Natural Science

Natural Science 5 is a collective work, conceived, designed and created by the Primary Education department at Santillana, under the supervision of Antonio Brandi Fernández.

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Do not write in this book.
Do all the activities in your notebook.
Back to the countryside

Over the last 100 years, many people have migrated from rural areas to big cities. As a result, over half of the world’s population now lives in cities.

The main reason for this migration is that urban life provides more opportunities than rural life. Cities offer more jobs, have more stores and shopping centres, and provide more options for entertainment.

However, life in big cities is often hurried and stressful. In addition, there are many environmental problems in cities which can harm the health of the people living there. Air pollution causes respiratory problems; noise pollution can result in ear damage; and light pollution prevents people from seeing the starry sky.

Rural areas do not usually have these environmental problems. For this reason, more and more people are deciding to move back to the countryside.

Read and understand

- Why have people migrated from rural to urban areas over the last 100 years?
- What types of pollution can you find in cities?
- What problems do they cause?
- Why are some people moving back to the countryside?
- How are the two places in the photographs different?
- SPEAKING. Discuss with your group the advantages and disadvantages of living in cities or in the countryside.

Know how to

- Identify different types of ecosystems.
- Talk about the effects of human activity on the environment.

Final task

Compare urban and rural ecosystems.
Environmental pollution

- Our daily activity can affect the environment where we live. The effects can be positive or negative.
- In order to reduce the effects of pollution, we can apply the three Rs rule: Reduce, Reuse and Recycle.

1. Look at the photographs and explain some of the effects human activity can have on the environment.
Terrestrial ecosystems are located on land and are surrounded by air.

There are different types of terrestrial ecosystems. Some examples are **forests**, **mountain grasslands**, **deserts** and **steppes**.

## Forests

Forests are ecosystems with many trees. In forests, trees provide shelter and food for various animals, including birds, like owls, and small mammals, like squirrels and foxes.

There are different types of forests depending on the climate. For example:

- **Atlantic forests.** These grow in regions with a humid climate and cool summers. They are home to animals like bullfinches, bears and wolves.
- **Mediterranean forests.** These grow in regions with a dry climate and warm summers. They are home to animals like eagles, lynxes and rabbits.

## Mountain grasslands

Plants in mountain grasslands are **herbaceous**, which means they have soft, flexible stems. These grasslands extend over large areas of fertile soil that can be used as **pastures** for cattle to graze.

Mountain grasslands consist of grasses, clovers and wildflowers. They grow in humid regions with cold winters and are home to animals like butterflies, grasshoppers, ladybirds and deer.

## Deserts and steppes

Deserts and steppes are found in very dry regions with extreme temperatures. Living things in these ecosystems have adapted to severe conditions.

Typical plants include herbaceous plants, like grasses, and small shrubs, like thyme. Deserts and steppes are home to animals like hares, mice and lizards.
Aquatic ecosystems are located in water environments.

Depending on salinity, which is the amount of salt dissolved in water, there are two types of aquatic ecosystems: marine ecosystems and freshwater ecosystems.

**Marine ecosystems**

Marine, or saltwater ecosystems have high salinity. Water in these ecosystems is in constant movement due to waves and currents. Some marine ecosystems are:

- **Sandy beaches.** These are affected by tides and by waves. They are home to seagulls, oystercatchers, sand fleas and sandworms.
- **Rocky shores.** These are shallow areas with sunlight, which allows algae to grow. They are home to starfish, octopuses, sea anemones and moray eels.
- **Open sea.** This is the deep sea far from the coast. Sunlight reaches depths of about 100 m, so algae cannot grow below this point. The open sea is home to jellyfish, sea turtles, sardines, tuna, sharks, dolphins and whales.

**Freshwater ecosystems**

Water in freshwater ecosystems has very low salinity. Rivers and lagoons are freshwater ecosystems.

