GUARDIANS OF NATURE

HEROES IN ACTION TO SAVE THE PLANET

Interreg
Co-funded by the European Union
Italy – Croatia
ACTION

BASIC LEVEL

Preface

The digital educational kit “Guardians of Nature” provides **digital materials** that can be freely downloaded from the page https://www.italy-croatia.eu/web/action/library. This educational tool is created as part of the dissemination activities of the **Interreg Italy-Croatia ACTION project.**

The educational kit is designed with language suitable for primary and middle school students, to raise awareness and introduce them to the themes of biodiversity protection, climate change, and Nature-based solutions, as well as the actions that every European citizen can take to preserve the environmental heritage. The contents of the educational kit have been structured taking into account the current needs of school curricula for achieving **interdisciplinary skills** between Science and Civic Education, combining concepts of a purely scientific nature with those of key European competences, which as a whole represent the necessary skills for the personal fulfilment of each student, also as a future European citizen.

The kit includes a series of **educational supports** divided into a single module for students in the early years of primary school and 3 modules and 3 teaching units for the later years of primary and middle school, which can be integrated in various ways to create a kit suitable for both a few and several meetings. At the link above, in addition to the student manual for use in the classroom, you can download the teacher’s manual and printable sheets for carrying out extracurricular activities.

Comune di Ravenna

RB

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA | DEPARTMENT OF BIOLOGICAL, GEOLOGICAL AND ENVIRONMENTAL SCIENCES

ISTITUTO DELTA ECOLOGIA APPLICATA

ENTE DI GESTIONE PER I PARCHI E LA BIODIVERSITA' DELTA DEL PO

VRANSKO JEZERO Park prirode • Nature Park

Parco Naturale Regionale Dune Costiere da Torre Canne a Torre San Leonardo

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Chapter 1

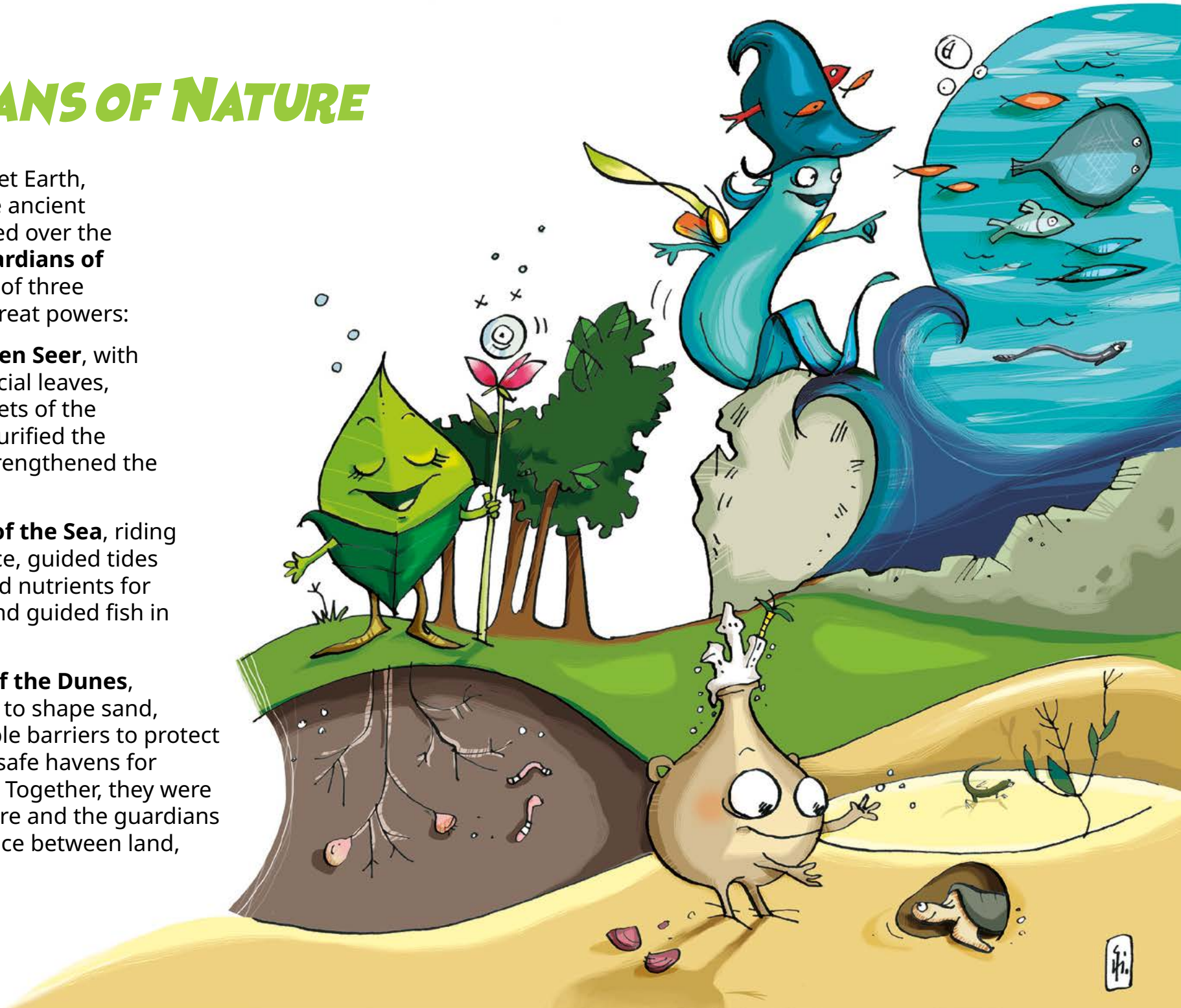
Guardians of Nature

In the heart of Planet Earth, on the coasts of the ancient Adriatic Sea, watched over the **Alliance of the Guardians of Nature**, composed of three superheroes with great powers:

Little Leaf, the **Green Seer**, with deep roots and special leaves, sniffed out the secrets of the air and the earth, purified the atmosphere and strengthened the soil;

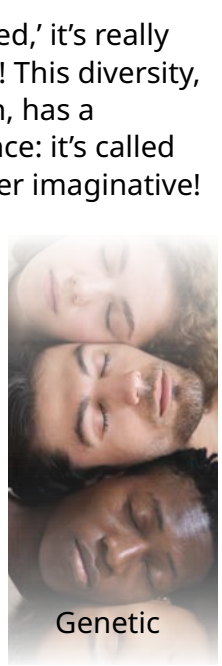
Wave, **the Knight of the Sea**, riding the waves with grace, guided tides and currents, moved nutrients for marine creatures and guided fish in their migrations;

Sand, t**he Wizard of the Dunes**, thanks to his ability to shape sand, created impenetrable barriers to protect the coast and built safe havens for animals and plants. Together, they were the keepers of nature and the guardians of the perfect balance between land, water and air.



BIODIVERSITY AND ECOSYSTEMS

When we say 'the world is beautiful because it's varied,' it's really true: seeing different plants and animals is fantastic! This diversity, meaning all the different forms of life living on Earth, has a somewhat difficult but very important name in science: it's called **biodiversity**. It's like saying life on our planet is super imaginative!


Genetic


Species


Ecosystem

We find biodiversity not only in forests or oceans but also in our cities: from the tops of buildings to the bottom of any puddle.

Think of nature as a huge puzzle: each piece is a tree, an insect, a bush, a puddle, a pile of earth, a flower, a bird, or a mushroom. If pieces are missing, the puzzle isn't complete and doesn't work well. Biodiversity is just like that: many beautiful, diverse puzzle pieces that work together, making nature more complete and varied, but also stronger and healthier!

All these elements together—living beings and the environment where they live—are connected and influence each other. In science, we talk about another very important concept: the 'ecosystem,' which is made up of:

- **Non-living components**: all those things that don't have life, like water, earth, rocks, sunlight, and air;
- **Living components**: living organisms, like animals, plants, fungi, and all microorganisms (those tiny beings that require a microscope to be seen!).

These parts of the ecosystem influence and help each other. If one of the parts is modified or a piece is lost (for example, if many trees disappear or if the water becomes polluted), the other parts will also suffer, and the entire ecosystem could change and stop functioning. That's why it's important that all parts of the ecosystem are in **balance** and take care of each other!

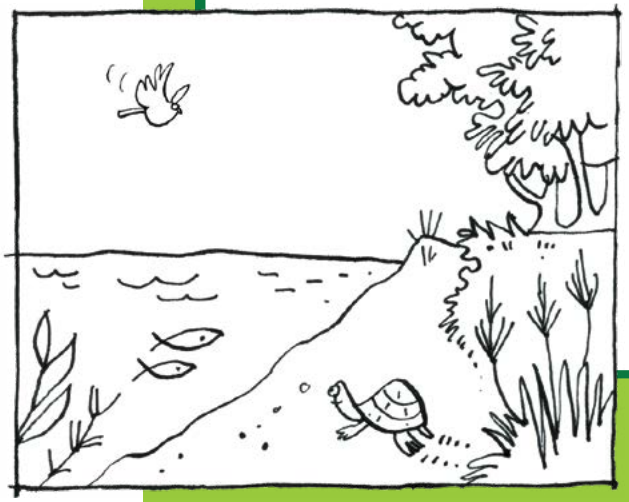
22 May INTERNATIONAL DAY

To celebrate the adoption of the Convention on Biological Diversity text in 1992, which defines the term biodiversity, the United Nations created the **International Day for Biological Diversity** (in English, Biodiversity Day).

Every year, a different theme is chosen to highlight the various aspects that make up biodiversity. Search the web for this year's theme

IN ACTION

Colour the abiotic and biotic components of the ecosystem below using two colours of your choice.



KEYWORDS

Habitat: a terrestrial or aquatic area with physical and environmental features that allow certain organisms to live or develop. Example: a marsh.

