



Biodiversity

The **living organisms** on the Earth can be grouped in **species**. A species is a group of organisms that are similar in outlook, way of living and behaviour. The organisms that reproduce sexually must be capable of producing prolific numbers of offspring. At the end of the 20th century, specialists had only examined and described a small part of all life – about 1.5 million species. According to estimates from some scientists, there are 4 million to 5 million further species, which remain unclassified, i.e. undiscovered and undescribed, while others believe there are 30-40 million species living on our planet.

We all know that humans share the planet with **several million** species of plants, animals and other organisms, collectively referred to with the term “biological diversity” or “biodiversity.”

Biodiversity is defined as the most valuable natural resource and is commonly accepted to consist of three components:

- **Genetic diversity.** All species on the Earth keep inherited genetic information, a key to adaptability to environmental conditions. In future, humans may be able to regenerate some extinct species, if their genetic material is available.
- **Diversity of species.** A diversity of life forms have adapted to specific conditions of the environment; over billions of years new species have formed, and those not managing to adapt to the changing conditions have died out. Since the Proterozoic Era, life has developed toward expanding diversity and we are living in a period of maximum biological diversity. Each plant and animal species has its own environment from which it receives all necessary conditions for existence: air, food, water, living space and shelter. When the environment of an organism changes, it adapts, migrates or dies out.
- **Diversity of ecosystems.** This includes various bio-communities such as forests, deserts, fields, rivers, seas and oceans. The inhabitants of an ecosystem interact both among themselves and with the non-living environment. Ecosystems exist due to the diversity of species, each species satisfying its needs for substances, energy and information while stimulating the existence of other species. The richer in species an ecosystem, the more stable.



Biodiversity

The term “biological diversity” is commonly used to refer to the diversity of species, but its other two components – the genetic diversity and the diversity of the ecosystems – should not be forgotten.

The countries richest in species are Brazil (the Amazon basin), Indonesia, the US, Russia (Siberia), India and China.

Biodiversity in numbers

Animal or plant species	Number of species		
	In the world	In Europe	In your country
Vascular plants	260,000	12,500	
Fish – all species	20,000		
freshwater only	8,400	334	
Amphibian	4,000	75	
Reptiles	6,500	198	
Birds	9,600	514	
Mammals	4,300	270	

- Find the data for your country and complete the table.

The **protection of biodiversity** is not only necessary, it is also a very important condition for the stability of natural systems, because only then will they be able to regenerate and develop.

Biodiversity preservation is important for:

- **Natural systems** that have the ability to maintain, protect and evolve. Organisms fulfil a cycle of food and organic substances. They take part in processes in the atmosphere and in the water cycle; they also influence the behaviour of natural elements. Water organisms purify water, predators ensure natural control of pests, and insects are the main pollinators of plant life.
- **People** who make use of provisions (food, wood, fabrics), raw material, chemicals and medicine, maintain human health and satisfy the needs of Earth’s growing population.



In nature, **extinction** of species is a natural process. Investigation of fossils has shown that, over the course of millions of years, species may die out at a rate of one to three per year. Contemporary estimates show that today several thousands of animal and plant species are becoming extinct every year, a reason for serious concern. Three-quarters of all known bird species and one-quarter of all known mammal species are currently thought to be in danger of extinction.



Some of the most serious reasons for the **manifold rise** in the species extinction rates are pollution resulting from economic development; excessive use of fertile soil; sharp increase in agricultural activity; development of transport; and expansion of cities. In other words, insensitive and imbalanced human activities can immediately influence biodiversity directly by destroying animal and plant species themselves or indirectly by destroying their habitats.

Contemporary values say that **reduction of biodiversity** is contradictory to the idea of harmonious and sustainable development of contemporary society. This is why, on a worldwide scale, measures are suggested to remove the causes leading to a decrease of biodiversity. Their realisation in practice can be achieved through mobilising significant material, financial and human resources.

Lesson plan: **The plants and animals around us**

Duration	3-4 class periods
Time of year	Any
Place	The classroom, in the open
Materials	Blackboard (flipchart); flipchart with several habitats marked on it; colour chalk or pastels, Worksheets
Aims	<ul style="list-style-type: none"> • To teach the meaning and the significance of biological diversity and its role for people and nature • To raise awareness about the notions of ecosystem and food chain
Methods	Associations game, discussion, game in the open

Part I: Biodiversity

- In advance, draw the following on the board: forest, represented by a few trees; meadow, by grass and bushes; the water basin, by a river or lake; and a house with a yard.
- Hand out the worksheet *If I Were . . .* and ask the students to complete the following:
If I were a plant, I would be a, because.....
If I were an animal, I would be a, because.....
Every student should choose a water or land animal and plant.
- Show the illustrations prepared in step 1, explaining that these are various habitats. Every student tells the class what plant and animal he or she has chosen. Have each student place his or her worksheet on the illustration most likely to serve as habitat for his or her choices. Ask the students if they know other plants and animals which live in these habitats, adding these to the illustrations.
- For advanced students, ask four volunteers to present information from the Basic Organisms and their Significance worksheet in front of the class. Discuss with the class whether plants, animals, bacteria and fungi can be found in the four habitats mentioned above. Add the names of the main groups of organisms if they have not already been included.
- Discuss with the class what these plants and animals need to survive (*air, water, light, food, heat, space, shelter*). Write the suggestions on the blackboard or flipchart. Conclude that the environments – water, land, soil, or, in the case of parasites, other organisms – where species live can vary and that they get all they need to survive from their environment.
- Give more information on biological diversity, its three components, and the importance of its protection. The information in the introduction may be used for the purpose.

**Part II: Why are plants and animals important?**

- Ask the students to consider the plants and animals they chose in the previous activity. Tell them that you are going to discuss why these life forms are important for nature and people. Hand out the worksheet *We Can't Do without Plants and Animals* to fill in.

- 2 When the students have finished filling in the worksheets, ask some to show the class what they have done. Have the students look around and identify objects of plant or animal origin (*pencils, paper, furniture, clothes*), and ask them to think what they had for breakfast or lunch. Ask them what plants or animals they keep at home, and why and where their families go for holidays or at the weekends. Summarise the results.
- 3 Discuss the question: Are there harmful plants and animals in nature? Come to the conclusion that every organism is important in nature, and that usefulness and harmfulness are relative notions usually described in reference to people.

Part III: My plant is

- 1 Take the students outside, into the schoolyard or the park, and ask them to scatter in search of plants — each child should look for a plant which she or he likes best. Without picking it, the child should look at it carefully, touch and smell it and then tell the group about it, by describing the following about it without saying its name:
 - My plant lives in
 - My plant is
(a peculiar characteristic — height, blossoms, fruit, smell, bark, etc.)
 - My plant is important because
(it makes a shade, is beautiful, can be eaten, etc.)
- 2 The rest of the class guess the plant by its description. If they find it difficult, they may ask Yes/No questions.

