and Giovane's father, Roberto, told us a Curupira story and of his unusual encounters in the forest.



**"THERE ARE THINGS  
IN THE WOODS THAT  
ONE COULD LIE IN THE  
MOSS FOR YEARS AND  
THINK ABOUT."  
FRANZ KAFKA**

## FORESTS & HUMANS

### LEARNING GOALS

German and Brazil are countries with large swathes of forest, and whose peoples have always had a strong connection to the forest. Many fairy tales, myths and legends surrounding the forest exist. Students will hear about a legend from Brazil. Subsequently, they will go in search of German fairy tales and myths that deal with the forest. They are to analyse texts with regard to the statements they contain on co-existing with nature.

Forests also provide cultural services. These include recreational activities and aesthetic effects, as well as elements associated with cultural, spiritual and religious values. Even today, the indigenous forest peoples of Brazil continue to maintain a close bond with the forest. Many stories have been passed down from generation to generation and from village to village. Such legends usually serve to remind people to treat nature with care and be mindful of sustainability. In Amazon mythology, there are a number of figures – various types of forest spirits – who are responsible for protecting the forest. They are called "Curupira", "Cai-pora" or "Mapinguari", to name a few. Many of the river people, or Ribeirinhos, believe that they need to ask these spirits for permission before they can enter the forest. Only by doing so will they be protected.

People in Germany also have an ancient and close relationship with the forest. Many of them associate nature directly with the forest. Although contact with the forest no longer occupies a place in everyday life for many Germans, most of them strongly identify with the German forest. Events such as the protests against the clearing of the Hambach Forest for the mining of lignite for energy generation are evidence of how important the preservation of old forests is for the population. Most children know the forest as the setting for fairy tales and myths, where it is sometimes a space for survival, a place of refuge or danger, or a source of raw materials.



To get to know the forest, you have to visit it yourself. (Photo: Lea Esser)

### TIP

**DOCUMENTARY: TERRA X ON ZDF**

[HTTPS://WWW.ZDF.DE/DOKUMENTATION/TERRA-X/DER-DEUTSCHE-WALD-100.HTML](https://www.zdf.de/dokumentation/terra-x/der-deutsche-wald-100.html)

(AVAILABLE UNTIL 2023)

### EXERCISE

- Students learn about the legend of the Curupira and discuss the moral message behind it. They then examine German fairy tales and myths in which the forest plays a central role.
- They ask others about what the forest is associated with for them (see WS 16).

### BONUS

Students write their own fairy tale that conveys a certain moral message regarding the conservation of nature at home or near their school (cf. WS 16). They can use creative writing methods for this fairy tale (cf. RECLAM Kreatives Schreiben: 111 Übungen [Creative writing: 111 exercises.]).

### FOLLOW-UP

Students visit a nearby forested area. After intensively examining relationships between humans and the forest, they think about what they find particularly beautiful about the forest. During an excursion to a nearby forest, they examine its aesthetics. They choose a section they find the most beautiful and photograph it. Using various online programs, they can create 3D stories. This allows students to present their own favourite spot and tell a story about it.

### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Being able to reflect on one's own and others' guiding models
- Being able to use concepts of justice as a basis for decision-making and taking action
- Being able to independently plan and act
- Being able to show empathy for others

WS 16

# LEGENDARY FORESTS



## EXERCISE

Germany, the land of poets and thinkers. Almost half of all Grimm brothers' fairy tales are set in the forest. Ask your neighbours or friends at home for books containing fairy tales and legends. You can also ask in your school library or do some online research. Choose two texts to examine more closely. What is the impression given of the forest? What image is created of the forest? Do a school survey: What do your schoolmates associate the forest with? In their opinion, do fairy tales and legends portray the forest in a good or bad light? What deeper message do you find in the fairy tales? Subsequently, discuss your results in class and share your opinions with others.

There are **STORYTELLING CUBES**, such as StoryCubes, which can be used for telling stories. On the sides of the cube are different symbols. The symbols that appear when the cube is cast should appear in the story. You can also make such cubes out of paper.

## BONUS

The legend of the Curupira serves to stop people from exploiting the forest and forest products. People should only take as much as they truly need and only so much that the forest is not harmed. Write a story of your own that also promotes sustainability. The story should remind people to behave with fairness towards each other. Not only between different generations, but also between people in different parts of the world and within the group.

## FOLLOW-UP

Think about what you find particularly beautiful about the forest and the things in it. Is there a place in or near the forest that you particularly like? If not, go on an excursion and take a closer look at a nearby forest. Pay attention to what the plants look like. How do the leaves on the trees differ? What colour do you see? Create a 3D story about this place or your personal favourite place in the forest. You will require a smartphone or a digital camera to take pictures of the place. You can take normal pictures or panoramic pictures. Using stories360.com, for example, you can upload your pictures and view them in 3D. You can also add texts, pictures, videos and audio. This gives you the opportunity to point out special aspects in the photo.



(Photo: Pixabay)



The forest plays a central role in half of all the Grimms' Fairy Tales. Right: The Brothers Grimm

(Source: Elisabeth Jerichau-Baumann - Public domain, <https://commons.wikimedia.org/w/index.php?curid=213388>)

4.3

# FORESTS & WATER FLORESTA E ÁGUA

When talking about forests, you also have to talk about water. In Germany, it is not immediately clear what the connection is. In Brazil, on the other hand, water plays a crucial role for the people living along the Rio Negro. Let Ha Linh from Munich and Carlos from Manaus take you on a watery journey through the forests.



(Photo: Katharina Schlünder)

**HA LINH TRUONG, 24 YEARS OLD**

**Lives in:** Munich  
**Occupation:** Student (Teaching Degree)  
**Hobbies:** Scouting, drawing, food



(Photo: Nathan Carvalho Simões)

**CARLOS ALBERTO DOS SANTOS JUNIOR, 26 YEARS OLD**

**Lives in:** Manaus  
**Occupation:** Advertising industry  
**Hobbies:** Reading, travelling, meeting friends

**Ha Linh:** I never imagined that a river could play such a huge role. Without the Rio Negro, life would not be possible in Tumbira. It is important as a water source, a transport route and a source of food. It is an incredible feeling to travel in a boat on such a large river. At no point could we see both banks because the river is so wide, and there are many extremely long islands. The colour of the river was also particularly spectacular. That's because the Rio Negro is black. While bathing on the banks, we could clearly see that the water was dark brown. It's like bathing in a river of coke. Just without the carbonation.

**Carlos:** In the Amazon, we are used to superlatives: The rivers are huge, wide and deep. In Germany, we saw a number of rivers that did not follow their natural course and had been straightened to an extreme extent. It was obvious that nature had been significantly influenced by man. However, in the small and large towns we visited, water does not come primarily from the rivers, but from the mountains or groundwater. Moreover, the water in Germany can be drunk directly from all taps. What struck me was that although the rivers were often the product of human actions, there is no fear among Germans regarding a crisis in water distribution. In Lychen, a small town to the north of Berlin that had been famous for timber rafting since the 16th century, we took a raft trip across a lake.

**MORE DETAILS ARE AVAILABLE HERE:  
[HTTPS://WWW.FLOES-SERVEREIN-LYCHEN.DE/STARTSEITE.HTML](https://www.floes-serverein-lychen.de/startseite.html)**



We too used the typical means of transport on the Rio Negro.

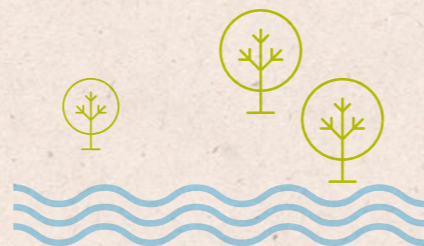
(Photo: Maiara da Silva Gonçalves)

## WATER AROUND THE WORLD

### LEARNING GOALS

Students will obtain an overview of the distribution of water worldwide. They will learn that the forest in the Amazon region plays a particularly essential role for water cycles worldwide and hence also for the climate.

At 6,400 km, the Amazon is the second-longest river in the world. Of all the rivers in the world, it has the largest volume of water and the greatest diversity of aquatic species. The rainforest surrounding the Amazon is a key component in the processes of the global water cycle (evaporation, cloud formation). Even in Germany, the forest plays a significant role in the water cycle. Many people are not aware of its importance, as surface water is only found in a few places in the forest and the important processes take place in the atmosphere and in the soil.



### EXERCISE

As an introduction to the lesson, an introductory game (energiser) can first be played. All students are to sit in a circle. Five to six glasses containing water and small spoons are distributed. The glasses are all filled with different amounts of water. Students are now asked to make music by carefully hitting the glasses with the spoons. After a while, the glasses are passed around.

Students are given illustrations of the outlines of Brazil and Germany. Maps can be downloaded for free from [www.d-maps.com](http://www.d-maps.com). With the help of an atlas or online resources, students then draw in the major rivers. These should definitely be on the list: The Amazon, Rio Negro, Solimões, Rhine, Main and Danube.

Using the illustrations in the atlas or online images, students then compare the differences in size. What do they notice? Do the rivers have similar or different structures? Where and how frequently are villages, towns, and cities located along rivers? Is there a connection between the availability of water and forests? In which directions do the rivers flow, and why?

### FOLLOW-UP

Students brainstorm what the respective geographical differences mean for the two countries. They make inferences as to how the people in Germany and Brazil are dependent on water.

### BONUS

Students go on an excursion into the forest and collect materials to build models of different types of forests (for example, a dry and a wet forest) (see WS 17).

### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Being able to reflect on one's own and others' guiding models
- Being able to show empathy for others



Winfried and a fisherman from Tumbira return from fishing.  
(Photo: Maiara da Silva Gonçalves)



## WATER AROUND THE WORLD

Create a mind map. Note down everything you can think of about water and forests. Try to sort your keywords by topic. Now compare your results with those of the person sitting next to you. There are various ways to present your ideas using a mind map. On paper, online or with the help of speech cards that you can stick to the board or lay out on the floor.

"THE WATER THAT WE HAVE" is an experiment that illustrates how much drinking water is available worldwide. You will require a few used bottles so that you can fill them with a total of 20 litres of water, and three additional empty bottles. You will also require a measuring cup and a waterproof pen.

4. Fill 70 percent of this 3 percent of fresh water into another empty bottle. This is the amount of fresh water that is locked in polar ice.
5. The water that now remains is the amount of fresh water that is available worldwide.

1. On the bottles, a scale is drawn with 100 ml increments.
2. Now a total of 20 litres of water is divided up among the bottles. This represents the amount of water that exists worldwide.
3. Calculate how much 3 percent of this amount is, and fill this amount of water into the extra bottles. This is the percentage that is fresh water.

Discuss the following questions in your class: What did you learn from the experiment? How do each of you use water at home? How can forests contribute to the conservation of drinking water? What might forests have to do with water and drinking water?

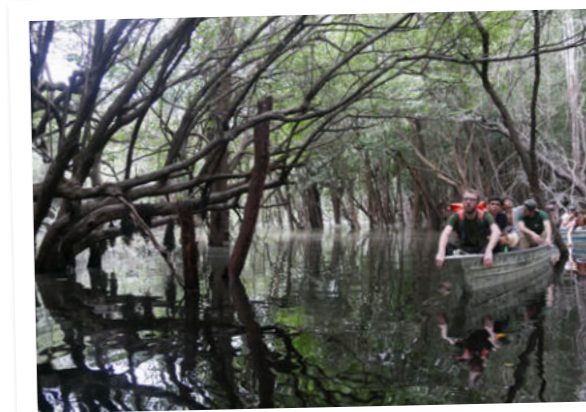
### BONUS

#### "MY WATER BOX"

Organise an excursion into the forest or go on an outing with your friends or family after school. It is important that there are wet and dry areas in the forest you visit. Ask your teacher where you can find such a forest nearby.

Carefully observe what you see in the forest areas and document the differences. What do you notice on the ground? What does the soil feel like? What does it smell like in the forest? What does the vegetation look like? What information can you infer about the animals that live here?

Working in groups, collect natural materials in both forest areas. This is what you are allowed to collect: Soil, leaves and branches from the ground, flowers and blossoms, and moss. You can take photos of living plants. Now take a box, such as a large shoe box, and create a model featuring both a wet and a dry forest. These models are then to be presented in class.