IN ACTION

Grab your pen and write the names of the species in the appropriate labels under the photos in the accompanying illustration. You'll find some suggestions below, but be careful, there are more species listed than present in the illustration.

- *Eel*
- *Dragonfly*
- *Heron*
- *Flamingo*
- *Sturgeon*
- *Kentish Plover*
- *Turtle*
- *Nutria*
- *Frog*
- *Dolphin*
- *Fox*
- *Wolf*
- *Red crayfish*
- *Mussels*

L'AMBIENTE COSTIERO

The coastal environment is a very special place where land and sea are truly close! In this area, you find many different types of ecosystems, which, like "homes" rich in plants and animals, create diverse environments. Just behind the **beach** are environments where fresh water from rivers meets and mixes with salt water from the sea. Some examples are **swamps**, characterized by lots of water and many plants, and lagoons, areas of salt water separated from the sea. Another example is river mouths, where a river meets and "flows" into the sea.

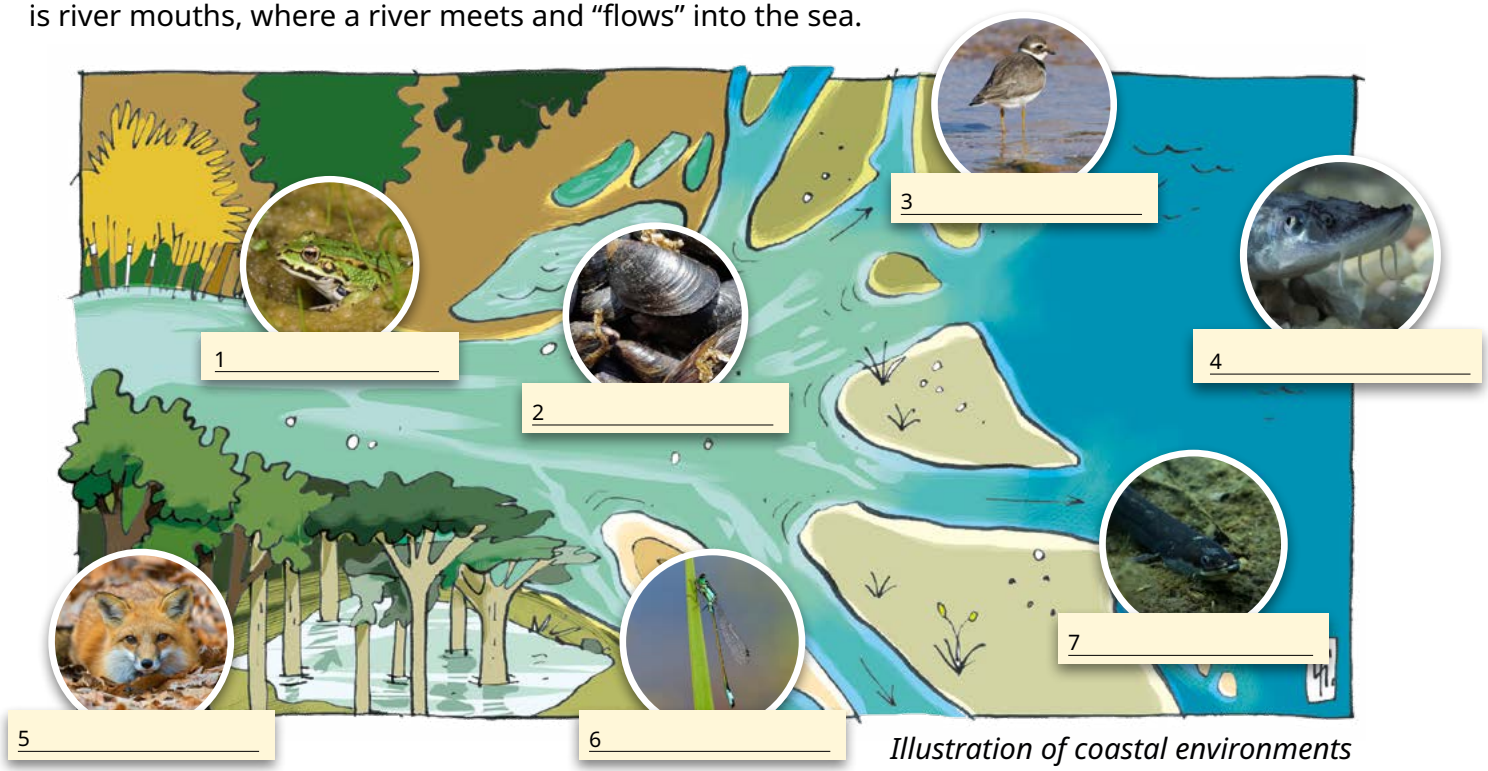


Illustration of coastal environments

In these environments, the water is neither fresh (like the water you drink) nor salty (like seawater), but a bit of both! This "special" water is called **brackish water**.

The coastal environment is unique because it's always in motion: there can be movements in the sea water like tides, the wind modifies the **sand dunes**, and the amount of salt present in the water in the areas behind the beach is never fixed. It's a somewhat complicated environment, but precisely because of this, it's **full of life** with living beings of all sizes: countless **bacteria**, different **plants** and **animals** find water, food, and a safe place to live here.

These areas we are studying are all characterized by a common element: the presence of water. In technical terms, they are called wetlands. Even though wetlands cover only a small part of the Earth (6%), they are very important environments because they:

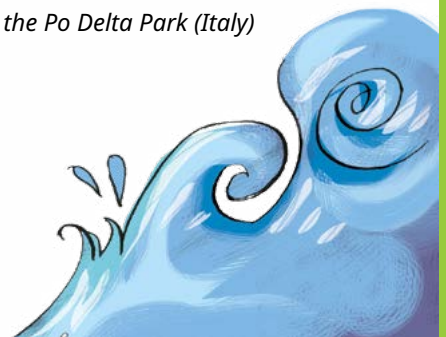
- **Protect coasts** from stronger waves that could sweep them away;
- Are like natural "**farms**" where food is found, such as clams and mussels in lagoons;
- **Collect excess water** when it rains a lot and thus help prevent floods;
- **Provide water reserves** for us and for animals.

The **biodiversity** that lives in wetlands is very rich and fundamental for activities like fishing, tourism, and for having clean water to use for cultivation. Protecting wetlands is a very important gesture that also helps us combat climate change (a concept explored in chapter 2): if these areas disappear, dangers like floods can increase, or less food may be available.

Unfortunately, over the years, humans have destroyed many wetlands around the world to build cities and businesses or by using or draining the water that created them. But humans, thanks to the study of the environment and nature, have made an international agreement to protect these precious areas: the **Ramsar Convention.**

Lake Vrana (Croatia)

Flooded forest in the Po Delta Park (Italy)



02 Feb

International Day

On **February 2nd**, World Wetlands Day is celebrated globally, the day on which, in 1971, the Ramsar Convention was signed, promoted by specialized international offices and bodies and supported by numerous international organizations (FAO, UNESCO, CIC, ICBO, IUCN, WWF...).

Keywords

Wetlands: environments with still (stagnant) or moving (flowing) water, with a depth of up to 6 meters. Areas with wet soil where aquatic plants grow are also considered wetlands. These areas can be permanent (always present) or exist only at certain times of the year (temporary), depending, for example, on abundant rainfall. A swamp, a wet meadow, or a lagoon are all examples of wetlands.

KEYWORDS

Habitat: the word comes from the Latin "habitare" (to inhabit) and refers to a place, on land or in water, where a particular group of animals or plants finds everything it needs to live, such as a specific temperature or a particular type of soil. A swamp is an example.

Extinction: when a species completely disappears, and there are no living individuals of that species left, it's called extinction. We know that most species that have lived on Earth are no longer here today. We know this thanks to fossils, which are like ancient "photographs" of animals and plants. A famous example is the Dodo, a large bird that lived on the island of Mauritius and no longer exists. A species is at risk of extinction when only a few animals or plants of that type remain, and their number continues to decrease. Even though extinction can happen naturally, humans often speed up this process!

CONSERVING NATURE

We've imagined ecosystems as a big puzzle. If you take out a piece, the puzzle is no longer complete, and nature's balance breaks. This is what happens when we **lose part of biodiversity**. By losing certain types of plants, animals, or environments, all of nature suffers, and we humans experience the consequences too! Less biodiversity means we could face more natural disasters, have less food and water available, and even **get sick more easily**.

We humans have always changed the Earth with our activities, sometimes improving the environment, but often creating problems, such as:

- **climate change**: when it's too hot or too cold compared to usual.
- **habitat destruction**: animals and plants lose their "home."
- **changes in the life cycle of some species**: some animals or plants can no longer live as they used to, which can lead to their extinction.

That's why it's important to understand that we must live in balance and protect nature, for our own well-being. You can help protect nature too! Here's how:

- **don't waste**: what we buy or use needs energy to be produced. If we throw it away, we waste energy. So, think carefully before taking something you don't need! Whether it's food or clothes, always ask yourself if you truly need it.
- **help pollinating insects like bees**. Without them, most plants couldn't produce seeds or fruits, and much of the food we eat depends on these insects. You can help them by creating places where they can hide or nest, not destroying their hiding spots, and putting flowering plants on your windowsill.
- **respect nature**, especially when you go to a park or a forest: observe animals from a distance, collect only what you're allowed to, and always take your trash with you.