Part IV: The food chain

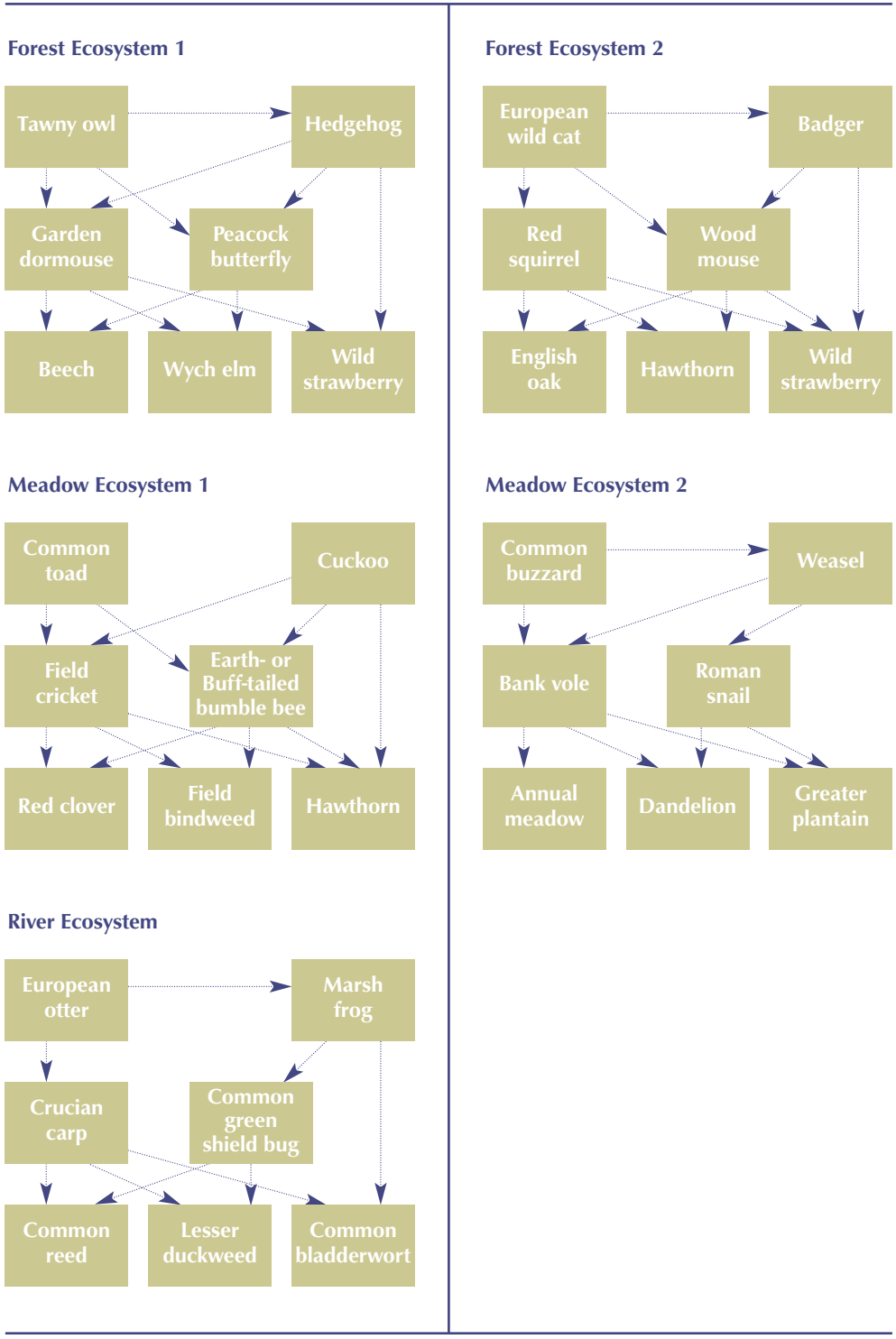
- 1 Explain the food chain to the class using the information given in worksheet The Ecosystem and the Food Chain, and on the board draw a graphic similar to the illustration on page 70 for the current activity.
- 2 Ask seven students to be volunteers. Have them choose the roles of plants and animals, for example cabbage, carrot, wheat, apple, mouse, rabbit and hawk. (One possible variant is to have the roles written on role cards in advance so that the volunteers can draw their roles.)
- 3 Ask the “plants” to get into pairs and hold their wrists to make a “basket”. Explain that they are the producers in nature and as such they form the first level of the chain. Ask the two pairs to stand facing each other.
- 4 Explain that the rabbit and the mouse form the second level of the food chain and are called primary consumers because they feed on plants. Ask them to stand in a way that they form a “basket” by holding on to one another’s wrists.
- 5 Ask the “hawk” to take his place in the food chain by sitting in the “seat” made by the mouse and the rabbit. Explain that this bird belongs to the group of the secondary consumers, because it feeds on the animals it catches every day.
- 6 Discuss with the class the following issues:
 - What would happen if there aren’t enough volunteers to play the roles of the plants? (In nature this would mean that a great deal of the plants — grass, bushes, forests — have been destroyed.)
 - What would happen if one of the volunteers drops out? (In nature, this would mean the extinction of a species.)
 - How do the animals from the upper levels depend on the plant and animal species from the lower levels?

Watch for the children’s safety during this game. You may wish to give the roles of the producers to the students who are physically stronger. You can add variety to the game by suggesting that students choose different plants and animals and form the food chain with them. Include a human in the chain, too.



Part V: Who eats who

- 1 Make copies of the fact sheet The Food Chain. Divide the class into five groups and give each group one copy of The Food Chain and one the five ecosystems.
- 2 Have the students cut out the different plants and animals and paste them into the boxes of the Food Chain. Have them draw arrows indicating which animals eat which plants and animals. Use the schemes below as a reference.
- 3 Have the students discuss what happens if part of the ecosystem disappears.



Lesson plan: **About people and nature**

Duration	3-4 class periods
Time of year	Any
Place	The classroom, in the open
Materials	7-8 lengths of rope of 3-4 metres each
Aims	<ul style="list-style-type: none"> • To demonstrate that when changes occur in the environment some organisms adapt themselves, others migrate and still others die • To raise awareness about the difficulties the birds encounter during their migrating
Methods	Role play, games in the open, discussion

Part I: The forest and the woodcutters (Role play in the school yard)

1 Take the class into the schoolyard or a nearby garden. Have the students use the rope (or just draw on the ground) to designate seven or eight areas of about 1 square metre in the shape of a circle or a square. Explain to the students that these shapes represent 7-8 decare of old forest inhabited by various plants and animals.

2 Choose 12-15 volunteers. Ask two of them to play the roles of woodcutters. Give the rest cards with names of various animals (forest mouse, deer, woodpecker, phyllophagous beetle, forest ant, titmouse, owl, fox, hedgehog, etc.).

3 The game begins with the distribution of the animals in the forest – place one or two animals within each figure. First, when the woodcutters come to the forest, they say they will cut down 1 decare of it. They choose a figure, where they “cut down” the trees by taking the rope with them or by erasing the figure from the ground. The forest animals leave their habitat and move to other figures or stay, depending on their character and on their own judgment. Ask the students to mime the mode and speed of their migration – flying, jumping, crawling, etc. When the woodcutters come again, they “cut down” another decare of forest, the animals leave their habitats and this goes on until just two figures remain. Eventually, a lot of animals are crowded within the last 2 decare.



4 After the game, discuss with the students the way they felt while playing. What did the forest dwellers have to do while their forest was being cut down? Try to guess what happened to the other forest organisms such as plants and fungi. Explain that in real situations, some organisms (e.g. trees) can be destroyed immediately, some are forced to adapt themselves to changes in the environment, some manage to move to different habitats, and others are destined to die. Conclude that human activity in this case has caused a decrease of the biodiversity mainly through destroying the habitat of forest animals and plants.

Part II: Migration isn't easy

1 Choose a fine, sunny day to take the class out to a meadow. Ask the students if they know about animal migrations. Let them come up with various examples of their own. Use the information given in the fact sheet Facts on the Move on page 81.



2 Tell the class you're about to play a game called "Migration isn't easy."

- Tell the participants in the game that they are going to play a flock of white storks, which migrate south every autumn to spend the winter and return north in spring to the places where they breed.
- Mark two areas 20-30 metres apart for winter time and for nesting. Allocate four to five spots between the two areas as "safe zones," where the storks will be able to rest during their migration. Safe zones could be trees, large rocks or some other natural place where birds can land.
- Ask students to choose roles or have them draw role cards at random. Two will act as hunters (a person and a non-human predator such as a fox) with the remainder of the class playing storks. The birds move fast, running from one area to another having the right to stop only in the safe zones during their crossings. The hunters try to catch the birds while they are migrating but they cannot enter the safe zones or the winter and the nesting areas. Every bird caught is out of the game. The start of every migration is signalled by the teacher.
- During the first migration, all zones are active. But before the second, tell the class that one of the zones is a marsh which has been drained and can no longer be used. Before the third migration, explain that on another safe zone wind turbines have been built and it cannot be used, either. Continue playing until only one safe zone remains. Use various justifications for destroying the safe zones – building a factory or a highway, turning a water area into a recreation centre, etc.
- Note the number of storks which survive after each migration. They will obviously be easier to catch by the hunters as the safe zones grow fewer. If the storks complain that this is not fair, tell them that the hunters tend to easily find the places where birds rest during their flight and also that, when safe zones are destroyed, it is very difficult for the birds to survive during migration.
- You can elaborate by dividing the storks into couples and suggest that they have chicks; every stork couple can bring back two players from among those caught to play the roles of stork chicks. After a while, the game can be repeated by changing the roles of the participants.