In Tumbira, we travelled through the wetland forest on boats. It is flooded during the rainy season, but not during the dry season. (Photo: Ha Linh Truong)



### 4.3.1 WATER CYCLE & WATER FILTER



**ANAILSON RIBEIRO BATISTA, 19 YEARS OLD**

**Lives in:** Novo Aripuanã Municipality, Santo Antonio Community, Sustainable Development Reserve Juma  
**Occupation:** Teacher for Environmental Education at FAS  
**Hobbies:** Football, hanging out with my girlfriend, helping out at home on the farm.

Hi there! My name is Anailson – it is pronounced something like "Anayusson". I live in a small community on the Rio Negro, five days by boat from Manaus. The river plays an extremely vital role for us. Along with the forest, it is our livelihood. The people who live in the Amazon region directly along the river and whose lives are dependent on it, like me, are called Ribeirinhos."

#### LEARNING GOALS

Using worksheets and experiments, students will learn about the water cycle and the filtering effect of the forest. They are to reflect on the importance and availability of drinking water in their lives and those of the people in the Amazon region.

The illustration on WS 18 shows role of the forest in the water cycle in Germany and Brazil. If the forest is cleared, the water cycle will be badly disrupted. In an intact forest, precipitation hits the canopy and is distributed among the tree, shrub and herb layers. Some of the water flows down the plants to the ground and seeps into the groundwater. In this scenario, the rain is slowed down and only reaches the ground after some delay. If the precipitation were to fall unhindered onto bare soil, the soil would not be able to immediately absorb these quantities of water. Some of the water would flow away above ground, washing away soil (erosion). The forest, on the other hand, consumes a lot of water. The trees absorb it from the soil through their roots and transport it to the leaves. There, it evaporates (transpiration). Some of the water already evaporates on the canopy (interception) and the rest from the earth's surface (evaporation).

The forest floor plays an important role as a water filter for drinking water. The percentage of the water that flows into the groundwater layer seeps down through different soil layers. These layers have different densities because they consist of different materials, such as gravel, sand or silt. Dirt particles are filtered out by these processes. During this percolation, the water is also cleaned of biological and chemical pollutants. This is performed mainly by microorganisms in the soil.

#### FOLLOW-UP

Water plays an important role in our daily lives. However, many people are unaware of this, because it is always available where we live. Students are to keep a water diary for one week. In it, they note down what they used water for, when it was used, and how much water they consumed. Note: We also consume "virtual water". This refers to the amount of water consumed to produce food or clothing, for example. More information on this at: [www.virtuelles-wasser.de](http://www.virtuelles-wasser.de)

#### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Being able to reflect on one's own and others' guiding models
- Additional competencies depending on the task

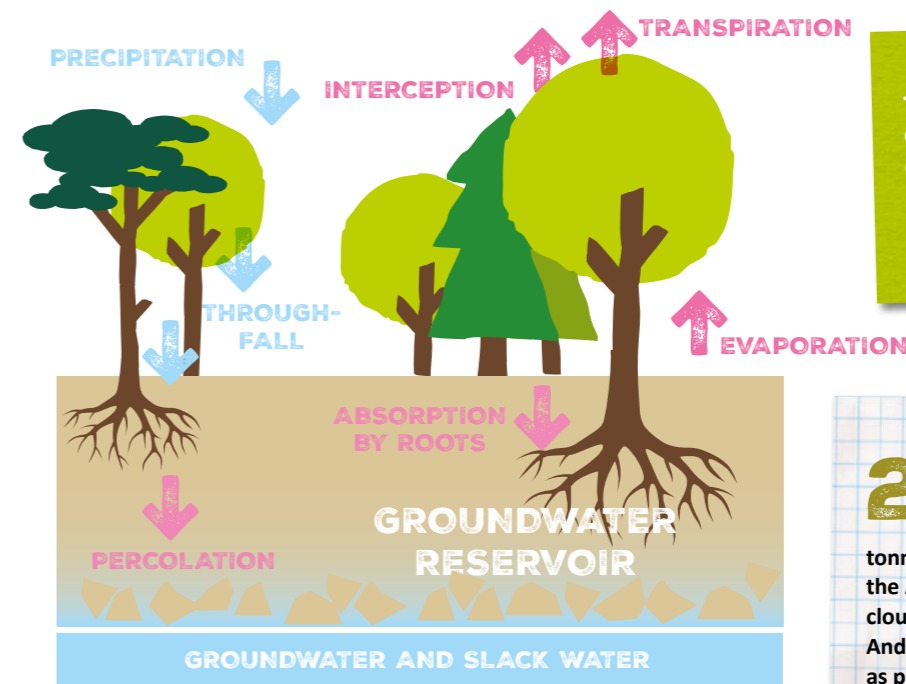
**ON WARM SUMMER DAYS, A BEECH FOREST TRANSPIRES 40,000-60,000 LITRES OF WATER PER HECTARE, ASSUMING A SUFFICIENT WATER SUPPLY.**

Source: Wasser – das „blaue Gold“ des Waldes [Water – The "Blue Gold" of the Forest]; Jürgen Müller (Eberswalde)



WS 18

## WATER CYCLE IN THE FOREST



THE RAINFOREST PRODUCES ITS OWN CLOUDS. THROUGH EVAPORATION AND THE RELEASE OF PARTICLES, TREES, PLANTS AND FUNGI CONTRIBUTE TO THE FORMATION OF LOCAL CLOUDS.

**20 BIL.** tonnes of water evaporate each day in the Amazon rainforest. The resulting clouds can travel all the way to the Andes mountains, where they then fall as precipitation. These clouds are also referred to as floating rivers.

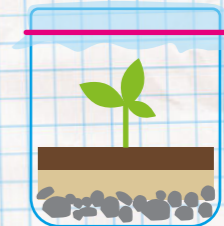


1. Take a look at the illustration. Using a few key points, describe what you see and what it is about.
2. Explain in key points: What is happening with the rain? How does some of the water reach the ground? What happens to the water that reaches the ground? What would change if the forest vanished?
3. Using key points, explain the differences between interception, transpiration and evaporation.
4. Discuss in class what role evaporation (interception, transpiration and evaporation) plays in the water cycle.

#### EXPERIMENT

You can easily recreate the water cycle yourself. You will need a jar (preferably a preserving jar), cling film and a rubber band, soil, stones, sand and a small plant with roots.

First, place the stones in the jar and pour the sand over them. Now add the soil. Then carefully plant your plant. Give it some water. Stretch the cling film tightly over the glass and fix it in place with the rubber band. Place your little ecosystem in the sun. Now all you need to do is wait. Something will start happening after a short time! What do you observe?



The water in the glass evaporates and rises as water vapour. It is stopped by the cling film and condenses into water, which rains back down to the ground. You can see that the water is not lost in the water cycle.

WS 19

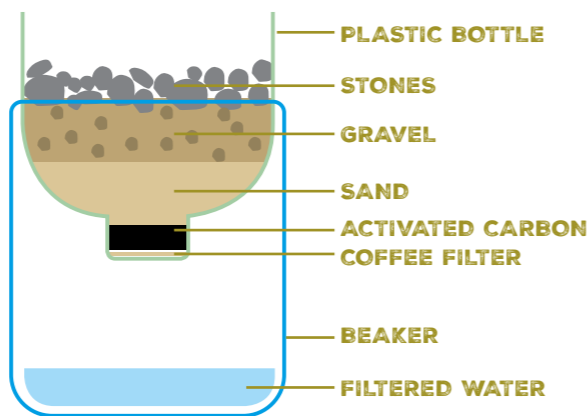
# THE FOREST - A WATER FILTER



The forest fulfils an important function worldwide as a water filter and reservoir. You can recreate how the forest filters water in a simple experiment. Set up the experiment using the materials exactly as shown in the diagram. Carefully pour some dirty water into the top of the plastic bottle that has been cut open. Observe carefully what happens.

**How does the colour of the water change? Where did the dirt particles go?**

**RESEARCH:** What happens to the soil when the forest is cleared? Discuss what this experiment has to do with the forest. What are the similarities? Why is the forest important for the production of drinking water?



### SUPPLIES

- Plastic bottle
- Large cup
- Scissors
- Coffee filter
- Activated carbon
- Stones
- Gravel
- Sand
- Dirty water

### BONUS

Visit the sewage treatment plant in your town with your class. How does the sewage get to the treatment plant? What happens there? How is the water cleaned? How is the clean water transported back to the households?

### PLAYLIST

ALTERNATIVELY, YOU CAN WATCH "LEON AUF DER SPUR DES ABWASSERS - WIE FUNKTIONIERT EINE KLÄRANLAGE" [LEON ON THE TRAIL OF SEWAGE - HOW DOES A SEWAGE PLANT WORK?] BY THE RUHRVERBAND. WE HAVE LINKED IT IN THE SDW PLAYLIST.

## GROUND TERRA

**Research!** Why can't the people along the Rio Negro simply drink tap water? Why do they need powder like the one shown in the picture to purify river water?

### TREATING DRINKING WATER AT THE RIO NEGRO

(Photos: Maiara da Silva Gonçalves, Katharina Schlünder)

Special powder for purifying river water



Water from the Rio Negro that is not suitable for drinking!



Four grams of powder are enough to purify 10 litres of water. The whole thing is stirred for a few minutes.



After a while, all the impurities settle to the bottom of the bucket. Potable water can now be scooped out.

## 1/8 OF GERMAN FORESTS ARE DESIGNATED AS WATER PROTECTION AREAS.

## 4.3.2 HUMANS & WATER

Oi! I am Pedro from Freiburg in southern Germany. I was born in São Paulo in Brazil and moved to Germany with my family when I was 14 years old. I feel a strong connection to both countries, because my mother has German ancestors. I have never been to the Amazon before and the close relationship between the river and the people was also new and exciting for me. Hence, I would like to tell you about my exciting experiences.



(Photo: Ha Linh Trung)

### PEDRO BREMBERGER PÁSSARO, 27 YEARS OLD

**Lives in:** Freiburg  
**Occupation:** Student (Forestry Management and the Environment)  
**Hobbies:** Cycling, jogging, swimming

There are river dolphins in the Amazon. They come in two colours: grey and pink. The Boto is a popular myth in the Amazon region. For a long time now, it has been retold from one generation to the next in the rural river communities along the Amazon and adjacent rivers. The people living in the Amazon region, who have African, European, and indigenous roots, have influenced and adapted the myth, adding more traditions and beliefs to the existing indigenous legends.

**The most famous story about the Boto is the one I am about to tell you:**

*The elders say that on nights with a full moon, the pink Boto transforms into a handsome and beautiful young man in a white suit who attends river parties. He wears a hat on his head to hide the hole through which he usually breathes as a dolphin. This way, no one notices that he is actually a dolphin. He seduces the most beautiful girl in the village and dances with her all night long. Like a gentleman, he flirts with and charms the pretty young woman, then takes her down to the river and swims with her in the water. Before the next day dawns, the man turns back into a Boto, disappears into the river and the young woman becomes pregnant.*



(Photo: Bruno Kelly/FAS)

Indigenous people often still believe in this story, such that even today, there are children whose birth certificate states that they are Boto children when the real father is unknown. The pink river dolphin seems to have a bad reputation. It changes colour over time. Newborns are usually grey and turn pink as they get older. There are two different species of freshwater dolphin in the Amazon: The "true" Amazon river dolphin (*Inia geoffrensis*) and the tucuxi (*Sotalia fluviatilis*), a smaller and typically grey-coloured species. While fishermen see the pink river dolphin as a competitor and accuse it of scaring away fish and damaging their nets, the smaller tucuxi is viewed as a guardian and helper, defending people against the pink river dolphin and saving them from drowning. Despite this, they believe that killing a dolphin brings eternal misfortune and that you will never catch fish again. There are also reports that pink Botos have the magical power to protect canoes and boats in storms, and are hence also considered friends of the Amazon fishermen. Hence, the relationship the people of the Amazon have with the dolphins is characterised by a huge divide. If a Boto comes too close to a boat or even touches it, fishing is no longer allowed at that spot. In this manner, the pink dolphin has even become a guardian that helps ensure balance in nature.

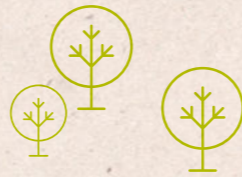


## HUMANS & WATER

### LEARNING GOALS

Students learn about the relationship between the Amazon dolphin and the river dwellers. They perform research on the meaning and origin of legends. Subsequently, they examine animal species in German fairy tales (such as the wolf) and critically compare the depictions in the stories with reality.

Two species of dolphins are found in the Amazon, the Amazon dolphin (*Inia geoffrensis*) and the Amazon sotalia or "tucuxi" (*Sotalia fluviatilis*). When they are young, both are grey in colour. As they get older, the Amazon dolphins turn pink, as their skin loses its colour. Legends have arisen concerning this pink dolphin, also called Boto.



