



# Diversity of Forests and Trees

Knowledge Box II



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Forests are home to **80%**  
animal and plant species  
on Earth



# Index

<b>There Are 70,000 Tree Species in the World</b>	<b>4</b>
Main regions and their diversity	4
Why is it important to have a large tree variety in forests?	5
<b>Tree Species in Croatia and Europe</b>	<b>5</b>
<b>Coniferous and Broadleaf Trees</b>	<b>7</b>
Evergreen and deciduous trees	8
<b>Ecological Relationships in the Forest</b>	<b>9</b>
<b>Primeval Forests in Croatia</b>	<b>10</b>
<b>Knowledge Quiz</b>	<b>11</b>

Forest Knowledge  
Toolboxes

Cover Page and Colophon



## Keywords



These words are important for a full understanding of the content.

*climate-driven forest communities*  
*primeval forests*  
*broadleaf trees*  
*coniferous trees*  
*boreal (taiga) forests*  
*commensalism*  
*biodiversity*    *predation*  
*tropical forests*  
*competition*  
*ecological relationships*  
*deciduous trees*  
*mutualism*  
*evergreen trees*  
*temperate forests*

## Sources

Want to know more?  
Search here for additional information.



## Follow the icons!

These icons represent different types of activities.



Did you know?



Praxis!



Media



Research

Use your smartphone to scan QR codes. You'll need an app to scan the code with your camera. Smartphones are really handy, so let's make the most of them!

# There Are 70,000 Tree Species in the World

The number of tree species in the world is a fascinating topic that shows the richness and diversity of plant species on our planet.

According to the latest research, there are around **73,300 species of wild trees** around the world. If we add to the trees and a variety of wild shrubs, it is estimated that this number exceeds 100,000 species with woody characteristics.

## Main regions and their diversity

**Tropical forests** are located near the equator and are characterized by high levels of precipitation and great biodiversity. The Amazon rainforest, the Congo rainforest in Africa, and the tropical forests of Southeast Asia have the greatest diversity of woody species in the world. They are home to around 40% of all the world's tree species.

Tropical tree species include baobab, mahogany, ebony, and many others.



**The Amazon rainforest alone may have over 16,000 species of trees.**

**Temperate forests** cover climatic zones with distinct seasons. These are the forests of Europe, North America, and East Asia, which have a lower but still significant diversity of trees.

This group also includes Mediterranean forests, which are found in areas with a Mediterranean climate such as the Mediterranean and California.

Oaks, beech, maple and hornbeam are very common in this zone.

**Boreal forests (taiga)** are found in cold, northern parts of the world such as Canada, Russia and Scandinavia and have a relatively low number of tree species, but cover large areas.



**Europe has around 600 species of trees, while North America has around 1,000 species.**

## Media

"Temperate Deciduous Forests"

03:25 min.



Mountains, plains, rivers, and other topographic features create diverse habitats for different tree species.



**Boreal forests generally contain a few dominant species such as spruce, pine, and fir.**



## Why is it important to have a large tree variety in forests?

Ecological function - forest ecosystems with a high diversity of trees often have more complex food webs, but also provide better ecosystem services such as carbon storage, water regulation, and soil conservation.

**Biodiversity** - a greater diversity of trees supports a greater diversity of other organisms, including plants, animals, fungi and microorganisms.

Adaptive capacity - diverse forest ecosystems are more resilient to environmental changes, such as climate change and pathogen attacks.

Preserving the diversity of tree species is essential for maintaining healthy ecosystems, securing resources for future generations, and preserving the natural beauty and ecological balance.



## Research

1. Why do some islands and isolated regions often have unique species that are found nowhere else in the world?
2. Why do tropical regions have high biodiversity, while boreal regions have much lower tree diversity?
3. Can a fir tree survive in a tropical forest?

Explain your answers.



## Media

“Forests in Croatia”