3 Ask the students to discuss how they felt playing their roles and what their hardships were. Draw their attention to the fact that during the real migrations, just as in the game, resting places are crowded with predators and hunters who stalk migrating birds thus endangering their lives. Add information about other endangering threats, e.g. power cables, food shortage, poisonous substances used in farming, oil spills in water basins.

4 Explain to students the general belief that animal migration is an easy and secure way to cope with winter. In reality, migration is a costly and quite often risky undertaking. During migration, animals require a lot of energy, food and resting places. They have to avoid predators and be able to find convenient habitats when they arrive.

Other activities

- Ask students to find more information on different migratory species to discuss in a future class period.
- Make copies of the picture on page 133 and hand them out to the students to colour in.



Lesson plan: **The biological diversity of Europe**

Duration	2-3 teaching hours
Time of year	Any
Place	The classroom, in the open
Materials	Blackboard or flipchart, cards with various plants and animals typical for Europe, physical map of Europe, tests
Aims	<ul style="list-style-type: none"> • To teach biological diversity in Europe • To raise awareness and sensitise the students to habits of protecting, recovering and sustainable use of biological resources
Methods	Discussion, group work, brainstorming, case studies

Activity 1: Do we know our wealth?

To prepare, hand out copies of the worksheet *The Living Wealth of Europe* and ask students to explore the text and find more information from other sources.

1 Ask volunteers to present to the class the result of their research on the flora and fauna of Europe. Discuss the following questions:

- What are the reasons for the current status of European biodiversity?
- What are the characteristics of plant life in Europe?
- What is most important to know about European fish, amphibians and reptiles?
- Is Europe rich in birds and are these species endangered?
- What is most important to know about European mammals?
- Why is it so important, from a global viewpoint, to protect biological diversity in Europe and how is this done in practice?



After the presentations, ask the students how much they had known about the rich biodiversity of Europe prior to their research.

(In a similar way, research on the flora and fauna of your own country/region may be organised.)

2 Divide the class into small groups and give each group a copy of the worksheet entitled *What Do We Know About . . .* containing information about six animal species valuable both for Europe and the whole world. Give about 10 minutes for individual work: to take in the information, share facts they had already heard on similar occasions, etc.

3 Ask each group to present their animal in front of the class, drawing attention to:

- the places where it is found most often;
- its importance;
- the threats to its survival and the measures that must be taken for its protection.

Part II: Having them forever

1 Ask the students to point out the factors and conditions which are a threat to the biological diversity of Europe, basing arguments on the examples presented in the previous activity. Write their ideas (pollution, hunting, cutting down of forests, farming, etc.) on the blackboard or on the flipchart. Give more feedback.



2 Remind the class that three-quarters of all known birds are threatened by extinction. Tell them that, according to research by the international organisation Bird Live International, the factors which have the strongest impact on the places of ornithological significance are:

- intensive farming;
- industry and urbanisation (growth of the cities);
- building of dikes, dams and barrages;
- disturbance to birds, especially during their nesting period;
- recreation and tourism;
- drainage of water basins and land areas;
- fishing and extraction of aquatic species;
- discharging sewage and waste in the environment;
- infrastructure development.



3 Give examples of activities which can be carried out to protect this natural wealth. (*changes and different laws; banning of hunting and shooting for specific periods of the year; declaring important areas to be protected; careful investigation of the possible impact economic activity may have on the environment and subsequently conforming plans based on the results of the investigation; considering the positions and views of all interested parties*)

4 Explain to the class that every person — meaning every child as well — can help to protect plant and animal diversity. At first glance, the activities of a single person to save or to help the existence of a single plant or animal may seem insignificant compared to the size of the planet or its population. But this is not so. Support your argument by asking a volunteer to read aloud the story in the worksheet A Walk on the Beach.

Dwell on the significance of the small efforts which every person needs to do sometimes in order to change things for the better in the world. Ask, “What would happen if most of the people did like the little boy?” Ask the students to share their own ideas and observations.

Other activities

- Ask the students to take the worksheets from this lesson plan home to talk about what they learned and experienced in class with family members.
- Have the students take the test Be a Friend of the Animals and the Plants. Organise group discussion for each question. Conclude that it is very important that people should always think before doing something if it will have any impact on the environment both at the moment and in future.
- Do the dilemma exercise A Stork Couple. Discuss them in groups. Give the students the freedom to support different arguments about what they think is the right thing to do.
- Invite an expert from an ecology institution or from a non-government organisation to present information about the species specific to your region and to discuss the problems with their protection.
- Do research on local plant and animal wealth and the protected areas in your region.
- Write a letter or a declaration in the first person singular on behalf of a plant or an animal threatened by extinction and have it published. It can start something like, “Dear humans, I am the White Stork and I am writing to you because . . .”
- Organise activities like tree-planting, making birdfeeders, etc.
- Celebrate the International Day for Protection of Biological Diversity by organising competitions and quizzes.





DILEMMA A Stork Couple

A stork couple have made their nest on a utility pole not far from your home. There is electric power in the post, which is dangerous for the storks. What do you do?

- scare away the storks because you care about their safety;
- build another nest in a safe place nearby;
- call the local power company;
- call an government ministry or a non-government organisation involved in environment protection;
- tell the mayor about the problem;
- nothing; or
- something else.



TEST Be a Friend of Animals and Plants

	TRUE	FALSE
1 When picking mushrooms, it is good to cut them with a knife.	<input type="checkbox"/>	<input type="checkbox"/>
2 When picking herbs it is good to pull them out with their roots.	<input type="checkbox"/>	<input type="checkbox"/>
3 When picking roots of a medicinal plant it is good to dig out the other plants around, too.	<input type="checkbox"/>	<input type="checkbox"/>
4 It is good to only collect big snails, leaving the small ones in their natural environment.	<input type="checkbox"/>	<input type="checkbox"/>
5 There is no problem leaving poison in the garden to protect it from field rodents and garden pests.	<input type="checkbox"/>	<input type="checkbox"/>
6 The nests of birds which have flown away should be destroyed in autumn.	<input type="checkbox"/>	<input type="checkbox"/>
7 If an animal is ill, you should take it out of its nest/den.	<input type="checkbox"/>	<input type="checkbox"/>
8 It is good to keep quiet and not enter areas used for nesting and reproduction.	<input type="checkbox"/>	<input type="checkbox"/>
9 You should not fish in spawning season.	<input type="checkbox"/>	<input type="checkbox"/>

Answer key: 1. True 2. False 3. False 4. True 5. True 6. False 7. False 8. True 9. True



FACT SHEET If I Were...



If I were a **plant**, I would be a(n)
because



If I were an **animal**, I would be a(n)
because



FACT SHEET What Plants and Animals Mean to Us

MY

(name of chosen plant or animal)

Mark boxes that have correct statements.