Chapter 2

The shadow of change

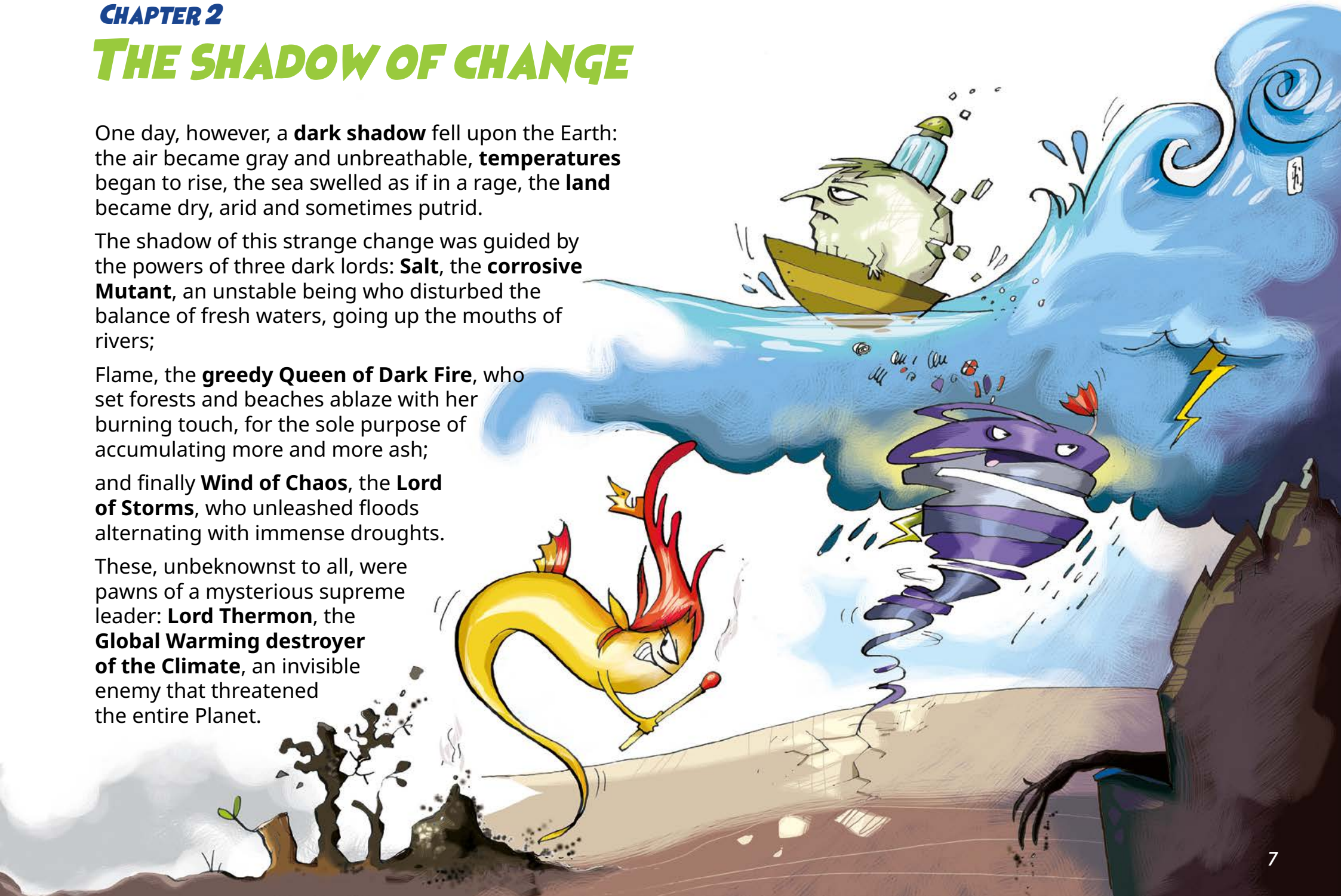
One day, however, a **dark shadow** fell upon the Earth: the air became gray and unbreathable, **temperatures** began to rise, the sea swelled as if in a rage, the **land** became dry, arid and sometimes putrid.

The shadow of this strange change was guided by the powers of three dark lords: **Salt**, the **corrosive Mutant**, an unstable being who disturbed the balance of fresh waters, going up the mouths of rivers;

Flame, the **greedy Queen of Dark Fire**, who set forests and beaches ablaze with her burning touch, for the sole purpose of accumulating more and more ash;

and finally **Wind of Chaos**, the **Lord of Storms**, who unleashed floods alternating with immense droughts.

These, unbeknownst to all, were pawns of a mysterious supreme leader: **Lord Thermon**, the **Global Warming destroyer of the Climate**, an invisible enemy that threatened the entire Planet.



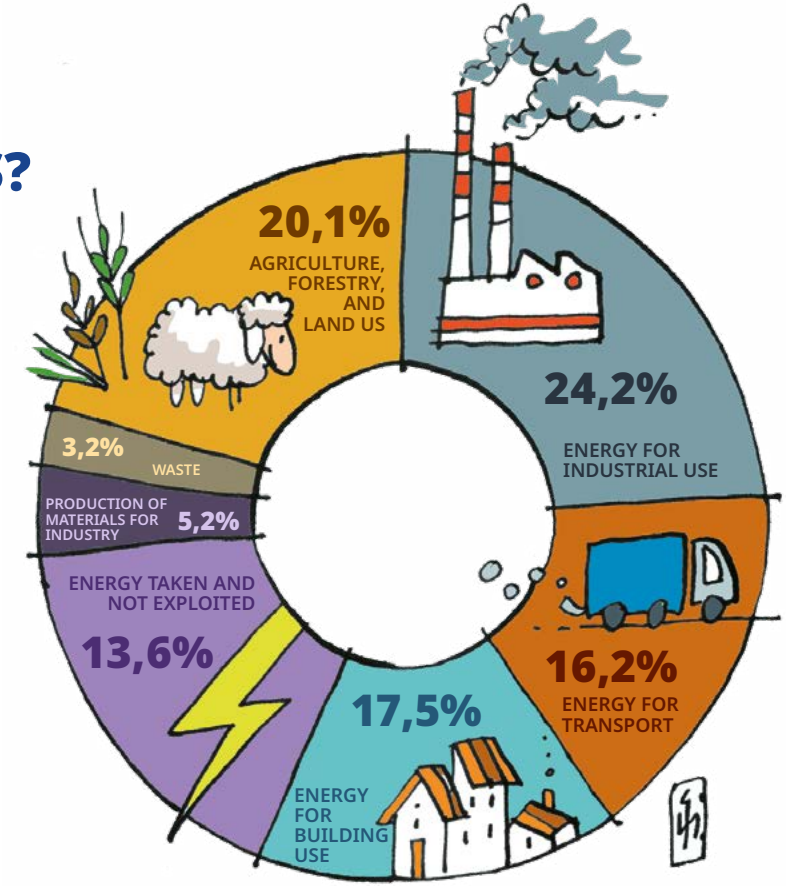
CLIMATE CHANGE: OUR FAULT,OR NATURE'S?

Have you ever heard on TV or social media that "the climate is changing"? It happens every day now! Do you know what climate change is? Actually, let's take a step back first: what is climate?

Imagine keeping a weather diary for many, many years, perhaps for 30 years or more! Every day you write if it's sunny, if it's raining, if it's hot or cold. At the end of all those years, you look at your diary and say: "Ah, in this place, it's usually hot and sunny in summer, while in winter it often rains and is cold."
Well, that's exactly what climate is: it's like the "summary" of how the weather behaves in a place over many years. It's not to be confused with today's weather, which is always changing! What you see outside your window right now (the sun, the rain, the strong wind), which is called atmospheric weather, is the weather that changes every day. The climate of a place is different and remains the same for many, many years.

So, returning to climate change (often just called "CC"), it's the change that occurs to our Earth's climate, capable of lasting for a long time. It can be caused by:

- **cause naturali**, cnatural causes, such as how the Sun moves or volcanic eruptions.
- **human-made causes**, such as pollution from factories, the cutting down of trees (also known as "deforestation"), or certain types of agriculture that exploit nature too much, consuming it.



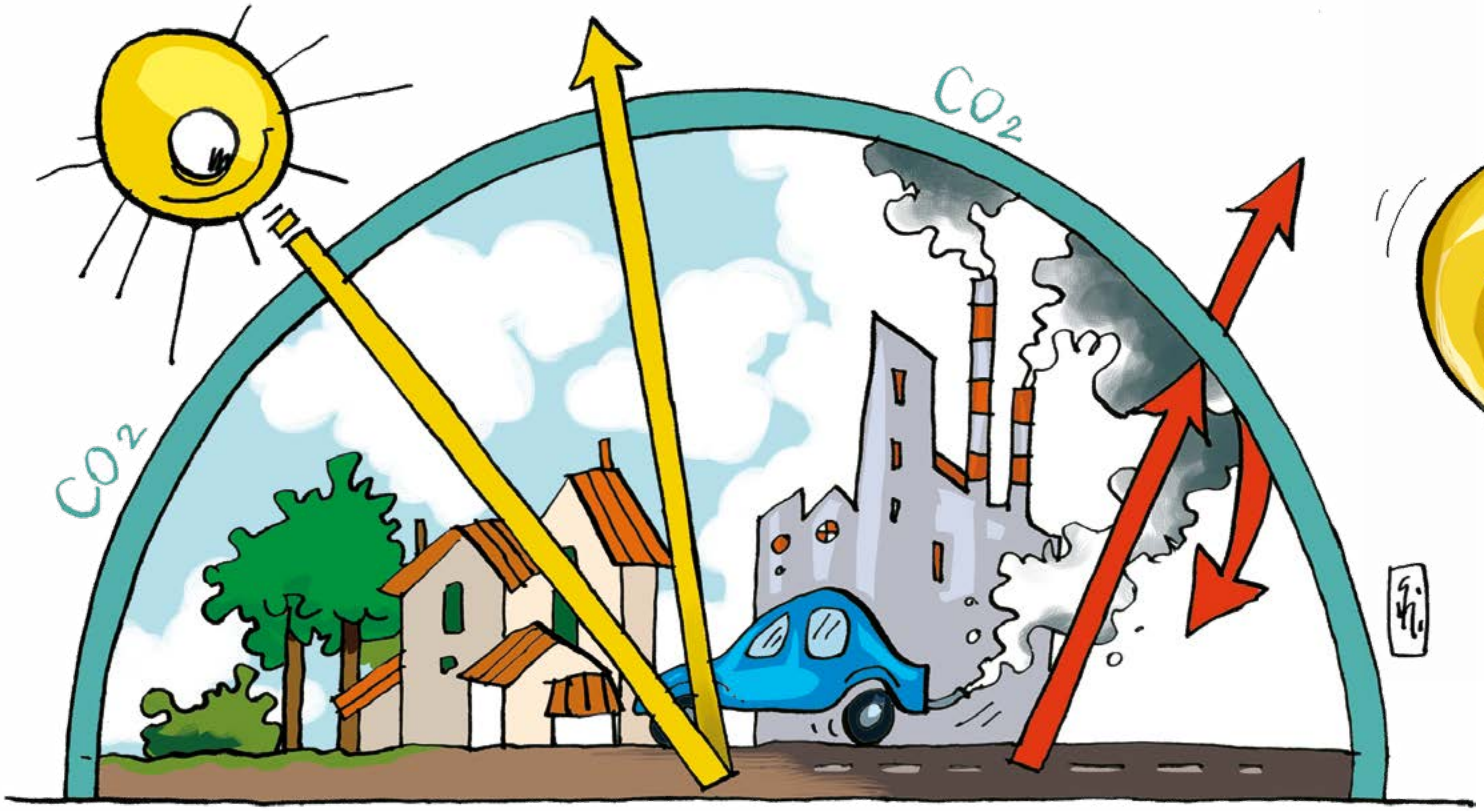
Percentages of global greenhouse gas emissions (data graphically reprocessed from OurWorldInData.org)