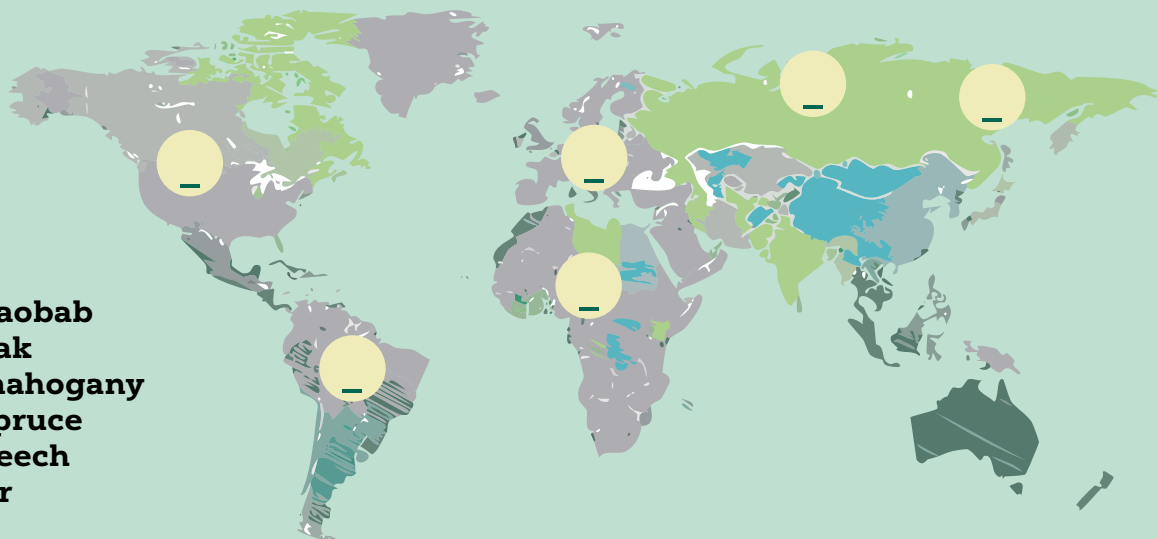
09:04 min.



## Praxis!

Mark the locations where these tree species grow.

1. baobab
2. oak
3. mahogany
4. spruce
5. beech
6. fir



# Tree Species in Croatia and Europe

**Croatia has three main climate zones:** Mediterranean climate along the coast, continental climate in the interior and mountainous climate in higher areas.

These climatic and geographical diversities allow for the growth of numerous trees that form **climate-driven forest communities.**

Forests make up a significant part of the Croatian landscape, covering about 47% of the country's surface, which amounts to about 2.7 million hectares.

According to available data, there are around 200-250 different tree species in Croatia. Here are some of them.

**Oaks** (*Quercus* sp.)  
pedunculate oak (*Quercus robur*),  
sessile oak (*Quercus petraea*),  
holm oak (*Quercus ilex*),  
downy oak (*Quercus pubescens*),  
Turkey oak (*Quercus cerris*)



They grow in lowland forests, hilly areas, and the Mediterranean region. There are about 500 different oak species in the world.

**Beeches** (*Fagus* sp.)  
common beech (*Fagus sylvatica*)  
It is the dominant species in hill and mountain forests.



## Media



“Coniferous vs. Deciduous Trees”

06:17 min.

**Pines** (*Pinus* sp.)  
common pine (*Pinus sylvestris*),  
black pine (*Pinus nigra*),  
maritime pine (*Pinus pinaster*)  
They are found in different habitats, including the Mediterranean region and mountainous areas. There are 115 types of pine growing in the world.



**Maples** (*Acer* sp.)  
field maple (*Acer campestre*),  
Norway maple (*Acer platanoides*),  
sycamore maple (*Acer pseudoplatanus*)  
They grow in forests and parks across Europe.



**Fir trees** (*Abies* sp.)  
common fir (*Abies alba*)  
These are found in European mountain forests. In Croatia, they are notably present in the Gorski Kotar and Lika regions.



**Birches** (*Betula* sp.)  
silver birch (*Betula pendula*)  
They are found in northern and central Europe, often in colder regions. It grows in Gorski Kotar, Lika, and the lowlands of northern Croatia.





## Did you know?!

What we often call a "Christmas pine" is not actually a pine, but a fir tree. Sometimes, a spruce is also used - which we can recognize by the fact that its needles start to fall after a certain period of time.



In Europe and the USA, up to 100 million trees are cut annually to be used as Christmas trees. Most of them end up in the trash after use. It is advisable to recycle the "Christmas tree" after use, rather than throwing it away.

# Coniferous and Broadleaf Trees

This is the main division of trees which distinguishes them by basic characteristics such as the appearance of leaves, fruit and habitat.

**Coniferous trees** have needles that are usually narrow, hard and have a protective layer of wax. Those trees produce cones as their reproductive organs. Most conifers are evergreen trees, meaning they retain their needles for one or more years.

They are adapted to colder conditions and often grow in mountainous or cold climates. Since they are drought tolerant because they do not lose much water through their needles, they also inhabit Mediterranean areas.

### Hornbeams (*Carpinus sp.*)

common hornbeam (*Carpinus betulus*),  
black hornbeam (*Ostrya carpinifolia*)

They are found in forests of central and southern Croatia.