### EXERCISE

Students will receive the worksheets (page 73 and WS 20). First, they will read the legend about the boto from the chapter introduction by Pedro. They are to think about the legend and consider the possible reasons why such a story could have arisen. Subsequently, they are to perform research to obtain scientific information about the Amazon dolphin and compare it with the information from the legend. In class, students then discuss whether there are animal species in Germany who suffer from negative prejudices against them that have been conveyed by fairy tales and myths. The various groups are to each examine one animal species and compile scientific information that they then compare with the fairy tales. Finally, the results are to be presented to the class.

### FOLLOW-UP

Working in pairs, the students are to create a podcast segment. Each recording is to last a few minutes, and feature two students discussing this lesson topic. Before they begin, they should prepare by thinking about a number of questions and topics to talk about.

- What did I learn? What was new? What did I already know?
- What did I find exciting? What did I find boring?
- Has my attitude towards a particular topic or a particular animal species changed?

### BONUS

As a bonus activity, students write a story about the boto, the wolf or other animal species that was critically discussed. This story should focus on an animal-human relationship and depict the reputation of the respective animal in a good light. For this activity, students are to draw on the information they researched and re-examine prejudices that have been fuelled by legends and stories. This story is to be presented as a comic. For tips on this, please refer to WS 20.

### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Being able to reflect on one's own and others' guiding models
- Being able to show empathy for others

WS 20

## HUMANS & WATER



Tasks:

1. Carefully read the legend about the Boto and the description of the relationship between the Boto and humans.
2. Discuss with the person sitting next to you what you noticed about the legend. Which aspects raise questions?
3. The people of the Amazon have a very complicated relationship with the pink dolphin. They honour yet fear it at the same time. Research information about the Amazon dolphin (*Inia geoffrensis*). Look for information about its habitat, biology, diet and mythology. You will also find numerous photos and videos of the Boto on the Internet. Create a profile on it.
4. Compare the legends and myths with the information you have researched. Is there any reason to be afraid of the Boto? Why do you think the people in the Amazon region pass down this story from generation to generation?
5. Do you know of an animal in Germany that also has a bad reputation in fairy tales and legends? Research this animal as well. Compare the representation of this animal species in the fairy tale with reality.

### TIP

FOR THOSE OF YOU WHO'RE NOT TOO GOOD WITH DRAWINGS: THERE ARE MANY WEBSITES ON THE INTERNET WHERE YOU CAN CREATE COMICS WITHOUT HAVING TO DRAW.

### EXAMPLES INCLUDE:

PIXTON.COM  
CANVA.COM  
CHOGGER.COM

### BONUS

Your task is to restore the reputation of the Boto and of the animals from German fairy tales. Think of a short story in which one of the animals as well as humans play a role. Use it to create a short comic! Your stories can be serious or funny, but they should convey real-life information about the animal species.

## THE WORLD OF FAIRY TALES AND LEGENDS...



(Photo: Pixabay)

Source: Forest Expedition!, Schutzgemeinschaft Deutscher Wald Bundesverband e. V. (SDW) 2018

## 4.4 FORESTS & BIODIVERSITY FLORESTA E BIODIVERSIDADE



(Photo: Ha Linh Truong)

**MAIARA DA SILVA GONÇALVES, 31 YEARS OLD**

**Lives in:** Manaus  
**Occupation:** Biologist  
**Hobbies:** Drawing, photography



(Photo: Ha Linh Truong)

**SOPHIA PUCHNER, 24 YEARS OLD**

**Lives in:** Würzburg  
**Occupation:** Student (Forest Sciences)  
**Hobbies:** Baking and cooking, playing the trumpet, hiking

Hi there! We are Maiara from Brazil and Sophia from Germany. During our travels, we have primarily been studying the biodiversity in forests. We would like to share the experiences we found the most exciting with you.

**Sophia:** What particularly impressed me was the soundscape. Constant buzzing and humming and calls from animals, which, however, mostly remain unseen. Tropical forests are home to 2/3 of all animal species worldwide. More than 120,000 different species have been identified to date, and new ones are discovered in the Amazon region every year. Every now and then, we did see an animal or two. A small group of monkeys on a rainforest walk, for example, or an Amazon dolphin if you were very lucky (and managed to get up from your hammock at 6 a.m.). I was also fascinated by the variety of plants that came in a wide range of bizarre growth forms, colours and sizes. I was particularly impressed by the adaptability of the many trees that stand in the river and of which only the crown is visible during the rainy season. Despite this, they manage to survive without rotting. And it was only there that I realised that Brazil does not experience any seasons.

**Maiara:** I found it incredibly exciting that we saw so many different landscapes in Germany. I had seen conifers in the south of Brazil before, but it was an entirely new experience in Germany. I found the beech forest in the Hainich National Park, Thuringia, to be the most beautiful. Some sections of the Hainich National Park have not been used for commercial forestry for a long time now, and Sophia explained to me that the aim was for it to revert to primeval forest in a few centuries. I saw many tree trunks lying on the ground with big mushrooms growing on them, and the entire forest floor was covered with wild garlic. Sophia explained to me that you could eat it, like garlic. During our trip across Germany, we often saw deer in the fields and at the edges of the forest. I thought that was awesome! Our forest animals are rarely seen in the dense rainforest.



View of the river bank from the Rio Negro (Photo: SDW)



The ground of the beech forest in Hainich National Park was carpeted with wild garlic. (Photo: Katharina Schlünder)

**FOR MORE INFORMATION, PLEASE VISIT:  
[HTTPS://WWW.NATIONALPARK-HAINICH.DE/](https://www.nationalpark-hainich.de/)**

### LEARNING GOALS

Students learn what biodiversity is, why it is important, and what role forests and sustainable forest management play for biodiversity. They investigate the importance of biodiversity for us and for wildlife. Furthermore, they also independently research information on the topic of evolution and formulate a definition of it in their own words.

Biodiversity refers to the diversity of organisms, but also of ecosystems. It refers to diversity not only within a species and between different species, but also the diversity of ecosystems. The three levels of biodiversity:

- **GENETIC DIVERSITY** (within a species),
- **SPECIES DIVERSITY** (many different species),
- **ECOSYSTEM DIVERSITY** (the interaction between different communities of animals, plants, microorganisms, and their habitat).



The Hainich National Park begins behind this sign. (Photo: Katharina Schlünder)



During our expedition in Germany and Brazil, we also planted trees, such as here with Joachim Lange from the Templin Forest Nursery in Brandenburg. (Photo: SDW)



### EXERCISE

- As an introduction, students engage in a short brainstorming session on the topic of biological diversity/biodiversity. Students are to collect all the ideas they can think of related to the topic. What do they associate with the terms? Who has heard of the names before? Now the teacher kicks off the game "monoculture vs. permanent forest". Detailed instructions can be found on page 79. In WS 21, students will read about evolution. They are then to work on the questions as a class and note down the answers.

### FOLLOW-UP

Students are to imagine that they are visiting a supermarket. How wide would the range of goods be if there was no biodiversity? What would be different? To conclude, the teacher is to focus on the variety of fruit and vegetables available in a supermarket.

### BONUS

Students form groups to perform research online. Their task is to find out why tropical forests have a much higher diversity of species than forests in Germany, for example. They are to choose one theory. The results are then discussed in class.

### ESD COMPETENCIES

- **Acquiring knowledge in an open-minded way while integrating new perspectives**
- **Being able to reflect on one's own and others' guiding models**

### DID YOU KNOW?

In Germany, trees drop their leaves in autumn. They do this to save water. When the leaves are no longer supplied with water and nutrients, they die. In the process, they turn from green to yellow, then red, and finally brown.

(Photo: Pixabay)



# BIODIVERSITY

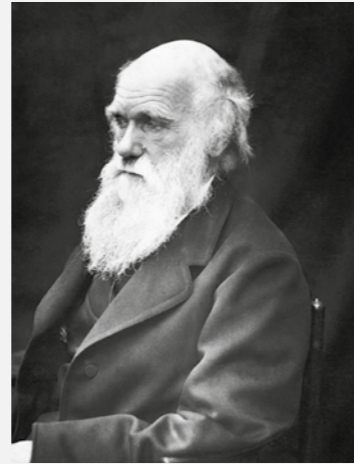


## Why Darwin's finches are named after the naturalist Charles Darwin

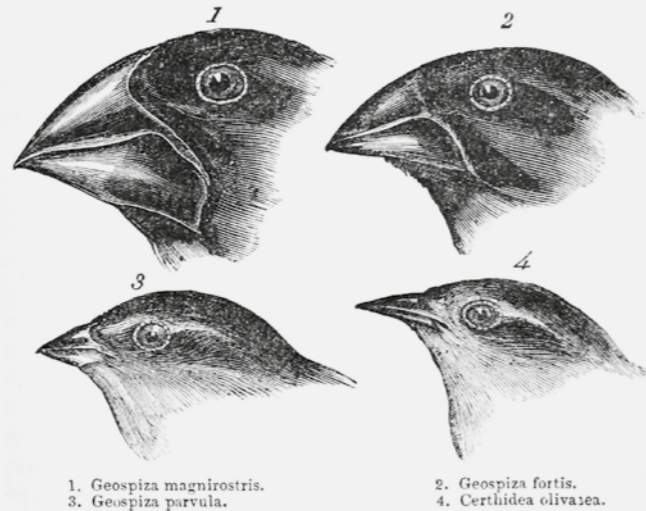
Beetles, mussels and birds: The scientist Charles Darwin had been fascinated by all kinds of creatures since he was a child. He would take specimens home to have a closer look at them. Charles Darwin was born in 1809, in a small town in Great Britain. In 1831, when he was still a student, he was asked if he would like to travel around the world on a ship. Charles Darwin was enthusiastic about the trip and boarded the ship at the age of 22. His voyage on the ship lasted for approximately five years. There are even birds named after him: Darwin's finches. They live mainly on the Galápagos Islands. They are located to the top left of South America, off the coast of Ecuador. Charles Darwin visited the islands in 1835.

These finches are around 20 centimetres tall and have many different beaks: Some have rather large and round beaks, others rather narrow and long ones. The size and shape of the beaks also give a rough idea of what the birds eat. Some of them can crack nuts. These have rather sturdy, thick beaks. Others can fish for worms using small sticks. Researchers believe that all of Darwin's finches are descended from a common ancestor. Over time, however, different beaks evolved among the species. And this is more or less how it happened: By random chance, a bird

was born with a beak that was advantageous to it in some way. It found a large amount of food, had children – and passed on its beak shape. This took place over many, many years. At some point, these birds evolved into a species of their own. This is an example of how the theory of evolution works.



Charles Robert Darwin was a naturalist who became famous for his theory of evolution. (Photo: Pixabay)



1. Geospiza magnirostris. 2. Geospiza fortis. 3. Geospiza parvula. 4. Certhiidea olivacea.

(Photo: John Gould (14.Sep.1804 - 3.Feb.1881) [Public domain], via Wikimedia Commons; [https://commons.wikimedia.org/wiki/File:Darwin%27s\\_finches\\_by\\_Gould.jpg](https://commons.wikimedia.org/wiki/File:Darwin%27s_finches_by_Gould.jpg))

1. Read the article carefully. Did you understand all the terms used? Now think about whether you already knew about Charles Darwin or Darwin's finches.
2. Do you know the word "evolution"? What do you think it means?
3. Together with the person sitting next to you and with the aid of the article, think about what the term "evolution" describes and write it down using your own words.
4. Share your ideas with others in your class.



Source: Forest Expedition!, Schutzgemeinschaft Deutscher Wald Bundesverband e. V. (SDW) 2018

## MONOCULTURE VS. MIXED FOREST

This is a game that can be played as an "energiser". All students are to stand in a circle. Each person draws a piece of paper from the bag and reads it secretly to themselves. The students hook on to each other and the teacher explains that she will now read a story. When the teacher reads out a tree species that someone has on their piece of paper, the person in question must drop to his or her knees.

As the game is played, the students will notice that at a certain point they all fall down at the same time. Now the game is repeated and this time the slips of paper with the different types of plants and animals are distributed. In the third round, the students can decide for themselves which species they want to represent.