To understand if climate change is happening, it's not enough to see if it's hotter today or if it rained more last year. Scientists study a lot of climate **data** over a **long period**. They check if the Earth's average temperature has increased, if it rains more or less, or if it rains at different times than usual.
They also look at whether there have been more **"extreme" events**, like intense heatwaves or heavy rains that caused floods.
It's a bit like measuring the average height of all the kids in your school for a very long time: if the average has grown a lot, it means that, in general, the kids have gotten taller!

EXPLORE

If you want to learn more, in the sections of NASA Climate Kids:

http://climatekids.nasa.gov/menu/weather-and-climate/ and http://climatekids.nasa.gov/bingo/ you can find more in-depth materials and games in English.



HEAT (RADIATION) LIGHT

Mechanism of the greenhouse effect

Since the mid-1900s, the Earth has started to warm up. This happened because humans, thanks also to technological development, have changed how they use land, cut down many trees, and released many polluting gases into the air, the so-called "**greenhouse gases**." A famous example is carbon dioxide (often known as CO2). These gases work just like the glass in a greenhouse: they make the sun's heat stay close to the Earth, warming it up. This phenomenon is called the **greenhouse effect**.

The greenhouse effect itself isn't a bad thing; in fact, it's good! It helps maintain a perfect temperature on Earth for life. The problem is that we've put too many of these gases into the air. This causes the Earth to warm up too much and very quickly, creating the phenomenon we call **global warming**. This warming, in turn, changes our planet's climate, which means it creates **climate change**. The most worrying thing for politicians and scientists today (and beyond) is the **speed** at which this is happening. If the Earth warms up too quickly, some animals and plants don't have enough time to adapt to the ongoing changes, risking not surviving.

IN ACTION

Imagine you're an alien asked to study humans on their strange planet: the first thing you notice is this change in Earth's temperature. Circle from the suggestions what you would analyze to study the changing climate:

- **Wind speed;**
- **Speed of lizard movement;**
- **Rainfall: increase or decrease;**
- **Number of bees flying;**
- **Number of parks or gardens in cities;**
- **Gases present in the air;**
- **Number of particularly hot days;**
- **Number of ice pops in your freezer.**

Explore

Visit Recycle City on the U.S. Environmental Protection Agency (EPA) website (https://www.epa.gov/recycle/recycle-city). This interactive game lets you explore how a city can reduce waste, reuse materials, and recycle, showing what happens to different objects!

International Day

If we imagine Earth as a big supermarket that produces food, water, and other useful things every year, **Earth Overshoot Day** would be the date when we've used up all of a year's supplies. From that moment on, we're taking more than the supermarket can offer, and it's like we're going into debt with Earth! This date isn't always the same.If we consume things more slowly, this day shifts later in the calendar (a bit like our food lasting longer). But if we consume too quickly, this date arrives sooner. Ask your teacher to find out together when Overshoot Day falls this year. Has it already passed?

In Action

Ecological Footprint Quiz:
answer the following questions, mark the points for each response and total your score!

ECOLOGICAL FOOTPRINT

Did you know that every time you do something, like eat an ice cream or turn on the light, it's like leaving a footprint on Earth?

The more things we do and the more things we use (like clothes, food, toys), the more footprints we leave, and the larger our "**ecological footprint**" becomes. It's a bit like asking: how much of the planet do we use to live? And how much do we use to make the mess we produce disappear?

There are various types of footprints: for example, if we think about how much water we use or pollute, that's called a "**water footprint**." You can see it represented by the blue footprint with the chemical formula for water inside. These "footprints" help us understand how much we're using our planet and how many things we leave in the environment. This way, we can learn to take better care of the Earth!

1 How do you usually get to school?

a. By car, alone or witha parent 4p
b. By car, with other schoolmates 3p
c. By bus or public transport 2p
d. bicycle or on foot 1p

2 What do you usually eat for lunch?

a. Packaged food or fast food 4p
b. Meat or fish every day 3p
c. Home-cooked meals with some meat 2p
d. Vegetarian or local food 1p

3 How much do you recycle at home?

a. Never 4p
b. Sometimes 3p
c. Often 2p
d. Always 1p

4 How many new things (clothes, toys, electronics) do you buy each month?

a. Many 4p
b. Some 3p
c. Only when needed 2p
d. I prefer to reuse or swap 1p

Results

4–6 points
Earth hero!
You have a small ecological footprint. Your habits help protect the planet.

7–10 points
Friend of Nature
You're on the right path! With a few improvements you can do even better.

11–13 points
Caution!
Some of your habits use many resources. Try to change something.

14–16 punti
SOS Planet!
Your ecological footprint is very large. Take time to reflect on your daily choices.

COASTAL ENVIRONMENT THREATS

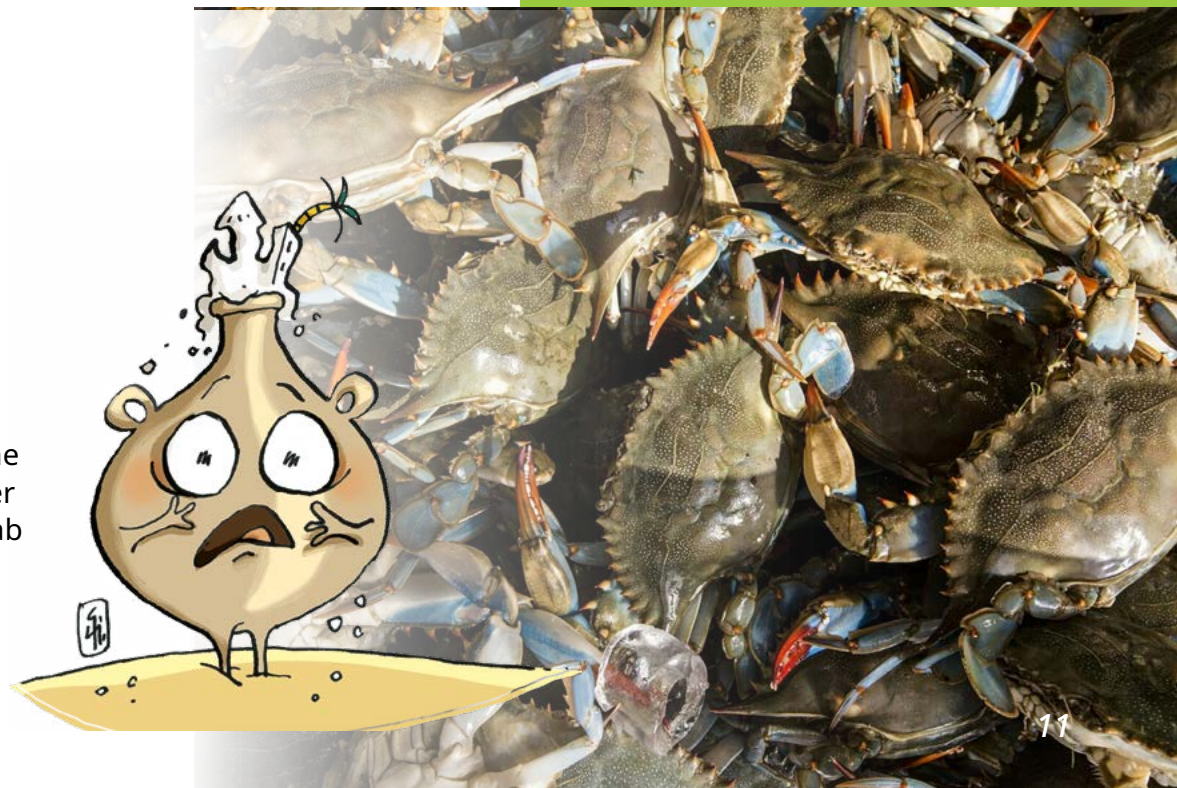
With this kit, we're exploring **coastal environments**, areas near the sea. Did you know they're in danger? Let's discover some of the threats they face so we can think about how to protect them!