- In **rivers**, the water is always moving, so living things need to adapt to the flow. Rivers are home to otters and trout, which live in the upper courses of rivers where the water is cold and flows fast.
- In **lagoons**, the water barely moves, so some plants like reeds can grow. Vegetation provides shelter for birds like herons and ducks. Lagoons are also home to frogs, water snakes and water beetles.

**ACTIVITIES**

1. **WRITING.** Compare the climates of the terrestrial ecosystems.
2. **Draw and label a picture of a terrestrial ecosystem.**
3. **Find out about a local aquatic ecosystem. Make an index card including a picture and a description of the flora and fauna.**
The environment

The environment of a living thing consists of everything that affects it.

For example, the environment of an oak tree is made up of the climate, the soil, the air, the herbivores that eat its acorns, and the people who may chop down the tree.

The environment of a mountain goat is made up of the climate, the rocks, the water it needs, the plants it eats, the wolves that may attack it, and any human activity on the mountain, such as the construction of roads and houses.

Human activity changes the environment

All human activity has an effect on the environment.

Some actions, such as collecting dry branches from a forest for your fireplace, have a small effect. Other actions, such as building a shopping centre where there was a forest, have a much larger impact.

Today, human activity has a greater impact on the environment than in the past. This is because of population growth and technological development.

Bare seafloors surrounding the Canary Islands

Large areas of the seafloor surrounding the Canary Islands have become a white desert, where few living things exist. These areas were once covered with algae and full of life. How did this environment change?

The algae were food for many fish and invertebrates, such as sea urchins, and the sea urchins were food for different types of fish. As a result of overfishing and pollution, the fish populations greatly decreased. This meant the sea urchins were free of natural predators, so their population increased dramatically. The sea urchins fed on the algae until no algae were left.

Without algae, these bare seafloors cannot support life.
Effects of human activity on the environment

Some of the negative effects of human activity on the environment are:

- **Pollution.** This is the accumulation of rubbish and harmful substances in air, water and soil. As a consequence of air pollution, the temperature of our planet is increasing. This is known as **global warming**.

- **Deforestation.** This refers to the disappearance of forests. It can happen due to forest fires or because people cut down too many trees. Deforestation leaves the soil unprotected against **erosion**. It also threatens the animals that depend on trees.

- **Desertification.** This is the slow transformation of fertile land into desert. It usually happens as a consequence of deforestation. Soil with no vegetation can be easily eroded. This means that water and wind carry away the fertile layer of soil.

- **Endangered species.** These are living things at risk of becoming **extinct**. Pollution, global warming, deforestation and **overexploitation** are threats to many species of animals and plants. Overexploitation occurs when we use up plants or animals faster than they can reproduce.

### ACTIVITIES

1. **Look at the photographs to the right.** Which are components of a rabbit’s environment? Explain.

2. **WRITING.** If the secondary consumers in an ecosystem disappear, how will the producers be affected? Explain with an example.

3. **What negative effects have human activities had on the ecosystems in your area?**

4. **ICT.** Search the Internet for information about an animal that has become extinct in Spain.
Protecting the environment

Human activity affects the environment. This means that we are all responsible for protecting it. Governments and individuals can help look after the environment.

**Responsible governments**

National and local governments have an obligation to protect the environment.

Some government protection measures include:
- Monitoring the conditions of natural areas.
- Disposing of waste appropriately.
- Providing water purification systems.
- Studying the environmental effects of construction projects before approving them.
- Establishing hunting and fishing restrictions.
- Establishing animal protection laws.

**Responsible citizens**

As individuals, we can all look after the environment on a daily basis.

Some ways of protecting the environment are:
- **Recycling waste.** For example, we should recycle plastics, paper and glass.
- **Saving energy.** For example, we should turn off lights when we do not need them, use low energy light bulbs and travel by public transport.
- **Saving water.** For example, we should turn off the tap while brushing our teeth, and we should have showers instead of baths. We should also run our dishwashers and washing machines with full loads.
- **Respecting nature.** For example, we should keep our noise level down when we visit natural areas. At the end of our visit, we should take all our rubbish with us.