### "Close your eyes and be very quiet. What do you hear?"

Do you hear the leaves rustling? Do you hear birds chirping, perhaps **blackbirds**? Or maybe the tapping sound of a **woodpecker** searching for food in a dead tree? Can you sense the tiny creatures in the soil? It contains more than just wriggling **earthworms**. The forest provides a habitat for many insects and animals. But the forest also provides space for many different types of trees to grow big and tall. Although trees often appear to be big, strong giants, there are many things that can harm a tree. For one, the fungus *Hymenoscyphus pseudoalbidus* can damage **ash** trees so badly that they die. The scientific term for this is ash dieback.

However, this fungus does not like all tree species. It doesn't really like the taste of **maple** wood, which is why these trees remain healthy and can continue to grow unharmed. Do you hear that crackling and rustling? A forest fire has broken out. **Pine** needles in particular serve as fuel for the fire.

The **beech** is a lot less susceptible to it, though. Its leaves are poor fuel for the fire. Is the wind howling around your ears? The past few days have once again been very stormy. Oh dear, what do we have here? Over the past few days, yet another storm knocked over trees in an area populated entirely by **spruce**. This is because the shallow roots of the **spruce** are unable to anchor themselves firmly in the ground. The **oak** has no problem with this, as its deep roots hold it firmly in the ground. A sweet odour wafts over to our noses. It comes from the **linden** tree, which attracts many bees.

The silence of the forest surrounds us. Let your gaze wander once more through the crowns of the trees. We have taken a walk along a scenic forest path and gathered a great many picturesque impressions. Under our soles we once again feel the fine sand of the footpath which leads us to the car park and back to school. But there will be many more animal and tree species to discover on each future walk through the forest."

**Story:** Sophia Puchner

**Game concept:** Bayerische Forstverwaltung: "Forstliche Bildungsarbeit – Waldpädagogischer Leitfaden nicht nur für Förster" [Bavarian Forest Administration: Forest pedagogy – Forest pedagogy guidelines, not just for foresters]

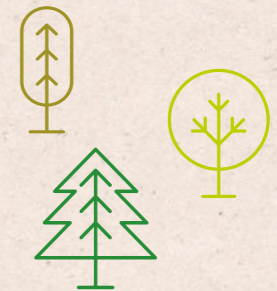
### FOLLOW-UP

What did you learn? Why is biodiversity important? Which German forests do you know of? What do they look like? Where do you encounter biological diversity in your daily lives?

### SUPPLIES:

1 bag with slips of paper for all students, with "Spruce" written on all of them.

1 bag with slips of paper for all students (e.g. 2x Oak, 4x Spruce, 3x Pine, 5x Beech, 2x Linden, 2x Ash, 2x Maple, 2x Blackbird, 1x Woodpecker, 3x Earthworm)



## DID YOU KNOW?

Mycorrhizal fungi in the soil play a particularly important role in the forest. Trees form a fungal network to "cooperate" and share resources, but also to compete. Studies suggest that trees communicate with each other through a mycorrhizal fungal underground network. It is a symbiotic relationship between a fungus and the roots of trees. For example, trees send chemical signals to the fungal network when they are attacked by beetles. Neighbouring trees pick up on these signals and increase their own resistance to the threat.



### 4.4.1 FORESTS & ANIMALS - FLORESTA E ANIMAIS



(Photo: SDW)

**NATHAN CARVALHO SIMÕES,  
18 YEARS OLD**

**Lives in:** Manaus  
**Occupation:** English teacher and law student  
**Hobbies:** Meeting friends, fashion



**REBECCA WOLFER, 21  
YEARS OLD**

**Lives in:** Dortmund  
**Occupation:** Student (Journalism)  
**Hobbies:** Travelling, reading

(Photo: Ha Linh Truong)



We are Rebecca from Dortmund and Nathan from Manaus. We were particularly fascinated by the fauna in the two countries. We found it particularly exciting to learn that there are many species with highly specialised tasks in ecological niches. The more diverse a forest, the more insects and animals there are which find shelter there. Some only want to live in the treetops, others prefer to stay on the ground, and there are even some who spend all their time hiding in the bushes. We would like to briefly introduce you to two species which we find particularly special.

**Nathan:** While in Manaus, we visited the Museu da Amazônia (MUSA) on the outskirts of the city. While walking through the tropical forest, the guide stopped us and pointed to a large, black ant. "Look here," he said and let the animal crawl onto a stick. "This is a giant tropical ant (Paraponera clavata) or 'tucandeira'. Its stinger is particularly painful." Normally, the approximately 25-millimetre insect, which lives in colonies in the root zone of trees here in the rainforest, is very peaceful. But in the Amazon, there are groups of indigenous people who perform a masculinity ritual with the ants. Young males have to endure several stings from previously antagonised tucandeiras to prove that they are brave men. Apart from that, ants are of course vital for the rainforest ecosystem. They eat other insects, both living and dead, and serve as prey for numerous other insects and animals. Most importantly, they loosen the soil and help with the formation of humus, thus helping plants to grow.

**Rebecca:** In Germany, the black woodpecker lives mainly in old beech forests. Its habitat must fulfil relatively stringent requirements. For one, it needs beech trees that are at least 100 years old. These must be large enough for it to build its nesting chambers. The black woodpecker looks for food in dead wood. It prefers what are called standing dead wood trunks, i.e. old trees that have not yet fallen down but are already dying. With its famous knocking sound, it pecks at the soft wood for insects. Every few years, the woodpecker builds a new nesting chamber. The old one is in great demand, and will subsequently be occupied by new tenants. More than 50 different types of prospective tenants compete for it, including tawny owls, bats, bees, pine martens and stock doves. This makes the black woodpecker a special keystone species of the forest that provides other animal species with a roof over their heads. In the Hainich National Park, we saw what an ideal black woodpecker habitat looks like.

#### ECOLOGICAL NICHE

This term describes the role of a species that occupies a gap in the habitat which no other species has yet occupied. This habitat is very special in terms of the food supply or opportunities for shelter. This species has adapted so well to these special living conditions that it hardly has to fear competition. Different species do not easily get in each other's way.



The harpy eagle is one of the most powerful birds in the world. It is capable of preying on monkeys and sloths. (Photo: Pixabay)

#### LEARNING GOALS

Students will learn about different wild animals from Brazil and Germany, how they differ, and what they have in common. They will be able to make statements about the biology of the animals and their respective importance for the ecosystem.

Each animal, whether mammal, bird or invertebrate, fulfils a special role in the ecosystem. All animal species, but also plant species, influence each other. Some animal species can only pollinate certain plant species or only feed on certain plants. This results in a close dependency between animals and plants. If natural habitats are altered to such an extent that, for example, only a few different plant species grow there, this will have a corresponding impact on the animal world.

#### EXERCISE

At the start of the lesson, a game can be played (based on CORNELL 2006) which clearly demonstrates the interdependencies in an ecosystem. All that is needed is a strong ball of wool. Everyone stands in a circle. The teacher asks: "Who can name a plant that grows nearby?" For example, a student answers "dandelion". The teacher gives him/her the end of the string in one hand and the ball of wool in the other. While still holding on to the end of the string, the ball of wool is thrown to someone who knows an animal that feeds on dandelions.

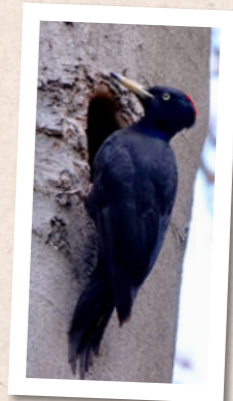
The next question would then be, for example: "What feeds on rabbits?" Using the questions, other elements can also be brought into play, such as soil, water, tree cavities, as well as many other animals and plants. The ball of wool is kept being thrown to the next person and everyone holds on to the wool. Students then examine the network that results. What happens if an animal species disappears, for example? Or one of the elements? Who or what would it impact? Try it out by having the respective student pull on the string. Everyone who feels the string being pulled is affected by the change.

Subsequently, students work on WS 22 in small groups. Based on the number of groups, the teacher prepares slips of paper on which various keystone species are written (see info box on Keystone species). Each group draws a slip of paper. Following the instructions on WS 22, students now prepare a campaign for their animal species. Posters can be created as analogue or digital (PowerPoint, Publisher or similar programs) variants.

#### GAME TIP

THE GAME ECOGON SHOWS THE CONNECTION BETWEEN ANIMALS, PLANTS AND HABITATS IN A PLAYFUL WAY. IT CAN BE PLAYED AS A GROUP OR WITH SEVERAL PARTIES COMPETING AGAINST EACH OTHER.

WWW.ECOGON.DE



The black woodpecker (Dryocopus martius) plays a particularly vital role in German beech forests.

(Photo: Pixabay)

#### KEYSTONE SPECIES FOR THE ANIMAL CAMPAIGNS (WS 22)

##### Germany:

Beaver  
Black woodpecker  
Squirrel  
Wildcat  
Wild bee

##### Brazil:

Japim (Golden-winged cacique)  
Pantera Onça (Jaguar)  
Boto (River dolphin)  
Louva-deus (Mantis)  
Peixe-boi (species of manatee)



WS 22

# ANIMAL CAMPAIGN

Many forest animals live their lives in secret. One rarely gets to see them, which is why many people know little about them. Plan a poster campaign for your animal, which can be exhibited in the school foyer, for example. Perform research on the internet, using books or magazines, or ask your teacher. Introduce the animal and describe what role it plays in its habitat.

**WHAT IS A CAMPAIGN?**  
A campaign is a temporary event planned by several people. It aims to draw the attention of as many people as possible to something specific in order to better achieve the planned goals.

**RESEARCH THE FOLLOWING:**

- Biology of the animal (appearance, habitat, food, distribution).
- Where is it unable to live?
- Is it endangered? If yes, why?
- How can the animal be protected?
- Why is the animal a keystone species?

**CAMPAIGN:**

- What is the most interesting information for your classmates to know if you wish to raise awareness about this species?
- What can the people you want to reach with the campaign do to help protect the animal?
- Where can they obtain more information?
- How would you like to present your information? Using diagrams, drawings, texts, comics?

When you have completed the poster, agree on what information is the most important for your campaign. Use this information to create an advertisement for an informational event. You will find free programs and templates for creating advertisements on the internet (e.g. a publisher program).

Present the posters and advertisements to your class. Then compare all the different animal species. Are there any similarities between the individual animal species? Are there animals that fulfil similar "duties" in Brazil and Germany? Discuss which information was new to you. What did you already know?

## DID YOU KNOW?

The longest animal in the Amazon is the manatee. It grows up to three metres long and weighs half a tonne. Of all the 156 primate species in South America, 60 % live in the Brazilian Amazon region.



Amazonian manatee (Trichechus inunguis) (Photo: pixnio)

## FASCINATING FACTS

- In Germany, 0.3 cubic metres (300 litres) of soil contains:
- 2.5 trillion microorganisms (bacteria, fungi, algae)
  - 1 million nematodes
  - 100,000 mites
  - 50,000 springtails
  - 25,000 rotifers
  - 10,000 bristle worms
  - 100 beetle larvae
  - 100 fly larvae
  - 80 earthworms
  - 50 snails
  - 50 spiders
  - 50 isopods

**EDAPHON (GR.) = SOIL LIFE**

Source: <https://www.geo.de/geolino/natur-und-umwelt/4390-rtkl-erdreich-es-wimmelt-im-boden>

**KEYSTONE SPECIES**  
A keystone species is an animal or plant species that, while it may not be common, has a major impact on the biodiversity of its ecosystem. When this species is gone, an imbalance occurs and biodiversity decreases. (Source: Wikipedia)

**KEYSTONE**

**WHAT HAPPENS WHEN YOU REMOVE THIS LOAD-BEARING STONE?**  
Illustration: Pixabay



Source: Forest Expedition!, Schutzgemeinschaft Deutscher Wald Bundesverband e. V. (SDW) 2018



In Brazil, we met Jean Sena. He is a woodcutter and knows the rainforest well. In the reserve, he and his colleagues are responsible for monitoring wildlife. We conducted an interview with him, which is available in the SDW playlist "Forest Expedition!".

(Photo: Katharina Schlünder)

**PLAYLIST**

MONITORING IM REGENWALD DER RESERVA RIO NEGRO - JEAN SENA [MONITORING IN THE RIO NEGRO RAINFOREST RESERVE]

## BONUS

Students watch the interview with Jean Sena. The teacher discusses the following questions with the class:

What did Jean talk about? What did you find particularly intriguing? What was new to you? What surprised you the most?