- | | |
|---|--|
| <input type="checkbox"/> is used for food | <input type="checkbox"/> is used by other organisms as living environment |
| <input type="checkbox"/> is used to produce medicines and chemicals | <input type="checkbox"/> maintains the structure and the fertility of the soil |
| <input type="checkbox"/> is valuable raw material | <input type="checkbox"/> is often praised in the arts |
| <input type="checkbox"/> is used for heating | <input type="checkbox"/> helps pollination |
| <input type="checkbox"/> is used to make clothes | <input type="checkbox"/> helps the cycle of organic substances in nature |
| <input type="checkbox"/> is used for scientific/research purposes | <input type="checkbox"/> is a good friend to people |
| <input type="checkbox"/> is used in building | <input type="checkbox"/> Other (fill in): |
| <input type="checkbox"/> is used for forage | |
| <input type="checkbox"/> can give pleasure | |

This is why it **IS/ISN'T** valuable for people and other living organisms.
(strike through incorrect answer)





FACT SHEET

Basic Organisms and their Significance



Plants are usually fixed organisms that have chlorophyll, which is necessary for the process called photosynthesis. All plants breathe, feed independently, have tactile receptors and can reproduce. Most plants have roots, stems and leaves. There are about 600,000 known plant species on Earth. The plants as a whole — the vegetable kingdom — are also called “flora.” Plants play a major part in life on Earth.

They release oxygen and produce food for animals and people. Using the energy of the sun, plants form organic food substances through photosynthesis, which defines their role as the producers within ecosystems. Plants buried in the earth millions of years ago have become fossil fuel, which we use as a source of energy.



Animals are organisms which possess a tactile sense, are capable of voluntary movement, and can reproduce. All animals are made of nuclear (eukaryotic) cells, which during the evolution process have grouped together to form various tissues, the tissues in turn forming organs and systems. The animal world is also called “fauna.” All animals depend on chemical energy, accumulated in the form of organic compounds, produced by plants. Animals assimilate this energy through their metabolism. The feeding of animals is non-independent, which defines their role as consumers within ecosystems. Animals breathe by taking in oxygen from the environment and releasing carbon dioxide.



Fungi feed non-independently, i.e. they take organic substances from the environment. Some species feed on living organisms; these are parasites such as rust fungus, ergot or *Claviceps purpurea*, vine mildew. Saprophytes such as bread mould take substances from food, and dead animals. There is no clear borderline between parasites and saprophytes. Mycorrhizal fungi, which develop along the roots of trees, help the tree take up water and mineral salts. In this way, they function as root fibres for which they receive food, vitamins and other substances. There are about 100,000 species of fungi.



Bacteria are mostly one-celled microorganisms. They reproduce by dividing themselves. As cosmopolites, bacteria can be found on all continents, in the air, the water, the soil, the plants, the animals, the people, food products and objects. They feed independently and non-independently. They take part in the cycle of substances in nature; in the formation and destruction of minerals and ores; and in the formation of soil structure and fertility. Bacteria are used in the food, microbiological, chemical and other industries. Pathogen bacteria cause diseases in plants, animals and people (e.g. anthrax, tuberculosis, brucellosis). It is believed that bacteria were the first organisms to appear on Earth.

Fungi and **bacteria** have additional significance for the biosphere. They are called reducers because they decompose organic compounds by rotting (putrefaction) and mineralisation, thus turning them into elementary non-organic substances. In this way, the food chain is closed and the non-organic substances can be assimilated by the green plants to create organic substances again. Fungi, especially soil fungi, contribute to the improvement of soil fertility. Mycorrhizal fungi help in the feeding of plants such as trees and grass.



FACT SHEET

The Ecosystem and the Food Chain

The ecosystem is a community of organisms which interact with one another and with the environment. The ecosystem is a dynamic system in which food and energy are in constant circulation among living organisms and non-living nature. Examples of common ecosystems are forests, rivers, lakes, seas, meadows, farms, and cities.



Plants are called **producers**

because they produce food from mineral salts and solar energy during the process called photosynthesis. The food

substances include six main elements: carbon, phosphorus, sulphur, nitrogen and oxygen. These elements are obtained from the soil, air or water. Another ten elements – potassium, magnesium, calcium, iron, manganese, copper, zinc, molybdenum, cobalt and boron – are also involved in the food cycle which occurs between the living organisms, soil, water and air. The food substances remain in the plants until they are eaten by animals feeding or until they die and decompose.

Animal organisms feeding on plants and other animals are called **consumers**.

By consuming plants, they help in furthering the circle of energy and food substances. Food substances remain in these organisms until their death. Bacteria, fungi and worms, which play the roles of **reducers**, decompose dead organisms, thus returning the food substances to the soil, where the cycle in the ecosystem may begin again.

The **food and energy chain** shows the complex interdependence between plant and animal organisms in the ecosystem. The **producers** are at the bottom, the broadest part of the pyramid which is called the “first level.” The second level is occupied by **primary consumers**, organisms feeding on plant food. The third and fourth levels of the pyramid belong to the **secondary consumers**, which feed only on animal food or both plant and animal food. Very often some consumers belong to more than one level. For example, humans eat plant and animal food from different levels of the food chain.

Within the chain, along with food substances, an exchange of energy also takes place. The transformation of energy from a lower level to energy of a higher level is approximately 10 percent. For example, the primary consumers mainly consume biomass (plants). From 100 kilograms of plant mass, the primary consumers produce about 10 kilograms of biomass. Similarly, the secondary consumers which eat these 10 kilograms produce about 1 kilogram of biomass. This fact is often mentioned by vegetarians to prove that consuming food of the lower levels of the food and energy chain saves energy, and is therefore good for the environment.

Every impact on the lowest level is felt upwards in the system. If, due to huge disasters, like fires, floods, freezing or because of unwise human activities like cutting down of forests, chemical poisoning, release of toxic waste or some other pollution, big plant areas are destroyed, then the food of the primary consumers will decrease. This will have a similar impact on the food of the secondary consumers – it will likewise decrease. The humans are also dependent on the changes occurring in the food and energy chain.





FACT SHEET
The Food Chain

A large yellow brushstroke background containing six empty rectangular boxes with black outlines, arranged in two columns and three rows. The boxes are intended for students to write information about the food chain.



FACT SHEET

Forest Ecosystem 1



Tawny owl
(*Strix aluco*)



Hedgehog
(*Erinaceus europaeus*)



Garden dormouse
(*Eliomis quercinus*)



Peacock butterfly
(*Inachis io*)



Beech
(*Fagus sylvatica*)



Wych Elm
(*Ulmus glabra*)



Wild Strawberry
(*Fragaria vesca*)



Tawny owl (*Strix aluco*)

This compact, medium-sized owl has large, black eyes and feathers that are many colours, from greyish to more reddish-brown. The tawny owl breeds mainly in the holes of trees in forests, parkland and wooded farmland. It is found near man in gardens and towns in all of Europe except Ireland and the far north. The tawny owl lives in the same place all year and is active at night. Its calls of “hoooooh.....ho, ho’ho’ho’hoooooh” are heard in early spring and autumn. It eats voles and insects, but also birds, including other small owls.



Hedgehog (*Erinaceus europaeus*)

The head and body of the hedgehog are 25 centimetres long, with a tail of 3 centimetres. It weighs up to 1 kilogram and lives about nine years. Its body is covered by about 6,000 spines that are 2-3 centimetres long and dark brown with a white end. It has yellow hair on its head and throat. It has a pointed muzzle with small eyes. Hedgehogs live in parks, gardens, forests, hedges and fields. It is found everywhere in Europe. The hedgehog eats worms, snails, spiders, centipedes, insects, frogs, lizards and fruit. The young are born blind, nude and without thorns. Hedgehogs come out at night. When danger appears, they roll up in a ball and freeze. It hibernates during winter, hidden in the leaves or in a hole.





FACT SHEET

Forest Ecosystem 1 (continued)



Garden dormouse (*Eliomis quercinus*)

The head and body of the garden dormouse is about 15 centimetres long, and its tail alone is 10 cm. It has grey, brown and red fur on its upper body, and white underneath. It has a black mask on its face. The garden dormouse lives in parks, orchards, gardens, forests, vineyards, rocky areas, and in buildings like barns. It is found in Europe, Asia and Asia Minor. The garden dormouse eats insects, spiders, centipedes, snails, lizards, eggs, fruit and bark. A nocturnal animal, it climbs on walls and trees, and jumps well. It hibernates from October to April in a tree hollow or building.