We've already talked about how the planet is warming due to global warming. One of the most significant things that happens is that when it gets hotter, the **ice at the poles** and from glaciers **melts faster.** This melted ice flows into rivers, causing the **sea level to rise**. It's like an ice cube melting in a glass: as it melts, the water level gets higher and higher. So, when the sea rises, it's said to "eat" the beach. This phenomenon is called **coastal erosion**: the sea carries away sand and earth, destroying animal habitats and human-made structures in coastal areas. It's as if the boundary between land and sea shifts further and further inland, towards homes and other areas.

Also linked to rising sea levels is the **incursion of saltwater from the sea into rivers**. Near river mouths, saltwater is pushed further and further inland. This saltwater can even end up underground, where fresh water is usually found, which we use to irrigate fields. So, if saltwater gets where it shouldn't be, it damages crops and plants accustomed to freshwater and makes it harder to find drinking water.

Another threat to coasts is **alien or allochthonous species**. No, they're not aliens from other planets, but animals or plants typical of other places on Earth! Due to climate change, some of these animals or plants find the right conditions to live even in places where they couldn't before. When they multiply too much, they become a problem for species that have always lived there. The most famous example is the **tiger mosquito**: it arrived worldwide from Asia, secretly traveling in objects like used car tires or in decorative plants that "were on a journey" to be sold globally.

Lately, there's also been a lot of talk about the **blue crab**: one of the most dangerous alien animals in the Mediterranean. Have you ever seen one? Perhaps you'll find it on the beach this summer! This crab is very aggressive and eats many marine species, like clams and mussels. The blue crab comes from the Atlantic Ocean and likely arrived in the Mediterranean Sea through ship trade.



KEYWORDS

Species: A group of living beings with similar characteristics that, by reproducing, create similar and fertile offspring, meaning they are capable of reproducing. The name of our species is Homo sapiens sapiens.

KEYWORDS

Urban heat island effect:
The increase in temperature that occurs when moving from rural areas (like the countryside or a forest) to the city center. Cities are hotter than surrounding areas because asphalt, concrete, and other materials absorb and retain heat, while vegetation is scarce.

ARE YOU CURIOUS?

Have you ever met people who think climate change isn't a problem, or that it doesn't even exist? They are "**climate deniers**". This means they don't believe, or say it's not important, that Earth's climate is changing. Or they say that we humans are not causing these changes. It's important to be careful not to believe everything you hear. Information is a powerful tool, and we must learn to use it well to understand what is true and what is not!

LET'S CHANGE THE CLIMATE

Have you ever heard the mottos "There is no Planet B" or "You're ruining our lungs!"? These are phrases that many people, of all ages, but especially young people, have carried in **climate protests** in recent years. These protests began in 2018 thanks to a young Swedish student named **Greta Thunberg**. She inspired more than seven million people to take to the streets in over a hundred countries. The goal is clear: to protest and fight against climate **change.**

Let's recap a bit... **Rains** are often extremely heavy and arrive suddenly, turning into **floods**. Our **summers** are getting hotter and hotter, especially in cities, and there are more and more fires than in the past. We've learned how this increase in Earth's heat melts the ice at the Poles and raises **sea levels**. It's thought that by 2050, the sea will rise by 30 centimeters! We can add that our mountains also have less and less snow and ice. Imagine they're like big "batteries" of water: in winter, they fill up with **snow and ice**. When the heat arrives, they melt slowly, and the water flows into rivers. But if they don't fill up much, there's a risk of long periods characterized by little water, like **droughts**.

It's easy to see how these changes, all linked to climate change, endanger many **animals and plants**, including us humans. But don't worry, it's not over yet! There are two important and truly powerful words we often hear linked to climate change: **adaptation** and **resilience**. Let's discover them together.

Adaptation means changing to survive. In nature, when things change, animals and plants that can't adapt disappear. So, adapting means learning new ways of doing things or developing new characteristics to live better. The climate is changing, and we must continually adapt!

Resilience is a truly interesting and complex concept. Imagine a spring: you pull it, but it always returns to its original shape. Resilience is similar to that; it's the ability to overcome a big problem and return to being "calm and in balance" as we were before.

In the face of climate change, we must prepare well to face difficulties and return to normality. Being able to adapt and be resilient helps us be ready for the challenges that climate change brings: they are our superpower against **global warming**!

Scientists have long wondered how to fight climate change. In the illustration below, you can retrace some of the main steps that led to today's agreements to save the Planet together.

1972: **1972**: The world's major countries met in Stockholm for the first time to discuss how to **protect our planet**. They created a special program for the environment within the **United Nations**.

1988: A group of super-intelligent **scientists** was formed (the IPCC - Intergovernmental Panel on Climate Change). Their task is to **study the climate** and understand why it's changing, then give advice to governments.

1992: Another important environmental meeting took place in **Rio de Janeiro**. Here, a general rule (a convention) was established to help stop climate changes.

1997: The **Kyoto Protocol** was signed, a code of conduct that was the first real agreement between countries to **reduce pollution.**

2015: Another important agreement was reached, the **Paris Agreement**, shared among states to avoid the biggest problems caused by a changing climate.

Every year, the countries that have promised to follow these rules meet to check if they are making progress and what they can improve.

Today, **everyone is working to fight climate change**: governments, businesses, and even young people. They are trying to use **cleaner energy**, move in ways that don't pollute, and recycle more.

In Action

Imagine you are a super-secret agent for the United Nations! Your mission is to defeat "hoaxes" (i.e., fake or wrong news) about climate change.

How it works: there are some phrases people say about the climate that are not true. Your task is to find out which of the following phrases are false.
Read carefully and answer with the help of your classmates. Watch out for the hoax!

1. "The climate has always changed throughout Earth's history, so it's not a serious problem now!"
2. "It's true that the climate has always changed, but this time it's us humans who are changing it too quickly."
3. "But if it's so cold in winter, how can we talk about global warming?"
4. "Most scientists around the world agree: our planet is warming up, and we humans are the main cause!"

Chapter 3

The impossible challenge

The **Guardians**, determined to defend the Planet, hurled themselves against these formidable adversaries. Wave unleashed **gigantic waves** to bring Salt back to the sea, Little Leaf evoked the **filtering power** of her leaves to purify the contaminated air and water, and, with her strong roots, tried to hold back the land, which risked being carried away by the floods. Sand erected **impenetrable shields** and, with patience, tried to **rebuild** the dunes that had been swept away by the enemies in action.

But these dark lords proved to be truly overbearing adversaries: the **fires** continued to rage, the land and water were **contaminated**, the air was still full of **unbreathable gases**. It was then that Little Leaf, while Wave and Sand held back the enemies, resorted to the power of vital sap to discover the identity of their real enemy: **Lord Thermon**. Now everything was clear: only by **joining the forces** of heroes and enemies could they defeat him!

NATURE-BASED SOLUTIONS

For a long time, humans have discovered how to "copy" from nature to solve some current problems, like those caused by climate change. This is called **Nature-based Solutions**. These are solutions and strategies inspired by how things work in nature, designed to create actions that benefit the environment, people, and, therefore, also the economy.

These actions are like a "superpower" that helps us protect nature and our planet as a whole, intelligently using what nature offers us without consuming everything around us. For example, they help us solve many current challenges like heatwaves or excessive rain, triggered by climate change. Have you ever seen **green roofs and facades**? They're walls or roofs covered with plants! You can see an example in the photo here. In cities, they're built for a special reason: plants absorb heat and help keep buildings cool when it's very hot outside. They act like "natural air conditioners," also very good at absorbing water when it rains too much, thus preventing floods.

So, Nature-based Solutions help us to:

- **create greener, more beautiful, and healthier cities**: with more trees, parks, and gardens, less pollution, and they make us feel better, with cleaner air to breathe.
- **help nature heal**: like medicine, they help nature be reborn, to regenerate after destructive events like fires or pollution.
- **fight against climate change**: they make the environment stronger and more capable of facing problems. For example, they help us capture harmful gases in the air, "cleaning up" the air we breathe.
- **protect us from natural dangers**: they use the power of nature to protect us from hazards like floods or landslides. It's like using a forest to slow down water instead of a wall!

ARE YOU CURIOUS?

Politicians, scientists, and economists from all over the world have recently developed the concept of sustainable development. This is a way of living, in a way that respects nature, also thinking about those who will come after us. Imagine you want to eat a delicious slice of cake... sustainable development means you eat your slice and also leave some pieces for those who will come after you!
In practice, it allows us to do three things at the same time:

- **Respect nature:** don't pollute, don't waste resources.
- **Keep the economy working well**: people need to be able to work and have the things they need.
- **Ensure everyone lives well**: without leaving anyone behind.