**WORK WITH THE PICTURE**

- Write out the rules in sentences.
- *Keep your dog on a lead.*
- Discuss the rules with a partner.
Nature Reserves and National Parks

National and local governments can protect some natural areas by declaring them **Nature Reserves** or **National Parks**.

In Spain, protected natural areas include reserves and parks, as well as protected marine areas. Other kinds of protected natural areas are called **Biosphere Reserves**. These areas are declared by international organizations. They are considered good examples of achieving a balance between human activity and nature.

Laws protect the flora, fauna and physical environments of all these places. For example, activities such as hunting, fishing or camping are restricted, and visitor access is limited.

### ACTIVITIES

1. **Find out about the air pollution level in your city or a nearby city.**
   - What are its main causes?
   - What effects can air pollution have on people and the environment?
   - What measures can the local government adopt to fight air pollution?
   - What can citizens do?

2. **Make a list of things you do every day to protect the environment. What else can you do to care for the environment?**

3. **Search the Internet for information about a Biosphere Reserve in Spain. Write a brief description of its physical environment, flora and fauna, and include pictures.**

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*Yellowstone National Park in the USA.* It was declared a protected area in 1872, and is considered the first national park in the world. In 1976, Yellowstone was declared a Biosphere Reserve.
Compare urban and rural ecosystems

People can live in urban and rural ecosystems. We are going to analyse these two ecosystems in order to compare them.

Analyse the ecosystems.

1. Copy this table in your notebook. Then, complete it with the items in the list below.

<table>
<thead>
<tr>
<th>components of the ecosystem</th>
<th>urban ecosystem</th>
<th>rural ecosystem</th>
</tr>
</thead>
<tbody>
<tr>
<td>physical environment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>living things</td>
<td></td>
<td></td>
</tr>
<tr>
<td>interrelationships</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The vegetation is abundant and the fauna is very diverse.
- Few people live here and almost everything is within walking distance.
- Food webs are complex due to the abundance and diversity of living things.
- There are many buildings and paved areas.
- Lots of rubbish is produced, mainly plastics.
- Soil can be rich and fertile.
- The vegetation is scarce and the fauna is limited.
- Food webs are simple and depend on human activity.
- Plant products can be used as food for animals, and animal waste can be used as fertilizer.
- Many people live here. They often use cars, buses and trains to move around.

Compare both ecosystems.

2. What are the main differences between the components of both ecosystems?

3. In which ecosystem are the effects of human activity more negative? Why?
1 **SUMMARY.** Copy and complete the text in your notebook, using these words.


** ecosystems are located on land. Forests provide food and ** for animals. In mountain **, all plants are **. Deserts and ** are dry with extreme temperatures.

** ecosystems, such as rocky **, have high salinity. Freshwater ecosystems, such as **, have very low salinity.

The ** of a living thing consists of everything that affects it. ** has negative effects on the environment, such as **, deforestation, ** and an increase in endangered species.

National and local ** have an obligation to protect the environment. Responsible ** can also look after the environment. National Parks and ** are protected natural areas.

2 **Copy and complete the table. Then, add two columns: mountain grasslands and deserts and steppes.**

<table>
<thead>
<tr>
<th>Atlantic forests</th>
<th>Mediterranean forests</th>
</tr>
</thead>
<tbody>
<tr>
<td>flora</td>
<td></td>
</tr>
<tr>
<td>fauna</td>
<td></td>
</tr>
</tbody>
</table>

3 **Answer the questions.**

- What is salinity?
- What is the main difference between rivers and lagoons?

4 **What problem is shown in the photo? What are its consequences?**

5 **ICT.** Search the Internet for information about an endangered species in your region.

- What are the threats to this species?
- What measures have been taken to help avoid its extinction?