Students can try out Jean's work for themselves. To do so, the class visits a nearby forest. All the students have paper and pens/pencils with them. The children spread out a little in the forest (remaining within sight), then try to remain quiet for 5–10 minutes and listen to the sounds in the forest. They record these sounds on a sound map. The starting point of the map is where they are seated. This is to be indicated on the middle of the sheet of paper. Students are to draw on the map where the sounds they hear are coming from. They should pay particular attention to animal sounds. In Germany, but also in Brazil, songbird species are monitored mainly through their songs. Often, the species cannot be seen. Hence, it is important for ornithologists to train their hearing.

## FOLLOW-UP

Students are once again made aware of the fact that everything in the ecosystem is interconnected. They create ecosystem dominoes out of paper (which can be copied for other classes if necessary). For this purpose, they write terms and draw pictures on rectangular pieces of paper or cardboard, which are then arranged next to each other to play the game. This game can also be used to represent the food webs of the forest.



To conclude the topic, the class can create moss graffiti at school. This is graffiti made of natural materials that can be removed. It is made of moss and grows to form a chosen motif by itself. Instructions for making one are available online. Students can "immortalise" their domino motifs.



**PLAYLIST**

YOU CAN ALSO SEARCH ONLINE FOR PICTURES OF WHAT MOSS GRAFFITI LOOKS LIKE. IN THE SDW PLAYLIST, YOU WILL FIND A VIDEO THAT DESCRIBES THIS ARTISTIC TECHNIQUE IN MORE DETAIL.

MOOSGRAFFITI - GRÜNE ANGRIFGE AUF GRAUES GEMÄUER [MOSS GRAFFITI - GREENING UP GREY WALLS]

## ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Obtain insights in an interdisciplinary fashion and make decisions
- Being able to recognise and weigh risks, dangers and uncertainties
- Being able to plan and act together with others
- Being able to reflect on one's own and others' guiding models

## 4.4.2 EDIBLE PLANTS - PLANTAS COMESTÍVEIS



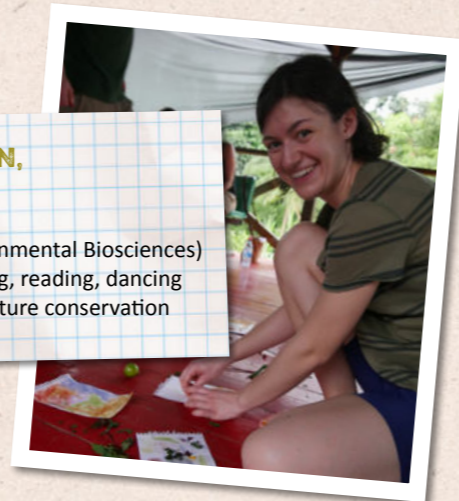
(Photo: SDW)

### BRENDA MENEZES RODRIGUES, 17 YEARS OLD

**Lives in:** Nova Esperança  
**Occupation:** Having finished school, she currently helps out on her family's farm  
**Hobbies:** Reading, playing games

### MICHÈLE FUGMANN, 25 YEARS OLD

**Lives in:** Saarbrücken  
**Occupation:** Student (Environmental Biosciences)  
**Hobbies:** Travelling, hiking, reading, dancing with friends, nature conservation projects



(Photo: Ha Linh Truong)

We, Brenda and Michèle, would like to tell you about the edible treasures we came across in Brazil and Germany.

**Brenda:** In the villages along the Rio Negro, the people in the communities have increasingly adapted to the forest. Even today, the people there make use of traditional knowledge in their everyday lives. The people on the Rio Negro, the Ribeirinhos, live in a subsistence economy. This means they harvest and hunt food exclusively for their own use, not for sale. There are a few products that they also offer for sale in small quantities, such as wood or handicrafts. With this money, the people can buy things like salt and sugar. One of the most important foods in the Amazon is cassava. Food made from cassava is consumed almost daily in both sweet and savoury dishes. Fishing and hunting also supply animal protein. Unlike the Ribeirinhos, people from the city, such as in Manaus, buy their food in shops.

**Michèle:** In Germany, I don't go to the forest and collect food to live off of. Every now and then I pick a few blackberries or collect chanterelles and porcini mushrooms. I purchase the food I need in my day-to-day life from the

supermarket. I have a very large selection of products there, such as different kinds of apples, pears or tomatoes. Many products aren't even from here, but have instead been transported to Germany from other countries. For this, the products sometimes have to travel very long distances; there are also products in Germany that come from the rainforest! Only through close examination can I determine how much food comes from our local forests or from distant ones. Can you find such products in your supermarket as well?



This is what a ripe cocoa fruit looks like from the inside. (Photo: Ha Linh Truong)

### EXERCISE

The teacher writes the following words on pieces of paper. All rainforest products from Brazil are to be arranged on the left half of the board, and on the right the products from German forests. The students are then asked which products they can think of, and these are also assigned to the corresponding country.

**Brazil:** Cassava, Brazil nuts, cocoa, coffee, chewing gum (rubber), pineapple, soya (=> beef), banana.

**Germany:** Wild garlic, walnuts, blackberries, woodruff (Waldmeister) ice cream, porcini mushrooms, blueberries, garlic mustard, hazelnuts, elderberry syrup, elderberry jam, chestnuts, cherries, chanterelles, forest honey, goutweed, beechnuts, linden blossom tea.

For a more memorable introduction, the students or the teacher can bring "food from the forest" from home. This refers to food that originally came from the forest.

The following questions are then discussed: Is everyone familiar with the products? Do all the students know about the use, cultivation and harvesting of the products?



## CASSAVA - POTATO OF THE RAINFOREST

### LEARNING GOALS

Students will get to know a selection of forest products from the Brazilian rainforest and from Germany, and can establish the connection between available products and climate zones. They will increase their awareness for products from the forest which they usually take for granted in supermarkets. In addition, students will gain insight into what life is really like in the communities along the Rio Negro.

Cassava (*Manihot esculenta*), or mandioca as it is called in Brazil, is a staple food for the people there, much like potatoes for us. The cassava plant is a shrub that can grow up to five metres high. It develops bulbous roots underground. This is the part of the plant from which cassava flour is made. Two versions exist: with yellow and with white tubers. The white type is called macaxeira, and the yellow one mandicur. We visited Edvaldo, a smallholder farmer near Tumbira, who has a small cassava plantation where he grows and processes cassava for himself and neighbouring villages.

Cassava is easy to grow. It is reproduced vegetatively via stem cuttings. This means that a new plant will grow out from a branch cut from the plant. Together with Edvaldo, we planted a few stems in an area that had already been harvested. From them, new cassava plants will soon grow. The tuber, i.e. the tuberous root, is processed and eaten – hence the name "potato of the rainforest". Products made from cassava are very rich in nutrients. In its raw state, however, the yellow tuber is very poisonous and cannot be eaten. Hence, it must first be processed, such as made into flour and subjected to high temperatures, boiled, or fermented. For fermentation, the tubers are soaked in water for a few days. This starts the fermentation process and removes the toxic components from the root.

The raw tuber must be peeled. In the Amazon, children learn to do this at the age of four. The yellow mass is mashed to make a thick porridge. The cassava pulp is then put into a press and squeezed out with great force. The juice that flows out is collected. After boiling, it can be used for things like soups (tucupi). Tapioca is the starch obtained as a white by-product from the cassava root. It is suitable for cooking, or is made into patties in a pan.



Cassava plant (Photo: Katharina Schlünder)



The cassava tubers are the roots of the plant. (Photo: Ha Linh Truong)



The tubers are easier to peel after they have been soaked in water for a few days. (Photo: Ha Linh Truong)



Cassava mash is prepared for pressing. (Photo: Ha Linh Truong)



Lukas tries his hand at processing cassava. A hot fire burns under the huge pan. (Photo: Katharina Schlünder)

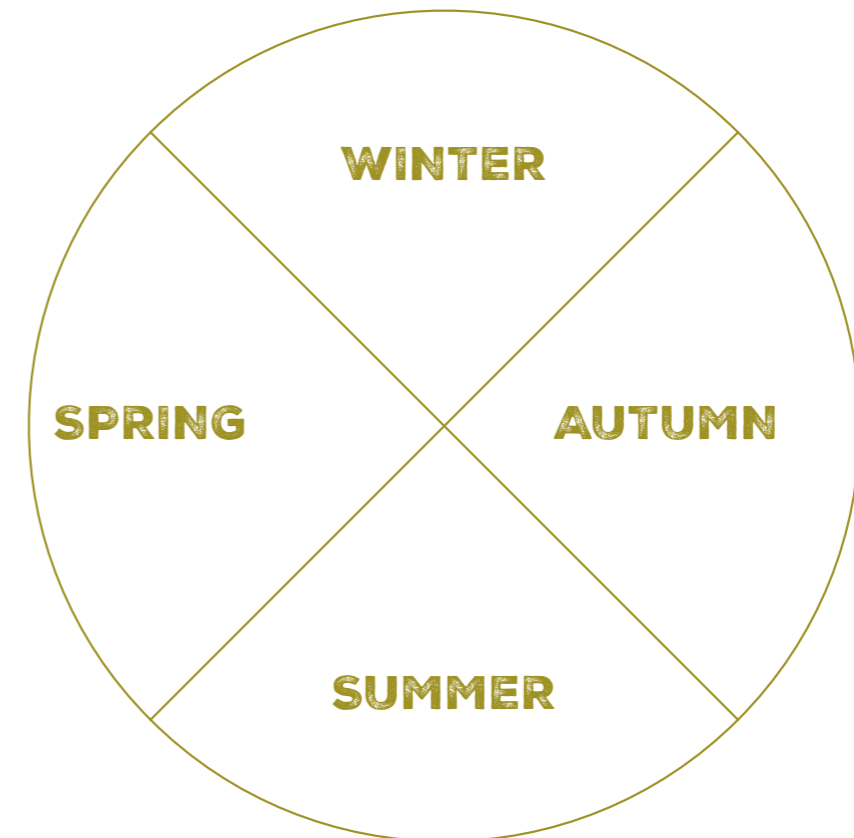


WS 23

# EDIBLE PLANTS

There are four seasons in Germany. In Brazil, there is a dry season and a rainy season, and edible forest products are available all year round, only in different quantities. For example, there are more açai fruits in the rainy season than in the dry season. In Germany, the supply is different in every season. In spring there is rhubarb, in summer strawberries, in autumn apples, and in winter kale. The climate is the determining factor here. Categorise the following forest products according to the appropriate seasons in the temperate climate zone. Simply write the names in the respective field. What do you notice? What would the seasonal chart look like with Brazilian products?

**Wild garlic, walnuts, blackberries, woodruff (Waldmeister) ice cream, porcini mushrooms, strawberries, garlic mustard, hazelnuts, elderberry syrup, elderberry jam, chestnuts, cherries, wild apple, wild pear, chanterelle mushroom, forest honey**



### FOREST SNIFFERS

How good are your noses? Search for herbs in the forest near your home! Fill them into old, clean tins or boxes. You will need to know which plants they are, so that you can label the tins on the bottom. Working together, create a smell evaluation sheet you can use to evaluate whether the smell is sweet or pungent, pleasant or unpleasant. Now distribute the "smelling stations" among the class. Everyone can now attempt to guess which herbs they are.

PRODUCT	SWEET	PUNGENT	SOUR	SALTY	BITTER
WILD GARLIC		X			X
...					

**By the way:** Wild boars have the best noses in German forests! They can even smell things that are three metres below ground!

Source: Forest Expedition!, Schutzgemeinschaft Deutscher Wald Bundesverband e. V. (SDW) 2018

The starchy mass left over after pressing can be used as cassava flour, for example mixed with salt and oil, to make a beiju, a small crêpe. The recipe for this can even be traced back to the indigenous people of the Amazon. What remains in the press is called "farinha", which translates as "flour". Roasted, this flour is added to many dishes.



Beijus and tapioca patties

(Photo: Ha Linh Truong)

### EXERCISE

The teacher prepares slips of paper for the activity on page 87 (WS 23). Students can add forest products or natural products and discuss them. If the activity is announced well in advance, students can search for edible plants in the forest and bring them along from home. Be careful when picking your own plants! There is a risk of confusing many plants with unpalatable plants!

Students watch the video "Maniok – Kleinbauer am Rio Negro" [Cassava – Smallholders on the Rio Negro] on the YouTube Channel "Expedition Wald!" [Forest Expedition!] of the SDW and then discuss the product and how it is processed together with the teacher. The teacher can buy some cassava and let the students taste it.

### PLAYLIST

THE VIDEO "AGROFORST-INITIATIVE IN TUMBIRA - ALBERTA PACHECO UND ADINAMAR CASTRO" [AGROFORESTRY INITIATIVE IN TUMBIRA - ALBERTA PACHECO AND ADINAMAR CASTRO] INTRODUCES OTHER FOREST USES IN TUMBIRA.