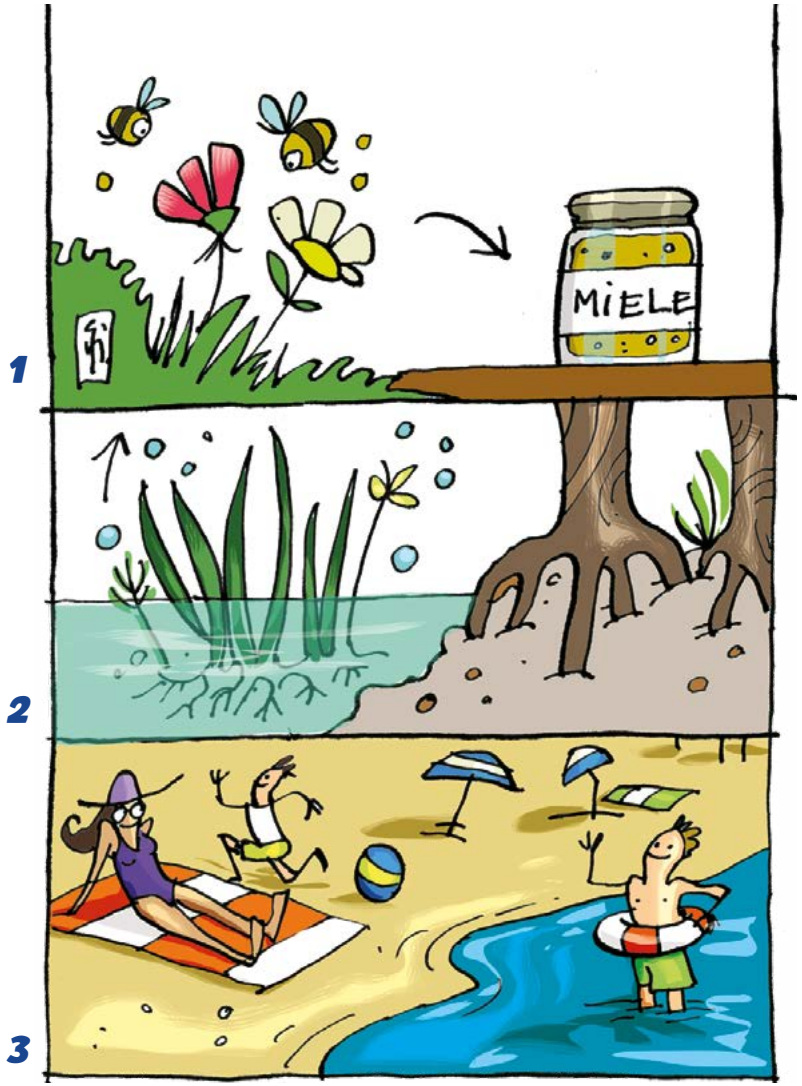
Since sustainable development is truly important for many things and areas, **17 common Sustainable Development Goals** have been created to be achieved, which you can see in the image below. Have you ever seen them somewhere?

ECOSYSTEM SERVICES

The **Nature-based Solutions** we just discovered, by their very presence, also increase all the benefits that nature offers to humans. Imagine nature as a kind of vast supermarket: it gives us, for example, oxygen to breathe, food to nourish us, and clean water to hydrate us.

These benefits are called **ecosystem services** and they are truly important: they help us live and also support all other animal and plant species. Since nature gives us all these "gifts," it's our duty to protect the environment, which, unfortunately, we sometimes put in danger ourselves!

In the 1990s, scientists began to study these services more deeply, classifying them into three groups:



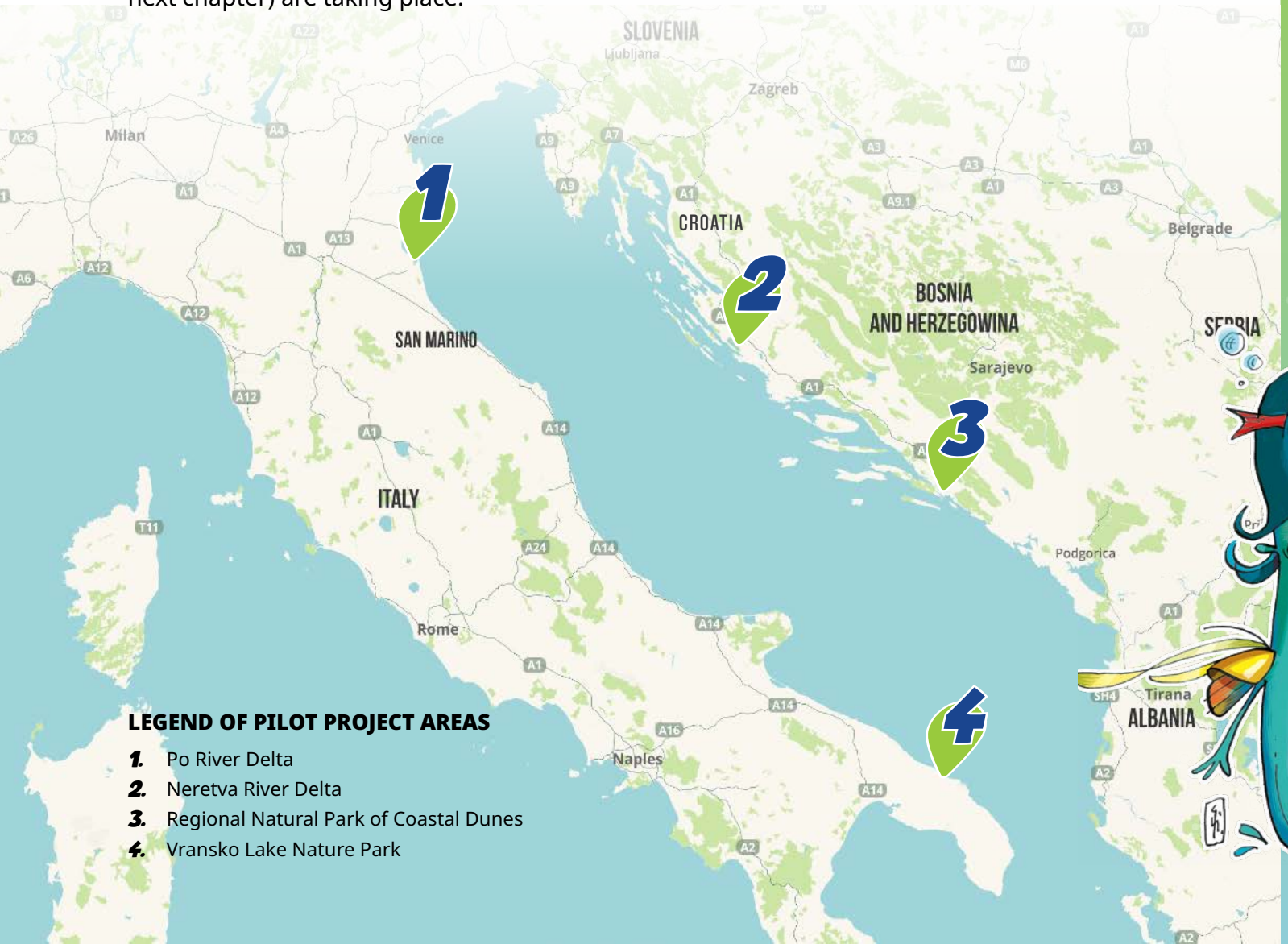
EXPLORE

You can watch an animated video on ecosystem services, created as part of the European AlpEs project, at this link: https://www.youtube.com/watch?v=pOQdRLV_-VY

1. **Provisioning services**: These are the actual products we take from nature. Think of the food we eat, the water we drink, wood for building houses, or plants we use as medicine.
2. **Regulating and maintenance services**: These services help us live better by cleaning and maintaining the environment. For example, nature helps us stabilize the climate (meaning avoiding excessive heat or cold), recycle waste, and make water clean. Without this, our health would be in danger.
3. **Cultural services**: These are all the services that allow us to have fun, relax, and also learn. For example, playing sports outdoors, going on excursions, fishing, or visiting places like meadows and forests. These activities make us feel good, allow us to relax, and help us learn new things.

MISSIONE ADRIATICO

Have you ever been to the **Adriatic Sea**? You can see it on the map below. For a long time, exciting adventures, extensive trade, and important battles have taken place in this sea. In this part of the manual, you'll embark on a small journey through the Adriatic, discovering four coastal areas where activities from our **Interreg Italy-Croatia ACTION project** (presented in the next chapter) are taking place.



LEGEND OF PILOT PROJECT AREAS

1. Po River Delta
2. Neretva River Delta
3. Regional Natural Park of Coastal Dunes
4. Vransko Lake Nature Park

IN ACTION

You are the hero of the Adriatic, and you're asked to save the population living on its coastlines. **With your companions, highlight which of the main threats you might have to face from the list below:**

- poor water quality;
- decrease in biodiversity;
- saltwater intrusion;
- extreme weather events;
- coastal erosion;
- pollution.

PO DELTA

In Italy, the Po Delta Park in Emilia-Romagna protects the southernmost part of the Po River delta, including the mouths of rivers flowing down from the Romagnolo Apennines. It's a treasure trove of nature, history, and culture, rich in biodiversity thanks to its geographical position and unique concentration of diverse environments: marine coastlines, beaches, and dunes; lagoons and brackish valleys; freshwater marshes and flooded meadows; and broadleaf forests and pine woods.

Detail of Salicornia

The Project Area

North of Ravenna, one of the Park's municipalities, the **Lamone River** flows into the Adriatic Sea. Its mouth is within the Po Delta. The current Lamone river mouth is the result of extensive land reclamation projects carried out between the 19th and the first half of the 20th centuries. These efforts helped preserve some wetlands, like Punte Alberete, Valle **Mandriole** and **Bardello**, which are spectacular examples of these environments.

However, separating the Lamone from its main river course and significantly reducing the flooded area have created **some problems**:

- water quality has worsened.
- some plants and animals have disappeared.
- these environments have become more fragile and struggle to withstand climate change.

Today, various public and private organizations, including the Municipality of Ravenna, the Park Authority, the Forest Carabinieri, the Region, and the Land Reclamation Consortium, are working together to manage and protect this area and its waters.

ACTION to help nature!

Our ACTION project is carrying out activities to:

- **reconnect the Lamone River** and the wetlands present at its mouth;
- c**reate freshwater reserves** by building special areas that, like large "reusable bottles," can collect excess water during heavy rains or floods. This water can be very useful during droughts (low water periods) or to protect certain environments from the intrusion of saltwater from the sea;
- **open the CLAC (Climate Adaptation Center)**: a center in Ravenna where everyone can come and learn about the Po Delta Park. Like a gateway to the Delta, it allows you to discover which animals and plants live there and learn how climate change is affecting them;
- **join forces for nature**, bringing together people with diverse ideas and skills to work on projects that protect this special place. Together, we can do even greater things for nature!