### Spruces (*Picea sp.*)

common spruce (*Picea abies*)

Common spruce grows in mountainous and cold regions of Europe, often in high-altitude forests.



### Ash trees (*Fraxinus sp.*)

field ash (*Fraxinus angustifolia*),  
black ash (*Fraxinus ornus*),  
common ash (*Fraxinus excelsior*)

Depending on the species, it inhabits different areas, mountainous and lowland areas and the Mediterranean region.



### Poplars (*Populus sp.*)

white poplar (*Populus alba*),  
black poplar (*Populus nigra*)

They grow along rivers, marshes, and floodplains, often alongside willows and ashes.



## Research

Research and list all the coniferous trees that grow in your area.



## Media

"Not Every Conifer Is a Pine"

08:40 min.





# Praxis!

Identify 10 types of deciduous trees in your environment. Sketch and group the different shapes of their leaves (round, oblong, pointed, serrated...).

**Broadleaf trees** have broad, thin leaves that usually fall off during the winter, so most of these species are deciduous trees.

These trees produce fruits like nuts, fruits in the shell or berries. They grow in all climates with enough rain and heat during the summer.

Many forests include coniferous and broadleaf trees, creating diverse ecosystems that support a variety of plant and animal species.

This diversity contributes to the stability of forest habitats and their adaptability to environmental changes.

## Evergreen and deciduous trees

Within the broadleaf group, as well as the conifer group, trees are divided into **deciduous** and **evergreen**.

It is very rare for conifer trees to be non-evergreen. The larch is one such tree—it's a deciduous conifer that sheds its needles during the winter.

Broadleaf trees, although mostly deciduous, can also have evergreen leaves—meaning the leaves don't fall off in autumn, but remain on the tree. Such a tree is the holm oak, or shrubs like ivy and holly, which retain their leaves for one or more years. We call them evergreens.



# Praxis!

## Evergreen and Deciduous Trees

List some types of broadleaf trees and mark which are evergreen and which are deciduous (e.g., olive and laurel are evergreen broadleaves).

Broadleaf tree	Deciduous	Evergreen
Downy oak	✓	
Laurel		✓

# Ecological Relationships in the Forest

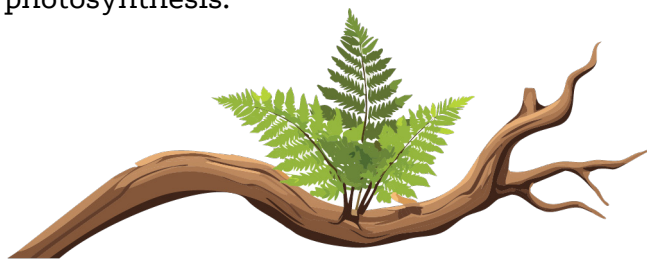


Regardless of climatic zones and geographical areas, forests with characteristic species of plants and animals have numerous ecological relationships.

**Ecological relationships** in the forest include the interactions between different species of plants, animals, microorganisms and their environment. These relationships are crucial for maintaining balance within the forest ecosystem.

**Mutualism** - is a form of ecological interaction in which both species benefit. It is a type of symbiosis, where mutual cooperation increases the chances of survival, growth, or reproduction of the participants.

- Mycorrhizal fungi live in symbiosis with tree roots. They help trees absorb water and minerals from the soil, while in return, they receive carbohydrates produced by the trees through photosynthesis.



- Aphids feed on plant sap and secrete a sugar-rich liquid (honeydew), which ants consume. In turn, ants protect aphids from predators (e.g., ladybugs).
- Birds, bees, butterflies, and bats transfer pollen between plants, enabling reproduction, while they receive food in the form of nectar or pollen.



**Competition** - is a relationship in which species compete for the same limited resources, such as food, space, water, or light.

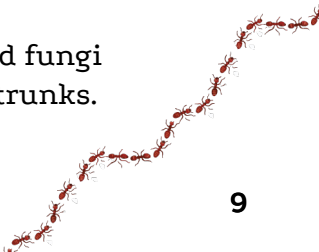


- In the forest, trees compete for sunlight, which can affect the growth and survival of young trees.
- Roe deer and wild boar often eat similar resources, such as saplings, fruits, and roots. When resources are limited (e.g., in winter), competition for food becomes more intense.
- Woodpeckers often make cavities in trees for their nests, but after they leave, starlings can take over these cavities. Sometimes, both species compete for the same hollows.



**Commensalism** - is an ecological relationship between two different species where one benefits and the other is neither harmed nor helped.