### FOLLOW-UP

Together, students reflect on what experiences they themselves have had concerning agriculture or the cultivation of food. Have they ever helped out with planting and harvesting? How old were they at the time?

In addition, during their next purchases, they should document whether they buy products from the rainforest. If so, what were these products? In addition, also discuss with the teacher which products from the rainforest play a role in the region where they live.

### BONUS

Forest recipe from Germany:  
**Fruit gums made from wild apples** (from LOUIS 2014)

- 750 g wild apple puree
- 250 g mild apple puree
- 1.2 kg light-coloured raw cane sugar

Place the puree made from wild apples and apples in a pot with 1 kg of raw cane sugar. Slowly bring to a boil, stirring constantly. Line a baking tin with parchment paper. As soon as the sugar has melted, increase the heat and keep stirring. The mixture will thicken, and is ready when it detaches from the pot. Now pour the jelly into the baking tin, making sure it is no more than two centimetres high. The mixture now needs to dry in a warm, airy place for at least one day. After that, turn the baking tin upside down, leaving the mixture stuck to the tin, and dry it for another day or two. Finally, the jelly is cut into small pieces, shapes or figures and "breaded" with the remaining 200 g of raw cane sugar.



Rebecca and Ha Linh think it's delicious!

(Photo: Ha Linh Truong)

### PLAYLIST

SMALLHOLDER CASSAVA FARMERS IN TUMBIRA

**5 SACKS OF CASSAVA TUBERS YIELD 1 SACK OF CASSAVA FLOUR**

### 4.4.3 FOREST APOTHECARY



(Photo: Ha Linh Truong)

(Photo: Ha Linh Truong)

#### MAIARA DA SILVA GONÇALVES, 31 YEARS OLD

**Lives in:** Manaus  
**Occupation:** Biologist  
**Hobbies:** Drawing, photography



#### SOPHIA PUCHNER, 24 YEARS OLD

**Lives in:** Würzburg  
**Occupation:** Student (Forest Sciences)  
**Hobbies:** Baking and cooking, playing the trumpet, hiking

We, Maiara and Sophia, are fascinated by the diversity of the forest. In Brazil and Germany, we became acquainted with a number of medicinal plants from the forest which the people there benefit a lot from.

**Maiara:** Among the communities of the Amazon region, medicinal plants play a very big role. We don't have doctors' clinics in the small villages like we do in the city. Therefore, it is important that there are medicinal plant experts in the communities who can help the inhabitants. The knowledge of medicinal plants comes from the indigenous peoples of the rainforest and has been passed down from generation to generation. Today, this traditional knowledge is used in research to produce new medicines. Doctors and pharmacists from all over the world benefit from these findings.

**Sophia:** I often deal with medicinal plants from the forest in Germany. I study forestry and often conduct forest education programmes with children. We discuss different forest plants, whether and how you can eat them, but also their healing effects. The children rarely come into contact with them in everyday life. Hence, they find it exciting to learn about the plants and then go in search of them themselves in the forest. Many are amazed at how many plants from the forest are used in the production of medicine and, above all, how beneficial they are for treating some illnesses. For example, with a tea made from nettles or elderflowers for colds, or with plantain leaves for an insect bite.



## FOREST APOTHECARY

### LEARNING GOALS

Students will learn about different plants from Germany and Brazil, how they are used to produce medicines, and how important they are medicinally. They will examine traditional knowledge about medicinal plants. They will take a closer look at medicinal products from their everyday life and their relationship to forest plants and make their own medicinal teas from plants.

Around the world, the forest is home to many important plants or plant components for the production of medicines. Indigenous peoples in particular, for example in the Amazon rainforest, possess traditional medicinal knowledge which is passed on orally from generation to generation. In the remote communities along the Rio Negro, people are dependent on experts in medicinal plants, as there is no widespread availability of modern, conventional medical facilities.



Wild garlic leaves are eaten fresh, for example in a salad.

(Photo: Ha Linh Truong)

### EXERCISE

Before starting the lesson series "The Forest and Medicine", students perform research at home on products containing medicinal plants (cf. WS 24 Forest apothecary). They present their results in class and share their initial findings. During class, students complete worksheet WS 24. They are to examine ten Brazilian and German medicinal plants and briefly present the most important information. Subsequently, students will create posters with information about local medicinal plants that they can find near their school. After this theoretical discussion of the plants, students go out and collect "their plants" to process them.

### BONUS

Students conduct an interview with a pharmacist or chemist. Working together, they prepare questions and plan how they wish to record the replies (e.g. notes, audio recordings, video). In pharmacies/chemists' near the school, they first enquire if anyone would be willing to be interviewed and make an appointment for the interview. In most regions, there are also people who offer walks for discovering herbs, for example. You could also try asking them for assistance.

### FOLLOW-UP

Students create a podcast on the topic of medicinal plants. In various audio episodes, they report on what they have learned in the series of lessons, what they already knew, and what was new or surprising for them. Each group can also plan and create an episode about their medicinal plant. If the students have recorded interviews with a pharmacist or chemist, they can include parts of the recording in the podcast.

### HELPFUL LINKS

**Podcasts for class**  
 Getting started: <https://podcast-helden.de/podcast-erstellen/>  
**Podcasts for class:** [https://www.friedrich-verlag.de/fileadmin/redaktion/sekundarstufe/Paedagogik\\_und\\_Faecheruebergreifende\\_Themen/Medienpaedagogik/Computer\\_Unterricht/Leseproben/Computer\\_Unterricht\\_90\\_Leseprobe\\_1.pdf](https://www.friedrich-verlag.de/fileadmin/redaktion/sekundarstufe/Paedagogik_und_Faecheruebergreifende_Themen/Medienpaedagogik/Computer_Unterricht/Leseproben/Computer_Unterricht_90_Leseprobe_1.pdf)  
**Lesson materials:** <https://www.lehrer-online.de/artikel/seite/fa/podcasts-im-spanischunterricht/podcasts-fuer-den-unterricht/>  
**Recording and editing program:** <https://www.audacity.de/>

### WHAT IS A PODCAST?

A podcast is a series of audio or video episodes that are available as files on the internet at any time.

WS 24

# FOREST APOTHECARY



1. Look for medicinal or healing plants at home! Examine medicines, teas, and ointments. Do you find any references to plants? For example, in the package inserts or as a picture on the packaging? What can your parents or grandparents tell you about medicinal plants? Document your findings in detail.

2. Split up into five groups. Each group is assigned one Brazilian and one German medicinal plant from the list. Use the information from the list, the internet and books to create index cards for both plants. Use the QR codes on page 91 to find pictures of the plants, fruits or leaves. Present the plants to the class with the aid of the index cards.

3. You now have a rough overview of the medicinal plants from both countries. Now focus on medicinal plants that you can find near your school. Create a poster containing the following information:

- Common name, botanical name, family (e.g. mallow family) and genus (Tilia)
- Native species of the genus (e.g. littleleaf linden and large-leaved linden)
- Appearance (illustrations, labels, descriptions)
- How to identify it (which other plants could it be confused with?)
- Medicinal uses => which parts of the plant are processed, and how? What effect do the products have?

Choose from the following list for the group activity: Dandelion (Taraxacum sect. Ruderalia), plantain (Plantago ssp.), daisy (Bellis perennis), wood sorrel (Oxalis acetosella), bugle/pyramidal bugle (Ajuga reptans, Ajuga pyramidalis), garlic mustard (Alliaria petiolata), ground ivy (Glechoma hederacea), Goutweed (Aegopodium podagraria), woodruff (Galium odoratum), oregano (Origanum vulgare), linden blossoms (Tilia platyphyllos).

4. Near your school, search for the five medicinal plants from Germany which you made posters about. Collect the plants carefully, approximately five specimens per species. For the trees, take only small twigs or leaves. Have the teacher check all the plants you find before picking them.

At school, you can press one specimen of each plant, which can then be stuck on the respective poster.

5. Process your medicinal plants for tasting. Research recipes for teas or salads to test your medicinal plants.

**BOTANICAL NAME:**  
**COMMON NAME:**

<b>ORIGIN</b>	
<b>MEDICINAL USE</b>	
<b>PLANT PARTS USED</b>	
<b>PHOTO</b>	



Many people are not aware that nettles are edible and even healthy, as the leaves cause a slight burning sensation on the skin if handled incorrectly.

(Photo: Pixabay)



Wood sorrel is encountered frequently in German forests. It has a refreshing, antipyretic and diuretic effect.

(Photo: Pixabay)



Freshly brewed tea  
(Photo: Pixabay)

Source: Forest Expedition!, Schutzgemeinschaft Deutscher Wald Bundesverband e. V. (SDW) 2018

COMMON NAME	BOTANICAL NAME	MEDICINAL USES	PHOTO
Uxi amarelo	Endopleura uchi	The yellow Uxi is a tree whose bark is used for medicinal purposes. As a tea or an extract in capsules, the plant helps with diseases such as gastritis, urinary tract infections, uterine infections and rheumatism.	
Manjeriçao (A species of basil)	Ocimum gratissimum	This plant from the basil family strengthens the immune system and protects the body from bacteria and the infections they cause. The leaves are used to treat colds and to relieve flu-like infections. In this case, the leaves are chewed.	
Quebra pedra (Stone-breaker)	Phyllanthus sp.	Phyllanthus grows as a herbaceous plant, shrub or tree. The roots, leaves and fruits of the different species can be processed and used to detoxify and protect the liver and kidneys, as well as to lower cholesterol levels.	
Andiroba	Carapa guianensis	Andiroba is a tree that belongs to the mahogany family. A tea can be made from the bark and leaves which helps against fever and intestinal worms. This tea is also used specifically against ulcers, insect bites and skin parasites. The oil of the fruit is used internally to treat coughs. Applied to the skin, it is effective against mosquito bites.	
Copaíba	Copaifera spp.	Copaiba species grow as a shrub or a tree. Their oil has a high essential fatty acid content. They help against cellulite and stretch marks. In addition, the oil reduces hair loss and oily skin, fights lice and fungal diseases, and also serves as a hair care product. Furthermore, it can also be used in the treatment of inflammations.	
Stinging nettles	Urtica ssp.	The seeds of the stinging nettle, a herbaceous plant, can be eaten as a salad or made into tea. They help with exhaustion, purifying the blood and the formation of blood cells, stimulate the metabolism, and act as an expectorant and detoxifying agent.	
Large-leaved linden	Tilia platyphyllos	Linden trees can be recognised by their heart-shaped leaves, among other things. A tea made from linden blossoms has a soothing effect on colds, fever, coughs and insomnia.	
Elderberry	Sambucus	Red and black elderberry bushes grow in Germany. The flowers and berries are rich in vitamins and boost the body's defences. A tea made from elderflowers helps with colds, coughs and fever. A vinegar made from the blossoms has a soothing effect against headaches when used in a compress.	
Wild garlic	Allium ursinum	Wild garlic is a small herbaceous plant that can be used not only in the kitchen. It helps with gastrointestinal disorders, but also against high blood pressure, rheumatism and fever. The leaves are eaten fresh. Note: Its leaves are easily confused with the leaves of the lily of the valley, which are highly poisonous!	
Willow	Salix ssp.	Willows can grow both as a tree and as a shrub. Their bark contains salicylates. This is a plant substance with a structure similar to acetylsalicylic acid, which is produced chemically. Both these active substances help against fever and inflammations, and act as painkillers.	

## 4.5 FORESTS & INFRASTRUCTURE

The forest provides us with many basic necessities for life. However, this also means that there are often conflicts of interest regarding forested areas. For example, nature conservation organisations primarily aim to protect their ecological function, such as habitats for animals and plants, while the forestry industry wishes to harvest the environmentally friendly raw material wood from the forest. Especially in a densely populated country like Germany, cities continue to grow and displace forest land, for example for the construction of housing. In Brazil, connecting roads to distant villages are often poorly developed. The expansion of the road network, for example, is often accompanied by the destruction of primeval forest. Depending on the region or country, the interests of various stakeholders clash in numerous conflicts over forest areas.



The Mooswald forest borders on the western city limits of Freiburg. It is to be partially cleared for housing. (Photo: Ha Linh Truong)

### LEARNING GOALS

Students learn about the different conflicting uses of forested areas in Germany and about which stakeholders are involved in disputes about how forest areas are to be used. They learn about the impact of various infrastructural measures (sewage, electricity, urban development, traffic planning) on the forest and the significance of material wealth in this context. Through role-playing, they get acquainted with different arguments for the use or protection of a forest area and are able to view the situation from the perspective of the various actors. They learn to discuss argumentatively and to jointly come up with proposed compromises.