EXPLORE

The **Po Delta Park** is a special place! It has been chosen by **UNESCO** (an international organization dealing with culture and science worldwide) to be one of the "**Biosphere Reserves**" of the MaB program. This means the park is an example of how humans can coexist well and develop without harming nature and all the animals and plants that live there. In the Po Delta Park, land and water go "hand in hand": there are forests where water reaches the tree trunks, called **flooded forests**, **pine forests** and other **woodlands** that are very close to **wetlands**. If you want to discover more about this park, you can visit its English website: https://www.parks.it/parco.delta.po.er/Eindex.php/.

KEYWORDS

river mouth: is where a river ends its journey and flows into the sea. It can be shaped like a "delta" (like a hand with many fingers) or an "estuary" (like a funnel). The river mouth is a super important place for nature! Here, the fresh water of the river and the salt water of the sea meet. This creates a special environment where many unique animals and plants live, which you won't find anywhere else.

LAKE VRANA NATURE PARK

Lake Vrana Nature Park (called “Vransko” in Croatian) is home to the largest natural lake in Croatia. This lake is in a protected natural area and has a unique feature: its bottom is lower than sea level, while the water on its surface is higher than sea level! This is one of the reasons why the lake is a very interesting and important place for studying nature.

The Project Area

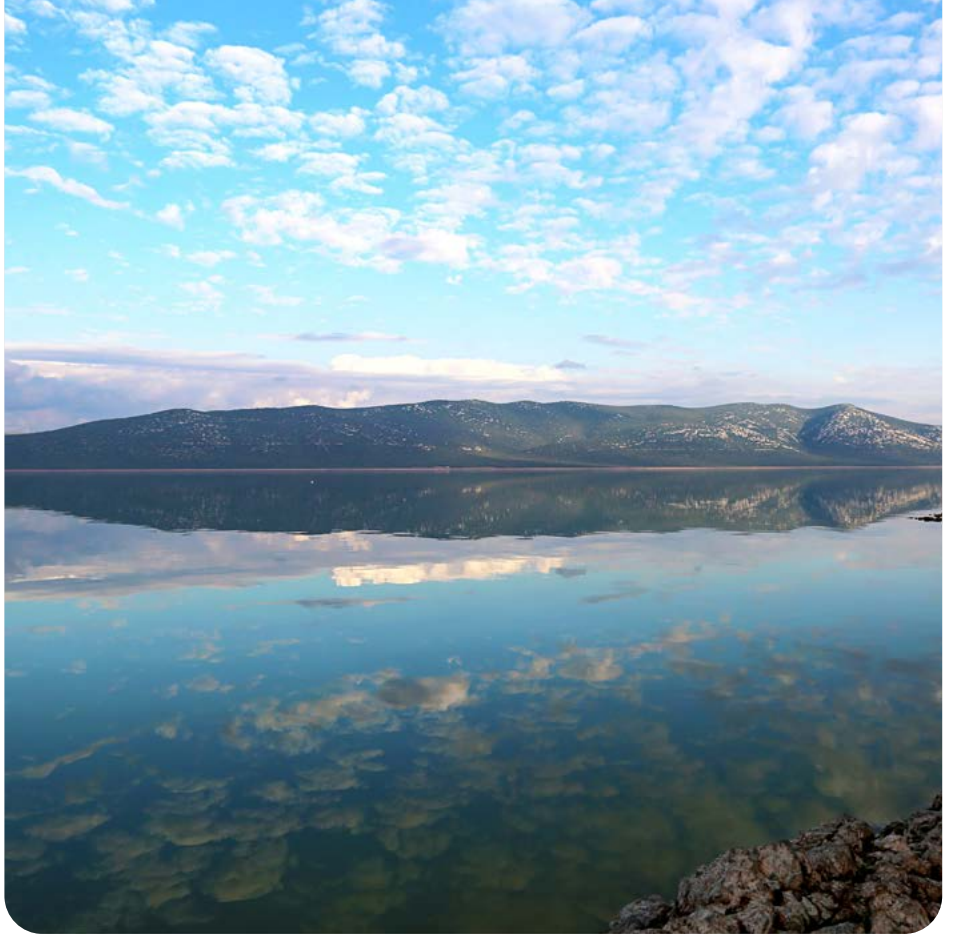
Lake Vrana is particularly popular with many **birds**. Just like a hotel and a restaurant, birds stop here to rest, eat, and nest. But the lake isn’t just home to birds; there are also many different types of fish! The park around the lake is mainly composed of **wetlands**, such as swamps or marshes.
These areas are not only rich in biodiversity, but they also help protect the environment **against climate change**, for instance, by regulating temperature. That’s why it’s crucial to **maintain and recreate these ecosystems**, so we can benefit from the positive effects these special areas can create

ACTION to help nature!

This Park has been chosen in our ACTION project to create and experiment with a plan to help the lake’s nature get better. Imagine it’s like an instruction manual with solutions copied from nature to make the lake beautiful and full of life again!

Specifically, this plan:

- **explains what the perfect lake should be like**, the one we aim to imitate and create with more animals and plants (biodiversity), clean water, and how to prevent floods from causing damage;



- identifies and lists the types of animal and plant species that live in the lake and how they help each other to make an environment like this function at its best;
- assesses the current “health” of the lake (how the lake is now) and what needs to be done to get closer to that perfect lake mentioned in the first point;
- lists all the actions to be taken to help the lake get better;
- implements the helping actions and monitors their progress: if something isn’t working, the plan is changed to adapt. This is important because the climate is changing, and we must always be ready!

Keywords

Sea level: This is an imaginary line that defines the height of the sea's surface. In science and geography, it's very important because it's the reference point from which the height of all other things is measured. For example, the height of a mountain is measured in meters above sea level.

Monitoring: like a detective, this is an activity undertaken by technicians and scientists that allows them to collect information. It involves observing and gathering data (such as how many animals there are or how they are doing) following precise "rules" for a certain period of time. Monitoring is extremely important because it helps us to:

Understand if the environment is changing, for example, if there are more or fewer animals, or if plants are healthy.

See if the actions we take to protect nature are working.

Discover what happens to the environment when there are changes, such as a fire or the arrival of new plants.

Explore

Navigate the English website https://www.pp-vransko-jezero.hr/en/ to discover the park.

NERETVA DELTA

The Neretva River is one of the coldest rivers in the world,. and around the river, nature is clean and wild. It originates in the southwest of Bosnia and Herzegovina, then flows through beautiful landscapes, and finally empties into the Adriatic Sea, near the Croatian city of Ploče.

The Project Area

The **Neretva River Delta** is as large as 20.000 soccer fields and is so important that it's recognized worldwide as a significant **wetland**. It includes **six nature reserves**, which are parks that protect particular species of animals and plants. Unfortunately, when it rains heavily and the river swells, it carries a lot of **trash and waste**, which ends up right in the river delta, making it one of the dirtiest places in the city of Ploče.
In addition, those who live there and work with agriculture, fishing or tourism are already seeing the climate changes taking place, including: soils have increasingly **salty water** that ruins crops, it is getting **hotter** and hotter and **rain is unpredictable**, sometimes too much and sometimes too little.

ACTION to help nature!

We've learned how cities are getting hotter due to our warming planet. Like a heat island, concrete and asphalt absorb heat and release it slowly, making the air scorching. This is exactly what's happening in the riverside city of Ploče, which was chosen for the ACTION project specifically to study solutions to reduce this effect and limit pollution through:

- **an eco-action at the river mouth**, involving removing accumulated dirt from the land and water. In this area, activities are also organized with citizens, especially young people, to teach everyone how to care for nature, including discussing invasive alien species and actions that can be taken to stop them.
- **creating citrus groves** (lemons, oranges, etc.) at the city entrance to study which plants can best withstand extreme heat and, overall, climate change.
- **reducing beach pollution** and making as many people as possible understand that our actions can harm the environment. Learning to be more mindful is the first step to protecting nature!

EXPLORE

The **Neretva Delta** is an area characterized by the presence of water due to the confluence of the Neretva River and its smaller tributaries. This area creates shallow lakes, sandy bays, and saltwater marshes. In some parts, humans have drained the land to create fields for cultivation. Many birds live here, such as the **Eurasian Bittern** and the **Little Crake**, which are very numerous in this area. Want to discover more about the Neretva River? Visit the website https://narenta.ch/it/narenta-it/.

ARE YOU CURIOUS?

When we talk about dangers to the environment, the first thing that comes to mind is **pollution**. This can be caused by:

chemical substances: like those we sometimes use to help plants grow better in agriculture. If we use too much, these substances can end up in the water, causing an excessive growth of algae. These algae, if in excessive quantities, take all the oxygen present in the water, "stealing" it from other living beings like fish and other aquatic plants! This very complex and important phenomenon is called eutrophication.

plastic: think of all the bottles or bags that end up in the sea. This waste can suffocate animals like turtles and fish, and more! Over time, plastic breaks into tiny pieces, invisible to the naked eye, which can be eaten not only by marine animals but can also end up in our stomachs!

heavy metal: these are very dangerous substances that are sometimes released by factories. They can poison fish and accumulate inside them, then pass from one animal to another, all the way to us.

REGIONAL NATURAL PARK "COASTAL DUNES FROM TORRE CANNETO TORRE S. LEONARDO"

This Park is a protected natural area located in the Italian region of Puglia, essentially the "heel" of the boot-shaped Italian Peninsula. This area features a line of sand dunes that separates the beach from the wetlands behind it. From there, the landscape extends into the countryside, filled with truly ancient olive trees, some of which are hundreds of years old.

Detail of Prickly Juniper

The Project Area

The Park is home to **Mediterranean** scrub plants, and along the coast, there are **ancient towers**. These were built long ago to watch for arrivals from the sea and warn nearby towns of danger from pirates or invaders! In this area, you'll also find many old farms (from the 1500s to 1700s) with underground olive mills—places where olive oil was made underground—which were used as far back as the Romans and later in the Middle Ages! All of this makes the landscape a truly special place, both for its nature and its history.