Peacock butterfly (*Inachis io*)

The wingspan of the peacock butterfly is 6 centimetres. It has reddish-brown colours above, each of them decorated with a big eyelike spot at the end. The underside is almost black, providing excellent camouflage when the insect is hibernating. The caterpillar is up to 45 millimetres long. It is black with small white spots and yellow legs and has 11 pairs of thick prickles. This butterfly lives in open landscapes, gardens, parks and other flowery places. It is found throughout Europe, except the far north. It lays its eggs on leaves, which the young caterpillars then eat. The eyelike spots on its wings scare away predators.



Beech (*Fagus sylvatica*)

The beech tree grows to 30-40 metres tall, with an enormous, spreading crown. The bark is smooth, thin, and grey. The leaves are oval shaped, shiny dark green in colour becoming brown by late autumn. Male seeds hang on a long stalk, while the female is borne in short-stalked, erect clusters. Flowers appear just after leaves in the spring. Nuts are triangular, shiny brown and can be eaten. They are found in pairs in a woody husk, which splits into four sections. In central Europe beech usually grows in mountains, forming forests with oak or spruce. Its wood is used for furniture.



Wych elm (*Ulmus glabra*)

This tree is 10-40 metres tall, and develops a broad, spreading crown. The bark is smooth at first but later develops thick, straight ribs and turns grey. The leaves have short stalks and are egg-shaped with sharply pointed tips and a base shaped like a heart. The upper surface is dark green, hairy and very rough to the touch. The red flowers appear in late February and the winged fruit is visible before the leaves are expanded. The wych elm is found everywhere in Europe, usually in woods in hilly areas and the foothills of mountains.



Wild strawberry (*Fragaria vesca*)

The thin leaves of the wild strawberry come in threes, with sharp-tipped teeth. The flowers have white petals and come out from April to July. They are pollinated by bees, flies, moths and butterflies. The fruit looks just like small strawberries. They are about 1 centimetre across and ripen from May to September. The wild strawberry has been cultivated in Europeans gardens for centuries. The modern garden strawberries *Fragaria ananassa* that are used in commercial strawberry production are clearly larger than wild ones. The wild strawberry grows in the woods, in grassland and scrubs. It is native to the temperate regions of Eurasia.



FACT SHEET

Forest Ecosystem 2



European wild cat
(*Felis sylvestris*)



Badger
(*Meles meles*)



Red squirrel
(*Sciurus vulgaris*)



Wood mouse
(*Apodemus sylvaticus*)



English Oak
(*Quercus robur*)



Hawthorn
(*Crataegus monogyna*)



Wild Strawberry
(*Fragaria vesca*)



European wild cat (*Felis sylvestris*)

The body of the European wild cat is 60-70 centimetres long, and the tail is about 30 centimetres. Its fur is grey to yellowish-brown with darker stripes. The male is somewhat larger and darker than the female. It looks like the domestic tabby cat but with a bushier, ringed tail. The eyes are yellowish-green with vertical pupils. Kittens have thin, yellowish fur with dark spots. These cats live in many places, but mainly in woodlands and scrub land across Europe. The cats spray a scent to mark their territory. Litters of two to six kittens, typically born in May, begin life in dens usually in tree hollows, but sometimes in abandoned fox or badger holes. They mainly eat mice and voles, but also birds and small mammals.



Badger (*Meles meles*)

Up to 90 centimetres long including the tail, the badger weighs 10-20 kilograms. It can live up to 20 years. The badger has short legs, a long and blunt muzzle, short ears and small eyes. Gray on the upper part of its body with brownish sides, its head has black and white stripes, black limbs and long, fierce nails. The badger inhabits deciduous and mixed forests, as well as grasslands in the mountains. It is found throughout Europe. Badgers eat earth worms and snails, as well as rodents and chicks. They hibernate in dens from October to February. Badgers live in couples or extended family groups, sometimes in big galleries dug by itself and inhabited for decades, consisting of corridors up to 40 metres long and various "rooms."





FACT SHEET

Forest Ecosystem 2 (continued)



Red squirrel (*Sciurus vulgaris*)

The head and body of the red squirrel measure 21-25 centimetres in length, and its bushy tail is 15-20 centimetres. It lives 10-12 years. The fur is usually brown or red, but can be black-brown as well. Its underparts are white, and it has a tuft of long hair at the end of its ears.

The red squirrel lives in woods, forests and parks, and is found in Europe, Siberia, Japan and Korea. The red squirrel feeds on plant and leaf buds, tree seeds, mushrooms, insects, and the eggs and chicks of certain birds. Active throughout the year, the red squirrel builds a nest out of leaves, moss and small branches high up in trees. It mostly moves on trees during the day and rarely goes to the ground for food, jumping from branch to branch and from tree to tree.



Wood mouse (*Apodemus sylvaticus*)

Its body is 7.5-11 centimetres long, covered in yellowish-brown fur, and has a pale grey belly. Its eyes and ears are large, while its tail is roughly the same length as its body. It has a whitish underside and is covered lightly with hair.

The wood mouse lives in fields, forests, hedgerows and many other places that are not too wet. They sometimes move into manmade buildings, especially during winter. They are found everywhere in Europe, digging burrows in the ground to live in. Its burrows have long tunnels with separate rooms for nesting and feeding. They run fast, and climb and jump well. The wood mouse eats berries, seeds, buds, shoots, and fungi and invertebrates.



English oak (*Quercus robur*)

This large tree grows up to 35 metres high. The bark is smooth and reddish-brown at first, later turning dark grey and finely cracked and rigid.

The fruit is the familiar acorn, enclosed shallowly in a scaly cup in small clusters on 5-12 centimetre long stalks. English oak is common throughout Europe, except in the far north. Some animals like jays and squirrels bury acorns in hoards, so that groups of small trees are sometimes seen.



Hawthorn (*Crataegus monogyna*)

Hawthorn grows as a dense thorny shrub, but can become a small tree up to 12 metres high. The bark is bright brown and flaking. Leaves are variable but normally with three or four pairs of lobes. The white flowers appear in late May and early June, turning pink as they mature. The fruit is small, apple-like, deep red, ripening in September. Hawthorn is found in the lowlands of Europe.



Wild strawberry (*Fragaria vesca*)

The thin leaves of the wild strawberry come in threes, with sharp-tipped teeth. The flowers have white petals and come out from April to July. They are pollinated by bees, flies, moths and butterflies. The fruit looks just like small strawberries. They are about 1 centimetre across and ripen from May to September. The wild strawberry has been cultivated in Europeans gardens for centuries. The modern garden strawberries *Fragaria ananassa* that are used in commercial strawberry production are clearly larger than wild ones. The wild strawberry grows in the woods, in grassland and scrubs. It is native to the temperate regions of Eurasia.



FACT SHEET

Meadow Ecosystem 1



Common Toad
(*Bufo bufo*)



Cuckoo
(*Cuculus canorus*)



Field cricket
(*Gryllus campestris*)



**Earth- or Buff-tailed
bumble bee**
(*Bombus terrestris*)



Red clover
(*Trifolium pretense*)



Field bindweed
(*Convolvulus
arvensis*)



Hawthorn
(*Crataegus
monogyna*)



Common Toad (*Bufo bufo*)

Up to 15 centimetres long, the female toad is much bigger than the male. The skin is warty, greyish brown, yellow or brick coloured with little or no pattern. The beanlike glands behind the eyes are visible and protect the toad by spreading an unpleasant liquid onto its skin. The common toad is found in all kinds of land habitats. It inhabits all of Europe except for Ireland and the far north. The common toad spends most of its time on land. This nocturnal amphibian eats many small animals.