The Mooswald is a forest area on the edge of the city of Freiburg that has been the subject of disputes for years. It serves as an ideal example for illustrating conflicts of interest centred around natural resources, as well as viewing things from different perspectives. The scenario description on WS 25 describes the starting point of this conflict over a forest area close to the city. Using role play to examine this topic is particularly suitable for cultivating the ability to see things from different perspectives, to better understand the arguments of the other group, and to learn to discuss things argumentatively. Such conflicts, such as the erection of wind turbines in forest areas, are commonplace today.



### EXERCISE

Students engage in the role play described on WS 25. They first read the scenario description of the Mooswald conflict. Subsequently, they assign themselves the different roles of the stakeholders. Depending on the size of the class, the roles will need to be assumed by several students. They are to decide who will be the mediator, i.e. play the role of the mayor. Again, several pupils can be assigned to this role. On the role cards are bullet points with arguments. These provide information about the position that this interest group takes on the Mooswald conflict.

Before the citizens' assembly begins, students will have time to get themselves prepared for their role, and if necessary, add further arguments. The citizens' assembly is then called to order, during which all interest groups meet. Now the discussion and debate on the topic begins.

The aim of the meeting is to decide on the future use of the Mooswald section of the forest. Students will realise that this will probably only be possible if a compromise is found that is acceptable to all parties involved. Otherwise, the mayor will have to decide by decree. The teacher pays attention to how the parties address and speak to each other, as well as the manner in which the discussion takes place. For this purpose, it would be helpful to come up with discussion rules with the students in advance and obtain assistance from a colleague who has experience in conducting role plays.

### FOLLOW-UP

Students reflect on and discuss what effects their lifestyle has on nature and the forest – both in the environment where they live as well as worldwide. What are the consequences of the demand for constant growth? How do students want to live in the future? What is important to them in life? What could they do without in order to help protect the forest?

### BONUS

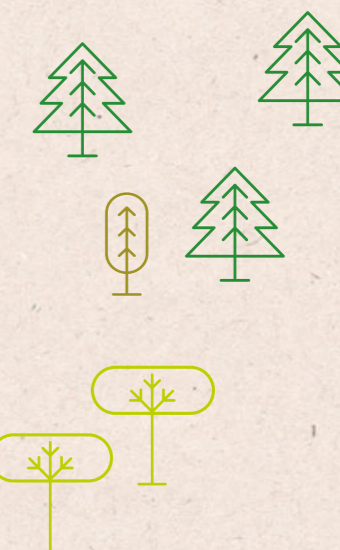
A project can only be realised quickly and without complications if as many of parties involved agree to it as possible. To ensure that all parties involved in a conflict can have their say and the best possible solution is found, environmental mediators are often brought into the negotiation process. You can also invite an environmental mediator to join the lesson for the role play. Ask your parents, the municipality, or an environmental organisation if they know of one. In this way, students can learn from a communications expert which rules, attitudes and formulations are helpful in conflict discussions.

### ESD COMPETENCIES

- Acquiring knowledge in an open-minded way while integrating new perspectives
- Being able to analyse and assess trends with foresight
- Being able to recognise and weigh risks, dangers and uncertainties
- Being able to plan and act together with others
- Being able to consider conflicting goals when reflecting on strategies for action
- Being able to reflect on one's own and others' guiding models
- Being able to use concepts of justice as a basis for decision-making and taking action
- Being able to show empathy for others

### PLAYLIST

THE VIDEO "ZIVILGESELLSCHAFTLICHE INITIATIVEN IM UMGANG MIT MÜLL AM RIO NEGRO - ODENILZE RAMOS, BRENDA RODRIGUES UND ANAILSON BATISTA" [CIVIL SOCIETY INITIATIVES IN DEALING WITH GARBAGE ON THE RIO NEGRO - ODENILZE RAMOS, BRENDA RODRIGUES AND ANAILSON BATISTA] SHOWS EXAMPLES OF CIVIL INVOLVEMENT IN TUMBIRA.



On our expedition, we got to know a part of the Mooswald and the conflict surrounding it in Freiburg. (Photo: Ha Linh Truong)

WS 25

# FORESTS & INFRA-STRUCTURE - MOOSWALD ROLE PLAY



Read the description of the conflict over the Mooswald. Subsequently, divide yourselves up according to the roles you find on the role cards. Roles can be assumed by more than one student at a time. Now spread out in class and think about the position your role would take. Consider whether there are any arguments missing, or come up with some to make this role's position on the Mooswald even clearer.

Now attend the citizens' assembly and discuss the use of the Mooswald with the other stakeholders. The goal is to find a solution that the local council can adopt and that will appear in the local newspaper.

## STARTING POINT/ SCENARIO DESCRIPTION

The Mooswald is a forested area covering a total of 2,000 hectares (northern and southern Mooswald) to the west of Freiburg, and is owned by the city. It is a deciduous forest with a high species diversity and is home to rare bird species, bats and numerous beetle species. Because it was used as a coppice-with-standards (Ger.: Mittelwald), it contains many old oaks, which is what makes it so special. Hence, it was placed under European protection under the Habitats Directive in 2007. However, the Mooswald not only plays an important role for biodiversity, but also for Freiburg's urban climate. It filters out dust and reduces noise pollution. It also contributes to clean drinking water, regulates the temperature, and is a popular local recreation area.

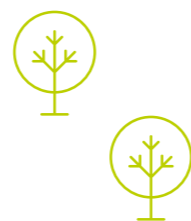
After the 2nd World War, large areas of the northern Mooswald measuring approximately 300 hectares were used for industry, a new city district and infrastructural measures. The groundwater level has also dropped considerably due to the impact of the city (impermeable surfaces, extraction of groundwater, river regulation), which has led to a change in the composition of tree species. Alders, which originally accounted for almost 30 percent of the trees, now only make up about 7 percent.

There is a housing shortage in the city of Freiburg, especially for affordable housing. For this reason, large-scale housing (50 percent social housing/50 percent non-subsidised housing) is to be built on an approximately 12-hectare section of the northern Mooswald area, between the districts of Landwasser and Mooswald, which is only protected as a landscape conservation area. Between the two neighbourhoods, there is a busy, elevated road that leads to high noise and pollution levels.

A large entrepreneur from northern Germany wants to invest money in the construction of the flats and build a modern residential park for Freiburg. Numerous social groups are in favour of preserving the current extent of the Mooswald. Others are in favour of building affordable housing close to the city.



An old oak, a typical tree in the Mooswald in Freiburg. (Photo: Michèle Fugmann)



WS 26

# INTEREST GROUPS MOOSWALD - ROLE CARDS



## COMMUNITY MEETING ON THE MOOSWALD PROJECT

Stakeholders/interest groups represented:



### CHAIRMAN OF THE LOCAL COUNCIL, MAYOR

(wants the new flats, also as a showcase project, to create affordable, social housing, as well as create added value in the surrounding area)



### SDW REPRESENTATIVE

(recognised nature conservation association for the protection of forests, in favour of the preservation of the Mooswald with all its forest functions)



### INVESTOR FROM NORTHERN GERMANY

(wants this profitable project, also wants to commission companies/tradesmen from the Freiburg area)



### MEMBER OF THE MUNICIPAL COUNCIL

(heterogeneous, political representation of interests from various political parties: Greens, CDU, SPD, Linke Liste, Freiburg lebenswert, FDP, Freie Wähler, Junges Freiburg)



### FORESTER

(municipal employee, personally in favour of preserving the Mooswald, but not allowed to speak out against his or her employer)



### REPRESENTATIVE OF THE MOOSWALD CITIZENS' ASSOCIATION

(initiative by members of neighbouring communities for the preservation of the Mooswald, also as a recreational forest)



This protest poster can be found at the entrance to the Mooswald. (Photo: Ha Linh Truong)

MORE INFORMATION CAN BE FOUND ON THE FOLLOWING WEBSITES:

- [HTTPS://MOOSWALD.ORG/](https://mooswald.org/)
- [HTTPS://WWW.FREIBURG.DE /PB/LDE/1025299.HTML](https://www.freiburg.de/pb/lde/1025299.html)



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## FOREST LEXICON

Ast	galhos	branch
Aufforstung	arborização	afforestation
Bach	riacho	brook, streamlet, creek
Baum	árvore	tree
Bäume pflanzen	plantar árvores	(to) plant trees
Biodiversity	biodiversidade	biodiversity
Blätter	folhas	leaves
Floß	balsa, jangada	raft
FörsterIn	técnico/a florestal	forester
Holz	madeira	wood
Holzprodukte, Nutzholz	produtos madeireiros	timber
Kräuter	ervas	herbs
Medizinpflanzen	plantas medicinais	medicinal plants
Nachhaltigkeit	sustentabilidade	sustainability
Natur	natureza	nature
Naturschutzgebiet	reserva natural	nature reserve
Pilze	fungos	fungi
Regenwald	floresta tropical	rainforest
Rinde	casca da árvore	bark
Tiere	animais	animals
Vögel	pássaros	birds
Wald	floresta	forest
Wurzeln	raízes	roots
Blume	flor	flower
Boden	terra	soil
Jaguar	pantera onça	jaguar
Ananas	abacaxi	pineapple

## 5.0 INSTRUCTIONS FOR TEACHERS

The educational unit "Forest Expedition!" consists of informational texts and teaching methods for teachers on forests and sustainable forest use, using the countries of Germany and Brazil as examples. Each chapter contains a variety of activities and tasks for teaching in secondary school, which can be used across all school types. The worksheets, which are marked with the symbol "Copy me", can easily be photocopied for an entire class. The entire educational brochure "Forest Expedition!" can be downloaded free of charge from the website [sdw.de](http://sdw.de).

This educational unit consists of 5 chapters. First, the background which led to the creation of the lesson content is described. Reference is also made here to the promotion of Education for Sustainable Development competencies and the correlation to the 17 international sustainability goals is described (chapter 1). This is followed by chapters 2 - 4 with the learning content and worksheets on forests and sustainable forest management in the countries Germany (chapter 2) and Brazil (chapter 3). Chapter 4 presents the experiences and findings of our educational trip to the forest in these two countries. Most of the topics and exercises were chosen and developed jointly with the participants. Both the German and Brazilian participants give very personal reports on their impressions and experiences. At the beginning of chapter 4, you will find an expedition plan that gives you an overview of the following topics: Forests and the economy, Forests and water, Forests and biodiversity, and Forests and infrastructure. Participants each introduce one topic. This is followed by instructions for exercises, experiments and worksheets.

The instructions for activities for the students are structured as follows: Notes on learning objectives, background information for the teacher, instructions for the exercise, reflection on the exercise, and a bonus exercise that may require more extensive preparation. At the end, you will find out which Education for Sustainable Development competencies in particular were developed by carrying out the activities.

At the end of the educational brochure, you will find an overview of the worksheets and photocopy templates which the students can use. In addition, there are also further instructions for exercises in the respective chapters.

YOU WILL FIND MORE HELPFUL  
ADDITIONAL MATERIALS AVAIL-  
ABLE FOR FREE AT:

SDW.DE  
BILDUNGSSERVER-WALD.DE

### PLAYLIST

WE HAVE COLLECTED ALL THE VIDEOS LINKED HERE IN OUR YOUTUBE CHANNEL IN THE SDW PLAYLIST "EXPEDITION WALD!" [FOREST EXPEDITION!]:

[https://www.youtube.com/channel/UCYvoT6xNHqG\\_6Wm6xCyctxg/playlists](https://www.youtube.com/channel/UCYvoT6xNHqG_6Wm6xCyctxg/playlists)

On the websites linked below, you can read about how we recorded our findings over the weeks of our project in the form of a "harvest". Further below, you will find lists of helpful links and references to background knowledge and pedagogical/didactic methods.

### HARVEST

The verb "to harvest" means to reap, gather, gain, win, or use (the result of one's actions). In this case, it refers to the knowledge and skills which students have gained from this educational unit – the fruits of their labour. In each lesson on the topic of "Forest Management in Brazil and Germany", there will be a "harvest" team consisting of three students to record everything that was done. This documentation should be creative and include photographs and texts. It will be collated in the form of a book, together with the harvest results of the other lesson units. At the end of the series of lessons, all the harvest results are to be collected in one place and can be viewed by the students in class at any time. In the harvest teams, the students themselves decide who is responsible for which aspect of the documentation (photos, creative tasks, text).