- Small mammals (e.g., mice) or amphibians (e.g., frogs) use fallen branches or logs for shelter.
- Forest birds (such as woodpeckers or owls) build nests in the cavities of old trees.
- Ferns, mosses, lichens, and fungi grow on tree branches or trunks.



**Predation** - is a relationship in which one species (the predator) hunts and eats another species (the prey) to survive.

- Owls hunt rodents, which will affect the regulation of their population and reduce damage to plants and seeds.
- Wolves control the deer population by hunting. A reduced deer population prevents overgrazing of young plants, which allows the forest to regenerate.
- Spiders trap prey in their webs, reducing the population of harmful insects.



This wide range of interactions between species is crucial for maintaining balance and dynamics within a complex forest ecosystem and contributes to the survival and adaptation of different species.

# Primeval Forests in Croatia

We most often associate them with lush tropical regions, but primeval forests also exist in Croatia.

These forests are called primeval forests because, unlike other forests, they have never been managed—meaning they have never been cut down. These are completely natural forests, where old trees fall to the ground when they die and slowly decompose. Many insects survive in dead trees, and birds, especially woodpeckers, inhabit them, making these forests very rich and abundant in life.

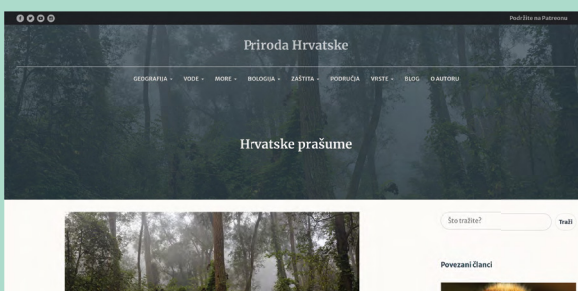
The most famous **primeval forests in Croatia** are:

- **Čorkova uvala** (Plitvice Lakes National Park) - a primeval forest dominated by old beech and fir trees and inhabited by a large number of carnivores.
- **Prašnik** - a primeval forest of old Slavonian pedunculate oaks.
- **Klepina duliba** - a spruce and beech primeval forest in the Štirovača forest vegetation reserve.
- **Ramino korito** (Biokovo Nature Park) - a beech primeval forest on southern Velebit.
- **Devčića tavani** (Northern Velebit National Park) - part of the UNESCO World Heritage Site "Primeval Beech Forests of the Carpathians and Other Regions of Europe".



## Media

"Croatian Primeval Forests"



# Praxis!

## From Seed to Tree

In this exercise, we will grow a tree from a seed. It is advisable to collect tree seeds in the fall and store them so that they can be used in the spring.



We will plant seeds of two different trees in parallel to monitor which seeds need more light and heat for their growth and rooting.

It is important to make the soil of sufficient quality for the process of seed germination and its growth into a seedling, and then into a new tree.

### • PHASE I

#### Collecting seeds, preparing soil, and caring for the seeds



After we collect the seeds, we'll determine which two are best suited to our climate.

We can take seeds of:  
oak and hornbeam;  
spruce and fir;  
walnut and hazelnut, etc.

After determining which two seeds we will use, we will prepare them for planting through the process of germination. In this phase, it is important to work on preparing a quality substrate or soil that will allow the seeds to germinate.

When the seeds germinate, we will plant them in two vases to monitor their development. We will place them in an environment that suits their needs in terms of light and moisture, and nurture them.

We will observe the planted seeds and monitor which one develops faster in terms of air temperature, soil moisture, and light sources in the environment where the seeds grow.

The seeds will grow into seedlings, which we will transplant into the schoolyard when they become small trees.

### • PHASE II

#### Transplanting seedlings to the schoolyard or surrounding forest



In this phase, we will follow all the rules for planting and transplanting seedlings.

It is important to dig a sufficiently deep hole, fill it with natural fertilizer, and place the seedling in the hole. After that, tamp the soil around it well and water it abundantly.

We will continue to visit, water, and nurture our little tree, keeping a journal of its progress. Changes in trunk circumference, leaf size, and any other variations in color and shape will be recorded during its first year of growth.

Look for questions and answers in digital format.



## Knowledge Quiz

1. What is the main classification of trees based on the shape of their leaves?
2. In which climate zone do forests have the greatest biodiversity?
3. How many tree species are there in the Amazon rainforest?
4. Why is the conservation of tree biodiversity important?
5. What percentage of Croatia's land area is covered by forests?
6. Which coniferous tree loses its leaves in winter?
7. How many tree species are there in Croatia?
8. What are the species of oaks?
9. What is the ecological relationship in which both individuals benefit?
10. What are the most famous primeval forests in Croatia?



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