6 **GROUP WORK.** Divide your group into government and citizens. For each item, discuss what you can do to protect the environment. Then, share your ideas.

- water
- waste
- natural areas

7 **CRITICAL THINKING.** How does reusing or recycling paper help to protect forests?
Check your vocabulary

carbon dioxide one of the gases in air. Plants need it to make their food.
chlorophyll the green substance in plants that traps sunlight.
commensalism a relationship when one species benefits and the other remains unaffected.
community all the populations in an ecosystem.
competition a relationship between different species that have the same needs.
consumers living things that obtain their food from other living things.

decomposers microorganisms and fungi that break down dead animal and plant materials.
deforestation the disappearance of forests, which leads to erosion.
desertification the slow transformation of fertile land into desert.
ecosystem all the organisms living in one place, as well as the physical environment they live in.
elaborated sap the food that plants make. It is distributed through phloem vessels.
endangered species living things that are at risk of becoming extinct.

environment everything that affects a living thing.
food chain the representation of how living things feed on other living things.
food web many food chains joined together and interconnected form a food web.
herbaceous herbaceous plants have soft flexible stems.
mutualism a relationship between two species when both benefit.
parasitism a relationship when one species benefits while the other suffers.
phloem vessels tubes that transport elaborated sap to all parts of the plant.
photosynthesis the process by which plants make their own food.
pollution the accumulation of rubbish and harmful substances in air, water and soil.
population all the organisms of one species in an ecosystem.
producers living things that make their own food.
raw sap the mixture of water and mineral salts that plants absorb through their roots.
salinity the amount of salt dissolved in water.
scavengers animals that feed on the remains of dead animals.

defined sap the mixture of water and minerals that plants absorb through their roots.
described sap the mixture of water and minerals that plants absorb through their roots.
described environment the physical environment in which the organism lives.
described animals and plants the animals and plants that can be found here.

developed sap the mixture of water and minerals that plants absorb through their roots.
described environment the physical environment in which the organism lives.
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Define these types of consumers:
- Primary consumers.
- Secondary consumers.
- Tertiary consumers.

Observe the photograph and answer these questions.
- What type of ecosystem is it?
- Describe the physical environment.
- What animals and plants can you find here?
Check your progress

Copy and write the correct answers in your notebook.

1. Carbon dioxide is...
   a. a mineral salt.
   b. one of the gases in air.
   c. part of the function of sensitivity.

2. Raw sap is a mixture of water and...
   a. nutrients that is found in the phloem vessels.
   b. mineral salts.
   c. sunlight.

3. A physical environment does not include...
   a. animals and plants.
   b. rocks and water.
   c. temperature and humidity.

4. All living things are grouped into...
   a. communities.
   b. populations.
   c. species.

5. Carnivores can be...
   a. producers.
   b. secondary consumers.
   c. decomposers.

6. Fauna refers to...
   a. all the animals in an ecosystem.
   b. all the plants in an ecosystem.
   c. the physical environment.

7. The type of relationship in which neither of the species benefits is...
   a. commensalism.
   b. mutualism.
   c. competition.

8. Chlorophyll is mainly found in the...
   a. leaves and the roots of plants.
   b. roots and the stem of plants.
   c. leaves and the stem of plants.

9. Herbaceous plants are mainly found...
   a. on sandy beaches.
   b. in mountain grasslands.
   c. in forests.

10. Stomata...
    a. absorb mineral salts.
    b. take in carbon dioxide.
    c. carry out photosynthesis.

Check your answers
- Correct the wrong answers.
- Write in your notebook which lessons you need to practise more.

Think like a biologist

Imagine you are a biologist. You are going to take a group of students on an excursion to learn about the ecosystem of a Mediterranean forest.

Explain to them:
- what type of vegetation is most common.
- the characteristics of the climate in Mediterranean forests.
- what animals are the most common there and what type of relationships they have.