At the end of the series of lessons, students will spend time looking at their harvest book together and reflect on what they have learned and what they personally have gained from each unit.

### LINKS TO OUR TRIPS

[www.fas-amazonas.org](http://www.fas-amazonas.org)

<http://museudaamazonia.org.br/en/>

<http://www.waldhofschule.de/>

<http://www.fva-bw.de/>

<https://www.baysf.de/de/ueber-uns/standorte/forstbetriebe/oberammergau.html>

<https://www.nationalpark-hainich.de/>

<http://www.lychen.de/>

[https://www.bmel.de/DE/Startseite/startseite\\_node.html](https://www.bmel.de/DE/Startseite/startseite_node.html)

### CREATIVE PROJECTS

Comic, drawing, song, podcast, collage, model, wall newspaper, quiz, etc.

### TEXT

Report, article, fairy tale, minutes, graphic novel, storytelling, infogram, poster, science slam, flyer, etc.

### PHOTOS

The photos are to document the series of lessons. If necessary, they can draw attention to the project via social media. In this case, students must carefully consider how their photos can be effective in gaining media attention and plan their "stories" carefully.

## MATERIALS TO ORDER OR DOWNLOAD

### Bildungsserver Wald [Educational Server – Forests]

You can download educational materials from the SDW free of charge from this server.

<https://www.bildungsserver-wald.de/>

### Federal Ministry of Food and Agriculture (BMEL) publications

From the website of the German Federal Ministry of Food and Agriculture (BMEL), you can obtain the Waldfibel [forest brochure], a number of forest and tree posters, as well as the brochure "Unsere Waldbäume" [Our forest trees] for free as a PDF or print version. You will also find a forest domino game and a small herbarium as a PDF that the students can work on.

[https://www.bmel.de/DE/Service/Publikationen/PublikationenWaldFisch/publikationenWaldFisch\\_node.html](https://www.bmel.de/DE/Service/Publikationen/PublikationenWaldFisch/publikationenWaldFisch_node.html) and here: <https://waldkulturerbe.de/startseite/>

### Federal Agency for Civic Education (bpb) – Thema: Wald [Topic: Forest]

<http://www.bpb.de/gesellschaft/umwelt/dossier-umwelt/61225/wald>

### Forest infographics

Here, you will find facts and figures on forests in the form of infographics that you can use as copies, on the OHP or whiteboard.

<https://www.bundeswaldinventur.de/index.php?id=427>

### SDW Shop

This is where you will find e.g. leaflets on the topics of forests and soil as well as our tree leaflets with extensive information and a poster page.

<http://shop.sdw.de/>

### Thünen Institute

The Thünen Institute has presented all the results of the Federal Forest Inventory in the form of tables and maps, thereby made them available in an easy-to-understand form.

<https://bwi.info/start.aspx>

### Federal Environment Agency (UBA)

Environmental protection, forests and sustainable wood use in Germany, April 2016

[https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/umweltschutz\\_wald\\_und\\_nachhaltige\\_holznutzung\\_in\\_deutschland\\_web.pdf](https://www.umweltbundesamt.de/sites/default/files/medien/376/publikationen/umweltschutz_wald_und_nachhaltige_holznutzung_in_deutschland_web.pdf)

### The environment in the classroom

Materials from the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)

<https://www.umwelt-im-unterricht.de/>

### Unser Wald aus Försterhand [Our forests and foresters] – German Federal Ministry of Food and Agriculture (BMEL)

All important information about forestry and forests compiled

[https://www.bmel.de/SharedDocs/Downloads/Broschueren/UnserWaldneu.pdf?\\_\\_blob=publicationFile](https://www.bmel.de/SharedDocs/Downloads/Broschueren/UnserWaldneu.pdf?__blob=publicationFile)

### Waldwissen [Forest Knowledge]

Practical forestry information. Numerous articles and publications on forestry and forest ecology.

[www.waldwissen.net](http://www.waldwissen.net)

## TEACHING METHODS & DIGITAL MEDIA

### Audacity – Professional Recording and Editing

Students can use this free software to e.g. record their own podcasts.

<https://www.audacity.de/>

### Federal Agency for Civic Education (bpb) – Methodenkiste, Einsatz digitaler Medien [Methodology box, use of digital media]

<https://www.bpb.de/lernen/>

<https://www.bpb.de/shop/lernen/thema-im-unterricht/36913/methoden-kiste>

### Classflow – Collaborative Learning – Developed by Teachers for Teachers

Allows for the easy implementation of interactive lessons.

<https://classflow.com/>

### GrafStat

An application designed specifically for school use. It is used to develop and evaluate questionnaires. The Federal Agency for Civic Education provides extensive information and tips.

<http://www.bpb.de/lernen/grafstat/46251/grafstat-im-unterricht>

### Glogster – Interactive Multimedia Posters

Interactive posters can be created on this platform. Texts and graphics are combined with videos and audio.

<https://edu.glogster.com/>

### Hotpotatoes – Software for creating teaching material

With hotpotatoes you can create e.g. cloze texts, crossword puzzles or quizzes. Students can also use this platform to consolidate or share what they have learned.

<https://www.hotpotatoes.de>

### Infogram – Easily create infographics

Visually appealing infographics can be created within minutes by using templates for complete infographics or individual elements.

<https://infogram.com/>

### Media education

Working with Twitter in the classroom

[https://www.meinunterricht.de/blog/twitter-fuer-den-unterricht/?utm\\_source=facebook&utm\\_medium=wall-post&utm\\_term=link&utm\\_content=twitter\\_fuer\\_den\\_unterricht&utm\\_campaign=2015\\_09\\_10\\_02](https://www.meinunterricht.de/blog/twitter-fuer-den-unterricht/?utm_source=facebook&utm_medium=wall-post&utm_term=link&utm_content=twitter_fuer_den_unterricht&utm_campaign=2015_09_10_02)



## OVERVIEW OF WORKSHEETS

### FORESTS IN GERMANY

<b>WS01</b>	<b>TREE PROFILE</b> Students research information on different tree species in Germany and classify them by forest community.	<b>PAGE 15</b>
<b>WS02</b>	<b>THE MULTI-TALENTED FOREST</b> Students learn about forest functions and categorise them. They also discuss conflicts between forest functions and reflect on the importance of individual functions.	<b>PAGE 19</b>
<b>WS03</b>	<b>FOREST FUNCTIONS &amp; FOREST USE CONFLICTS</b> Newspaper article for WS 02 as a basis for discussing conflicting interests regarding the use of a forest area, in this case using the example of mountain bikers.	<b>PAGE 20</b>
<b>WS03</b>	<b>FOREST DAMAGE &amp; FOREST THREATS</b> Forest damage & forest threats In groups, the students research information on different forest threats and present them in an infographic.	<b>PAGE 22</b>
<b>WS05</b>	<b>INFOTEXTS: FOREST DAMAGE &amp; FOREST THREATS</b> Supporting information for WS 03 – Research assignment on Forest damage and forest threats	<b>PAGE 23</b>
<b>WS06</b>	<b>SUSTAINABLE FOREST MANAGEMENT</b> At four stations, students read information on sustainable forest management.	<b>PAGE 25</b>

### FORESTS IN BRAZIL

<b>WS07</b>	<b>THE AMAZON RAINFOREST</b> Using maps (digital and analogue), students take a closer look at both countries, Germany and Brazil. They identify differences and similarities in terms of geographical characteristics.	<b>PAGE 32</b>
<b>WS08</b>	<b>"WHAT DOES THE RAINFOREST HAVE TO DO WITH ME?"</b> Working in small groups, students find out about various products from the rainforest. They examine how their day-to-day decisions are connected to the rainforest, how they influence the rainforest through their consumer behaviour and how they can contribute to protecting the forest.	<b>PAGE 39</b>
<b>WS09, 1+2</b>	<b>SUSTAINABLE FOREST MANAGEMENT IN BRAZIL</b> Students read an interview with a Brazilian forest worker and learn about how sustainable forest management is carried out in the protected area along the Rio Negro. They learn how the land there is managed.	<b>PAGE 42+43</b>

### EXPEDITION

<b>WS10, 1+2</b>	<b>FOREST PROFESSIONS – OCUPAÇÕES NA FLORESTA</b> Interviews with Lukas and Giovane, who both work in the forest. One in Germany, the other in Brazil.	<b>PAGE 53+54</b>
<b>WS11</b>	<b>FOREST PROFESSIONS – OCUPAÇÕES NA FLORESTA</b> Students read the interview and quotes. They learn some technical terms and create crossword puzzles in groups. They discuss the similarities and differences in the daily working lives of Lukas and Giovane.	<b>PAGE 55</b>
<b>WS12</b>	<b>FOREST PROFESSIONS – INDEX CARDS</b> Information about the occupational index cards for playing the game "Who am I?"	<b>PAGE 56</b>
<b>WS13</b>	<b>FORESTS &amp; THE ECONOMY – MAPPING THE FOREST</b> Students perform their own mapping of the forest and learn what a forester pays attention to when managing the forest. They then present the results to the class.	<b>PAGE 57</b>
<b>WS14</b>	<b>FOREST PRODUCTS</b> Students examine products which originally came from the forest, both at home and in school. They examine selected products with regard to their origin, production and sustainability. They consider which products a student from Brazil would have found at their home. Students plan an event to raise awareness for the topic among their schoolmates.	<b>PAGE 60</b>
<b>WS15</b>	<b>CERTIFICATIONS – BECOME AN INFLUENCER FOR THE FOREST</b> Students learn about different certification systems for forest products by performing research. As influencers, their job is to use social media to draw the attention of their friends, family and classmates to the topic, as well as create their own online posts for this purpose.	<b>PAGE 62</b>
<b>WS16</b>	<b>LEGENDARY FORESTS</b> Students learn about forest legends from Brazil and Germany. They examine them with regard to moral recommendations for action and create their own story. They then reflect on their own relationship with the forest.	<b>PAGE 66</b>
<b>WS17</b>	<b>WATER AROUND THE WORLD</b> Via an experiment, students learn about proportions and scale with regard to the distribution of fresh and salt water on the planet. Using the example of a dry and a wet forest, students learn about how water affects the species composition.	<b>PAGE 69</b>
<b>WS18</b>	<b>WATER CYCLE IN THE FOREST</b> Students learn about the importance of the forest for the water cycle. For this purpose, they will examine a diagram and then create a model of the water cycle.	<b>PAGE 71</b>
<b>WS19</b>	<b>THE FOREST – A WATER FILTER</b> Students learn about the connection between forests and clean drinking water. They will build a simple water filter and also learn how the water of the Rio Negro is made potable.	<b>PAGE 72</b>
<b>WS20</b>	<b>HUMANS AND WATER</b> Students learn about a Brazilian legend concerning the Amazon dolphin and identify its moral associations. They then research scientific information on the life cycle and biology of Amazon dolphins and compare this with the prejudices presented in the fairy tales and legends.	<b>PAGE 75</b>
<b>WS21</b>	<b>BIODIVERSITY</b> Students read an article on Charles Darwin and his investigations. They reflect on which information was new for them and which was not. Subsequently, they are to derive a definition of "evolution" from the information in the article and then discuss it in class.	<b>PAGE 78</b>

EXPEDITION

<b>WS22</b>	<b>ANIMAL CAMPAIGN</b> Students will share their knowledge of biodiversity. For this purpose, they will learn what a campaign is. They choose a keystone species from a list, develop a campaign around this species, and carry it out at their school.	<b>PAGE 83</b>
<b>WS23</b>	<b>EDIBLE PLANTS</b> Students learn about edible plants and/or products from German forests, and classify them according to the seasons in which they are harvested.	<b>PAGE 87</b>
<b>WS24</b>	<b>FOREST APOTHECARY</b> Students research information on medicinal plants from Germany and Brazil and present them to each other. They then go in search of medicinal plants from the environment near where they live and present them in detail to their classmates.	<b>PAGE 90</b>
<b>WS25</b>	<b>FORESTS &amp; INFRASTRUCTURE - ROLE PLAY</b> Via role play, students learn about conflicts of use surrounding the forest and interest groups. They hear about the different arguments of the stakeholders, try to see things from their perspective, and find solutions regarding the future use of a forested area close to the city.	<b>PAGE 94</b>
<b>WS26</b>	<b>INTEREST GROUPS IN THE MOOSWALD CONFLICT - ROLE CARDS</b>	<b>PAGE 95</b>



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