Cuckoo (*Cuculus canorus*)

The cuckoo is a slim, medium-sized bird with a long rounded tail and pointed wings. The male is grey above and on the breast, with horizontal bars below. The female can be grey or brown above with barred belly, breast and throat. It resembles the kestrel and sparrowhawk in flight. The cuckoo adapts easily to different habitats, including all types of woodland, farmland, mountains and coasts. It can be found across Europe. The cuckoo mainly eats caterpillars. It is known as a brood host, whereby the female lays an egg in another bird's nest. The host bird then incubates the egg, and when the cuckoo chick hatches, it pushes out the other eggs and chicks from the nest.





FACT SHEET

Meadow Ecosystem 1 (continued)



Field cricket (*Gryllus campestris*)

Up to 3 centimetres long, the field cricket is black on the whole, except for the forewings, which are brown on a yellow background. It has fine and comparatively short antennae on its large head. Found in Europe, Asia Minor, and northern Africa, the field cricket inhabits dry and sunny regions such as grasslands, gardens and hedges near country roads. Unable to fly, the male protects its territory by chirring from May to September by rubbing its hind wings. It hides in holes that it digs in the ground. It mainly eats plants that hold a lot of water.



Earth- or buff-tailed bumble bee (*Bombus terrestris*)

Up to 24 millimetres long, the queen bumble bee is over 2 centimetres in length and has a wingspan of up to 43 millimetres. Workers and drones are 14-17 millimetres long and have wingspans of 30-35 millimetres. It has a pollen basket in a specially adapted hind leg, in which the bee builds up a dense mass of pollen, slightly moistened with nectar. This is then transported back to the nest. One of the most common European bumblebees it lives in almost any well-vegetated habitat throughout Europe. It nests in the ground, sometimes in a mouse-hole or mole's burrow. When fully developed, each colony comprises a single, egg-laying female – the queen – and a number of sterile females called workers. In general, a minimum of 100 bees occupy one nest, but bigger nests may consist of more than 600 animals.



Red clover (*Trifolium pretense*)

Red clover's leaves are deeply divided into three separated lobes with a V-shaped pale patch in the centre of each one. Its stems branch out and are up to 50 centimetres long. The pink flowers are grouped in plumb flower heads. Red clover grows in open landscapes, particularly in wet meadows and pastures. It is found throughout Europe.



Field bindweed (*Convolvulus arvensis*)

A climbing or sprawling weed, the stems of the field bindweed grow up to 200 centimetres long, winding anticlockwise up any suitable support. The leaves are shaped like arrowheads, and its flowers are funnel-shaped with white to pink coloration. The field bindweed grows in waste ground, grasslands and cultivated areas. It often climbs cereal stalks at the edge of fields.



Hawthorn (*Crataegus monogyna*)

Hawthorn grows as a dense thorny shrub, but can become a small tree up to 12 metres high. The bark is bright brown and flaking. Leaves are variable but normally with three or four pairs of lobes. The white flowers appear in late May and early June, turning pink as they mature. The fruit is small, apple-like, deep red, ripening in September. Hawthorn is found in the lowlands of Europe.



FACT SHEET

Meadow Ecosystem 2



Common buzzard
(*Buteo buteo*)



Weasel
(*Mustela nivalis*)



Bank vole
(*Clethrionomys glareolus*)



Roman snail
(*Helix pomatia*)



Annual Meadow Grass
(*Poa annua*)



Dandelion
(*Taraxacum officinalis*)



Greater plantain
(*Plantago major*)



Common buzzard (*Buteo buteo*)

The buzzard grows to about 50 centimetres long, with a 125-centimetre wingspan. It has broad wings, a short neck and a medium length tail in flight. The colouration varies vastly from dark brown through reddish-brown to white spotted dark. There is often a pale patch on the breast.

The buzzard breeds in different types of forests or small woods with access to open lands, and nests in trees. Often seen perched on fence posts or telephone poles watching for prey, the buzzard is highly vocal, especially in spring. It mainly eats voles, but also birds, susliks, reptiles, amphibians and sometimes insects and earthworms.



Weasel (*Mustela nivalis*)

At 11-26 centimetres in length and with a 4-9 centimetre tail, the weasel is Europe's smallest carnivore. It has a long, slender body, short legs and a short tail. Brownish to ginger in colour, it has a white belly.

In northern Europe, the weasel turns white during the winter.

It thrives in a number of European, Asian and North American habitats, such as forests, fields, gardens, parks and places near people. This agile animal is active all of the time. It mainly eats small rodents such as voles and mice, but also preys on birds and insects.





FACT SHEET

Meadow Ecosystem 2 (continued)



Bank vole (*Clethrionomys glareolus*)

The head and body of the bank vole measure up to 12 centimetres long, with a tail of up to 7 centimetres. It is brownish-red above and grey below. Young voles have a paler, brownish-red colour. The bank vole lives in woods, hedgerows and scrub, including shrubberies and rural gardens. It lives nearly everywhere in Europe. Active both day and night, the bank vole eats fruit, seeds, leaves, moss, fungi and other small animals. It climbs well and often eats fruit on trees and bushes. It usually has three to seven babies at a time.



Roman snail (*Helix pomatia*)

The shell of the roman snail is 6-7 centimetres across, round and light brown, grey or yellow, with stripes running lengthwise. It has four tentacles, with eyes on the longer pair.

The roman snail inhabits different habitats, such as hedges, gardens, parks, grasslands and forests. It is found throughout Europe. Young snails grow for almost three years. When hibernating for the winter, the snail seals off the opening of its shell. It does exactly the same during long dry periods to save water. It is more active in wet conditions, especially in the morning because of the dew. It eats grassy plants.



Annual meadow grass (*Poa annua*)

This grass grows to about 30 centimetres tall and has leaves that are light green arising from flattened shoots. The flower clusters have relatively few branches. The flowers are pollinated by the wind or are self-pollinated without flowers ever opening. Annual meadow grass has a fairly weak and shallow root system. Meadow grass grows well in moist areas in full sun. However, it can also do well in semi-shaded conditions. In coastal regions or in moderate temperature areas where turf is frequently irrigated, annual bluegrass may persist all year. In warmer areas, it usually dies in summer. It is found on arable land, grassland and in gardens.



Dandelion (*Taraxacum officinalis*)

The dandelion has basal leaves that form rosettes and are divided into several triangular lobes. The flower stems are hollow and up to 50 centimetres long. It has yellow flowers and its seeds are in umbrella-shaped structures that serve as parachutes when the wind blows. When leaves or stems are broken a milk-like liquid comes out. This extremely common plant is considered a weed by most people. It grows in different types of waste ground, especially in meadows, along roads, and in gardens throughout Europe.



Greater plantain (*Plantago major*)

A perennial herb, the greater plantain's leaves are rosette-forming and broad. The tiny flowers are grouped in long dense dark flower heads. The flower stems are up to 50 centimetres high. The lowest flowers open first and rings of purplish stamens gradually move up the flower head. The greater plantain grows in open landscapes and as it is resistant to trampling. It is often seen on paths, drives and pavements. It is common throughout Europe.



FACT SHEET

River Ecosystem



European otter
(*Lutra lutra*)



Marsh frog
(*Rana ridibunda*)



Crucian carp
(*Carassius carassius*)



Common green shield bug
(*Palomena prasina*)



Common Reed
(*Phragmites australis*)



Lesser Duckweed
(*Lemna minor*)



Common Bladderwort
(*Utricularia vulgaris*)



European otter (*Lutra lutra*)

The body of the European otter is 70-80 centimetres, and its tail is 40 centimetres. The male is a little larger and heavier than the female. The otter's head is flat and its ears are small and round. The fur is shiny brown. The feet are both webbed and clawed. The European otter lives in all kinds of freshwater areas and sometimes inhabits coastal areas. It lives all over Europe, northwest Africa, and Eurasia. Otters are active at dusk and during the night. They swim and dive exceptionally well, closing their ears and nostrils when diving. Their fur is waterproof and a thick undercoat holds a layer of air that keeps it warm. Its dens are found in earth tunnels, tree roots, boulder piles, shrubs, and banks, and usually entered from beneath the water's surface. Otters mainly eat fish, but also water birds, frogs, crustaceans and molluscs.