This area is a **protected natural area** because it's rich in diverse plants and animals, but they're endangered due to **climate change** and **rising sea levels**. The sand dunes, in particular, are extremely important because they protect the coast and prevent saltwater from entering inland.

ACTION to help nature!

In the Coastal Dunes Regional Natural Park, our project aims to help the park's caretakers better understand how climate change is altering the sand dunes. To achieve this, several activities are being carried out, including:

- **environmental control and monitoring** to observe what's happening, studying dangers and problems, and analyzing the benefits nature provides.

  An example is protection from sea waves or the presence of many diverse animals and plants (i.e., biodiversity!).

- **dialogue with local people** to collectively decide how best to protect the dunes from climate change. After various meetings, an action plan is conceived to seek further funding and ideas for similar projects. Finally, guidelines are written—documents that share project results and offer advice that can be useful to others in solving similar problems.

Keywords

Coastal dunes: natural sand mounds found along the beach, shaped (in science and geography, they're said to be molded) by wind and sea. Many specialized plants and animals live there, even though there's a lot of saltwater and little freshwater. The sea lily is an example.

Mediterranean scrub: an ecosystem rich in diverse plants and animals that can survive even with heat and little rain, typical of Mediterranean coastlines. Some examples of plants you'll find here are myrtle, rosemary, and the olive tree.

Explore

to discover the park. https://www.parcodunecostiere.it/ita/index.php to discover the park..

Are you curious?

Did you know that sand **dunes on the beach** have a superpower? They can protect the coast from storms, acting a bit like an invisible wall. They absorb the force of waves and wind, so the sand isn't washed away. However, dunes don't stay still: wind and waves slowly move them, changing their shape. Humans have discovered a trick to "stop" them: there are **special plants**, like the prickly juniper, whose roots can "block" the sand. This way, the dunes stay put and continue to protect our coast!

Chapter 4

Unity is strength

So, the Guardians also summoned Salt, Wind of Chaos, and Flame, and **together** they **defeated** Lord Thermon and restored the **climate balance**:

Wave **cooled** the oceans and **guided** the now disoriented currents back to their ancient routes; Little Leaf restored balance to the air and land by **increasing oxygen** and **eliminating** the toxic substances that were poisoning them;

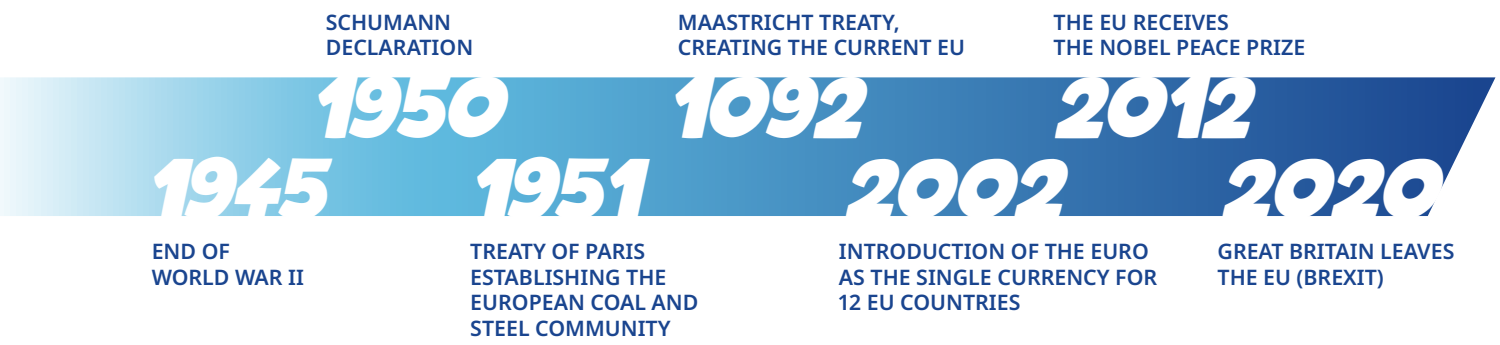
Sand and Salt **created** coral reefs and dunes to defend the coasts; Flame **generated** clean energy with the force of her fire and **renewed** numerous areas where new plants sprouted. Finally, Wind of Chaos, who had now learned to control his fury, **brought cool winds**, refreshing rains, and **dissipated** the storms.

The Alliance of the Guardians of Nature, united with their former enemies, thus became the legendary **Union of the Planet**, which watched forever over the balance of the elements of our beloved Earth!

EUROPE AND THE EUROPEAN UNION

Do you know what the difference is? **Europe** is a geographical area, a continent with many countries. Of these countries, 27 have decided to unite in a common space, called the **European Union (EU)**. The EU is like a collaboration among "friendly" states, called Member States. It was created to live in peace and help each other against hunger and wars.
The EU's motto, "United in diversity," explains that people of all ages in Europe have come **together to live and work** as one.

The EU has only existed for a few decades, but the story of how it came about is much older and began many centuries ago. The **timeline** below will help you discover important events that led to the EU we know today.



The EU not only helps people in Europe but also plays an important role worldwide. Imagine the EU as a huge network where diverse stories, cultures, and traditions unite and intertwine. Bringing this intertwining together is not easy!Similarly, the EU combines its forces to provide money for many important things: for example, in **education** (schools), **environmental protection**, **research** and **agriculture**. It also helps **people in need** around the world.
If you look closely, you can see the EU at work even where you live! Can you give some examples of what the EU does in your local area?

09 may

INTERNATIONAL DAY

On May 9, 1950, a French politician named Robert Schuman had the idea of how to make European countries live together in peace. For this reason, every year on that day, we celebrate **Europe Day** (#EuropeDay in English). You can check your local Municipality's calendar, Parks, or Museums near you to see if they organize anything special. Why not ask your school to dedicate a day to celebrate Europe?

EXPLORE

Go to the website to listen to the European anthem: *https://european-union.europa.eu/principles-countries-history/symbols/european-anthem_hr*

EXPLORE

Visit the European Commission's website to discover more about its environmental protection activities:

https://commission.europa.eu/energy-climate-change-environment_hr.

Search among the various themes for those that interest you most.

ARE YOU CURIOUS?

The Italian State has transformed these Directives into **national laws**: together with Europe, the National Parks, Regional Parks, Reserves, and local authorities (Regions, Provinces, and Municipalities) collaborate to contribute to the protection and control of biodiversity. These laws are not "static" but interestingly follow scientific advancements: as scientific knowledge changes over the years, these laws adapt accordingly.

GREENER EUROPE

Who doesn't love eating super delicious food or taking walks in beautiful places? Air, water, energy, and raw materials on Earth are fundamental for life, and that's why we mustn't waste them! Given that none of these stop at borders between different states, countries must collaborate to **collectively protect** the environment. The **EU** has always worked to have a natural and healthy environment, a "home" to live in and is always at the forefront of fighting **climate change** and reducing polluting greenhouse gases.

In the diagram next to this text, you'll find some important dates about European laws concerning nature, with a brief explanation.

2024:
The **Nature Restoration Law** is the first law proposed and approved in Europe to help nature return rich and strong. It serves to combat climate change and fulfill promises made with other countries worldwide to protect the environment.

2021:
Regulation (EU) 2021/1119 is the first EU climate law, with which Europe has promised to become the first continent to achieve "zero emissions" by 2050. This means it will not produce more polluting gases than nature can naturally remove from the air.

2019 - 2020:
The **European Green Deal**, a plan to grow Europe's economy in a way that doesn't harm the environment, improving people's health and lives.

1979 – 1992:
During these years, two European laws (called directives) were created to protect nature:
Directive 79/409/EEC "Birds" (updated in 2009 as Directive 2009/147/EC) indicates which birds are at risk of disappearing and the habitats where they live and nest, rest, or spend the winter; while **Directive 92/43/EEC "Habitats"** protects biodiversity by listing endangered natural sites (habitats) and species to be conserved.

COOPERATION BETWEEN REGIONS AND THE ACTION PROJECT

The EU is like a great friend, always ready to help. It creates and continues to create programs to finance that is, provide money for projects taking place in the regions of European states. Regions and local businesses are, in fact, very important for Europe's economy! When regions work together, they can exchange ideas, learn new things, and make the best use of their knowledge and resources. If you're reading these lines, it's thanks to EU funding!

Interreg Co-funded by the European Union

Italy – Croatia

ACTION

NAME:
Interreg Italia-Croazia ACTION - *Increasing coastal ecosystem resilience to climate change*.

DURATION:
From April 1, 2024, to September 30, 2026.

CHALLENGES: Joining forces to...

- understand the dangers of climate change;
- discover risks in the project areas;
- tell many people what's happening.

SUPERPOWER: Creating a special plan to...

- help nature and cities prepare for climate change;
- encourage people to behave in ways that make coastal areas stronger against a changing climate;
- use solutions like those nature offers us (green areas, dunes, etc.);
- protect special places in the project areas, so others can also learn from what the project has achieved;
- increase the knowledge of local people.

HOW TO CULTIVATE THE SUPERPOWER:

The **Interreg Italy-Croatia** programmme helps Italian and Croatian **regions near the Adriatic Sea** to create projects to work together. The goal is to collaborate on many different topics, such as environmental protection.

EXPLORE

Visit the project's website (in English) to learn more: https://www.italy-croatia.eu/web/action.

IN ACTION

Now that we've reached the end, what do you remember about this project? Fill in the short text below with your classmates:

_____The Interreg Italy-Croatia A_____ project promotes joint actions to address ongoing c_____ climatico. The project is inspired by Nature-based s_____ to develop a shared action plan. The project's pilot areas are __ (2 in Italy and 2 in Croatia), namely the Po D_____, Neretva D_____, Coastal D_____ Regional Natural Park from Torre Canne to Torre S. Leonardo, and Lake V_____ Nature Park. Naturale del Lago di V_____.

This booklet belongs to:

_____

Address:

_____

School:

_____

Class:

_____