Marsh frog (*Rana ridibunda*)

The marsh frog is the largest frog in Europe, growing to be 15 centimetres long. Its body comes in many different colours. In general, its back is green, sometimes with dark spots. Males have big vocal sacs on the sides of their mouths, which appear grey when inflated. Marsh frogs live in different types of wetlands in Central Europe, Asia Minor and some parts of northern Africa. They spend most of their time near rivers or marsh banks when hunting. The mating period is during April and May, during which males call throughout the night. Females lay between 700-13,000 eggs attached to plants in the water. They mainly eat insects, but also other frogs or fish, and sometimes small rodents, capturing prey with their elastic tongues. They hibernate under the water.





FACT SHEET

River Ecosystem (continued)



Crucian carp (*Carassius carassius*)

The Crucian carp can grow to be 51 centimetres long. The dorsal fin is long, with a strong, lightly serrated third spine. Colours range from olive green to reddish brown on the back, while the paler feature a brassy tint with a rounded dark spot near the base of the tail. Its other fins are a bright reddish bronze. This carp is found throughout Europe in still waters and, less commonly, slow-flowing rivers in the lowlands. It is very tolerant of low-oxygen conditions and lives in marshes with only occasional pools of open water, and in small ponds. It eats small invertebrates and water plants.



Common green shield bug (*Palomena prasina*)

The common green shield bug has a flat, shield-shaped body, about 10-15 millimetres long. It is bright green in spring and summer, but becomes dark bronze-green in autumn, just before hibernation. The green shield bug lives in forests, shrubbery, and near bodies of water in most of Europe. This species passes through five nymphal stages, where it loses its shell between each one. Each stage brings a different colouration, and short wings appear in the final stage. The shield bug has specialised sucking mouthparts, which it uses to eat plant sap from a wide range of trees, shrubs and tall plants. In Europe it is a minor pest that causes most of its damage to beans.



Common reed (*Phragmites australis*)

An aquatic grass, the common reed can grow up to 6 metres tall. Strong leathery horizontal shoots growing on or beneath the ground surface, give rise to roots and tough vertical stalks. These stalks support broad leaves 20-40 centimetres long. It has large purple flower heads that turn grey in late summer. Reeds grow in dense colonies along sunny wetland habitats like riverbanks, marshes, swamps, and lakeshores. Reeds are often found in disturbed or polluted soils along roadsides, ditches and dredged areas. It is perhaps the most widely distributed flowering plant.



Lesser duckweed (*Lemna minor*)

Duckweeds are among the world's smallest flowering plants. Individual lesser duckweed plants are tiny, round, bright-green disks, each with a single root. They are found scattered among emergent plants or massed together in floating mats. They have no true leaves. The leaf-like body is called a tallus. It is nearly circular to oval, 2-5 millimetres in diameter. Flowers are tiny and rarely seen. Floating freely in freshwater ponds, marshes, lakes, and quiet streams, duckweed spreads rapidly across quiet bodies of water rich in nutrients like nitrogen and phosphate. It is widespread throughout temperate regions of the northern and southern hemispheres.



Common bladderwort (*Utricularia vulgaris*)

Bladderwort is a carnivorous, underwater, free-floating aquatic plant. Its leaves are delicate and finely-divided under water, and its flowers are bright yellow. The bladderwort uses small traps to capture small invertebrates or even tiny fish that trigger the trap door. It uses enzymes to digest the prey, which provides the plant with nutrients. Floating freely in the shallow water of lakes, ponds, marshes and rivers throughout the northern hemisphere, bladderwort lives where there is a lot of microscopic life, which means there is a healthy aquatic environment.



FACT SHEET

Facts on the Move



Animals migrate periodically for reproduction, finding food, seasonal change, change of day and night, and other reasons.



Many birds such as swallows, storks, nightingales, orioles, kingfishers, and herons come in spring and build their nests in Europe, and some kinds like rooks, peewit-gulls, ducks, and wild geese come from the north to spend the winter in warmer countries to the south.



Only few kinds of birds can fly over large bodies of water: Quails can fly for up to 300 kilometres and the golden eye up to 3,000 kilometres.



Animal migration can take place over small distances. Field sparrows migrate in the autumn from the fields to the towns; some birds come down from the higher to lower areas in the mountains when the weather gets cold.



Animal migration can be short (several hours), but some migration takes years. For example, the European eel goes to Sargasso Sea to reproduce, traveling around 10,000 kilometers.



The north polar kingfisher is an absolute champion of long-distance flying: Every year it flies from Alaska to Patagonia and back.





FACT SHEET

The Living Wealth of Europe

Europe's land, without the human intervention of the last 3,000 years, would be 80 to 90 percent covered by forests today. The remainder would be virgin meadows, pristine mountains and clean rivers. Human activities have made big changes to the original landscape through deforestation, agriculture, the drainage of wetlands, coastline and river course modifications, mining, road construction, urbanisation and other environmentally harmful activities. As a result, lowland forests and wetlands have disappeared, and many plants and animals have had to find refuge in relatively small enclaves. It is now impossible for people to avoid these issues if a love for nature and admiration of its beauty is to grow into wise management and a caring attitude for its resources.

Approximately 6 percent of the entire continent is under protection, but the enacted measures are far from strict or effective enough everywhere. Despite progress in nature conservation in Europe, the population of many species continues to decline rapidly. Presently, about 53 percent of fish species, 45 percent of reptiles, 40 percent of birds and 21 percent of the 12,500 European vascular plant species are seriously endangered or facing extinction. The population of a number of animal species associated with human activities, however, is increasing, and some plant species tolerant to high nutrient levels are spreading. There is also some recovery in the number of breeding birds in areas where organic farming is practiced.



Mammals Europe is home to 250 species of mammals belonging to nine different orders. Of these species, 91 percent are indigenous, while the remaining 9 percent (21 species) are not native to Europe and were introduced by humans, often on a very local scale. Such introductions have had significant impact in Britain, France, Germany and Italy. Forty-four species of mammals are endemic, found mainly in Southern Europe, the Alps and the Caucasus. No mammal species has become extinct throughout Europe in the past century. Currently, however, seven mammals are critically endangered, 19 are endangered, and 56 are vulnerable.



Birds Presently, 78 percent of the 520 recorded species of European birds are believed to be threatened. Six species are critically endangered, six are endangered and 40 are vulnerable. More than one-third of the birds found in Europe are rare, declining or localised to a few sites. The intensification of agriculture, fishing and forestry, together with continued urbanisation and industrialisation, have reduced the diversity and degraded the quality of Europe's natural habitats.

Significant problems arise from the drainage and reclamation of wetlands. The survival of birds such as herons, ducks, geese, swans and shorebirds is intimately linked to wetlands. The need to protect these areas, as well as to maintain a network of wetland "service stations" in order to provide migrating birds with food and shelter, is vital for their protection. Birds of prey constitute a group of species that is especially vulnerable to environmental threats like pollution and contamination. Due to their position at the top of the food chain, they are more exposed than other birds to the accumulation of large amounts of poisons.

Hunting, disturbance and fragmentation of habitats also have negative impacts on bird populations and reproduction.



FACT SHEET

The Living Wealth of Europe (continued)



Amphibians and reptiles As you go southward in Europe, there is a clear increase in the number of species. Most amphibians and reptiles are found around the Mediterranean Sea and in South Eastern Europe. There are currently 71 species of amphibians and 199 species of reptiles, including sea turtles, in Europe. All of them suffer from habitat destruction, the main cause of their decline. Reptile habitats are particularly vulnerable to fires, which destroy habitats and kill animals. The change to habitats is often so fast and strong that the species cannot recover. In Europe, there are eight critically endangered reptiles, 12 endangered and 11 vulnerable. Among amphibians, there are two critically endangered, one endangered and seven vulnerable species. In Europe, amphibians and reptiles have not yet received as much protection, or money for this protection, compared to other species, like birds and mammals. Environmentalists now realise that reptiles and amphibians are among the more heavily threatened animal groups in Europe and require urgent protection measures.



Fish There are 227 species of freshwater fish in Europe: 200 are native and 27 were introduced, mostly from North America. Humans have destroyed a lot of fish habitat and many rare species have disappeared over the past two centuries. There are 13 critically endangered fish, 23 endangered and 47 vulnerable. We know little about the status and distribution of freshwater fish in many countries.

The pollution of lakes and rivers is probably the single most significant factor in the major decline of many fish populations in Europe. Most pollution comes from domestic, agricultural or industrial wastes, and can be so toxic that all fish species present are killed. The impact of land use changes (land drainage schemes, monoculture forests, filling-in of ponds) often results in problems such as silting, increased acidification and alteration of the hydrology, affecting important sites for fish. Migratory species are particularly threatened by dams and other obstructions, and if such fish are unable to reach their spawning grounds they may become extinct within a few years.



Plants Compared with other parts of the world, Europe has few plant species. There are more flowering plants (some 12,500 species) in some parts Europe and less in others. A lot of Europe's original plants grow in mountain regions. There are many threatened plant species in Europe, especially in Central Europe. Many species are gone from their original home in Central Europe and are now more in Eastern Europe. Economic growth and more farming in Eastern Europe may make things worse if nothing is done. The unique diversity of habitats and the large number of endemic plants in some eastern and southern regions, such as the Carpathian, Trans-Caucasian and Balkan mountains, the maritime Alps, Cyprus, the Greek mountains, Crete and Sierra Nevada, make their decline or loss a matter of global importance.

There are things that can help plant species diversity, such as: reducing pollution; making an international system of large nature reserves, primarily in comparably unaffected regions such as the Alps, Central and Eastern Poland, northeastern France, and Slovakia; and avoiding further loss of the most threatened plant habitats (damp meadows of large watercourses, dry grasslands, coastal dunes, oligotrophic bogs and lakes, and inland salt springs).





FACT SHEET

What Do We Know About...



Red deer (*Cervus elaphus*)

Description: Its body length is about 2 metres long. The male (stag) is larger than the female (hind). During summer, the body colour is reddish-brown, and greyish-brown in winter. Calves are spotted. Stags grow impressive sets of antlers that can weigh up to 15 kilograms. The antlers are shed each season and grow back larger than before. The shape and size of the antlers depends on the age and health of the stag, and greatly determines the stag's status and rank among members of his species.

Habitat and range: The red deer lives in deciduous, mixed and coniferous forests up to the tree line, as well as parkland, upland moors and river valleys throughout Europe.

Habits and food: The red deer runs and jumps very well. The hinds live in groups with their calves. Stags compete both violently and non-violently with their rivals during mating season (September-October). Mainly herbivorous, the red deer eats leaves, treeshoots, bark and fruit.

This impressive animal is often a victim of road traffic and illegal poaching.



Little owl (*Athene noctua*)

Description: This comparatively small owl is 25 centimetres long with a large, broadly rounded head, long legs and a short tail. Brown above speckled white, it is whitish below densely streaked brown with yellow eyes.

Habitat and range: The little owl prefers to breed in open country with a mixture of fields, copses, cliffs, gardens, parks, hedgerow trees, rocks and semi-deserts. It is found across Europe except Ireland and the far north.

Habits and food: The little owl is sedentary and partly diurnal, often seen perched and fully exposed. It feeds on mice, worms, insects, birds, small amphibians and reptiles. Nesting in holes in trees, buildings or rocks, its most common call is a sharp "kee-ew."

This fascinating bird is often the subject of myths and superstition.



Hoopoe (*Upupa epops*)

Description: About 27 centimetres long, the hoopoe is one of the most striking and distinctive birds in Europe, with a puffy-pink head, neck and breast, and black- and white-striped wings, back and tail. Its long, narrow bill curves downward slightly. It has an erectile crest on its crown that makes it resemble an Indian chief of lore.

Habitat and range: The migratory hoopoe breeds in open, grazing country with copses, hedges and bushes. It is found across Europe except for the UK, Ireland and northern Europe.

Habits and food: The hoopoe's song is a hollow "oop-oop-oop" repeated several times. It nests in the hollow of trees or walls. If the chicks are disturbed they emit a foul-smelling liquid. The hoopoe feeds mainly on insects.

This attractive bird is easily identifiable by its appearance and song.



FACT SHEET

What do we know about... (continued)

**European pond terrapin** (*Emys orbicularis*)

Description: Up to 36 centimetres long, the European pond terrapin has a life expectancy of 70 years. Its carapace is comparatively flat, brownish black to greenish and greyish with light stripes or dots. Its legs, neck, head and tail are greyish black with yellow spots.

Habitat and range: Inhabiting all types of fresh or semi-salt water wetlands, and even small puddles, the European pond terrapin is found in Europe and eastern Asia.

Habits and food: The European pond terrapin feeds on amphibians, fish, water invertebrates and carrion.

This amphibian depends strongly on the availability of wetlands. Drying up wetlands is essentially a death sentence to the terrapin.

**European Tree frog** (*Hyla arborea*)

Description: Up to five centimetres long with cups on the tips of its fingers, the European tree frog varies in colouration depending on environment, temperature and humidity. It can be greyish brown or bright green.

Habitat and range: Inhabiting deciduous trees and shrubs, it is found in central and southern Europe.

Habits and food: This frog climbs trees extremely well. It spends the winter under stones, trees and foliage. During breeding season, the male calls with a resonator on its throat and can be heard over a kilometre away. It is active mainly at night, but also during the day. It feeds on small invertebrates.

This attractive animal is easily identifiable. Its reproduction depends on the existence of water basins.

**Honeybee** (*Apis mellifera*)

Description: The honeybee is perfectly adapted to its way of life. Workers and drones grow to be 15 millimetres long, and the queen reaches 20 mm. The abdomen is mainly brown with dark and pale bands. The whole body is covered by fine hairs, and on the hind pair of legs it has a special "sack" where it collects pollen.

Habitat and range: Wild populations of honeybee live in rocky and woody regions, but people often keep bees to produce honey. They are found in Europe, Africa and Asia.

Habits and food: Honeybee colonies have a lot of workers, some drones and one queen. They have a sophisticated society and communication system. The honeybee collects pollen and produces honey that serves as food in the winter. Honey and larvae are kept in a honeycomb made of wax. The bees use a complex system of signals to tell each other about new fields of flowers. When hibernating, the bees flutter their wings in order to maintain a specific temperature in the hive. It stings once to defend itself and then dies.

Some scientists now think that mobile telephones confuse bees' navigation and has reduced dramatically their population.





FACT SHEET A Walk on the Beach



Somewhere along the ocean beachfront at sunset, there was an old man taking a walk. A big storm had just calmed and the man enjoyed taking in the sea breeze. He was deep in thought when suddenly he noticed a child. The child kept picking up things from the sand and throwing them into the water. The old man became curious, so he came closer to see that the boy was picking up starfish from the sand and throwing them back into the ocean. Only then did the old man notice that the beach was strewn with hundreds, perhaps thousands, of starfish.

“What are you doing?” the old man exclaimed. “You’re just a little boy and there are thousands of starfish around. Do you really think you can change anything?”

The boy looked at him, picked up a starfish from the sand, threw it into the ocean and said: “Well, for that starfish I’ve just changed everything!”

.....

Task for reflection at home: what could my family and I do to help protect the plants and animals around our home, in our region, in our country (*suggest ideas, and if possible, discuss them with your family*):

1 Near my home there are:

We could:

2 In our region we can find:

We could:

3 Our country is proud of hosting the following plants and animals:

To protect them we need to: