

My Name is Earth

Fundación **epm**[®]

In collaboration with:



MINISTERIO DE EDUCACIÓN
NACIONAL

Imagined by:



In the 21st century, environmental, climate and social crises are the greatest challenges we face as humanity. **The Earth demands a collective effort**, in which every single person participates, to care for and preserve life, given that our destiny as human kind is deeply linked to nature's.

The EPM Foundation, in collaboration with the National Education Ministry and Click+Clack, presents the second part of the **My Name is Earth** strategy. It aims at giving children and adolescents the tools to understand and act towards their well-being of their environment's.

Education has a transformative power. This is why **My Name is Earth** seeks to support the construction of peaceful and sustainable territories and communities through child and youth empowerment and by strengthening and showcasing teacher's work and their dynamizing role in schools. Sustainability, civic skills and social-emotional skills build up the main pillars in the strategy in order to promote a type of education that responds to the challenges of the present day, and that, from the perspective of care as an ethical principle, **supports the preservation and restoration of the planet.**

This is how the EPM Foundation —an organization committed towards the Sustainable Development Goals (SDG) from the Berlin Declaration, adopted in the Unesco Conference of 2021— **strives to make environmental education a key element of a holistic education of children and young people and a cross-cutting practice in educational systems at all levels.** Promoting attitudes and actions that favor the environment must be a main component of school curriculums and study programmes.



Similarly, the National Education Ministry promotes the right to peace and the social-emotional education of citizens. One of its objectives is to strengthen, from the young age, skills, attitudes, learnings and behaviors that help people recognize and encourage care and well-being-based interactions with themselves, others and their environment. Additionally, exercising rights and ensuring constructive, democratic and inclusive actions are key components to attain this objective.

The interinstitutional collaboration that gave birth to **My Name is Earth**, allowed the development of pedagogical resources for preschool and primary education on sustainability, climate change and water protection. The aim of this strategy is to make children, adolescents, caregivers and teachers true agents of change for a Colombia that empowers peace and sustainable life.

Our planet needs us.

Which is why we invite you to use, enjoy and learn from these contents to act and care for Earth.





Hi, my name is Earth! I want to introduce you to all of my friends:

Wetland, Ocean, Jungle, Atmosphere, Páramo, Mangrove, Sierra Nevada and River are all part of me. But there's something wrong with them, so there's something wrong with me.

We will dig deep into the mysteries of the Jungle and the Sierra Nevada, we will sail in the currents of the River and the Ocean, we will climb the peaks of the Páramo, swim among the roots in the Mangrove, meet all the layers of Atmosphere and dive into the sacred waters of the Wetland.

Come with me and let's start this adventure!



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Learning guide

1. A Hidden Treasure

Wetlands under threat by urban development

Standards and learning processes

1st through 3rd grade

Language



- **I describe** people, objects, places, etc., in an accurate way.
- **I can look** for information in different sources: people, media, books, among others.

Natural sciences



- **I identify** and describe fauna, flora, water and soil in my surroundings.
- **I recognize** the importance of the species, water and soil in my surroundings, and I come up with strategies to take care of them.

Civic skills



- **I care** for the proper treatment of animals, plants and resources in the environment (cognitive and emotional skills).
- **I recognize** and accept the existence of groups with diverse ethnicities, age groups, genders, occupations, socio-economic status, etc. (knowledge and cognitive skills)

Objectives

- **Understand** the structure and functioning of wetland ecosystems and the main risks for their stability caused by human actions.
- **Identify** daily actions for communities to reduce their impact on wetland ecosystems.

4th and 5th grade

Language



- **I understand** the formal and conceptual elements (particularly, sentence structure and relations among sentences) in each text.
- **I plan** strategies to search, select and store information: summaries, synoptic tables, mind maps and cards.

Natural sciences



- **I design** and carry out experiments to answer my own questions.
- **I classify** living things in different taxonomic groups (plants, animals...).

Social sciences



- **I recognize** that the studied phenomena have different aspects that should be considered (change over time, geographical location, economical aspects...).
- **I use** coordinates, scales and conventions to locate historical and cultural phenomena in maps and graphs.

2. Everything in its Rightful Place

Plastic pollution in our oceans

Standards and learning processes

1st through 3rd grade

Social sciences



- **I set up** relations between natural and cultural landscapes.
- **I identify** different ways to measure time (hours, days, years...) and relate them to people's activities.

Natural sciences



- **I classify** and compare objects according to their use.
- **I distinguish** between natural objects and man-made objects.

Civic skills



- **I understand** that my actions can impact people near me and their actions can impact me (cognitive skills)
- **I understand** what a rule is and what an agreement is (knowledge).

Objectives

- **Recognize** the function of plastic in the development of human societies and the environmental impact of its manufacturing and widespread use.
- **Identify** daily actions for communities to decrease plastic use and promote sustainable practices to reduce, reuse and recycle.

4th and 5th grade

Language



- **I plan** strategies to search, select and store information: summaries, synoptic tables, mind maps and cards.
- **I conceive** nonverbal works as products of human communities.

Natural sciences



- **I study** the environmental characteristics of my surroundings and the dangers that threaten it.
- **I fulfill my role** when I work as part of a team, I respect other's functions and I contribute to common goals and products.

Social sciences



- **I am able to identify** situations in which I act against other people's rights and I understand why those actions infringe on their rights (cognitive skills).
- **I know and use** the mechanisms for student participation in my school environment (knowledge and social skills).

3.

The Lung of the World

Deforestation and climate change in the tropical jungle

Standards and learning processes

1st through 3rd grade

Language



- **I describe** events sequentially.
- **I can look** for information in different sources: people, media, books, among others.

Social sciences



- **I express** myself in different ways (orally, writing, graphically) to communicate the results of my research.
- **I conceive and verify** the needs of living things.

Natural sciences



- **I make** measurements with conventional tools like ruler, measuring tape and watch.
- **I explain** adaptations of organisms to their environment.

Objectives

- **Identify the biological** components and the interactions between organisms in a tropical rainforest ecosystem and understand the causes and consequences of human actions on those ecosystems.
- **Conceive solutions** to local environmental issues by understanding that they will have an impact on other territories' ecosystems.

4th and 5th grade

Social sciences



- **I identify and describe** characteristics of different natural regions in the world.
- **I classify and describe** different economic activities (production, distribution, consumption) in different economic sectors (agriculture, mining, industry) and I recognize their impact in communities.

Natural sciences



- **I identify** the adaptations of organisms according to the characteristics of the environments they inhabit.
- **I value and use** the knowledge of different people in my surroundings.

Civic skills



- **I participate** with my teachers and classmates in collective projects aimed at solidarity and the common good (social skills).
- **I recognize** how different people are and I understand those differences as opportunities to build new knowledge and relations that make life more interesting and fun (cognitive skills and knowledge).

4. A Dangerous Change

Atmosphere, climate change and life on the planet

Standards and learning processes

1st through 3rd grade

Natural sciences



- **I describe** people, objects, places, etc. in a detailed way.
- **I relate** graphs and written texts, by completing them or explaining them.

Natural sciences



- **I observe and describe** changes in my development and the development of other organisms.
- **I link** the weather with the way of living of different communities.

Social sciences



- **I perceive and describe** the main physical characteristics of a landscape.
- **I set up** relations between the weather and people's economic activities.

Objectives

- **Recognize** the composition and functions of the atmosphere and its importance for life on Earth.
- **Identify** the impact of climate change, and understand its definition, causes and daily opportunities for mitigation.

4th and 5th grade

Social sciences



- **I classify and describe** different economic activities (production, distribution, consumption) in different economic sectors (agriculture, mining, industry) and I recognize their impact in communities.
- **I use** resources responsibly (paper, water, energy).

Natural sciences



- **I establish** the relation between the greenhouse effect and the ozone layer depletion due to atmospheric pollution.
- **I associate** the weather and other environmental characteristics with construction materials, most used electric appliances, natural resources and the habits of different communities.

Civic skills



- **I take care** of myself! I understand that taking care of myself and having healthy habits favors my well-being and my relationships (social skills).
- **I cooperate and I show** solidarity towards my classmates; I work constructively within a team (social skills).

5. The Guardian of Water

Páramos in danger because of conflict of interests

Standards and learning processes

1st through 3rd grade

Language



- **I recognize** the social function of the different kinds of texts I read.
- **I read fables**, short stories, poems, myths, legends and any other literary text.

Natural sciences



- **I select** the appropriate information to answer my questions.
- **I describe** the characteristics of living things and inanimate objects; I establish similarities and differences among them and I classify them.

Social sciences



- **I identify** the main natural resources (renewable and non-renewable).
- **I recognize** economic factors that provide well-being or generate conflict in social life.

Objectives

- **Understand** the composition and interactions between the different elements of the páramo ecosystem and acknowledge its importance for water supply to other lower-altitude ecosystems.
- **Build up** daily sustainable behaviors at school, at home and for the community.

4th and 5th grade

Language



- **I read** different kinds of text: descriptive, informative, narrative, explanatory and argumentative.
- **I select** and classify the information issued by different media.

Social sciences



- **I classify and describe** different economic activities (production, distribution, consumption) in different economic sectors (agriculture, mining, industry) and I recognize their impact in communities.
- **I submit** answers to my own questions, and I compare them with other people's answers.

Natural sciences



- **I analyze** the environment around me, and I compare it with others.
- **I put** forward ideas to care for my environment and to avoid dangers and threats to it.

6. A Meeting Place

Overexploitation of mangrove resources

Standards and learning processes

1st through 3rd grade

Language



- **I use** mass media to gather information and include it in a meaningful way in my knowledge schemes.
- **I identify** the intention of the author in a text.

Natural sciences



- **I set up** relations between the functions of the five senses.
- **I look** for information in different sources (books, online, personal experiences, and others) and I am able to give credit accordingly.

Social sciences



- **I express** myself in different ways (orally, writing, graphically) to communicate the results of my research.
- **I recognize** economic factors that provide well-being or generate conflict in social life.

Objectives

- **Identify** the main characteristics, the components and the economic benefits that mangrove forests provide.
- **Understand** the relations between ecosystems and natural environments and human communities and their cultural development, their interdependence and the importance of balance in their interactions.

4th and 5th grade

Language



- **I understand** the formal and conceptual elements (particularly, sentence structure and relations among sentences) in each text.
- **I identify** narrative elements in the texts I read such as time, space, action and characters.

Social sciences



- **I recognize** that the studied phenomena have different aspects that should be considered (change over time, geographical location, economical aspects...).
- **I identify** and describe characteristics of different natural regions of the world.

Natural sciences



- **I identify** the adaptations of organisms according to the characteristics of the environments they inhabit.
- **I explain** the dynamics of an ecosystem, considering the nutrient and energy needs of living things (food chain).

7. At the Center of the World

Threats to the Sierra Nevada of Santa Marta

Standards and learning processes

1st through 3rd grade

Language



- **I read** fables, short stories, poems, myths, legends and any other literary text.
- **I can look** for information in different sources: people, media, books, among others.

Natural sciences



- **I communicate** in different ways my research process and its results.
- **I link** the weather with the way of living of different communities.

Social sciences



- **I perceive** and describe the main physical characteristics of a landscape.
- **I identify** and describe the main characteristics of a natural and a cultural landscape.

Objectives

- **Recognize** the biological wealth, biodiversity and cultural heritage in the Sierra Nevada of Santa Marta.
- **Identify** the importance of conservation strategies in national parks.

4th and 5th grade

Language



- **I understand** the formal and conceptual elements (particularly, sentence structure and relations among sentences) in each text.
- **I use** strategies to search, select and store information to support my process of text production and reading comprehension.

Social sciences



- **I recognize** that the studied phenomena have different aspects that should be considered (change over time, geographical location, economical aspects...).
- **I identify** the adaptations of organisms according to the characteristics of the environments they inhabit.

Natural sciences



- **I recognize** how different people are and I understand those differences as opportunities to build new knowledge and relations that make life more interesting and fun (cognitive skills and knowledge).
- **I identify** my cultural origin and I recognize and respect the similarities and differences there are with other people's cultural origin (cognitive skills).

8. Life source

Illegal mining, overfishing and impacts on rivers

Standards and learning processes

1st through 3rd grade

Language



- **I describe** people, objects, places, etc., in a detailed way.
- **I identify** the communicative purpose and the main idea of a text.

Natural sciences



- **I ask questions** about objects, organisms and phenomena in my environment, and I explore possible answers.
- **I submit** answers to my own questions, and I compare them with other people's answers.

Social sciences



- **I can** locate myself in the physical and representational environment (in maps and graphs) using spatial references like up, down, inside, outside, right and left.
- **I recognize** economic factors that provide well-being or generate conflict in social life.

Objectives

- **Gain understanding** of Colombia's water system by identifying the main characteristics of the rivers that flow across the territory.
- **Understand** the impact that human actions have on rivers in Colombia, and the progressive deterioration of their health and of the ecosystems that depend on them.
- **Identify** concrete actions that children and their families can take in their daily life to prevent and reduce the pollution and decline of rivers and other water bodies in the territory's water basins.

4th and 5th grade

Language



- **I plan** strategies to search, select and store information: summaries, synoptic tables, mind maps and cards.
- **I design** a plan to present my ideas.

Social sciences



- **I take** care of my surroundings and I manage waste responsibly.
- **I classify and describe** different economic activities (production, distribution, consumption) in different economic sectors (agriculture, mining, industry) and I recognize their impact in communities.

Natural sciences



- **I study** the environmental characteristics of my surroundings and the dangers that threaten it.
- **I put forward** ideas to care for my environment and to avoid dangers and threats to it.




A Hidden Treasure



Scan the QR code or visit www.mellamotierra.com
to listen to the audio for this story!





It's not easy to see me even though I've always been here. I am hundreds of years old and I have many stories to tell. I may seem old, but the ongoing movement of the water that feeds me keeps me young. I'm unique and irreplaceable, and even if you don't know it, you need me more than you think.

Long before you were born, the Muisca came to my shores to have their children and to invoke Sie, the goddess of water. I was a symbol of life and prosperity. My crystal-clear waters helped them wash, quench their thirst, water their crops and mix mud to make their objects. They respected and cared for me.

But that was before. Now you don't even see me because I'm surrounded by buildings, an abandoned factory and a road that was built next to me many years ago. I'm not sure when it happened. Suddenly, the nearby town became a city; the houses and avenues multiplied. Little by little the trees began to disappear. The green landscape was replaced by cement and bricks. The city—with its lights, haste and movement—grew and surrounded me.



That's when they wondered what to do with me.

—What is this?

—It looks like a swamp.

—Something like that. It's just dirty still water. The best thing we can do is clean it. That would allow us to take better advantage of this area and its surroundings.

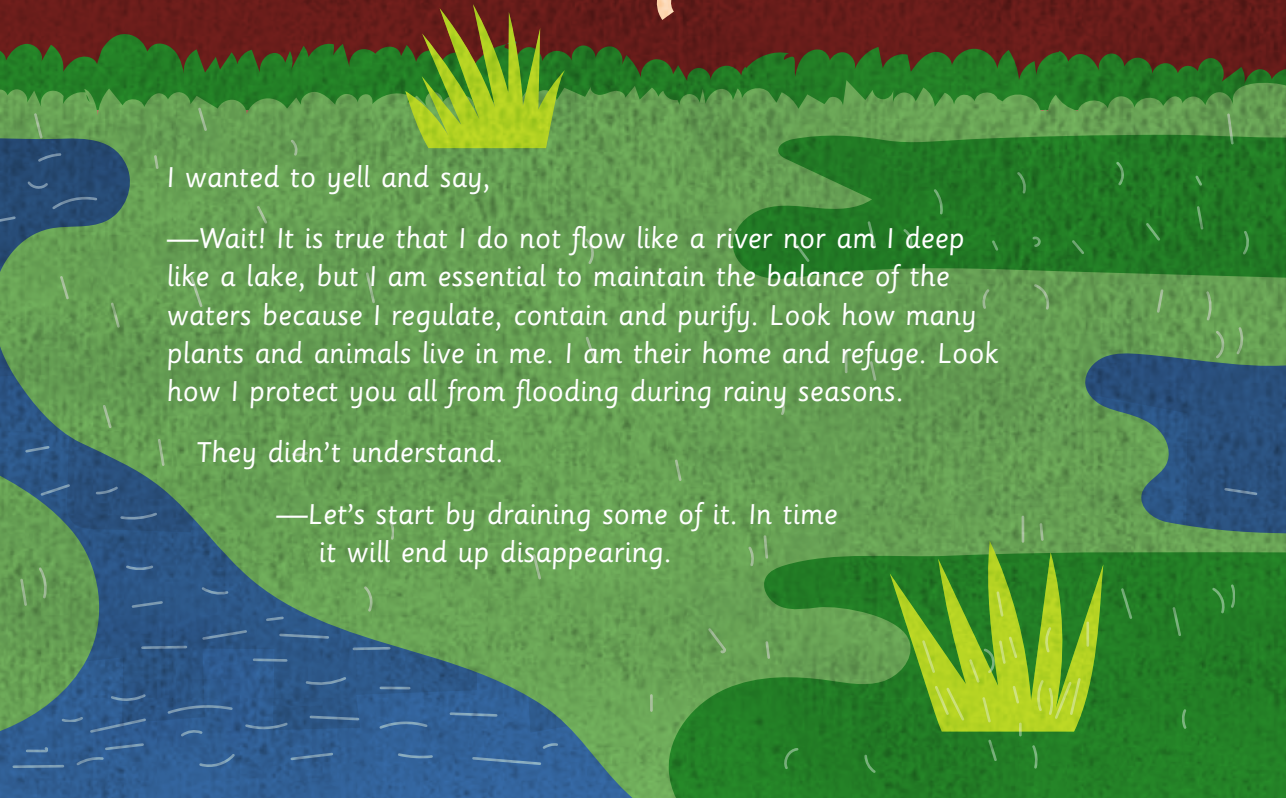


I wanted to yell and say,

—Wait! It is true that I do not flow like a river nor am I deep like a lake, but I am essential to maintain the balance of the waters because I regulate, contain and purify. Look how many plants and animals live in me. I am their home and refuge. Look how I protect you all from flooding during rainy seasons.

They didn't understand.

—Let's start by draining some of it. In time it will end up disappearing.



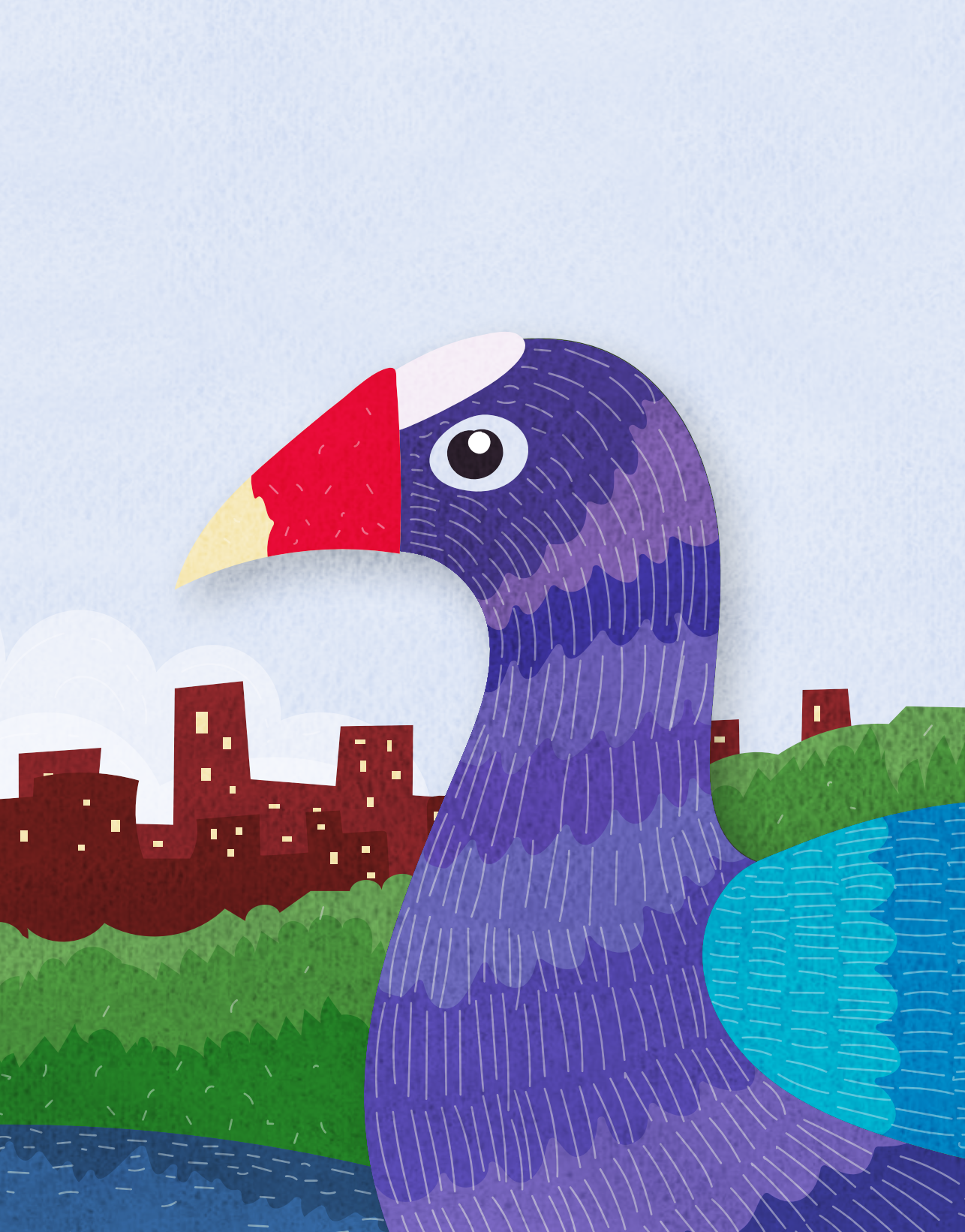
That's how I ended up surrounded by buildings, without any air or space. Many plants died; the animals moved away. I never saw the savannah crab again, and my waters turned dark. I felt sad and lonely.

I was about to lose all hope when things started to change. Some people were interested in meeting me and taking care of me. They cleaned my water from waste, planted trees, and decided that building close to me was not allowed. They stopped the draining and looked for ways to recover me. Now I am a reservoir in which visitors can learn of my importance. I feel better each day, and notice small progress, but there is still a long way to go for me to heal. Recently, the American purple gallinule came back to visit.

I want to believe that, although some still don't understand it, more and more people are thinking about taking care of me because they know that my work is essential for the ecosystem and the well-being of all.

I am the wetland.





Challenges

Friends... let me introduce you to one of my most important allies in the fight against climate change:

the wetlands!

When I'm feeling very hot, **this super hero helps me by reducing the effects of climate change and capturing the carbon dioxide in the air.**

Unfortunately, this ecosystem –like the majority of those who inhabit me– is in danger.

Play attention to the **EnviroClues**, solve the challenges, and together we'll discover what's happening in this wonderful wetland.



The Field Trip icon **shows you the activities** planned for a nature outing.

Challenge 1. Missing Words

Somebody has laid bricks on the wetlands and sunk some of the words in this paragraph. **Complete the phrases and discover a powerful secret.**

Wetlands are mixed e__y_s__s, meaning they are part land and part w__r, which makes them a good __me for a large number of diverse __i__als, plants, and other living things. They are flooded m__t o__ the year, sh__o__, and they get water from aquatic ecosystems like oceans, rivers, underground aquifers, and also r__n. Wetlands regulate the flow of rivers to prevent __lo__s, and their plants help to __rif__ the water and air by absorbing and transforming organic waste and chemical contaminants. This magnificent ecosystem has been a sacred place, a provider of f__o__ and fresh __a__r, and a place of contemplation for human communities.

EnviroClue

Wetlands cover 26% of the land in Colombia and approximately 87% of the country's population lives on top of or near areas that were or still are wetlands.



Mystery Questions:

On your mark, get set ... ask! Challenge one of your classmates, or your teacher, to answer one of the mystery questions.

1. What is a wetland?
2. What does a wetland give to your community?

Challenge 2. A Healing Place

My friend the wetland's water and plants have provided wellbeing, food, and natural medicines to many generations of humans, but they also offer peace and pure air in the middle of the city. **Take out your colored pencils and look for some friends and a wetland near your house or school;** or research another wetland that interests you. **Draw it in the blank space, record your impressions, and answer the question**

EnviroClue

The **Muiscas** are a **Colombian indigenous culture** that has historically inhabited the Cundinamarca, Boyacá, and Santander territories. **They have a deep respect for nature.** Muisca women had a special tradition that has been lost: they gave birth with help from the calming power of the cold wetland waters. Once born, their sons and daughters were introduced to Sie, the water goddess.

what does the wetland mean to you?

Field trip

Impressions

What did you see?

What scents did you discover?

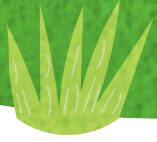
What textures did you feel?

What sounds did you hear?

Any tastes?

What is a wetland to you?

Draw your wetland here:



 **Mystery Questions:**

1. How pure is the air you're breathing right now? Why?
2. Who are the Muisca and what is their relationship to the wetlands?

Challenge 3. A Wetland in My Home

The wetlands hide a secret that makes them unique: they can absorb, purify, and regulate the flow of the water around them. **With the help of the following experiment you'll discover how they do it!**

1. You'll **need two used** plastic bottle of the same size, one sponge, a handful or dirt, and a handful of stones.
2. Have an adult help you cut off the top of the bottles to create two funnels and remove the caps.

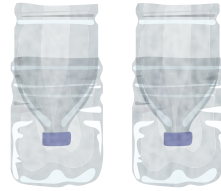


EnviroClue

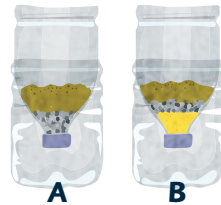
A wetland is like a big sponge that regulates the amount of available water.

When it rains, the wetland absorbs the excess water and prevents flooding. And during a drought, the accumulated water becomes a reserve for all things living there.

3. Place a funnel inside the bottom part of each bottle.



4. In the bottom of one funnel, place a layer of stones and then a layer of dirt (A); in the other, place a sponge at the bottom, before adding a layer of stones and another of dirt (B).



5. Pour half a glass of water into each of the funnels. Observe and answer the following questions:



a. What happened in funnel (A) and what happened in funnel (B)?

b. Which of the two allows the water to pass through more easily? Why?

c. Which of the two imitates the way the wetlands work? Why?



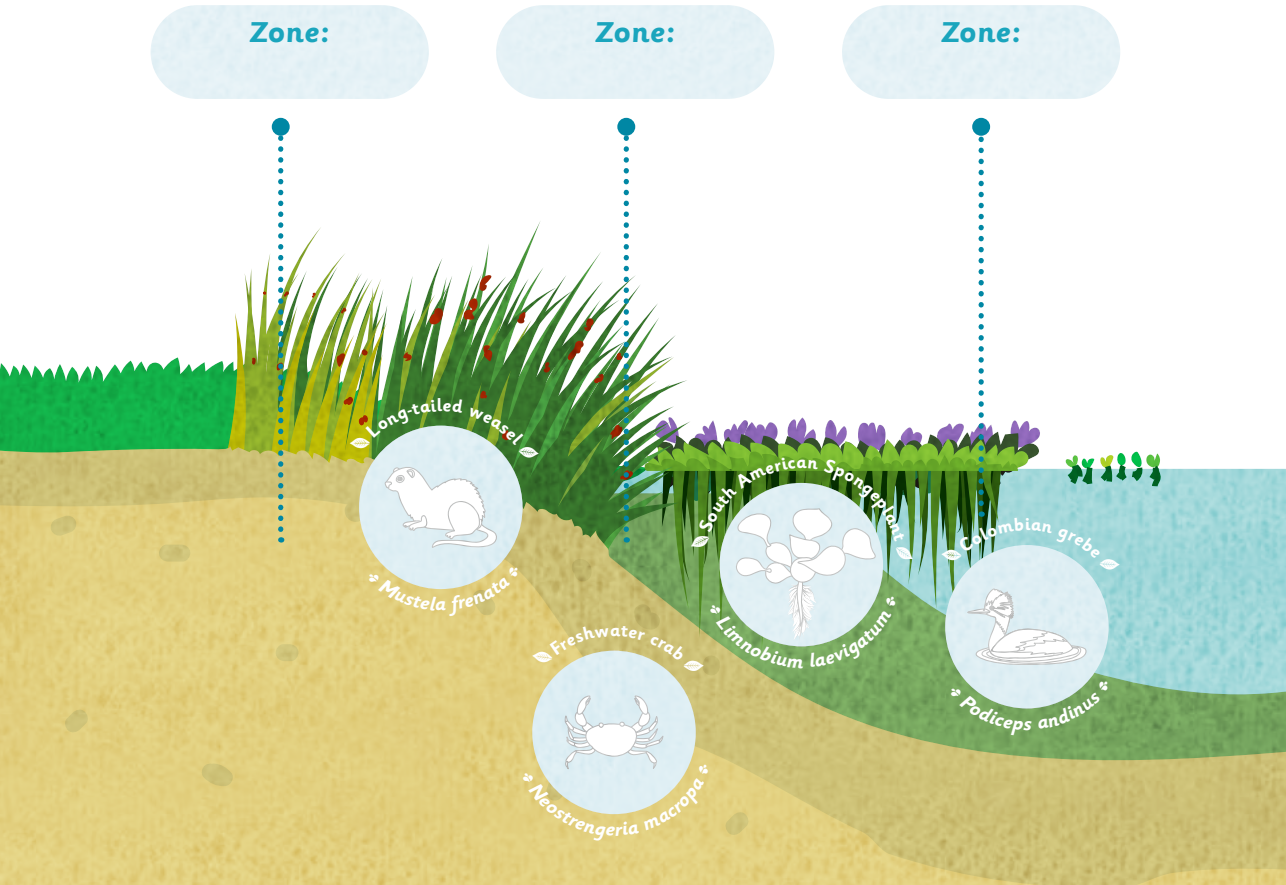
Mystery Questions:

1. Why is it possible to compare a wetland and a sponge?
2. How do you think the wetland purifies the contaminated water and the air that enter it?

Challenge 4. Dry and Wet

Because of humans' actions, the wetlands have suffered great changes and are almost unrecognizable. Certain flora and fauna species have even abandoned the wetlands because of contamination.

- a. Help this wetland remember its characteristics. Observe the image and write the name of each zone in the blank spaces. Use the following guide to identify them:
- **High Zone:** firm terrain with tall vegetation surrounding wetlands.
 - **Riverside Zone:** terrain with damp land and lower vegetation.
 - **Aquatic Zone:** flooded terrain with aquatic vegetation.



- B. Draw or use the stickers at the end of the book to bring back its inhabitants.

Conventions

🌿 **Common Name** 🌿

🌿 **Scientific Name** 🌿



Mystery Questions:

1. Which flora species are most important to the wetlands and what is their function in the ecosystem?
2. Which fauna species are most important to the wetlands and what is their function in the ecosystem?

EnviroClue

Alders, angel's trumpets, and myrtles are among the tree species that live on the wetlands in Colombia's Andean region.

They help prevent flooding and soil erosion.

Andean alder
Alnus acuminata

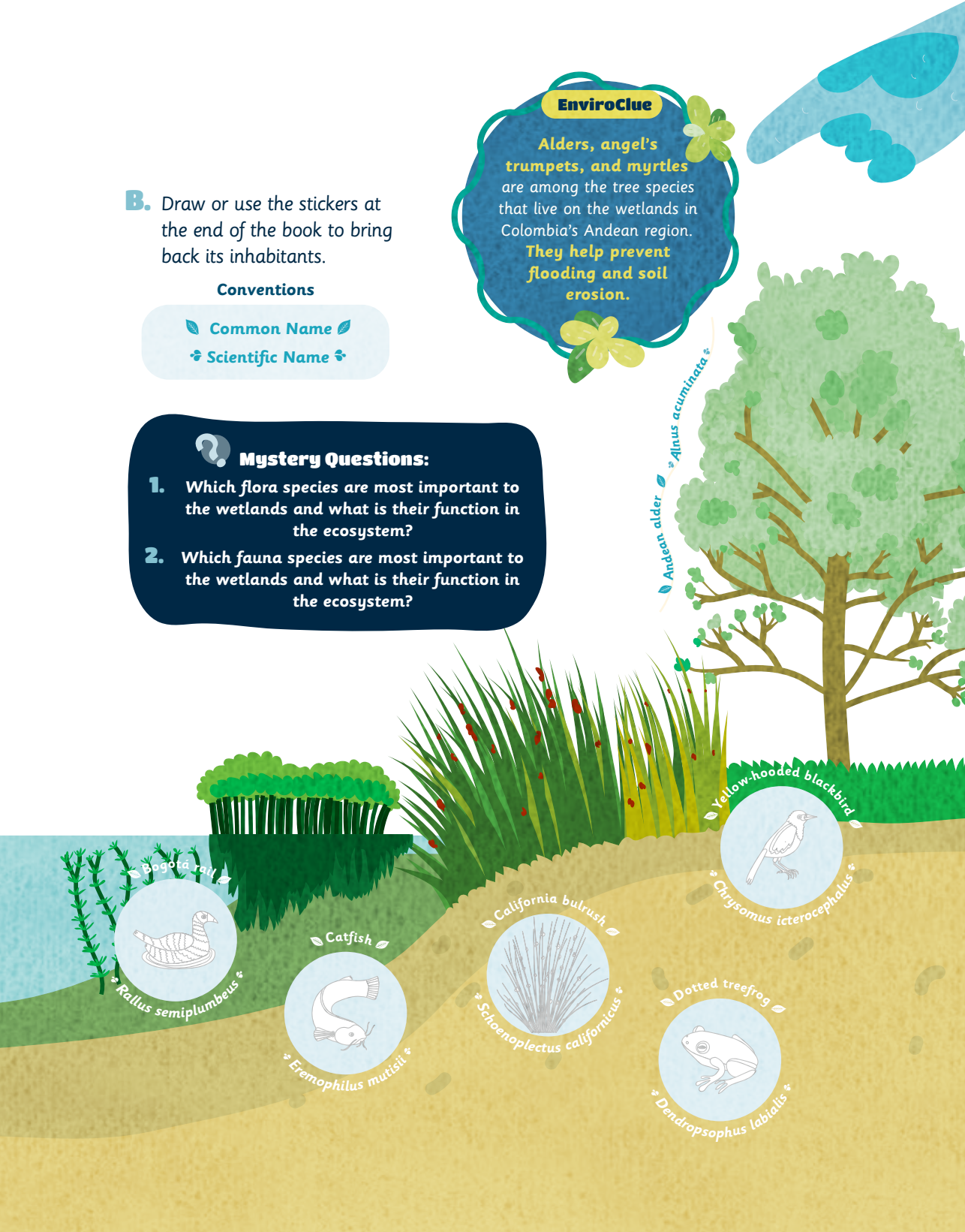
Yellow-hooded blackbird
Chrysomitris icterocephala

Dotted treefrog
Dendropsophus labialis

Bogotá rail
Rallus semiplumbus

Catfish
Eremophilus mutisii

California bulrush
Sclenoplectus californicus



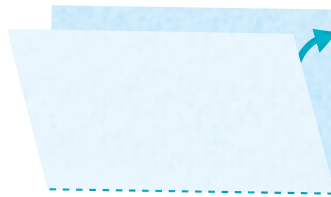
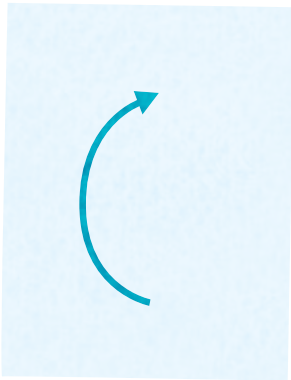
Challenge 5. Less and Less

Imagine a wetland called Chincú, which has lost part of its area to the growing Progress City. After 30 years of urbanization, agriculture, ranching, and deforestation, the great Chincú has been reduced to **half of half of half its original size**.

In the following exercise, calculate half of half of half:

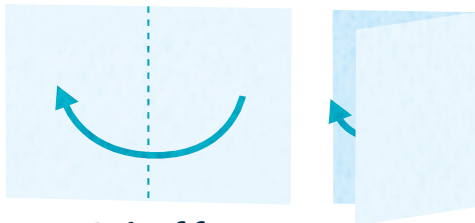
a.

1. Fold a sheet of paper down the middle.



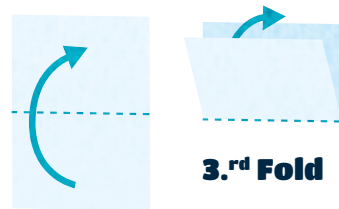
1.st Fold

2. Next, fold it in half again.



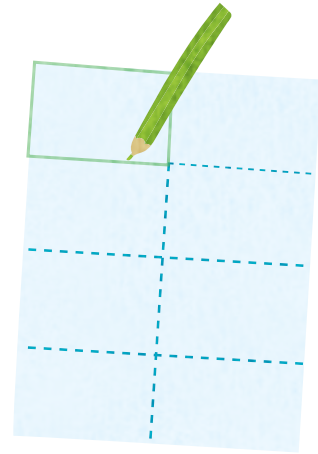
2.nd Fold

3. Make the same fold again.



3.rd Fold

4. Unfold the piece of paper and observe:
How many sections are there? Use a colored pencil to outline the border of one of these sections. **That's the current area of the Chincú wetland!**



Open sheet

- b. On the same page, draw the wetland in the outlined section and draw the buildings and streets of Progress City in the other sections.
- c. **Think:** If all the waste and dirty water produced by the inhabitants of Progress City are dumped into what remains of the wetland...

What color would the water be?
Color the water.



Mystery Questions:

1. What would happen to the birds that visit this wetland?
2. Can a wetland that has dried up be restored?

EnviroClue

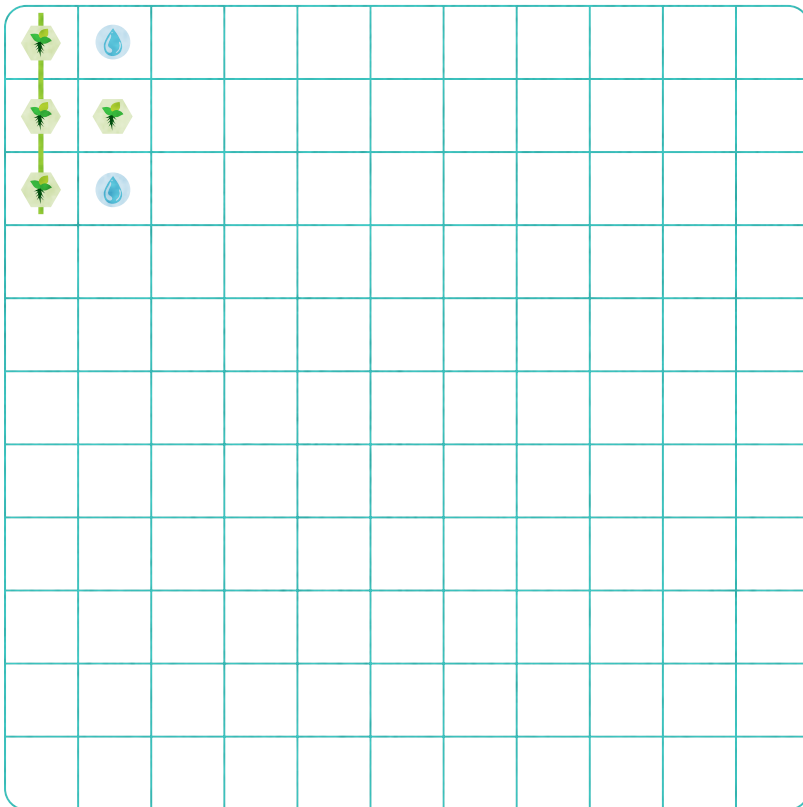
In the past 100 years, 64% of the planet's wetlands have disappeared and, currently, the danger continues. The activities that affect the health of the wetlands the most are: cattle ranching, large-scale agriculture, urbanization, and deforestation. What can we do to protect the wetlands?

Challenge 6. Invasive Common Water Hyacinth

Invasive plant and animal species affect the wetlands' natural balance. **Use green and blue colored pencils to play a game with a friend using the board below.**



1. You'll draw the water and your friend will draw the hyacinth.
2. Take turns drawing your figure in one of the squares on the board.
3. Whoever draws three figures in a row wins. **Can you keep the hyacinth from invading the wetland?**



Water



Hyacinth

Mini-Challenge 6A. Investigate, Understand and Care

With help from your teachers and relatives, study up on the common water hyacinth (scientific name *Eichhornia crassipes*). **Draw it in as much detail as possible, with all its parts, to get to know it better, and answer the following questions:**

a. Why does its presence harm the wetlands?

b. Where did it come from and why is it invasive?

c. How might we help restore balance to the wetlands?

Drawing



Write your answers below:

Findings



Mystery Questions:

1. What are the different ways in which invasive species enter ecosystems?
2. Can invasive species become allies of the ecosystems they invade?



Challenge 7. Neighbors No Longer There

Certain species of animals have disappeared from the wetlands due to high levels of contamination, the presence of cattle, large-scale agriculture, and deforestation. Ask your teachers and relatives about species they may have known in their childhoods that are no longer present. **Choose two of them and write a story that narrates their return to their habitat.**

EnviroClue

The **Colombian grebe**, whose scientific name is *Podiceps andinus*, **disappeared from the wetlands and lakes in Colombia's Andes mountains in 1971**, due to hunting and habitat pollution. Several species of birds and mammals currently face the same danger. What might you do to prevent other wetland species from disappearing?



Mini-Challenge 7a. Neighbors that Heal

Many of the plants also essential to the wetlands are now facing multiple threats. Ask a teacher or relative about any wetland plant species they may have known in their childhoods that are no longer present.

Investigate two of these species and write down three interesting facts about the medicinal or cultural uses of these plants.

Interesting Fact 1

Interesting Fact 2

Interesting Fact 3



Mystery Questions:

1. How can we care for the species with whom we share our territory?
2. Which plants and animals are part of the myths or traditions in your territory?

Challenge 8. Close Your Eyes and Open Your Ears

The yellow-billed cuckoo, whose scientific name is *Coccyzus americanus*, is a migratory bird that visits the Colombian wetlands from North America.

EnviroClue

Approximately 275 species of migratory birds pass through the wetlands of Colombia on their flight paths; 154 of them come from North America.

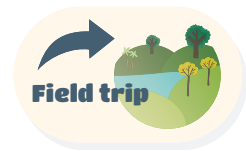
- a. Listen to its song here.

<https://bit.ly/CantoCuclilloPiquigualdo>



- b. Organize an early-morning outing with a relative to a wetland or natural setting near your home.

Try to discover whether this traveling bird is visiting your territory.



- c. Take a notebook with you and write down the following: **How many different birdsongs did you hear?** If you didn't hear any, **why do you think it was?**

d. **Write three tips below** for hearing the wetland birdsongs better and for promoting the care of these species.

Tip 1

Tip 2

Tip 3



Mystery Questions:

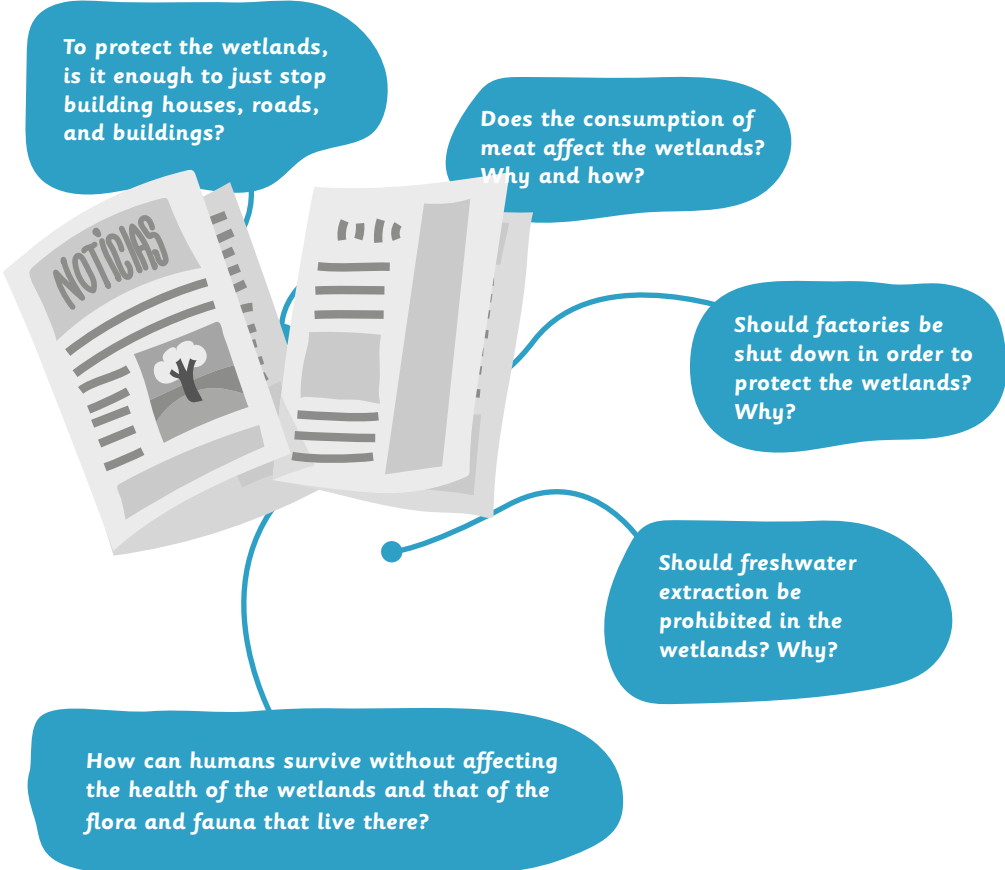
1. Why does the yellow-billed cuckoo travel from North America to Colombia to visit our wetlands?
2. Why do birds sing?

Challenge 9. Analyze and Participate

Wetlands are essential ecosystems for fighting accelerated climate change.

Discuss with your classmates how to protect them.

- a. Organize a debate among your classmates based on the following questions:



To protect the wetlands, is it enough to just stop building houses, roads, and buildings?

Does the consumption of meat affect the wetlands? Why and how?

Should factories be shut down in order to protect the wetlands? Why?

Should freshwater extraction be prohibited in the wetlands? Why?

How can humans survive without affecting the health of the wetlands and that of the flora and fauna that live there?

- b. Write down the answers and create a newspaper wall mural publishing the different points of view and the proposed solutions.

Notes from the debate:

Mystery Questions:

1. Why is dialogue important when analyzing a problem?
2. How can we mediate different points of view regarding the affectations of ecosystems?

Challenge 10. Sustainable Communications

You can join the community of people who recognize and are helping the wetlands by using your creativity and powers of communication. **Work together as a team to create a poster with information.** Work with your teachers and relatives to collect information and share your knowledge of the natural treasures in your territory. Use what you learned in the debate from the Challenge above. You can even add your posters to the newspaper wall mural!

Title of poster

What is a wetland?

Services provided to the community

Plant species that inhabit it

Illustration of a "wetlands" character

Wetlands in your territory

Animal species that inhabit it

Threats to the wetlands in your territory

Authors of the poster



Mystery Question:

1. Why is it important to share our knowledge with others?

Congratulations!

You've solved all the challenges.

Look for the sticker
for this chapter at
the end of the book
and place it here.

**This medal recognizes you as a
member of the Earth Mission
Team: kids and families to
the rescue!**




Everything in its Rightful Place



Scan the QR code or visit www.mellamotierra.com
to listen to the audio for this story!





My story started in a factory. They made me light and resistant; the ideal packaging to contain any type of liquid. From there I left by truck to the place where you bought me. When you held me in your hands, I thought we would spend a lot of time together, but it wasn't like that. As soon as I was empty you threw me in the street and I started the journey that brought me to where I am now, so far from the factory.

I don't know if you thought someone would take an interest in me and pick me up. It didn't happen. People walked past me without looking at me. I spent a long time in the same place without anything happening.

One afternoon the rain came. Water flooded the place where I was, and a slight current dragged me. When I least expected it, I fell into a sewer. I floated through solid waste through endless tunnels. Rats used me as a transport. One of them nibbled me but couldn't hurt me. I spent a lot of time in those murky waters and got used to their smells. I befriended a plastic bag and an old empty chip bag that had lost its bright colors. At some point we reached a river and let ourselves be carried away by its force until we heard the roar of the sea in the distance.

We were afraid to get lost in the vastness of the ocean, but we soon found a multicolored island made up of various objects like us. Forks, spoons, plates, empty bags, cigarettes, and disposable glasses kept me company, while others like me, of different sizes and colors, told me their stories. They were all very similar to mine.

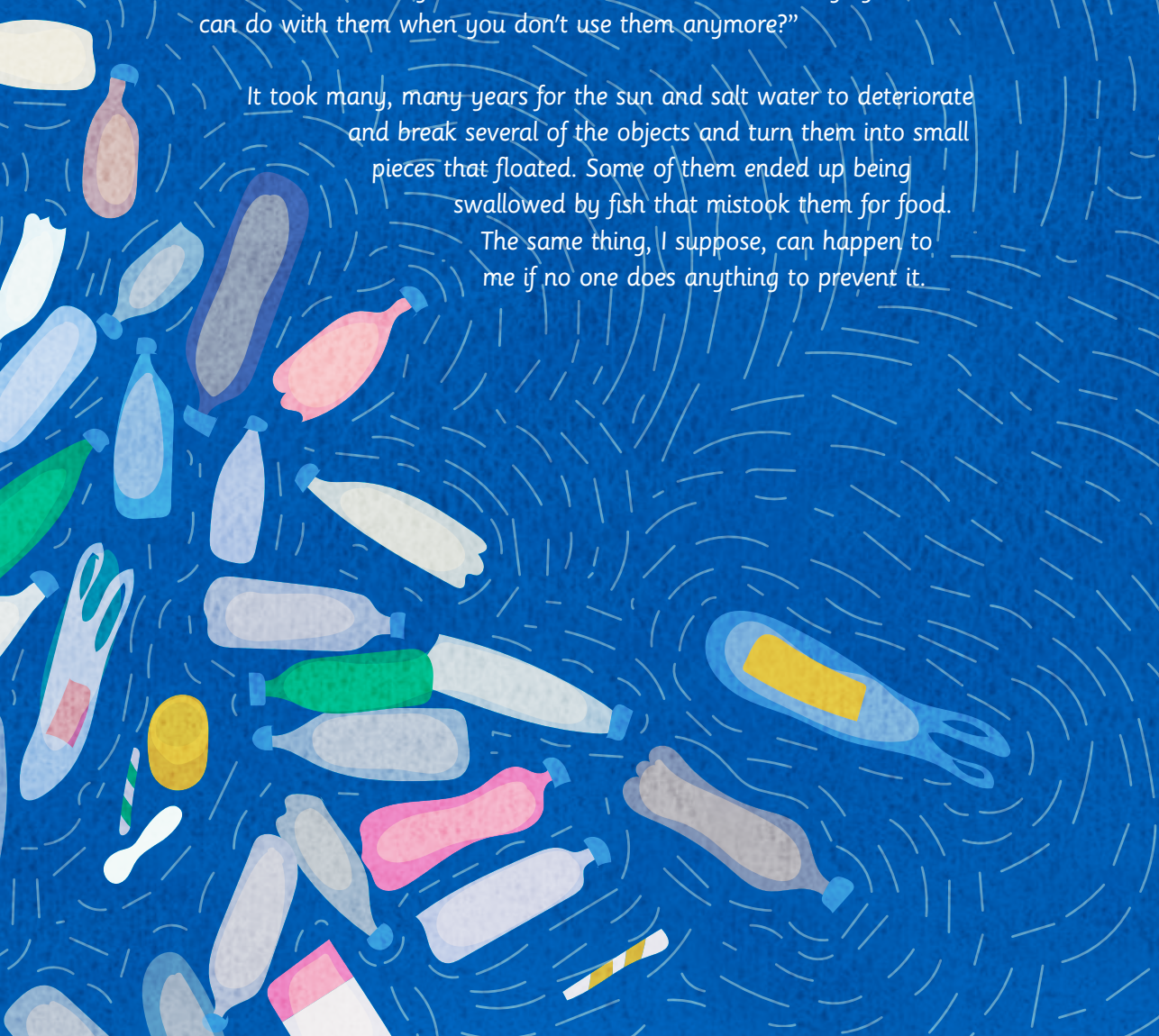



Turtles sometimes came to this island of waste and ended up tangled between the debris. They struggled desperately to free themselves. The birds also approached, looking for food, and more than one ended up eating a piece of plastic by mistake.

“Why do humans insist on throwing away these objects that do us so much harm?” a seagull once said. “Aren’t there other things you can do with them when you don’t use them anymore?”

It took many, many years for the sun and salt water to deteriorate and break several of the objects and turn them into small pieces that floated. Some of them ended up being swallowed by fish that mistook them for food.

The same thing, I suppose, can happen to me if no one does anything to prevent it.





Can you imagine that? One day, you could be eating a fish and I'd be there, inside of it, turned into a piece so small you wouldn't even notice it. I'm sure when you bought me you never imagined I could end up in your stomach.

**I am the
plastic bottle.**



Challenges

In recent years, human beings have found different ways to ensure their survival and make their lives more comfortable.

For example, manufactured tools and materials such as plastic have made it possible to preserve food, build resistant structures, prolong health, communicate, and travel long distances in a short time. **Plastic, especially single-use plastic, has become one of humanity's great allies, but it's doing a lot of damage to me**, to my plants and animals, and could even hurt you too.

Pay attention to the **EnviroClues**, solve the challenges and let's **work** together to reduce the amount of plastic on our planet.



Challenge 1. Good morning, Mr. Plastic

Plastic is a man-made product. It is made from organic materials present in nature —rubber, cellulose, or petroleum— and synthetic materials created in laboratories, which make it more flexible and durable. Plastics derived from petroleum are the worst polluters and the most harmful to health and the environment.

- a. Look around you and choose three objects made of plastic; describe them in the space provided in the following table.

	→ Object 1 ←	→ Object 2 ←	→ Object 3 ←
Hardness (very hard or changes shape when pressed)			
Smell or Taste			
What is it used for?			
How many times can you use it?			
What else might it be used for?			
Could you and your family survive without it?			

- b. What **similarities** exist between the plastics you chose?
 c. What are the **differences** between the plastics you chose?
 d. Could any of the objects be made of another material? Which material?
 e. How often do you use these objects in your daily life?



Mystery Questions:

1. What makes plastic an important material for humans?
2. How would your life and that of your family be affected if an order were given not to use any element manufactured from plastic?



Challenge 2. Plastic Here, Plastic There

Explore your house! Go through each area, check every corner, and make a list of the objects that contain plastic. **Write your findings on the chart below.**

Is any part of your house free of plastic?

Bedrooms



Plastic objects or objects containing a plastic component

Bathroom



Plastic objects or objects containing a plastic component

Kitchen



Plastic objects or objects
containing a plastic component

Common space



Plastic objects or objects
containing a plastic component

Exterior



Plastic objects or objects
containing a plastic component

Mini-Challenge 2A. At School

Team up with your classmates to perform the same exercise in the classroom. On the chart below, draw a map of the room and use red dots to mark all the places where plastic is present.

“Plastic Map” of the Room



Think:

Which objects found at home are also present at school?

Which plastic objects do you use the most?

Which objects are present at school but not at home?

Which plastic objects do you use the least?

Mini-Challenge 2B. The Natural Option

Could any of these plastics be replaced with other natural materials? **Select one of the objects that you found in your exploration, draw its plastic version and an invented version in which it is made from natural materials.**

Plastic version



EnviroClue

There are organisms in nature, such as fungi, that help break down fallen leaves, the bodies of dead animals, wood, and other organic waste and integrate them back into the life cycle. But these organisms cannot do the same with plastic, which is very resistant. A plastic bag can take up to 150 years to decompose and a bottle, more than 500 years! And as they decompose they release polluting gases such as methane and ethylene. **How do you think this affects living things?**

My version



Mystery Questions:

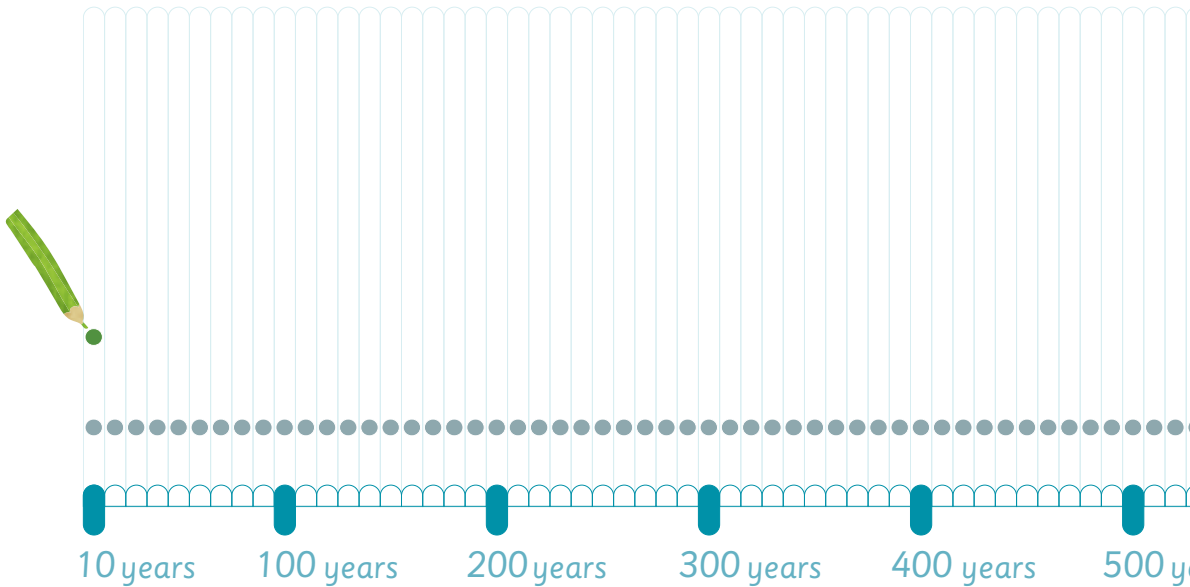
1. How could you bring greater balance to your home and your school by using objects that make them closer to nature?
2. What are the different types of plastic and how are they classified? Which ones pollute the most or are the most difficult to recycle?

Challenge 3. The Life of a Plastic Bottle

The oldest living human ever recorded was a woman who lived to be 122 years old. But this is nothing compared to the “lifespan” of a plastic bottle, which can take hundreds of years to decompose. This means that by the year 3000, future humans—or explorers from another planet— might come across the remains of a bottle discarded by someone today.

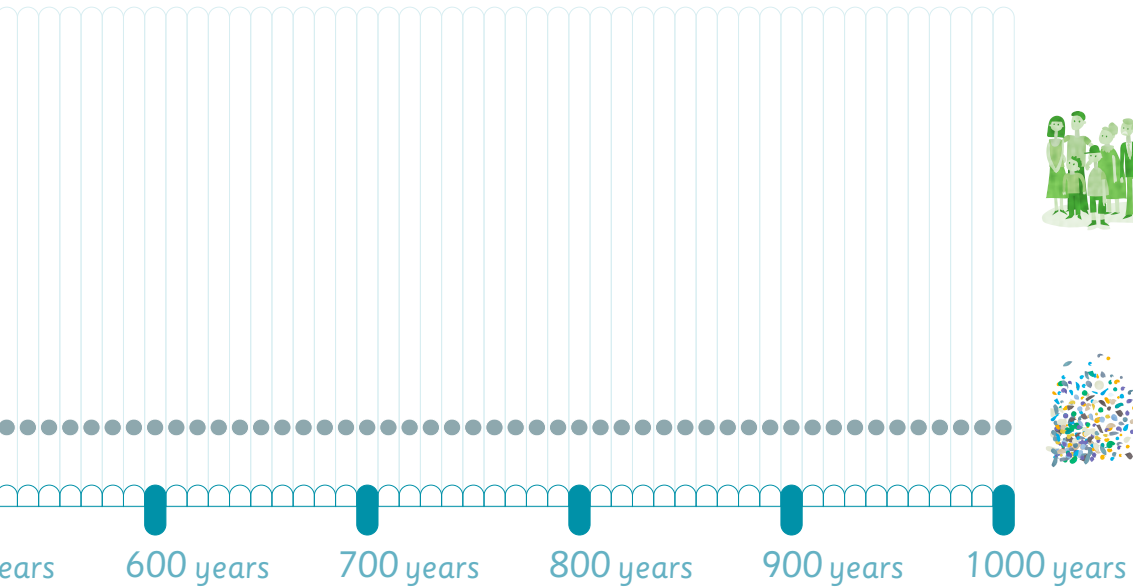
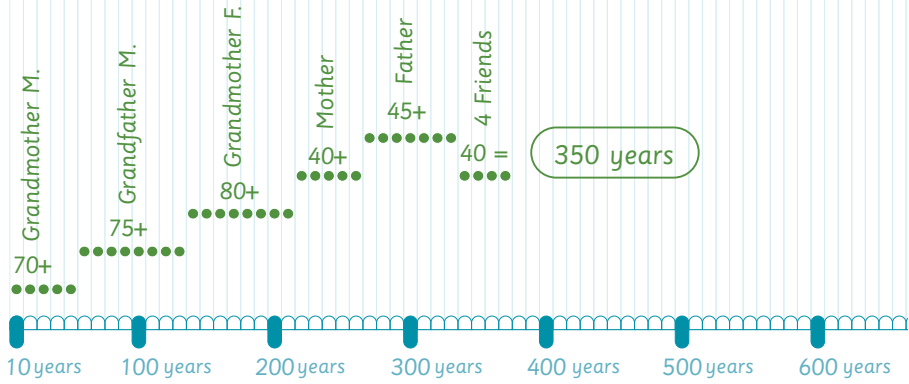
How old are your parents, grandparents, teachers, and friends?

Add up their ages on the graph until you reach 1,000. How many human lives are equivalent to the time it takes for a plastic bottle to decompose?



✿ Total Lives ✿

Example



- Mystery Questions:**
1. Why does plastic take so long to decompose?
 2. How might we take advantage of the "lifespan" of plastic to keep it from becoming a pollutant?



Challenge 4. My Plastic Footprint

Every time you buy a plastic bottle, bag, or food package, you're generating solid waste that will add to environmental pollution if not disposed of properly. The first step toward changing this situation is knowing how much solid waste we produce in a week, at home and at school



My plastic fingerprints



			
Example	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
Monday	<input type="text"/>	<input type="text"/>	<input type="text"/>
Tuesday	<input type="text"/>	<input type="text"/>	<input type="text"/>
Wednesday	<input type="text"/>	<input type="text"/>	<input type="text"/>
Thursday	<input type="text"/>	<input type="text"/>	<input type="text"/>
Friday	<input type="text"/>	<input type="text"/>	<input type="text"/>
Saturday	<input type="text"/>	<input type="text"/>	<input type="text"/>
Sunday	<input type="text"/>	<input type="text"/>	<input type="text"/>
Weekly total	<input type="text"/>	<input type="text"/>	<input type="text"/>

Reflect:

What are the plastic objects that you use the most during the week? Could you stop using them? Or could you replace them with other objects that are not made of plastic?

- a. Draw a **square** for every plastic bag you use.
- b. Draw a **triangle** for each plastic food package.
- c. Draw a **circle** for each plastic bottle.
- d. Draw a **diamond** for each disposable cup.
- e. Draw an **oval** for each piece of disposable cutlery.
- f. Draw a **star** for each plastic straw.
- g. Draw a **spiral** for other plastics you use.



Eight horizontal rounded rectangular boxes for drawing, each corresponding to a cup. The top box is light green and contains two diamond shapes. The remaining seven boxes are light blue.



Eight horizontal rounded rectangular boxes for drawing, each corresponding to a fork. The top box is light green and contains two circles. The remaining seven boxes are light blue.



Eight horizontal rounded rectangular boxes for drawing, each corresponding to a straw. The top box is light green and contains two star shapes. The remaining seven boxes are light blue.



Eight horizontal rounded rectangular boxes for drawing, each corresponding to a food package. The top box is light green and contains a spiral. The remaining seven boxes are light blue.

Mini-Challenge 4A. Plastic Nightmare

What a beautiful landscape! **Draw what it would look like if all the plastic waste you produce in a week were dumped there.**

What do you think might happen to the flora, fauna, and inhabitants who live there?





Mystery Questions:

1. Do you think that the weekly consumption of single-use plastics in your home is high or low?
2. Is it possible for your family to stop using any of these plastic objects? How?

EnviroClue

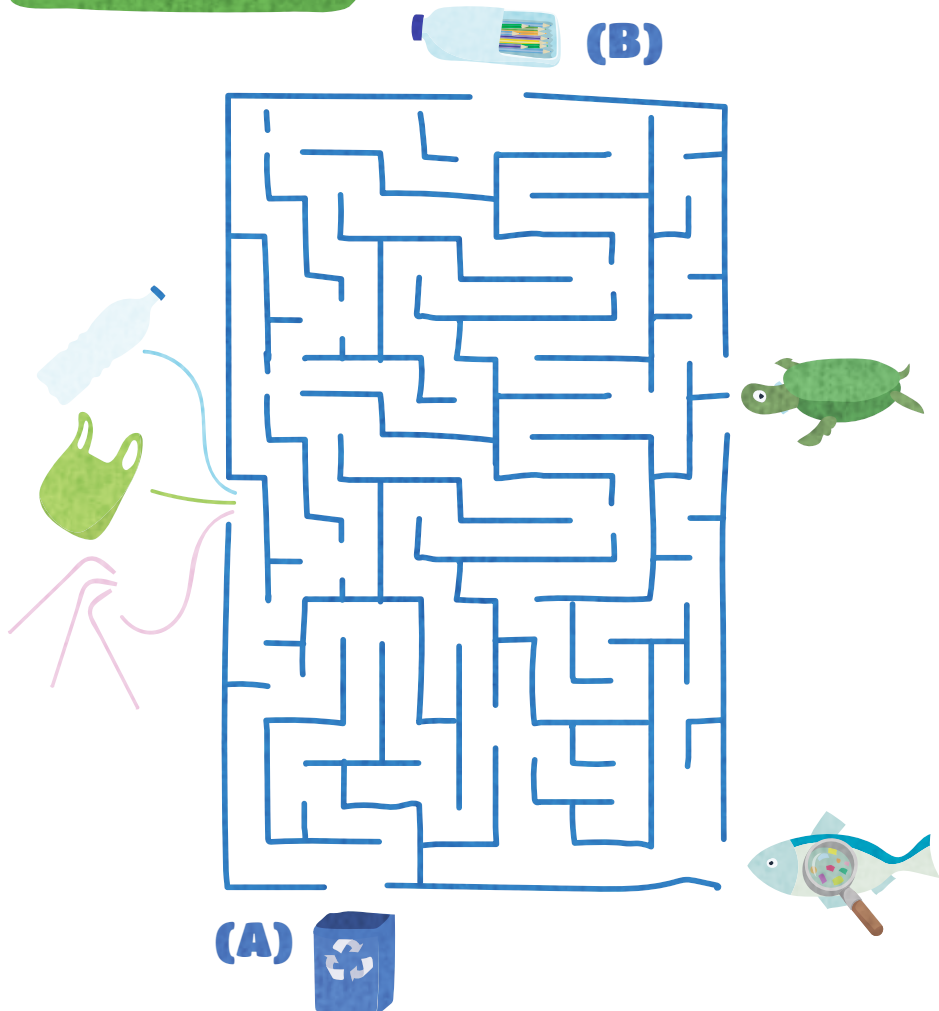
Thanks to human creativity, it is now possible for all solid waste to be reused, transformed, recycled, repaired, and reduced... **nothing is garbage!** When you hold something plastic in your hand, and before you throw it away, ask yourself: where will it go and how long will it be there?



Challenge 5. A Different Way

Every day, thousands of plastic containers and objects used and discarded by humans end up in rivers, oceans, forests, and other ecosystems. **Travel the maze to transport the containers to the waste separation station (Destination A) or to the reuse station (Destination B); use different colors for each object.**

Prevent the plastic from reaching the fish's stomach and the turtle's neck!



Mini-Challenge 5A. Final Destination

Describe where each plastic container has ended up and create a short story to explain or imagine what might happen to it at each of the four destinations. **Use the following questions as a guide to create your story:**

Answer on a notebook

Driving Questions

What did it become?

How did its presence impact the environment?

How did it get there?

How can we change this situation?



Mystery Questions:

1. Do you know of a body of water, river, wetland, lake, or ocean in your territory that is highly contaminated by solid plastic waste? How might you lead a campaign to clean it up?

AmbientaPista

Every year, eight million tons of plastic end up in the ocean. This is the equivalent of covering all the world's beaches with garbage bags. Ocean currents transport the accumulated plastic to a single place, forming gigantic islands of plastic waste. To see what one of these islands looks like, scan the QR code. **Can you imagine what the oceans will look like in 100 years if these islands of waste continue to grow?**



Scan me

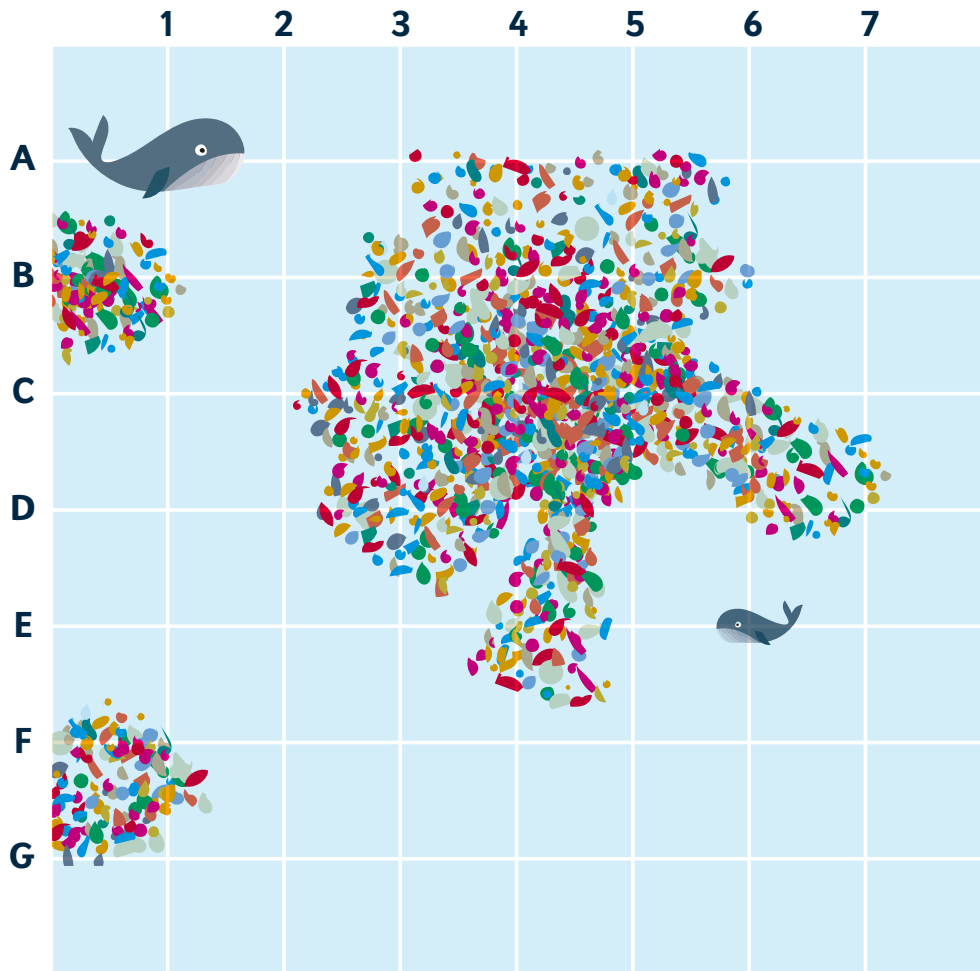
Challenge 6. Where Will the Whales Play?

Mother Whale has heard the call of her whale daughter, who was lost while playing near an island of plastic waste. **Mother Whale** is located at coordinates **A-1** and **Daughter Whale** is located at coordinates **E-6**. Help them find each other!

- a. Create a safe route for Mother Whale to reach her daughter without touching the plastic islands.
- b. Use a pencil to mark the points on the map where Mother Whale must pass to avoid the island of waste. **Watch Out! Mother Whale is very big and can only move in straight lines.**
- c. Write down the coordinates of the plastic waste that you would clean up so that they can return to the starting point together as soon as possible.

Coordinates

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____








Mystery Questions:

1. In what ways does plastic affect animals' lives and habitats?
2. How can we prevent plastic from reaching the oceans?

Challenge 7. Explore and Diagnose

Visit the playground at your school or in your neighborhood and diagnose the area by determining the amount of plastic waste you see there. **Record your findings on the table by placing an “x” next to each type of waste you find on the ground.**

Plastic waste	Low Level			Medium Level		
	1	2	3	4	5	6
 Plastic bag						
 Food packaging						
 Plastic bottle						
 Disposable cup or spoon						
 Styrofoam						
Other (Write it down)						



Mystery Questions:

1. How does the presence of solid waste affect the well-being of people in their communal spaces?
2. Are cleaning crews the only ones responsible for the presence of solid plastic waste in communal spaces?

What does the area look like before and after people play there?

How does it feel to see it in this condition?

What is the most common plastic waste found there?

What is the least common?

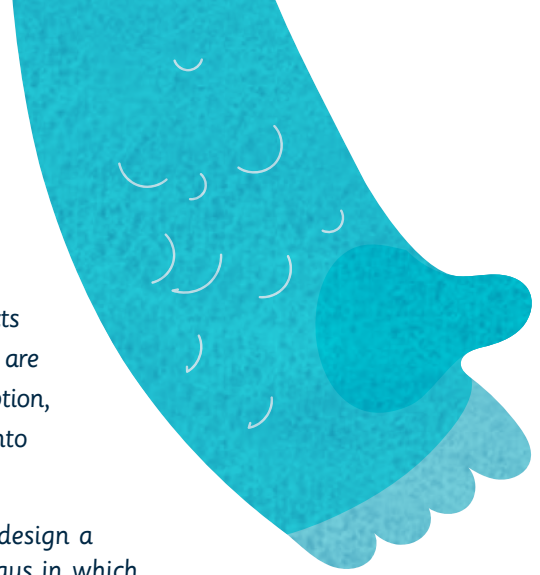
How contaminated is your playground?

High Level			Extreme Level			
7	8	9	10	11	12	13

Challenge 8. Everybody Reduce!

Thousands of families work daily to reduce the effects of the production and use of plastics. These families are part of the global "3R" movement: Reduce consumption, **reuse** objects, **recycle** solid waste to transform it into something new. **Join the "3R" community!**

Use a sheet of paper and your favorite colors to design a poster to communicate to your classmates the ways in which plastic consumption at home, at school, and in the community can be reduced. Ask your family to contribute their ideas?



For example:



Mini-Challenge 8A. Action!

Organize a campaign with your teachers and classmates to reduce the amount of plastic used at your school. Start with the posters you made in Challenge 8. Complement these posters with artistic interventions, sculptures made from reused objects, or even a collection point set up to receive plastics to be reused. Don't forget to tell others how and how much you have decreased your plastic footprint!

EnviroClue

Have you heard about PRAEs? They are Schoolwide Environmental Projects that help educational communities to understand the environmental problems that affect them, and to develop skills to seek joint solutions at the school level. Find out if there is a PRAE at your school and join in to build a sustainable present and future in harmony with nature. **How can you help implement a PRAE at your school?**



Mystery Questions:

1. What innovative ideas can you think of to reduce the consumption of plastic in your school?
2. How can you make other people aware of the impact of solid plastic waste on nature?

Challenge 9. The Art of Reusing

With a little creativity and ingenuity, plastic can be turned into a material for creating art.

Observe the following works of art made from reused solid waste and answer the questions about each of them:



Skyscraper,
Studio KCA,
2018, Belgium.



Recycled Trashure,
Johanna Keimeyer,
2008, Germany.

How would you name it?

What type of solid waste did the artist use to create the work?

What emotions does it produce?

What message is the artist sending to his community?



Freedom,
Eduardo García,
2011, Colombia.



Toy Rhino,
Robert Bradford,
2012.



Okomural,
Óscar Olivares,
2020, Venezuela.

Mini-Challenge 9A. PlastiArtist

Observe the following image and make a mural with your classmates using used plastic bottle caps. **How many caps will you need? What colors? Could you also represent animals and plants from your region?** Ask your teachers and family for help.



Mystery Questions:

1. Do you think that art can promote collective actions for taking care of the planet? How?
2. What message would you write to one of the artists you have just met through his or her work?

Challenge 10. RecycleFriends

Recycling is an industrial or artisanal process in which waste (glass, plastic or cardboard) is transformed into a new product. For example, used plastic bottles can be recycled and transformed to produce new bottles. To do so, however, requires proper separation of waste.

Work as a team using your creativity to build a cool **recycle-bin** from cardboard to use at home or at school as a place to collect the solid plastic waste that you accumulate daily to be recycled. Consult with your teachers and use the following questions as a guide:

Design the prototype here before building your **recycle-bin**



What color should it be?

What symbol would you use to make everyone understand the function of this bin?

Where would you place it?

How would you promote its use?



Mystery Questions:

1. What is recycling and how is it related to natural energy transformation processes?
2. Who are recyclers and what is their role in society?



Challenge 11. Transformative Words

Recycling is a job for everyone! If your community can reduce the use of plastic containers, and you and your friends start to reuse solid waste, there will be fewer and fewer resources to recycle. But, in the meantime, invite everyone to recycle!

Write a verse, stanza, rhyme, couplet, poem, or song that encourages people to recycle properly. Keep in mind the following messages:

Separate solid plastic waste from organic waste.

Clean and dry your solid plastic waste.

Recycling can be fun and cool.

When we help the planet we improve the well-being of all living things, including humans.

Mini-Challenge 11A. Festival of Transformation

EnviroClue

Although we know how to recycle, only one fifth of all the plastic produced on the planet is recycled. This is like using five plastic bottles every week and only recycling one. **How many bottles or packages have you recycled this week?**

Organize a festival at your school to make “3R” culture cool. Reduce consumption, reuse objects, **recycle** solid waste to transform it into something new. At the festival, you can exhibit the artwork created with solid waste, share what you learned about plastic and the poems or songs you created, and offer workshops to get even more transformers to join in.

Plan with your classmates and teachers:



1. Where and when would the festival take place?
2. What would it be called?
3. What activities would the festival offer?
4. Who would you invite?
5. How would you invite them?
6. Why is this festival important?
7. How can you link this festival to your school's PRAE?



Mystery Questions:

1. What is a PRAE and how can you help design and put it into practice?
2. How does it make you feel when you help the Earth and the ecosystems that make it so wonderful?

Congratulations!

You've solved all the challenges.

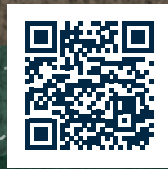
Look for the sticker
for this chapter at
the end of the book
and place it here.

**This medal recognizes you as a
member of the Earth Mission
Team: kids and families to
the rescue!**

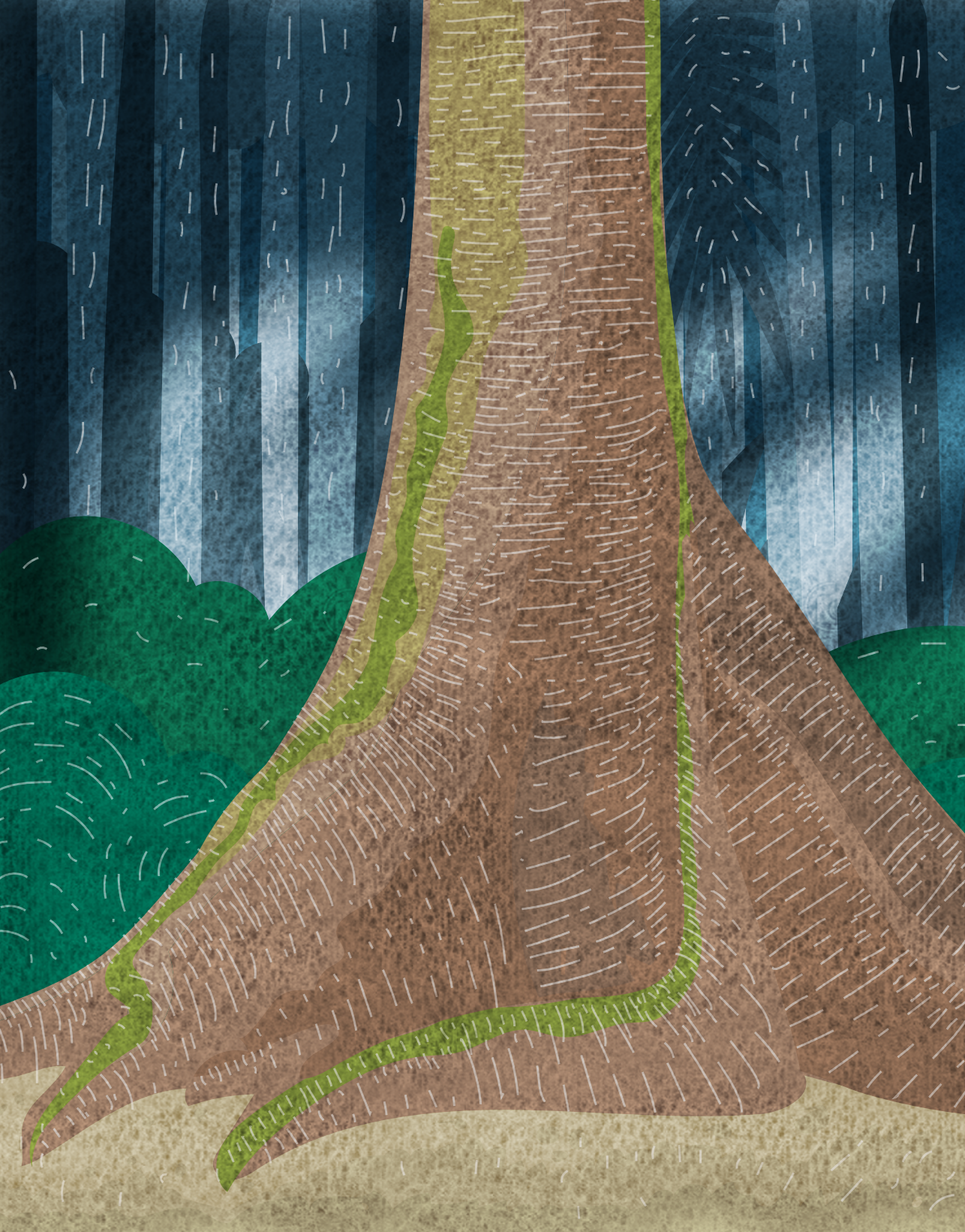





The Lung of the World



Scan the QR code or visit www.mellamotierra.com
to listen to the audio for this story!






At first, I was a flower that opened slowly in the middle of the jungle. I lost my petals and became a pink fruit. When I fell to the ground, I became a seed and then a wise, centennial tree.

My trunk is wide and strong. I have grown up for years, at my own pace, alongside others like me. We harness the nutrients of rain and soil, and produce oxygen. That is why my home has been called the lung of the world.

Birds, monkeys and insects visit my branches every day.

“We like to come because we can protect ourselves from the sun and quietly eat some delicious fruit.”



In the jungle everything is connected: my leaves fall and decompose in the soil to help build a nutrient rich protective layer that feeds my roots. Water springs from the plants and rises through the air, moist and light. In the skies, it transforms into clouds, which travel the world covering the Earth with rain.

Nothing is wasted. Everything is transformed and reused.

The indigenous people who live in this place take care of it and respect it. From a young age, they listen to the stories their elders tell them about Mother Earth:

"Our history is linked to these trees. We are all children of the earth."

"Listen and learn. In the jungle, each plant and each fruit has a story, so you must live in harmony with nature and find a balance for current and future generations."

"With the right type of bark you can make an infusion that cures stomach pains; the right type of leaf can be used to help a wound heal faster."

But eventually, other people came along. They didn't agree:





"There are too many trees, what good are they to us? We should knock some down so we have more room to sow. That would give us money."

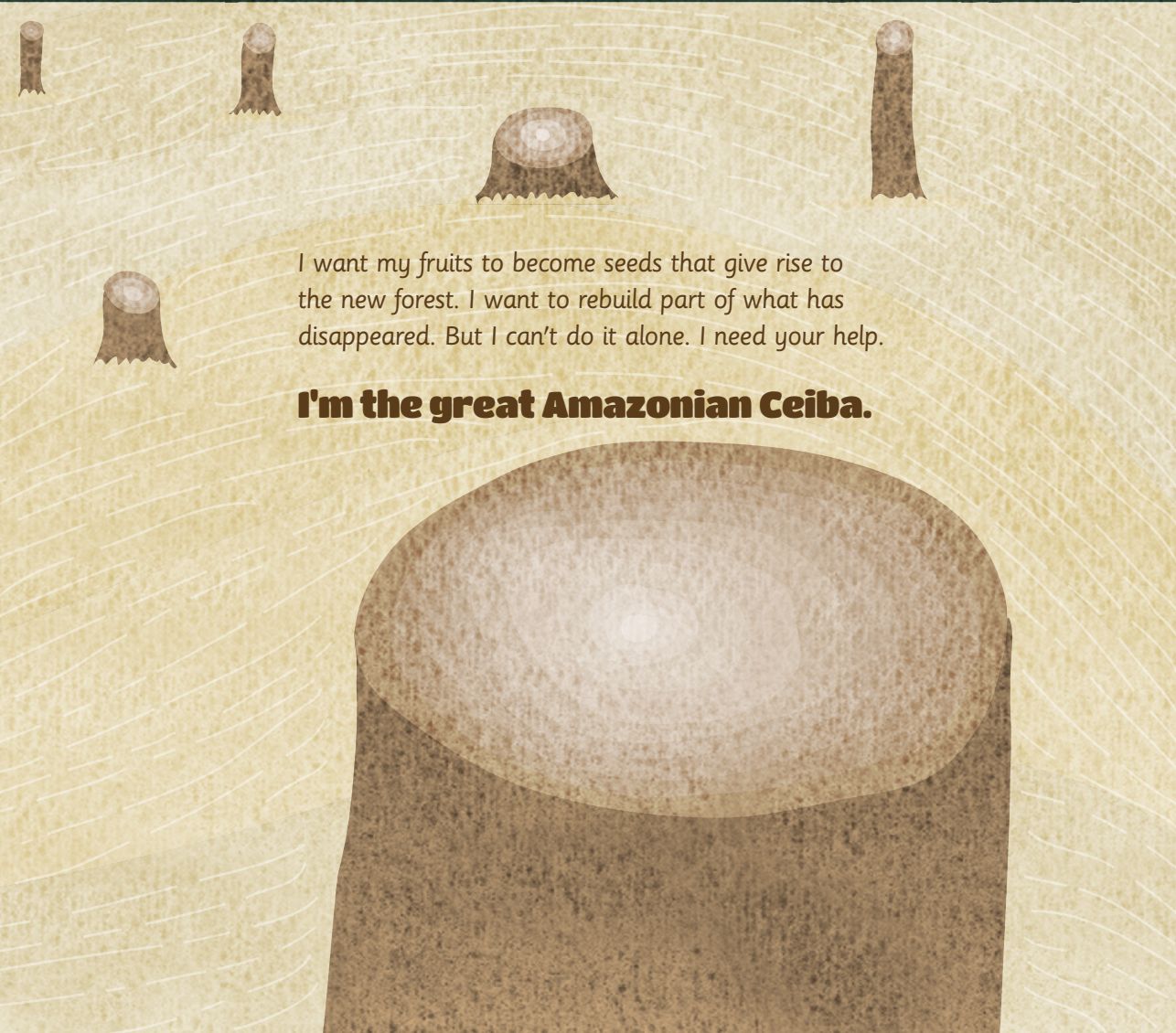
"We could also bring cows and make better use of this space."

Trees like me became inconvenient for agriculture and livestock, so they made the decision to cut us off. However, when they realized how long that took, they decided to use fire to go faster. The flames destroyed huge plants and trees that had taken years to grow. Color faded away: multicolored bromeliads, wild orchids, bark and medicinal leaves turned to ashes.

In a few minutes, the protective layer of the soil that we worked so hard to build was destroyed. Animals and insects fled, terrified, and the natives had to leave their home.

I can't run away. I'm a large, centennial tree, and I don't know if I will survive the next fire. It is not yet too late. If people understand the importance and value of the jungle, further destruction can be prevented.






I want my fruits to become seeds that give rise to the new forest. I want to rebuild part of what has disappeared. But I can't do it alone. I need your help.

I'm the great Amazonian Ceiba.

Challenges

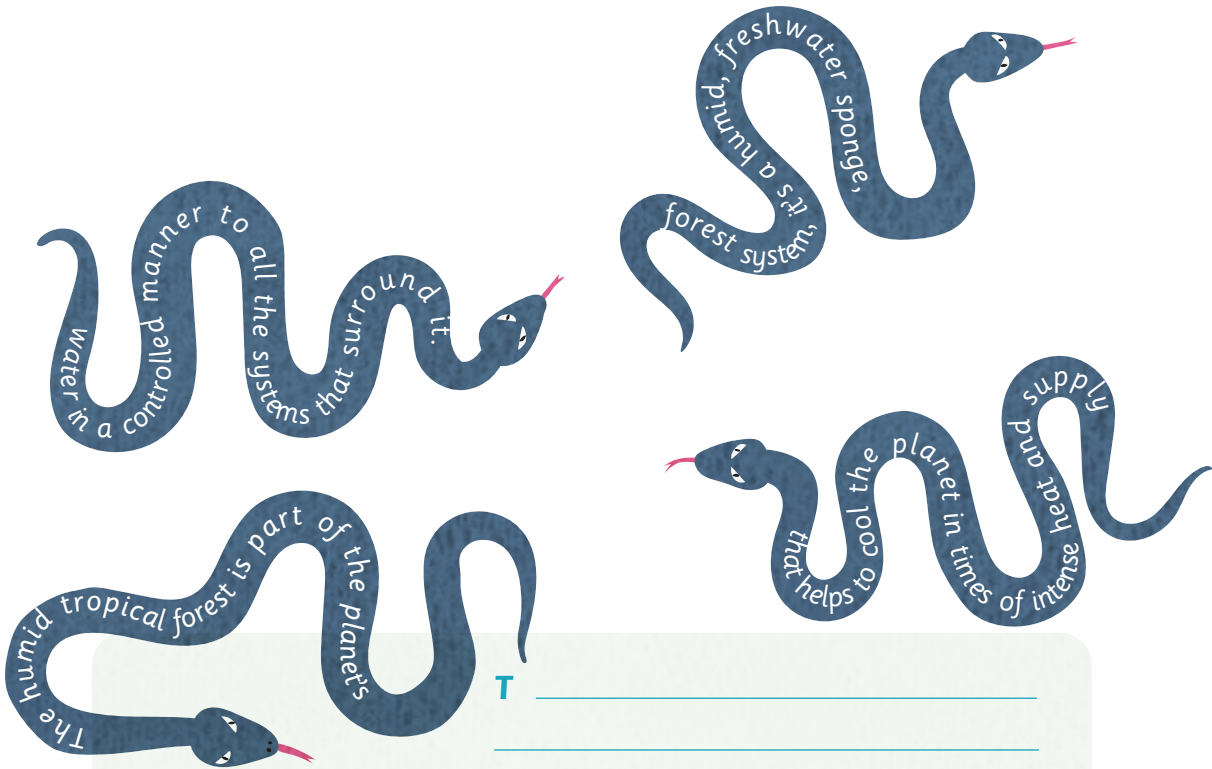
Jungles are humid tropical forests that cover just 6% of my surface, but are still home to half of the fauna and flora that inhabits me. They are megadiverse! Their rivers are mighty and their year-round average temperature is **22 degrees Celsius**. But, like the ceiba tree in the story, they're having a very hard time surviving.

An illustration of a tropical island with a river and forest. The island is green and has a small river flowing through it. There are several trees, including palm trees and deciduous trees. The island is surrounded by blue water with white waves. The sky is light blue with white clouds.

Pay attention to the **EnviroClues**, **complete** the challenges, and **become** a protector of the planet's largest tropical forest.

Challenge 1. Dance of the Anaconda

Climate change has resulted in excessive rains that have taken the anacondas by surprise, interrupting their river dance. Help them organize the phrases below to discover the important message they're trying to send you. **What should the first sentence be? (Hint: a capital letter will help you).**



EnviroClue

The jungles of Colombia's Chocó department are among the rainiest places on the planet. In the municipality of López de Micay, a total of 13,300 millimeters of rainwater can fall during a year. This means you'd need a container 13 meters deep (or a four-story building) to store all the rain that falls there. All this water is absorbed and distributed throughout the jungle to keep it alive. **Have you counted how many days it rains every month in your territory?**

Mini-Challenge 1A. Let's Measure the Rain

In the month of September, up to 10 millimeters of rain can fall every day in the humid jungle. How much rainwater falls daily in your territory? **Make a rain gauge and find out!** Maybe your territory has more in common with the jungle than you think.

You need:



Two-liter reused plastic bottle



A handful of pebbles



Scissors



Liquid silicone or tape



A ruler

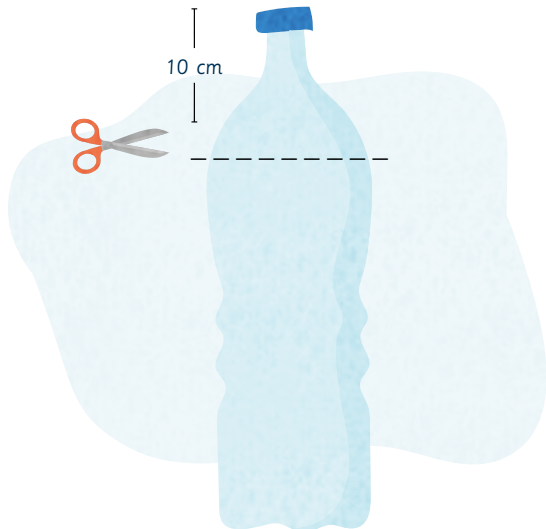


A permanent marker

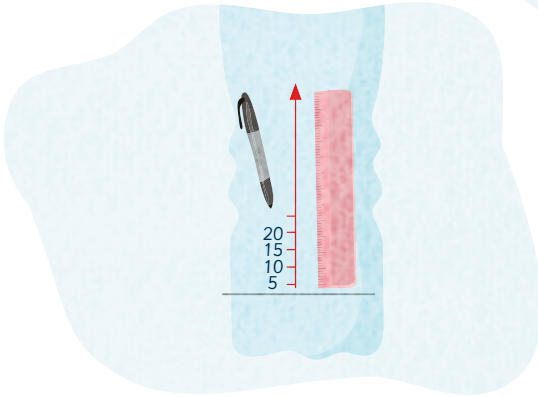
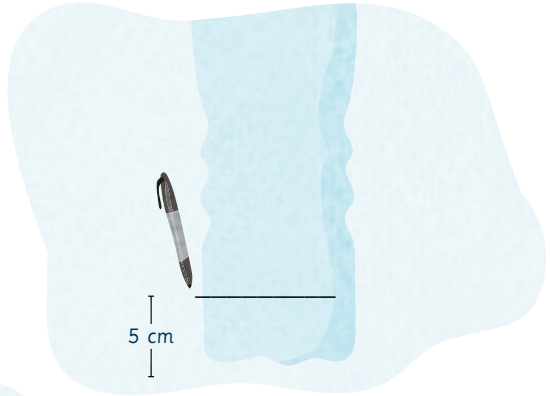


Modeling clay

- a. Remove the cap and label from the bottle. With help from an adult, cut off the top of the bottle 10 centimeters from the mouth to create a funnel.

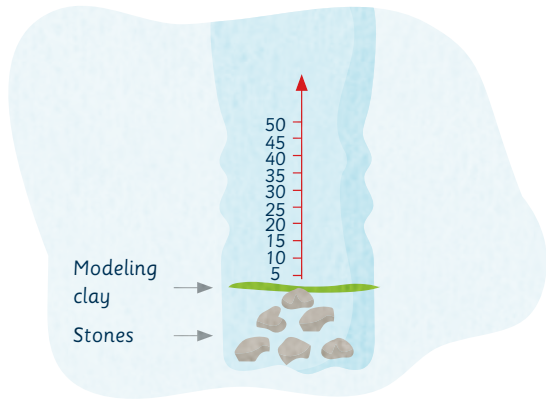


- b.** Use a ruler to measure five centimeters up from the bottom of the bottle and draw a horizontal line with the permanent marker.



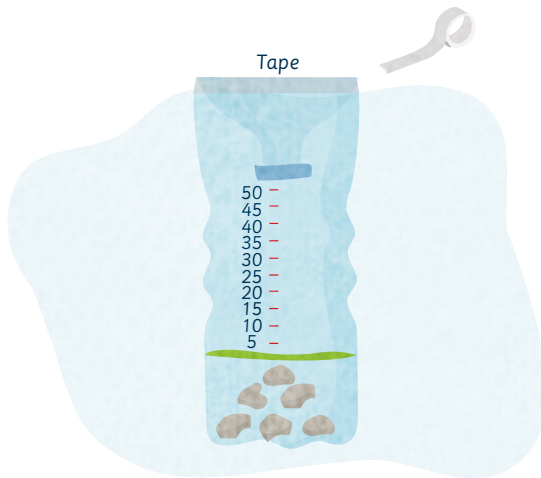
- c.** Starting from this line, use the marker and ruler to draw a 10-centimeter vertical line (equal to 100 millimeters).
- d.** Use the ruler to measure and draw a small line every five millimeters along the vertical line and number it by fives (5, 10, 15, 20, etc.).

- e.** Give your rain gauge stability by placing the pebbles in the base of the bottle, up to the horizontal line, and cover the pebbles with a layer of modeling clay to create a floor.



**Continue on
the next
page**





- f.** Insert the funnel into the body of the bottle and attach it to the edge with liquid silicone or adhesive tape

- g.** First thing every day, place your rain gauge outdoors so it can catch rainwater.
- h.** Check your gauge 24 hours later and write down on the table below the number of millimeters of rainwater that have fallen onto the ground.
- i.** Repeat the same exercise daily for a week.
- j.** With help from your teacher, answer the following questions:

Why is this data important?

Will the results be the same every month of the year?

How can you use rainwater at home?

	Amount of rainwater in millimeters	Amount of rainwater in centimeters
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		
Weekly Total		



Mystery Questions:

1. What is a jungle and what characteristics differentiate it from other ecosystems?
2. Why are the jungle and rain important to Planet Earth?
3. What is the relationship between water and the humid tropical forest?

EnviroClue

Colombia has the second largest number of tree species in the world — a total of 5,776 species. Brazil has the greatest diversity, with a total of 8,715 species. Antarctica and the Arctic have no species of trees.

Why don't trees grow in these territories?

Challenge 2. Jungle Giants

Another of the characteristics of the jungle is the number and size of its trees. Observe the image of the arazá or Amazonian guava tree (*Eugenia stipitata*), a shrub in this ecosystem that grows **10 meters tall**, and solve the puzzle:

How tall are the trees in the jungle?

Meters



Arazá
(*Eugenia
stipitata*)

10 m

Palma milpesos
(*Oenocarpus
bataua*)

__ m

Achapo
(*Cedrelinga
cateniformis*)

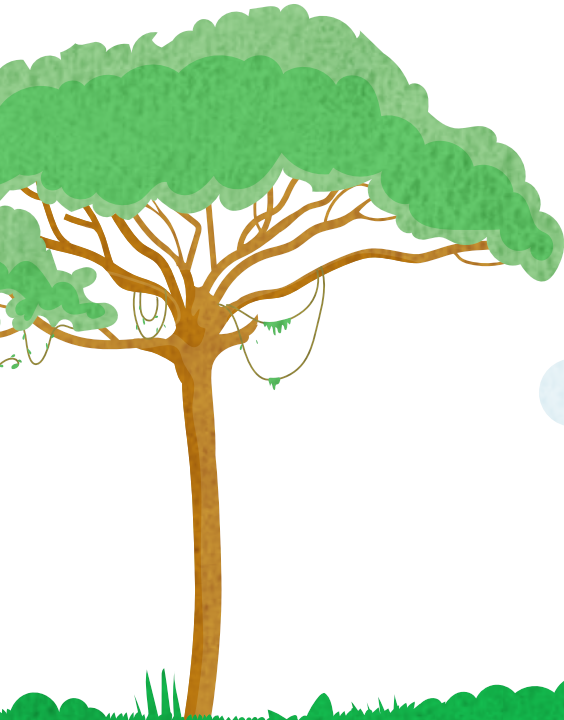
__ m



Mystery Questions:

1. How many species of trees are there in your territory and how tall is the oldest tree?
2. Which animals live in ceiba trees?
3. How do nutrients reach a tree the size of a ceiba?

Ceiba
(*Ceiba pentandra*)



--m

The ceiba is one of the largest trees in the jungle, and one of the oldest. It would take more than ten people holding hands to surround its trunk. If transported to a city center, **it would be as tall as a 20-story building.**

Challenge 3. Friends Near You

Explore your territory and discover the tallest tree, the tree or bush with your favorite fruit, and the tree that best represents your community. **Talk to relatives, teachers, and neighbors to complete the following data sheets.**

The Tallest Tree



Common name

Drawing

Shape of leaves, flowers, and fruit

Trunk diameter

Approximate age

Animals that benefit from it

Benefits to humans

Tree or shrub with my favorite fruit



Drawing

Common name

Shape of leaves, flowers, and fruit

Trunk diameter

Aproximate age

Animals that benefit from it

Benefits to humans

**Continue on
the next
page**



Tree that represents my community



Drawing

Common name

Shape of leaves, flowers, and fruit

Trunk diameter

Aproximate age

Animals that benefit from it

Benefits to humans



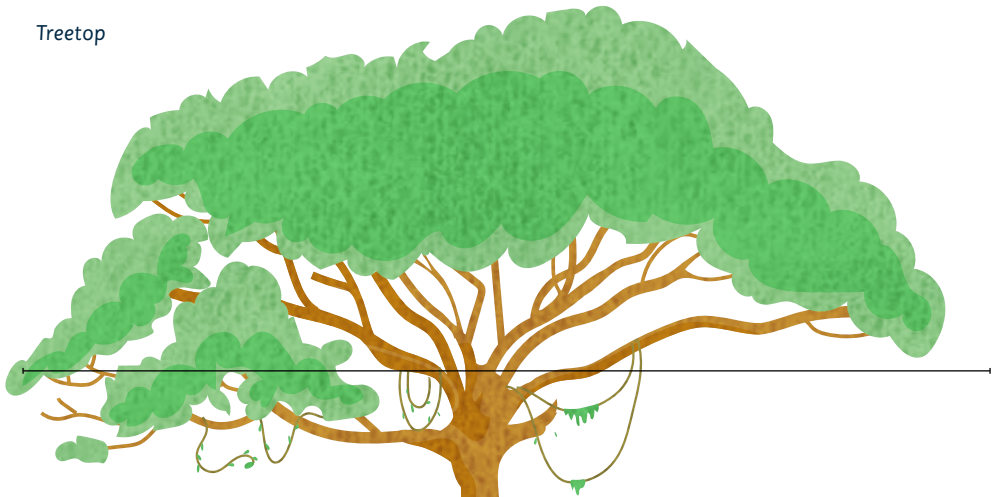
Mystery Questions:

1. What is the relationship between the trees you chose?
2. How do humans benefit from trees?
3. How do humans benefit trees and other plant species?

Challenge 4. Tree City

The jungle is one of the ecosystems with the greatest biodiversity. **Different inhabitants can be found in the same tree.** Use the stickers at the end of the book or draw some of the animals that live in the jungle; place them in their habitat according to the description on the data sheet.

Treetop



Vines

Lower branches

Ground

Continue on
the next
page



Species Facts

Iris-billed Toucan '*Ramphastos sulfuratus*'



Toucans generally live **in treetops**, where they search for the fruits that are its main source of food. They also help scatter the seeds of the fruits they eat, allowing new trees to grow.

Emperor tamarin '*Saguinus imperator*'



Recognizable by its large white moustache, the emperor tamarin or tamarin lives mainly **among vines and tree branches**. Males see the world in two colors, which allows them to detect predators, but females can see a third color that allows them to spot fruit among the branches.

Giant Tree Frog '*Phyllomedusa bicolor*'



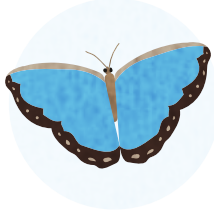
Giant tree frogs live in trees. Their tadpoles are born in puddles, but as they grow they move towards the trees, where they settle **in the lower branches**. The Matsés indigenous people of Peru use a substance produced by this frog to improve their physical resistance.

Amazon Tapir '*Tapirus terrestris*'



Although it may look like a cousin to the pig, the Amazon tapir is a distant relative of African horses and rhinos! Tapirs **are terrestrial and excellent swimmers** and they usually run towards rivers to escape from their predators.

Blue Butterfly '*Morpho peleides*'

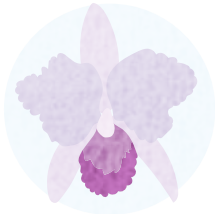


The blue butterfly is one of the largest butterflies in the world. It spends most of its time in the understory, but **flies everywhere when looking for a mate**. They have even been spotted by pilots flying over the jungle!

EnviroClue

Trees and other jungle plant species have developed a symbiotic relationship with fungi known as mycorrhiza. Fungi connect with plant roots via tiny structures to exchange water, nutrients, and minerals. They work as a team to survive in the poor jungle soil! 80% of the planet's terrestrial plants have mycorrhizae that, with help from photosynthesis, complement their feeding process. How can you contribute to this process?

May Flower '*Cattleya trianae*'



This species of orchid is an **epiphyte** plant, which means that it **grows on other plants or vegetables**, like the trunks of trees, and uses them as support and to grow. Don't worry! They are not parasitic plants so they don't hurt their host or feed on it.

Jelly Ear '*Auricularia delicata*'



This edible fungus of gelatinous consistency **grows on trunks and fallen branches, and sometimes on the moss that develops on living trees**. It grows laterally, and its shape is similar to that of an ear; hence its name!



Mystery Questions:


1. How is it possible for such different animals to inhabit the same tree? Could it have to do with their functions in the ecosystem?
2. Do you think that trees and the living organisms that inhabit them help each other? How?

Challenge 5. Recycling in Action

The soil in the humid tropical forest is poor in nutrients and minerals, much like that of the desert. Even so, it manages to support the life of its species thanks to the recycling of leaves, branches, trunks, bark, animal excrement, feathers, skin, and bones: Nothing goes to waste!

Use different colored arrows to link the following actions and number them to indicate the order of the transformation and absorption process of nutrients in the forest.

Do you think that more than one answer is possible?



Branch, leaf, flower, fruit, or bark falls to the ground.

Fungi transport decomposed nutrients and minerals into the soil.

Birds and animals chew or crush leaves and fruits.

Worms and fungi eat and decompose droppings, meat, leaves, twigs, flowers, feathers, trunks, twigs.

Birds and animals excrete organic material in their digestive process.

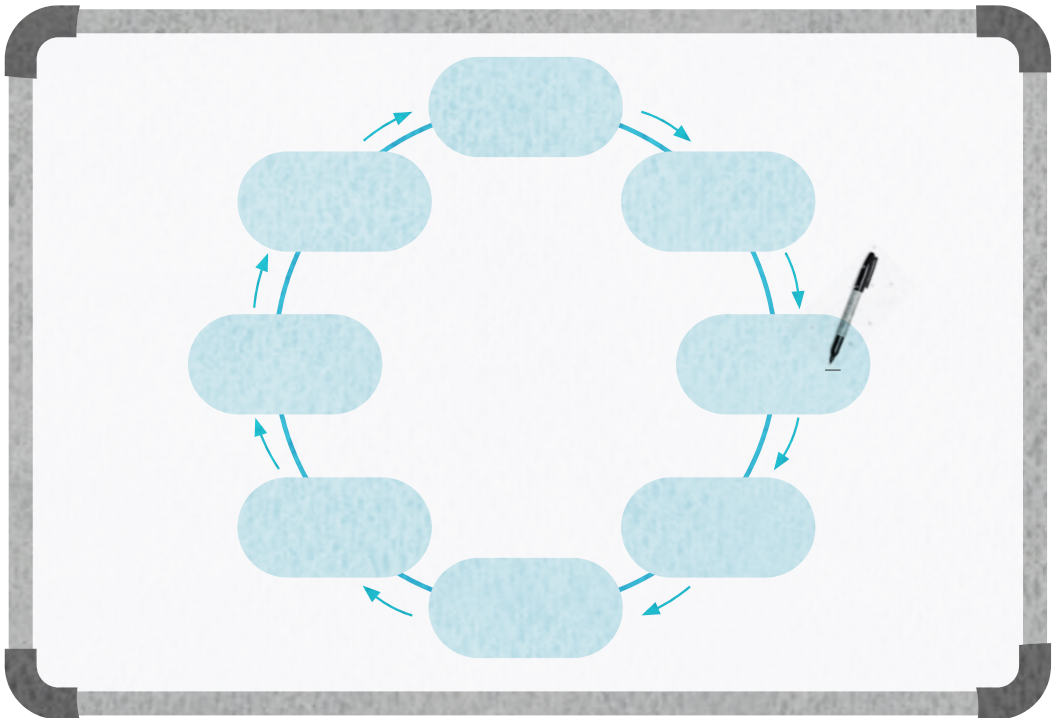
Stems transport nutrients and minerals and are transformed into energy for the trunk, branches, leaves, and fruits.

Animals die and their bodies fall to the ground.

The roots of trees, shrubs, and plants absorb nutrients from the soil with the help of fungi, and these in turn receive energy and vitamins from the roots.

Mini-Challenge 5A. Cycle and Recycle

Organize a contest with your classmates to represent the jungle's nutrient-recycling cycle. Form three teams and use eight cards, or cut-out sheets, to write down the parts of the process. **Draw the graph below on the classroom blackboard.** Each team will have an opportunity to place the parts of the process in the boxes and explain their model of the cycle. Start playing!



Mystery Questions:

1. Why is the soil in humid tropical forests poor in nutrients?
2. At what point do humans enter the feeding cycle of plants and trees?
3. What is a symbiotic relationship? Do you have a similar relationship with any other living organism?

Challenge 6. Feed the Plants

Discover a natural recycling process and perform an experiment to contribute to the feeding process of the plants around you.

You need:



Organic waste (for example: egg shells, fruit or vegetable remains, coffee, leaves, flowers, or others)



Dirt



A medium pot with a small plant



A stick, spoon, or shovel to turn the soil

Write down or draw your observations in the blank spaces.

1. Choose your organic waste. You can use several.

2. Place your organic waste in the pot and cover it with dirt.

Write down the date:

3. Come back after five days and stir the dirt with a stick to see what has happened to the organic waste

Date:

Write down what changed:

4. One week after your previous observation, take another look to see what has happened in the pot. Stir the dirt again.

Date:

Write down what changed:

5. What happened to your organic waste?

Record or draw your findings:

Work together with your classmates to analyze, discuss, present arguments, and answer the following questions:

What happened to the organic waste that you covered with dirt? Has it changed its shape, color, or smell?

How do you explain what you observe?

What elements are part of the process you are observing?

You can continue to observe and record for days!

Use the compost produced in the experiment to grow your own plant in a pot! Water it, take care of it, and watch it grow and transform.



Mystery Questions:

1. What would happen if human beings collected all the dry leaves that fell from the trees?
2. What is biodegradation and why is it important in nature?



Challenge 7. We Recycle Water Too

Trees and other plant species in the jungle produce water through transpiration, a process by which they release water in gaseous form into the air. In other words, they can sweat just like you! This water is consumed by animal species and is absorbed by other plant species that grow off the ground. **Experiment and demonstrate how plants recycle the water they consume.**

You need:

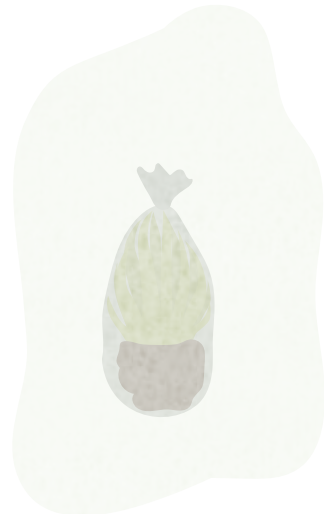
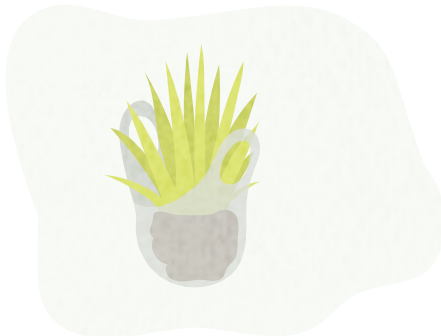


A small potted plant. **(You can use the plant you planted in Challenge 6.)**



A reused transparent bag, larger than the plant.

1. Carefully place the pot inside the bag without damaging its branches, leaves, fruits, or flowers.
2. Seal the bag tightly and place the plant in a place where it gets sun.



3. Wait 40 minutes or more, depending on the amount of sunlight it receives. (If the plant receives only a little sun, wait longer.)



EnviroClue

Every day, millions and millions of Amazonian trees like the ceiba transpire and release water vapor into the atmosphere. A portion of that vapor is absorbed again, but another part is transformed into floating rivers of water vapor that carry the precious liquid to distant regions like the Andes.

4. Observe what happens to the walls of the bag.



Analyze and Answer:

- What's happening inside the bag?
- How do you explain what you're observing?
- How does this help the plant?
- Based on your observations, how does the plant help its ecosystem?
- Does the plant produce water or recycle it? Where does the water come from?
- Why do plants need water?



Mystery Questions:

- Can plants reuse the water they produce?
- How do rainforest trees help cool the planet?

Challenge 8. Superbiodiversity

The Amazon jungle is home to a large variety of very diverse living organisms. **It is home to about 400 species of fungi (in a single small portion of land), approximately 2.5 million species of insects, 40,000 species of plants, 100,000 species of invertebrates, 3,000 species of fish, 1,300 species of birds, 427 species of mammals, 400 species of amphibians, and 378 species of reptiles.** It is one of the most biodiverse places in the world!

How many species share your territory with you? Observe, record, and classify.

- a. In the company of your family, teachers, and friends, explore your home, your neighborhood, your school, or a nearby natural environment. Use the table below to record the animals and plants you find (ants, salamanders, spiders, humans, cats, cacti, all forms of life!).

Plants, Animals, and Other Living Organisms

House and
neighborhood:

School:

Forest, park,
water source:



Mystery Questions:

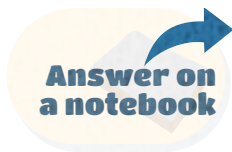
1. What can the Amazon jungle teach us about interacting with other people?
2. We know that biodiversity is important to nature. Why is diversity important to humans?

- b. With the help of your teacher, use the following table to classify, according to their characteristics, the living organisms that you found in each place.

	House and Neighborhood	School	Forest, Park, Water Source
Plants			
Fungi			
Invertebrates			
Fishes			
Birds			
Mammals			
Amphibians			
Reptiles			
Insects			

Mini-Challenge 8A. JungleNews in Action!

Create a newspaper to share the results of your exploration. Answer each question and create a headline from each of your answers.



1. Does your territory have high or low biodiversity?
2. Why is biodiversity important?
3. Are you part of the biodiversity of your territory?
4. What threats does biodiversity face in your territory?
5. How can you protect the animal and plant species in your territory?
6. Why is biodiversity in the Amazon rainforest so important to the entire planet?

Challenge 9. Working Together to Understand What is Happening to the Jungle

For thousands of years, the Amazon jungle has been inhabited by human communities capable of maintaining a balanced coexistence with other species. However, that balance is threatened. **Help the jungle understand what is happening. Investigate, create hypotheses, and communicate.**

- a. Organize your classmates into four groups and distribute among team members the tasks of researching, writing, and creating communication pieces.
- b. Each group selects one of the following topics:

Mining

Expansion of agricultural crops and extensive livestock production

Construction of hydroelectric dams

Road construction

- c. Each group writes a definition of their topic and researches the topic in the school or community library. Next, list the consequences of these actions for the continuity of life in the Amazon jungle. Select images and photographs that support these findings. Look for news stories related to the topic and present the ways in which these actions affect jungle communities.



- d. Each group presents their findings to their peers in a special class called: **“Summit of Leaders for the Jungle: Part One”**.



EnviroClue

The UN (United Nations) is an international organization responsible for finding joint solutions to humanity’s problems, including environmental problems. In 2017, it created the Strategic Plan for Forests, which features a set of six goals and 26 associated targets all aimed at protecting the biodiversity of these ecosystems worldwide. Goal 1 seeks to reverse the loss of forest cover worldwide and its associated Target 1.1, to increase forest area by 3% worldwide (by 2030). How can you help meet this goal?

Answer on a notebook



Mystery Questions:

1. What does it mean to live in balance with nature and how are humans destroying this balance?
2. How can damage to the forests affect the people and living organisms that live far away from them?

Challenge 10. A Treeless Forest?

One threat to the jungles due to human intervention is deforestation, the massive felling of trees and intentional forest fires. Calculate how many trees the forest has lost through deforestation in recent days. How many are at risk in the short term? How long will it take the forest to completely disappear if we do nothing to prevent it?

- Each box represents one hectare of land (10,000 square meters).
- Each hectare has 500 trees.
- Every day one hectare of trees is felled.
- Calculate, analyze, and answer:

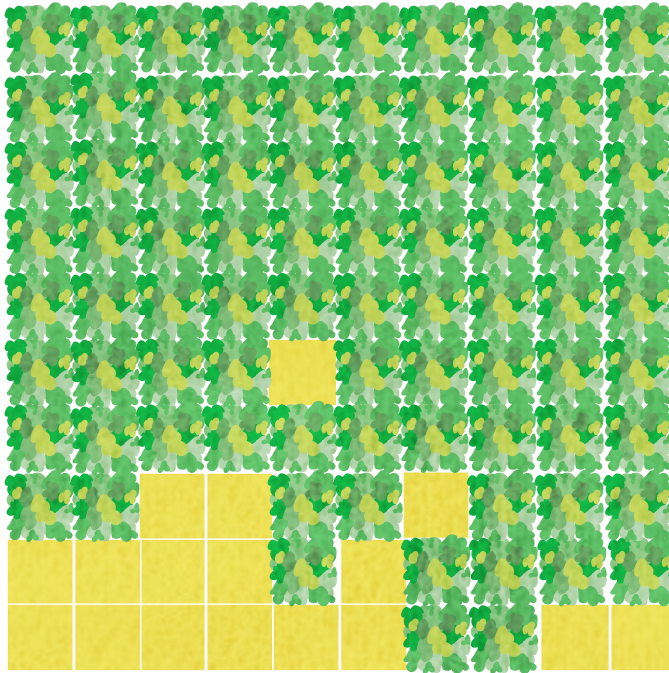
How many trees have been felled so far?

How many trees will be felled in the next eight days?

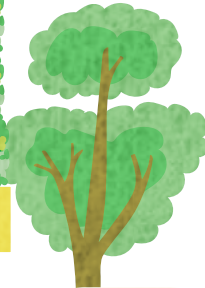
How many days will it take for all the trees in the territory to disappear?

What will happen to the animals and human communities in this part of the jungle

What will happen to the planet if this occurs?



- 1 hectare (10.000 m²)
- Deforested area
- 500 trees



Mini-Challenge 10A. Letter to Loggers and Deforesters

Answer on a notebook

Now that you're a bit more familiar with the jungle and the importance of its trees for biodiversity and ecosystems, write a letter to the people and companies that are cutting down trees in Colombia's jungles. Encourage them to improve their relationship with nature. **Design a logo for a button you can give them that certifies their commitment to caring for the jungle.**



Mystery Questions:

1. Is it easy to replace a felled tree? Why?
2. How many animals and plants are affected when humans cut down 500 trees?

Challenge 11. Inhabitants in Equilibrium

One of the indigenous peoples that inhabits the Amazon jungle are the Ticuna (they call themselves duum, meaning "people" or "person") and for centuries they have maintained a relationship with their ecosystem. They've even known how to use the jungle's resources responsibly to obtain food and medicine. **Research the fruits shown below and draw an arrow to the picture of the plant described and its medicinal uses.**

Name in
Ticuna (Name
in English)

Bere
'Cocona'

Wacapuruna
'Huacapurana'

Ngowaatü
'Anamú'

Properties
and Uses

Acidic fruit consumed in juices and jams: helps fight anemia, regulates blood sugar and cholesterol levels, improves digestion.

Tree bark consumed in tea or extract: helps treat bone pain, detoxify the blood, regulate high blood pressure, treat osteoporosis, and heal ulcers.

Leaves and stems prepared in tea and baths: relieves respiratory illnesses, headaches, and joint pain (arthritis) due to its analgesic and anti-inflammatory powers.

Image



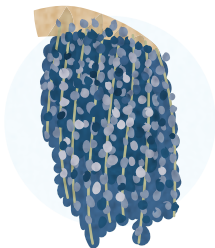


EnviroClue

Currently, there are 62 indigenous peoples in the Colombian Amazon jungle who speak 42 different languages. This cultural diversity is unique in the world. For thousands of years, these peoples have successfully integrated with the jungle ecosystem, learning to use plant species to care for their health. Certain animals and plants are therefore sacred to them, guardians that protect them and must be safeguarded. What indigenous communities live in your territory and how can you learn from them?

Michipatü 'Cat's claw'

Leaves consumed in tea: climbing plant used for the prevention and treatment of cancer, rheumatism, anemia, and gastritis.



Nguman 'Avocado'

Fruit consumed in salads and seed in tea: prevents heart disease and low blood pressure.



Waira 'Acai'

Small fruit prepared in juice or extract: rich in antioxidants and nutrients, anti-inflammatory, detoxifies the body.



Mini-Challenge 11A. Community of Wisdom

Explore the knowledge in your territory and with help from your family and teachers make a list of the medicinal plants found there. **Use the following table to record your findings.**

Plant Name	Uses and Superpowers	Drawing

**Plant
Name**

**Uses and
Superpowers**

Drawing



Mystery Questions:

1. How did indigenous communities come to discover the superpowers of plants?
2. Why is the ancestral knowledge of indigenous communities being forgotten? What have you learned from your elders?

Challenge 12. Cousins in Danger

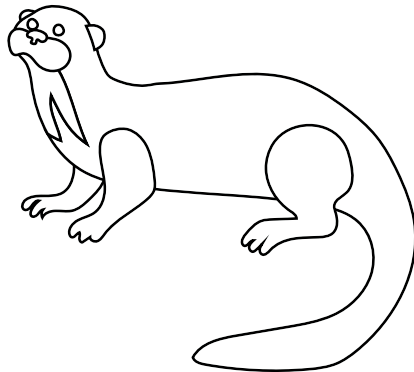
You belong to the family of mammals. Some of the jungle animals currently in danger due to deforestation, hunting, and mining also belong to this family. **Use your storytelling skills to create a story that helps communicate their situation and encourages their protection.**

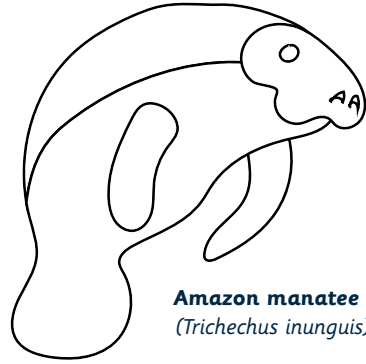
- a. Color all the illustrations.
- b. Select one of these animal species and find out everything you can about it: its habitat, its diet, the way it contributes to its ecosystem, the threats it faces, among others.
- c. Write a short story in which the animal gives a first-person account of who it is, why it's so important to the ecosystem, and its current situation.
- d. Share your story and what you learned with your classmates.

Most Endangered Amazon Mammal Species

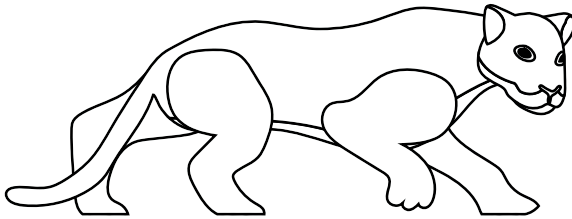


Giant otter
(*Pteronura brasiliensis*)

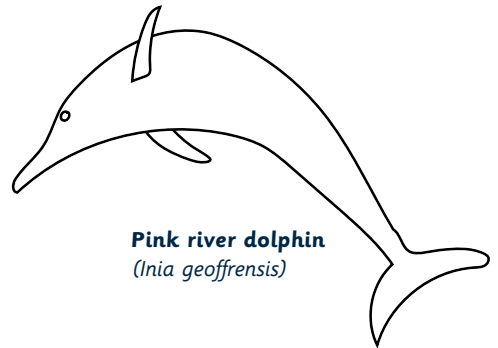




Amazon manatee
(*Trichechus inunguis*)



Jaguar
(*Panthera onca*)



Pink river dolphin
(*Inia geoffrensis*)



Mystery Questions:

1. How can we help endangered animals?
2. Why is it important to inform people about which species are threatened in an ecosystem like the jungle?

Challenge 13. Working Together to Inform

With your classmates, research and communicate your findings about **Serranía del Chiribiquete National Natural Park**.

- a. Design a jungle journal, using recycled materials, to record your research findings. Use drawings or cut-outs to illustrate the data.
- b. Use the following questions to guide your investigation.

Where it is located?

What animal and plant species live there?

Why is it considered a sacred place?

Why is this place important to many communities in the region?

How is it threatened?

Which of its landscape features make it a special place?

Write down a fun fact.

Which of the country's jungles have you visited or heard of?

What conclusions did you reach at the end of this activity?

- c. Create a newscast to publicize the results of your investigation. Include different sections, news stories, funny commercials, and tips for caring for nature and your territory's cultural heritage. Use your cell phone to record it, or act it out in front of your classmates.
- d. Share your findings with the educational community.

Mini-Challenge 13A. Adopt a Tree

Find a tree near your home or school and give it a big hug. (First, make sure it doesn't have thorns!). **Keep your arms around it for two minutes and secretly tell it your commitment to take care of it and protect it from now on.**



Mystery Questions:

1. What emotions did you feel while hugging the tree? Has the way you see trees changed?
2. What does it mean to you, to your country, and to the world that there is a place on Earth like Serranía del Chiribiquete National Natural Park?



Congratulations!

You've solved all the challenges.

This medal recognizes you as a member of the Earth Mission Team: **kids and families to the rescue!**


Look for the sticker for this chapter at the end of the book and place it here.



A Dangerous Change




Scan the QR code or visit www.mellamotierra.com
to listen to the audio for this story!



I'm sure you've heard my name on the news, the radio or on television. People mention me when they talk about torrential rains that overflow rivers and destroy homes, or when they explain that the drought season is so strong that animals die of thirst. They blame me for the affected crops and for all the natural disasters. Many fear me; others ignore me, but more and more people want to know about me.

You can't see me or touch me. I'm not in one place, but over time I've been changing the planet you live on, as well as its inhabitants.



Let me explain. On Earth everything is connected and in constant movement.

It seems simple but it's easy to forget. In nature nothing stays still: trees grow, plants are transformed to flourish, the sea and the rivers have their constant flow. The weather isn't quiet either. Millions of years ago, for example, the Earth was a cold place. White and icy glaciers covered it all.


Slowly I made the temperature go up. Glaciers melted and created great oceans. It took millions of years for the Earth to look like you know it now.

The atmosphere has been my companion. She covers the planet with her protective layer, filters the sun's rays, keeps the heat, and protects us from the cold and dark space. Besides, she contains and controls me.

We coexisted with humans for a long time. I kept moving, causing the temperature to drop or rise, but always trying to be careful and taking it slow.

However, one day Atmosphere explained to me that humans began with their inventions and changed everything.





"At first it was the factories with their clouds of smoke and coal trains. Then the cars, planes and other means of transport used by humans. Hydroelectric plants, garbage dumps full of waste that does not degrade, cows that don't stop multiplying and whose farts fill me with methane... the list is long. All these emissions come to me and they don't let the heat out".

If the atmosphere does not allow the sun's rays to leave the Earth, it does not have the strength to contain me either. That is why I have produced strong and more frequent changes in temperature. People have noticed. That's why the climate is changing.




"This is not a rainy season, why is it raining?"

"It's never been so hot in here."

"It's troubling that the snow on the glaciers is melting."

"This morning's frost damaged the crops. What are we going to do?"

Many people have been saying for some time that we need to act quickly to prevent this situation from getting worse. Laws and agreements have been created to address the causes that affect me. You can also help so that this does not continue to happen. No effort, however small it may seem, is useless.

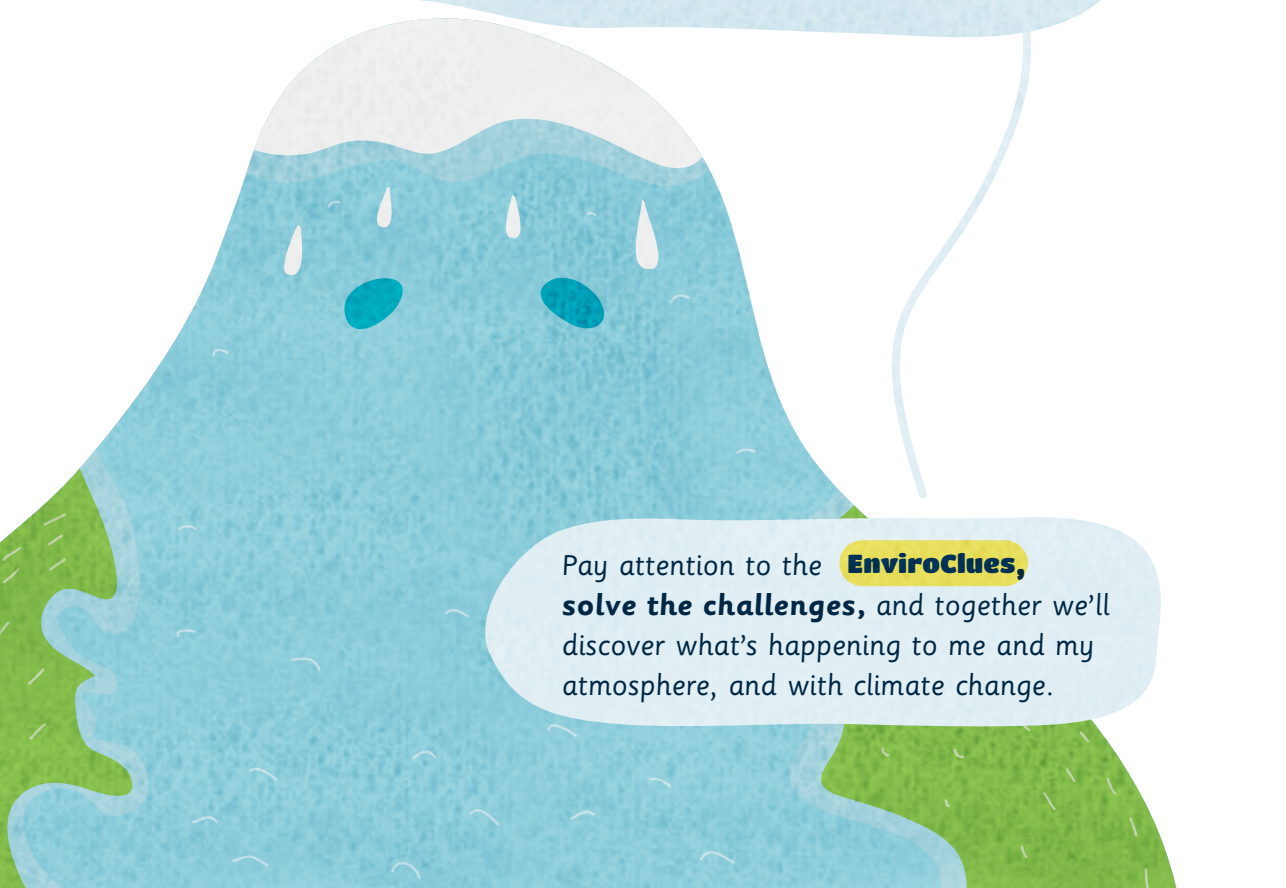


Like I told you, life on the planet is connected.
We are a network. Every single one of your actions
can keep me from getting out of control.

I am climate change.

Challenges

Now that you've read the story, you realize how much I've changed over the course of my life. Although changes are natural and necessary (especially if you've been around for more than four billion years), lately they're happening so fast that I can barely keep up! However, **I've managed to adapt, allowing you and many other organisms to live on.** Surely, you too have the ability to adapt to change!



Pay attention to the **EnviroClues**, **solve the challenges**, and together we'll discover what's happening to me and my atmosphere, and with climate change.

Challenge 1. Super Powerful Skin

The atmosphere is like Earth's invisible skin, protecting it from cold outer space and absorbing heat from the sun's rays to maintain a temperature suitable for life. Do you think your skin does something similar? Let's find out!

Close your eyes and run your fingers over your right cheek. You're touching the largest organ in your body: your skin! Explore and discover its main functions.

a. In the space below, draw the outline of your body and color your skin.



Observe and explore your body and mark on your drawing:

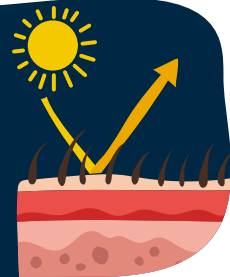
1. The parts of your body that are not covered with skin. Did you find any?
2. The parts of your body that are almost always warm.
3. The parts of your body that get cold easily.
4. The most ticklish parts of your body.
5. The parts of your skin that are a different color.

b. Use your senses to explore your skin and complete the following table. Ask your family to help you complete this stage of the challenge:

	How does it do it?
Your skin protects you	
Your skin allows you to explore the world	
Your skin allows you to communicate with others	
Your skin, with its spots and scars, is unique	

 **Mystery Questions:**

1. What is the skin and what functions does it perform?
2. What similarities do you observe between your skin and the atmosphere that completely covers Earth?
3. What does your skin protect you from? And what does the atmosphere protect Earth from?



Mini-Challenge 1A. You take care of me and I take care of you

Your skin does wonderful things for you. What do you do to take care of it? **With help from your family, design a card with five tips for taking care of your skin** You can use pictures and words.

EnviroClue:

Your super skin has three layers: the deepest one is called the hypodermis, the middle one is called the dermis, and the outer one, which is visible, is called the epidermis. The three layers are connected to the interior of your body and are capable, among many things, of healing your skin when it is injured. How does your skin repair itself when you hurt yourself?

Title:

Tip 1:

Tip 2:

Tip 3:

Tip 4:

Tip 5:

Challenge 2. A Superlayer

The atmosphere is made up of gases such as oxygen, carbon dioxide, ozone, and nitrogen, and many others. This superlayer can be 1,000 kilometers thick, stretching from the ground you walk on to outer space. Just like your skin, the atmosphere has inner layers that keep it healthy. **Color each layer of the atmosphere and write its name on the image, according to the following descriptions.**

Troposphere:

This layer is in contact with the earth's surface and measures approximately **12 kilometers**. Most of the life on the planet lives inside it, along with the clouds and the air you breathe.

Stratosphere:

This layer begins **13 kilometers** from the Earth's surface and is **40 kilometers** thick. The high concentration of ozone present in this layer helps to **block the ultraviolet rays emitted by the Sun** (the famous ozone layer is hidden in it).

Mesosphere:

This layer is located behind the stratosphere and is **30 kilometers** thick. Its temperature ranges from **-70° C to -90°C**.

Thermosphere:

Because it is charged with electricity, radio and television signals are conducted through this layer. It is located **90 kilometers from the earth's surface and measures up to 300 kilometers thick**.

Exosphere:

This is the last layer of the atmosphere. It can measure up to **500 kilometers thick and borders the vacuum of the universe**. The force of gravity disappears inside it.



Mystery Questions:

1. What is the atmosphere? What is its most important layer and why?
2. How do you think the atmosphere protects the planet and the life that inhabits it?

Thickness of layer

----- 500 km

----- 300 km

----- 30 km

----- 40 km

----- 12 km

land surface



Mini-Challenge 2A. Atmosphere in Action

Like your skin, the atmosphere has **several functions** that keep the interior of the planet healthy. **Design a model using reused materials that recreates some of the atmosphere's functions. Complete the table to plan and design your model, then build it with help from your family.**

Atmospheric Function

It receives, stores, and distributes chemical elements necessary for life such as oxygen, nitrogen, or carbon.

Atmospheric Function

It filters out ultraviolet radiation (UV rays) emitted by the sun, allowing only the amount necessary for life to pass through.

Atmospheric Function

It is part of the water cycle: it traps the vapor and gathers the drops of water to form clouds that later become the rain that hydrates continents and oceans.

Atmospheric Function

It helps maintain the climate by moving large masses of warm and cold air and influencing ocean currents.

Who Will Help You?

Materials You'll Need

Model Plan



EnviroClue

Did you know that climate and weather are not the same? Although both terms refer to aspects such as the temperature, wind, rainfall, and humidity, weather refers to current conditions, while climate refers to patterns that occur over many years.



Mystery Questions:

1. What would happen to the planet and its ecosystems if the Earth's atmosphere ceased to exist? Why?
2. What is the difference between climate and weather?
3. What do you think is the most important function of the atmosphere and why?

Challenge 3. Earth Has Changed

Like you, since its birth almost **4.6 billion years ago**, the planet has changed. At one point it was like a ball of fire, covered in volcanoes and burning lava, and at another, like a snowball covered by glaciers and frozen oceans. It is currently at a point of equilibrium conducive to life called an interglacial period. However, some scientists have called this geological age the **anthropocene** or "Age of Humans", in reference to the impact that human actions have had on the accelerated changes on Earth.

a. Use your imagination and **draw Earth in each of its stages**

b. What is the level of biodiversity (number of species of living organisms in a place) in each stage? **Use the biodiversity-meter –our tool to measure the level of biodiversity– to point to your answer and justify it.**



EnviroClue

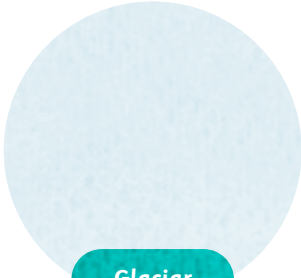
Glaciations are processes through which the planet, due to different circumstances, freezes almost entirely. The Earth has experienced seven ice ages in its lifetime. The most intense one occurred 850 million years ago and produced global climate change in a process that lasted 220 million years and extinguished all living things in its path. Currently, actions by humans have caused dangerous changes in the atmosphere, threatening the survival of thousands of species over the course of just 250 years. How can we prevent this situation?



Biodiversity-meter

Image of Earth

Level of biodiversity



**Glacial
stage**

0 2,5 5 7,5



Justification of your answer



**Interglacial
stage**

0 2,5 5 7,5



Justification of your answer



**Extreme
warming
stage**

0 2,5 5 7,5



Justification of your answer

Mini-Challenge 3A. Changing Me

How have you changed? Have they been slow changes or rapid changes? With help from your family and teachers, complete the following data sheet by checking the type of change and filling in causes and examples to formulate hypotheses.

Change	Slow	Fast	Causes and examples
Height			
Hair and nail length			
Voice change			
Tastes (music, food, etc.)			
Body temperature			
Mood changes			
Other			



Mystery Questions:

1. What does change mean to you and why is it important?
2. What would happen if the planet never changed?
3. What happens to ecosystems when rapid temperature changes occur in a short time?

Challenge 4. Between Cold and Heat

Although the planet is likely to freeze again, for millions of years its atmosphere has managed to maintain a balance between cold and heat that has been conducive to life. Between the ice on the poles and the desert sands, life has managed to adapt! What is the climate like where you live? **Answer the questions, make a map of your territory, and mark the following on your drawing:**

a. The coldest place

What foods are grown there?

What animals live there?

How do people dress there?

How often does it rain there?

What do you like there?

Continue on
the next
page



b. The hottest place

What foods are grown there?

What animals live there?

How do people dress there?

How often does it rain there?

EnviroClue

Thanks to its geographical location, Colombia has different ecosystems and climates, ranging from perpetual cold in the snow-capped mountains of the Andes to the intense heat of the Magdalena River valleys. The place with the coldest climate in Colombia is Pico Cristóbal Colón, located in the Sierra Nevada de Santa Marta mountain system at 5,775 meters above sea level, where temperatures can reach -11° C. What is the hottest place in Colombia?

What do you like there?

Draw the map of your territory here:



Mystery Questions:

1. Why are the highest places the coldest if they are closest to the sun?
2. How does the vegetation change between the coldest and warmest places in your territory?



Mini-Challenge 4A. Climate Memory

How much has the climate changed over time in the region where you live? Ask your grandparents or elders how the weather has changed since they were young. What differences have you noticed in your daily life as a result of these changes?

Write down on the time line the name of your region, the years when your grandparents or elders were young, and the changes in climate from then until now.

Region: _____

Date Today



Mystery Questions:

1. Are climate changes in your region easily observed? Why?
2. What is the biggest or most important change to have occurred in your region? What caused it?

Challenge 5. Variety Is the Spice of Life

In Earth's early years, carbon dioxide (CO₂) was the most abundant element in the atmosphere and there were no living things. But once single-celled plants (cyanobacteria) began producing another element called oxygen—more than 2 billion years ago—, living organisms have been able to survive. What other elements present in the atmosphere allow for life on Earth?

With help from your teacher, match each element with its description and learn about its functions.

Continue on the next page

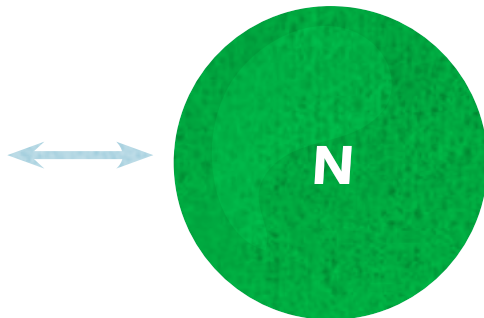


Example

Element

Nitrogen: It is the seventh most abundant element in the solar system. Its symbol is N and it constitutes 78% of the volume of air in the Earth's atmosphere. It participates in cell division and in many other nutritional processes in plants, such as the production of chlorophyll.

Representation



EnviroClue

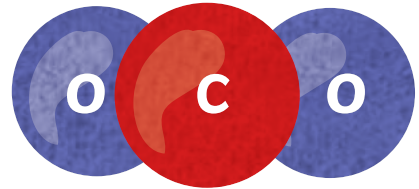
To produce energy, animal cells must constantly consume oxygen (O), which is transformed into water and helps release glucose. The residue from this cellular process is carbon dioxide (CO₂), which animals expel from their bodies and release into the atmosphere. Yes! Our body produces carbon dioxide! Plants undergo a similar process, except that they absorb carbon dioxide (CO₂) and use it in their food process, and as a result of this exchange, they release oxygen (O) into the atmosphere.

We give and we receive!

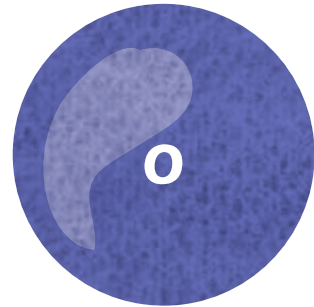
Element

Representation

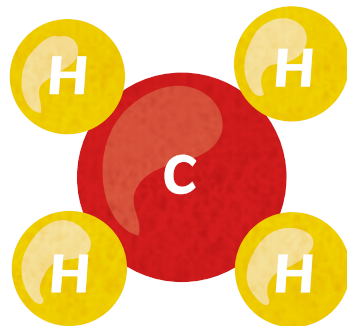
Oxygen: It is the third most abundant element in the solar system. Its symbol is O and it constitutes 21% of the volume of the air in the Earth's atmosphere. Most living things need it to live.



Carbon dioxide: It is a gas composed of one atom of the chemical element carbon (C) and two atoms of oxygen (O) and its formula is CO_2 . It constitutes 0.04% of the volume of air in the Earth's atmosphere and plays a very important role in biological and climatological processes.



Methane: It is a gas composed of one atom of the chemical element carbon (C) and four atoms of the chemical element hydrogen (H) and its formula is CH_4 . It helps retain inside the Earth's atmosphere the heat generated by the sun's rays as they enter it.

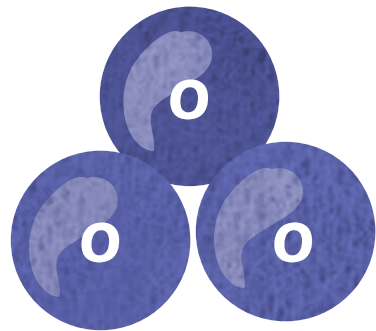
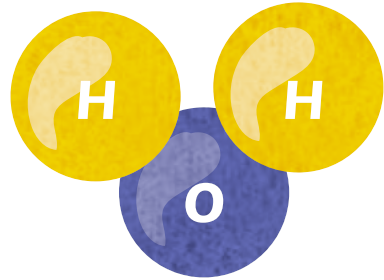


Element

Ozone: It is a gas composed of three atoms of the chemical element oxygen (O) and its symbol is O_3 . It is found in the layer of the atmosphere called the stratosphere and is very important to life, since it is capable of absorbing most of the sun's ultraviolet rays, preventing them from reaching the surface.

Steam: It is a gas produced when the substance water evaporates as is comprised of two atoms of the chemical element hydrogen (H) and one atom of the chemical element oxygen, and its formula is H_2O . It plays a role in the water cycle and is essential to life on Earth, since, in its gaseous form, it helps to retain the heat generated by the sun's rays.

Representation



Mystery Questions:

1. Why is the presence of plants and trees around us important to our well-being?
2. What are the sun's UV rays and what is the element that helps protect us from them?

Challenge 6. Trapped Heat

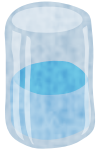
Have you heard of the greenhouse effect? The greenhouse effect is a natural phenomenon that makes life on our planet possible. The atmosphere contains gases that trap heat from the sun and prevent it from returning back into space. These gases are called greenhouse gases. But why greenhouse? Let's do a little experiment to find out!

EnviroClue

A greenhouse is a man-made enclosed space built to conserve heat. It is generally used to grow plants and protect them from the cold, thanks to its transparent cover that stores heat and helps control the temperature.



You'll need:



A clear glass cup



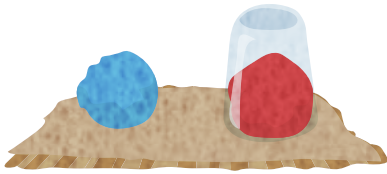
Two balls of modeling clay
(preferably reused)



A sheet of paper or a
piece of cardboard

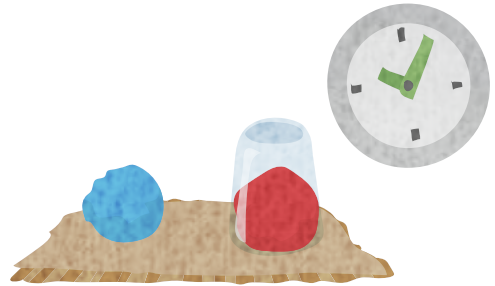





1. Find an outdoor spot with direct sunlight and place the sheet of paper or cardboard on the ground.



- Place the balls of modeling clay in two different places on the sheet and cover one of them with the glass.

- Wait one hour. Approach your experiment. **What has happened?**



	 Appearance How does it look?	 Touch How does it feel?	 Hypothesis How do you explain what happened?
Modeling Clay A (no glass)			
Modeling Clay B (with glass)			

You have just simulated a greenhouse!

Mini-Challenge 6A. Action Soup

We've seen that greenhouse gases help keep the planet warm. Industrial activity by humans over the past 250 years has triggered an accelerated increase of these gases, especially carbon dioxide and methane, affecting the atmosphere's natural balance and retaining more heat than necessary. **Look through this alphabet soup to find the principal human activities that contribute to increased presence of these gases in the atmosphere.**



Human Activities That Produce Greenhouse Gases

Textile factory

Air transportation

Oil burning

Gasoline-fueled vehicle

Coal burning

Construction

Electricity generation

Waste burning

Fertilizers

Mining

Chemical industry

Burning of forests

Meat production

Logging

t	e	x	t	i	l	e	f	a	c	t	o	r	y	a	c	t	h	i	b	n	k	e	r
a	q	r	l	c	b	e	z	o	l	n	e	v	e	l	e	l	j	o	g	h	v	e	w
v	l	o	f	m	a	i	r	t	r	a	n	s	p	o	r	t	a	t	i	o	n	q	l
q	r	v	z	j	s	v	a	b	o	p	l	m	c	e	i	g	t	u	t	h	e	l	g
t	h	e	g	i	l	o	l	h	i	g	g	c	o	a	l	b	u	r	n	i	n	g	l
a	t	l	n	m	g	i	f	h	l	f	h	a	t	t	l	a	c	e	r	y	f	c	y
b	m	i	n	i	n	g	m	i	b	n	i	n	g	t	h	u	s	t	l	a	k	e	g
c	t	a	g	h	y	k	v	y	u	t	y	c	o	n	s	t	r	u	c	t	i	o	n
n	e	s	e	s	s	i	t	t	r	e	c	k	c	a	r	a	t	a	c	e	a	t	t
e	g	n	i	g	g	o	l	z	n	s	t	e	k	l	e	v	g	h	j	s	w	a	n
a	f	f	l	e	c	t	i	n	i	h	g	c	a	t	s	i	g	d	c	a	a	t	s
a	n	g	l	e	s	t	n	m	g	l	o	o	d	r	d	s	l	c	t	y	s	s	c
l	o	t	s	o	n	t	h	e	l	i	s	t	g	h	t	y	n	h	l	a	t	c	v
c	a	r	s	t	s	e	r	o	f	f	o	g	n	i	n	r	u	b	l	e	e	f	g
m	i	d	d	i	n	g	l	t	h	e	l	i	t	s	t	i	n	g	o	n	b	l	y
f	g	a	s	o	l	i	n	e	f	l	u	e	d	v	e	h	i	c	l	e	u	a	f
f	l	a	t	t	e	r	t	h	i	s	c	o	r	t	h	l	i	a	c	v	r	r	y
s	c	c	a	a	r	t	l	y	s	t	i	o	n	s	c	u	n	f	l	e	n	v	b
a	f	e	r	t	i	l	i	z	e	r	s	t	k	e	t	a	k	e	s	y	i	l	u
h	e	l	l	m	e	a	t	p	r	o	d	u	c	t	i	o	n	o	n	t	n	w	h
w	h	a	y	t	t	e	r	f	a	c	c	e	s	t	r	y	l	m	i	n	g	o	f
c	c	h	e	m	i	c	a	l	i	n	d	u	s	t	r	y	e	n	h	y	p	p	e
a	g	h	l	a	t	t	e	r	i	n	g	r	t	h	u	s	s	t	h	y	r	e	l
r	t	e	l	e	c	t	r	i	c	i	t	y	g	e	n	e	r	a	t	i	o	n	l



Mystery Questions:

1. What is the greenhouse effect?
2. Is the greenhouse effect bad for the planet? Why?
3. Which of the human activities that produce greenhouse gases do you consider to be the most polluting? Why?

Challenge 7. Dangerous Heat

The excessive accumulation of heat in the atmosphere can accelerate changes in the climate, alter the functioning of different ecosystems, and threaten the survival of the plant and animal species that inhabit them.

Read the information for each species in the column on the left and match it with the species listed in the column on the right. Make a drawing of this mysterious friend once you know have identified it. Find out what its conservation status is and place this information in the corresponding space. Use the conventions table as a guide to help you identify it.

EnviroClue

The most consulted international conservation status report for species that inhabit the Earth is called the IUCN (International Union for Conservation of Nature) Red List. According to the latest Global Assessment Report on Biodiversity and Ecosystem Services (IPBES, 2019), more than one million species of plants and animals are currently in danger of extinction, meaning they are at risk of total disappearance. **What are the most vulnerable species in your territory?**

Extinct



EX

EW

Threatened



CR

EN

VU

NT

Least concern



LC

(EX) Extinct

(EW) Extinct in the wild

(CR) Critically endangered

(EN) Endangered

(VU) Vulnerable

(NT) Near threatened

(LC) Least concern

Information

Example

This prehistoric marine animal forms colonies of thousands of individuals. It is home to hundreds of species of fish and mollusks, but the increase in temperature and acidification of the ocean water weakens its structures and dries it out, killing it and therefore affecting the survival of the species living in it.

This species is grown throughout Colombia and the average temperature in which it can thrive is between 18 and 22 degrees C. The general increase in the planetary temperatures threatens its survival, and the forced displacement of bees due to warming in the areas where they mate also affects their reproduction.

Certain species cannot survive in hot climates. Moving to other territories in search of colder climates interrupts their pollination function, which affects the reproduction of plants that are vital for ecosystems and human nutrition.

Species and Conservation Status (CS)

Western honey bee
(*Apis mellifera*)

CS: _____

Coral reef
(*Agaricia lamarcki*)

CS: _____

Arabic coffee
(*Coffea arabica*)

CS: _____

**Continue on
the next
page**



Information

Global warming has caused humans to move certain crops, such as potatoes, to even higher altitudes in the mountains of Colombia. This has affected the habitat of this animal, causing its population to decline.

Lays its eggs on the beaches of Colombia's Caribbean Sea and has evolved so that the sex of its young depends on the average temperature of the environment. Rising sea levels, caused by the melting of the poles, affects the areas where they lay their eggs, and the increase in temperature causes more females to be born than males, which makes it difficult for them to reproduce and survive.

Species and Conservation Status (CS)

Hawksbill turtle *(Eretmochelys imbricata)*

CS: _____

Spectacled bear *(Tremarctos ornatus)*

CS: _____



Mystery Questions:

1. What does it mean for a species to be endangered?
2. What other factors, in addition to accelerated climate change, are endangering the animal and plant species in your territory?

Challenge 8. Thermometers of Change

Snow-capped mountains are important indicators of climate change since they show us how much the temperature on the planet is increasing. These magnificent, imposing mountains are crucial for life because they regulate and provide water; however, they are threatened due to the increase in global temperatures.

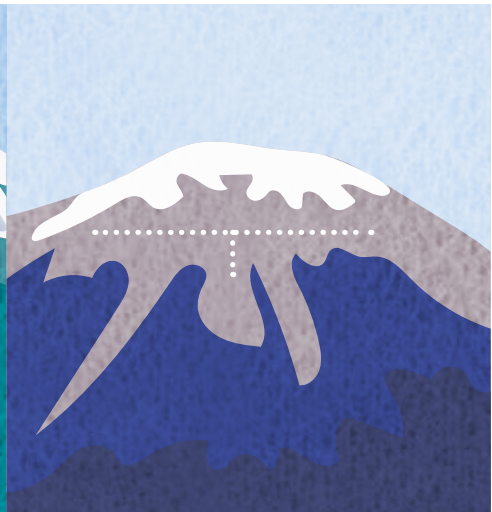
EnviroClue

Did you know that the snow-capped mountains found in tropical regions are the most vulnerable to rising temperatures? There are currently six snow-capped mountains in Colombia. Two-hundred years ago there were 19. Of these 19 snow-capped mountains, eight became extinct between 1900 and 2000: Cisne, Galeras, Quindio, Puracé, Pan de azúcar, Sotará, Cumbal and Chiles. What can we do to protect the six that remain?

Nevado del Tolima - 1990



Nevado del Tolima - 2007



Compare the two images of the Nevado del Tolima volcano, at 5,276 meters above sea level. What changes do you see? What do you think happened to turn the mountain on the left into the one on the right?

1990

2007

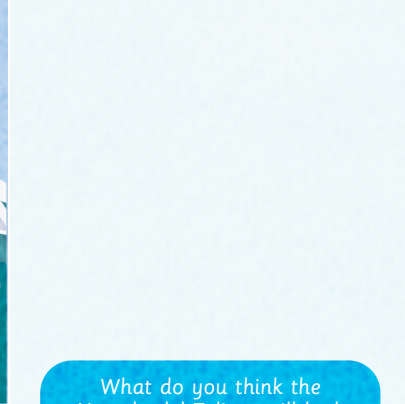
2030



Snow starting at 4,000 meters



Snow starting at 4,800 meters



What do you think the Nevado del Tolima will look like in 2030? **Draw it.**

Why do you think it will look like this?

At what height do you think snow starts to accumulate?



What can we do to preserve it?

Make a list of possible actions and start acting!



Mystery Questions:

1. Why is the snow melting on the snow-capped mountains? How can we measure how much has melted?
2. Do you think that your daily actions can generate some kind of impact on something as immense as a snow-capped mountain? Why?

Challenge 9. An Extreme Planet

Human beings are also impacted by extreme weather events due to climate change. **Look at the following images and describe what is happening in each one them and what you think about when you look at them. Have any of these situations occurred in your territory? How could they be prevented?**

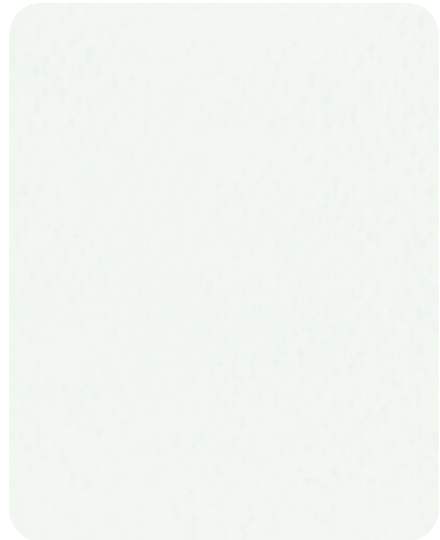
EnviroClue

Extreme weather events have affected the planet since its inception. However, in recent decades, they have become increasingly intense and recurrent. They are called extremes because of their duration, their force, the rare frequency with which they occur (for example, snow falling in a desert), and their impact on the life of ecosystems. Why is everything becoming so extreme?

Emergency Situation



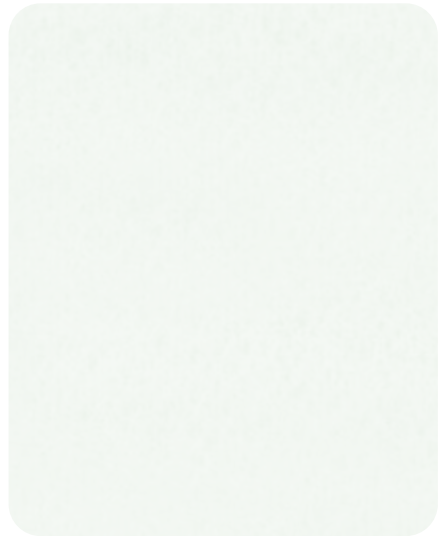
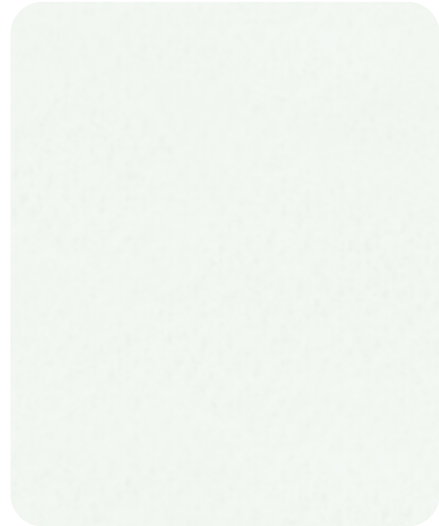
Description and Personal Reflection



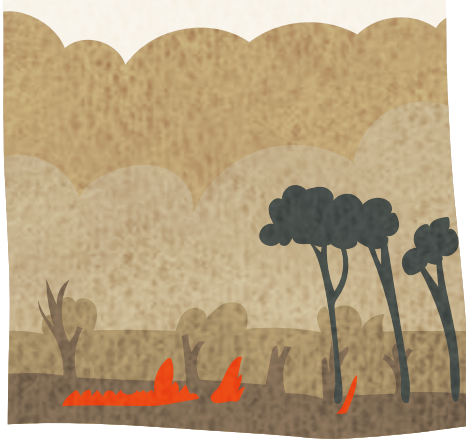
Emergency Situation



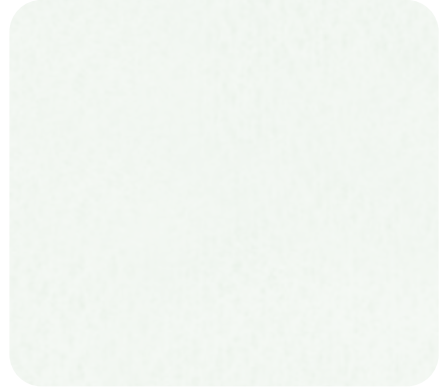
Description and Personal Reflection



Emergency Situation



Description and Personal Reflection





Mystery Questions:

1. What is a weather phenomenon and when is it considered extreme?
2. Are you, your family and your educational community prepared for an extreme meteorological phenomenon? Are you familiar with the School Emergency Plan for your school or community?

Challenge 10. Urgent Solutions

More and more cities around the world are joining the Mission Earth team: promoting bicycle mobility, building constructions with low electricity consumption, cultivating urban gardens, reducing water waste, reusing materials for industry, to name only a few. Colombia joins this mission with its own Nationally Determined Contribution, in which the country made several commitments, such as reducing greenhouse gases by 51% by 2030 and increasing climate adaptation and resilience. Would you like to participate?

- a.** Document all the things that generate greenhouse gases in your home and at your school. **On the table below, mark with an X the actions you carry out at home and/or at school.**

Action	 At home	 At school
Leave on lights that you don't need during the day		
Leave electrical appliances connected when not in use		
Travel in gasoline-powered vehicles		
Use single-use plastic objects		
Dispose of all waste in the same container		
Cut down trees		
Burn solid waste		
Remain uninformed regarding your school's PRAE (School Environmental Project) or fail to update it		

AmbientaPista

On December 12, 2015, during the United Nations Climate Change Conference, the leaders of 192 countries signed the Paris Agreement and set joint medium- and long-term goals to reduce greenhouse gas emissions. Colombia will contribute to this goal through its Long-Term Climate Strategy known as the E2050 which seeks to: reduce greenhouse gas emissions by 51% by 2030; facilitate communities' adaptation to climate change; reduce the impact on biodiversity; encourage people's participation in the planning and execution of national and local government strategies; and achieve climate resilience and carbon neutrality by 2050.

1. **Walk, jog, run, or bike** to limit the use of vehicles that run on fossil fuels such as gasoline.

- b. **Use the following tips to reduce greenhouse gas emissions at home and at school.**

With help from your classmates, create different memes, images, or short videos based on the recommendations below and share them with your families and community. Invite them to join the Mission Earth team!



2. **Make the 3R rule cool:**
Reduce your consumption -,
Reuse and extend the useful
life of objects -, **Recycle**
and separate properly so
that solid waste
has a second
chance.

**Continue on
the next
page**



- 3. Reduce electrical energy consumption** by turning off lights, unplugging appliances when not in use, taking shorter showers with less hot water, and watching less TV.



- 4. Grow plants at home or at school and take care of them;** remember that they help cool spaces in hot weather and absorb the CO₂ that you emit and convert it into oxygen.




Mystery Questions:

- 1. Why is it important to be aware of the impact that our daily actions have on greenhouse gas production?**
- 2. What is a PRAE and how, with its help, can you contribute to increasing climate resilience and reducing greenhouse gas emissions in your community?**
- 3. Why are world leaders important in tackling climate change? How might you become an environmental leader in your community?**

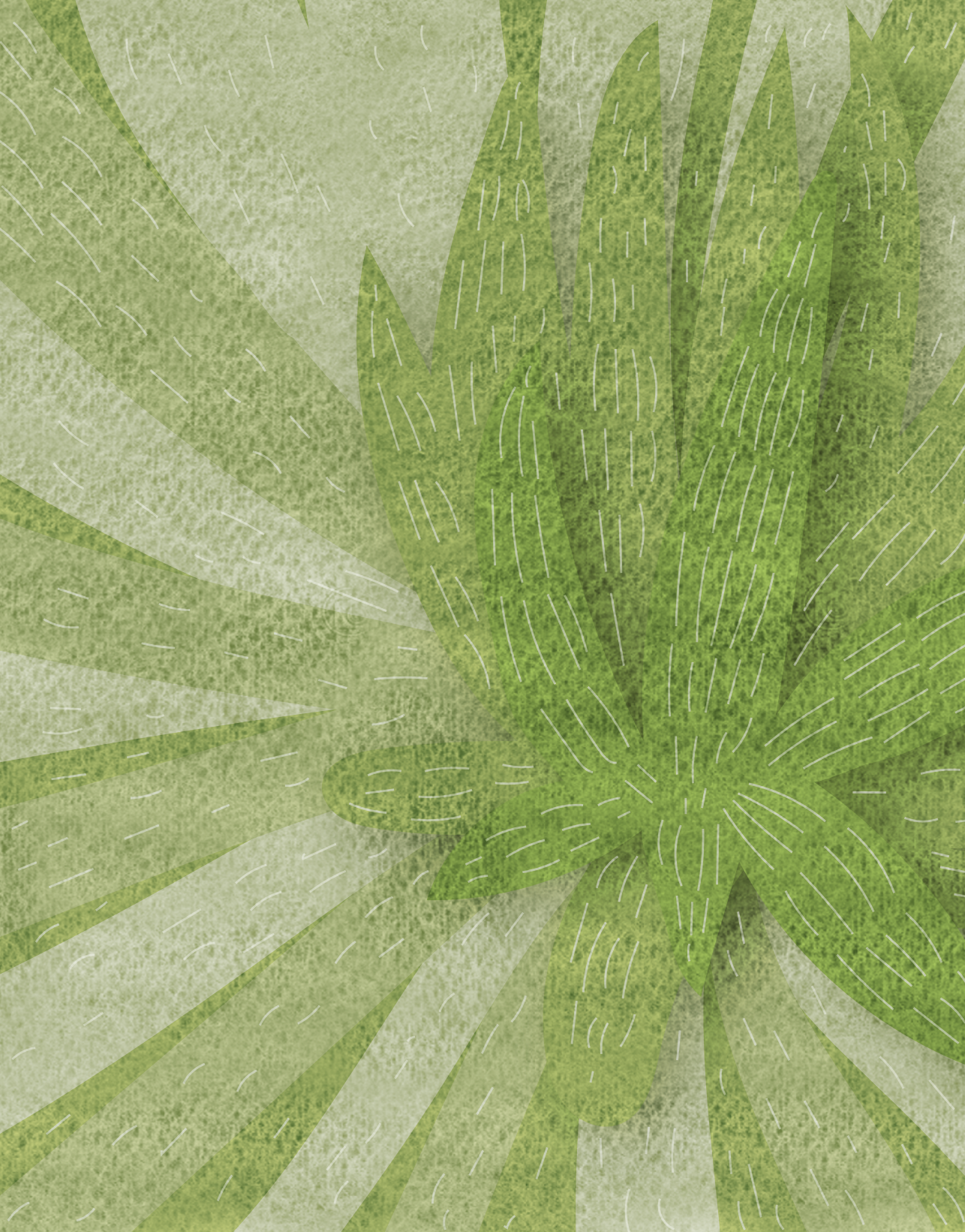
Congratulations!

You've solved all the challenges.



Look for the sticker
for this chapter at
the end of the book
and place it here.


**This medal recognizes you as a
member of **the Earth Mission
Team: kids and families to
the rescue!****



The Guardian of Water



Scan the QR code or visit www.mellamotierra.com
to listen to the audio for this story!



To visit me you must climb more than 2900 meters above sea level, where the clouds meet the mountains.


At first glance, you may not know what makes me special. No large, leafy trees live in me, no edible fruits are easily seen, nor do they adorn me with multicolored flowers. But look carefully...

Since ancient times the indigenous communities have considered me a sacred place. They have come here to perform ceremonies and honor their gods. They saw in me a place of unique beauty and rich in water, source of life. They were not wrong; if you walk through me, you will feel its presence in every step. You will discover that I bear beautiful lagoons of crystal clear water, many waterfalls and rivers are born here and then descend to bathe other territories with their waters.

In addition to being a guardian and protector of water, I am home to many animals such as the spectacled bear, the fox, the tapir and the oncilla tiger, as well as numerous reptiles and amphibians. I also grow unique plants and flowers that have been able to adapt to my particular ecosystem, such as the frailejones. The tallest are almost 300 years old. Can you believe it?







But not everyone sees me as a sacred place. Eventually, other people arrived and when they discovered me, they only had their own gain in mind.

"In those lands there are minerals that we could extract," they said.


"Yeah, like gold. We could also look for oil or gas. If we found it, we would be rich."

"These are lands with a lot of water but they are totally wasted. There are very few crops and potato could grow well there. We could have much bigger crops and even bring cows."

"We could also build houses and roads."

I hear them and shudder. I fear they will bring heavy machines that will crush the frailejones, drive away the animals and poison the water. That would damage my balance and affect the sources of water... and without water, I don't exist.

Fortunately, not everyone thinks in that way. Many have known how to approach me respectfully, honoring my rhythms, taking care of me and valuing the contributions and benefits that I offer them.



"Some people don't know that this ecosystem exists in very few countries. Colombia is very fortunate to have it."

"That's true. Sometimes it is not easy to realize that not all wealth is measured in money."

"We need to learn what can be done here and how to lessen our impact. We must respect it and take care of it."

I hear each and every person arguing about me and they just can't seem to agree. I just hope you make decisions that don't fill me with noise, machines and smoke, so that I can remain a place where silence and life reign.

I am the guardian of water, the home of unique plants, the refuge of animals that have adapted to this particular environment.

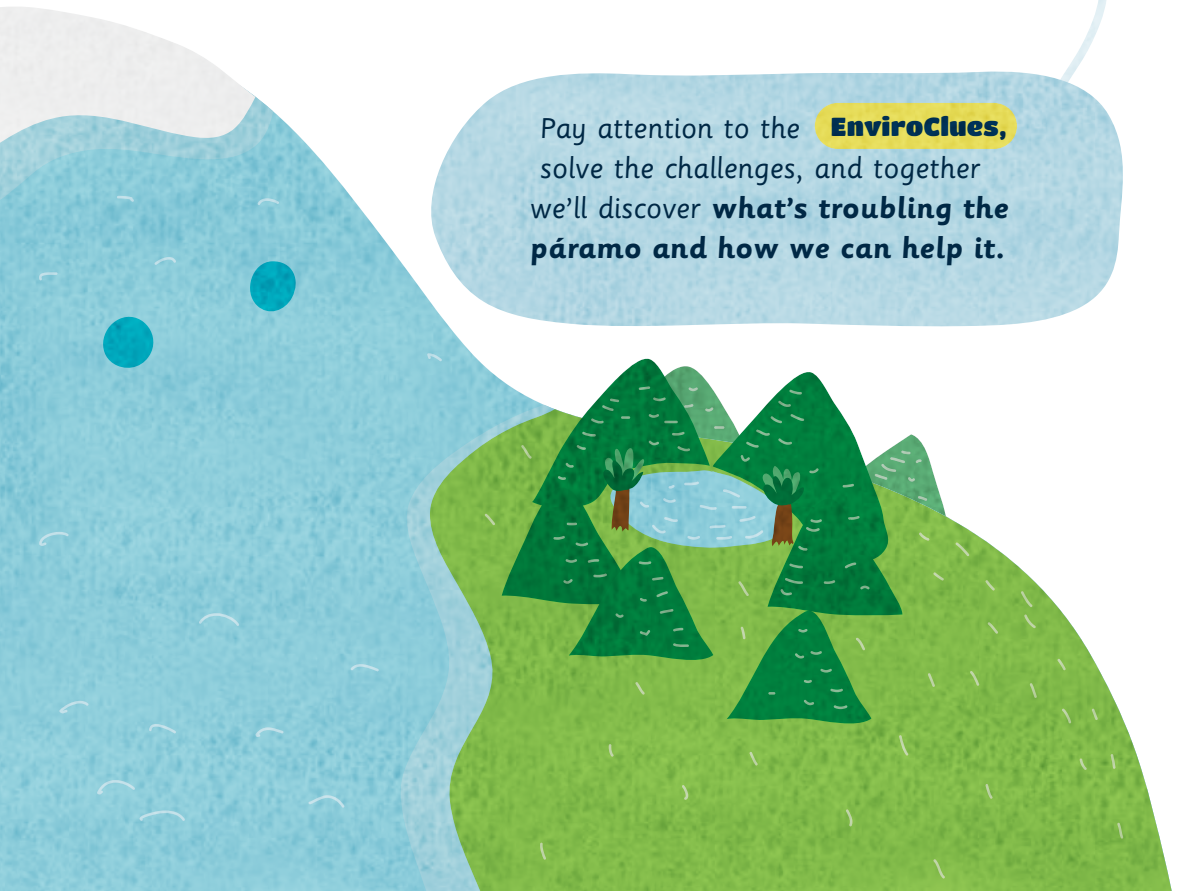
I'm the Páramo.



Challenges

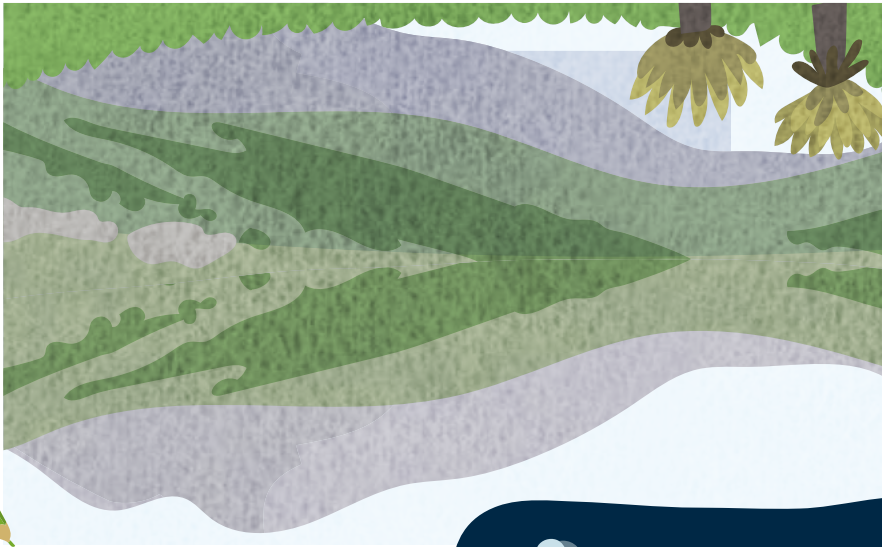
I've been thinking, and you and I have a lot in common! **70% of my surface is water and exactly 70% of your body is made up of water. We're aquatic buddies! Have you noticed?** However, not all the water on my surface can be consumed by humans. Only about **3% is fresh water** and a significant part is stored and distributed high in the mountains, thanks to one of my wettest, most fragile, and coldest friends, the páramo. Would you like to see it?

Pay attention to the **EnviroClues**, solve the challenges, and together we'll discover **what's troubling the páramo and how we can help it.**



Challenge 1. Páramo Upside Down

The lagoons on the páramo are so transparent that they look like mirrors and seem to duplicate the landscape. Use a mirror to discover the secret inside the image below. **Observe carefully and make a detailed list of what you see:** What is there? What words would you use to describe what you see? What is the weather like?



EnviroClues

The largest number of páramos in the world are found in the northern part of the Andes Mountains in South America. Although similar ecosystems exist in East Africa, New Guinea, and southern Central America, more than 70% are located in South America, and Colombia has the largest of all: the Sumapaz Páramo in the department of Cundinamarca.



Mystery Questions:

1. What is the relationship between the páramos and water production?
2. What differentiates a páramo from other ecosystems?

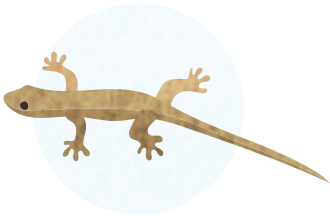
Mini-Challenge 1A. Locals and Visitors

The climate in the páramo is directly related to altitude.

Investigate and draw a green circle around the plants and animals below that belong to the páramo ecosystem.

EnviroClues

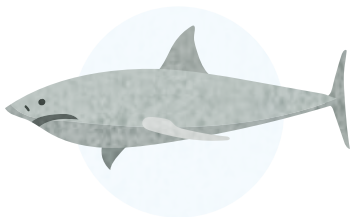
Colombia's páramos are not only the most extensive, but the most biodiverse as well. They are home to at least 4,700 species of plants, 207 species of birds, 70 species of mammals, 15 species of reptiles, and 90 species of amphibians. Did you know that Colombia is the country with the most high-mountain plant species in the world?



Chuchuri gecko
(*Gonatodes chucuri*)



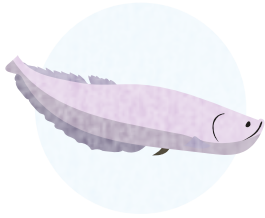
Reishi fungus
(*Ganoderma lucidum*)



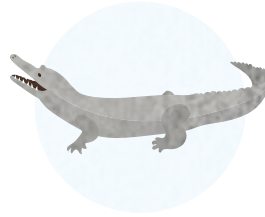
Great white shark
(*Carcharodon carcharias*)



Toucan
(*Ramphastos toco*)



Arawana
(*Osteoglossum bicirrhosum*)



Orinoco crocodile
(*Crocodylus intermedius*)



Starfish
(*Asterias rubens*)



Frailejón
(*Espeletia saboyana*)



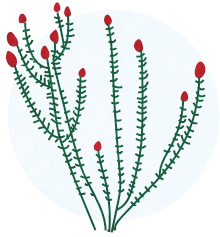
Andean condor
(*Vultur gryphus*)



Spectacled bear
(*Tremarctos ornatus*)

Continue on
the next
page





Flower of the Andes
(*Chuquiraga jussieui*)



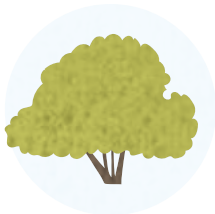
Bumblebee
(*Bombus sp.*)



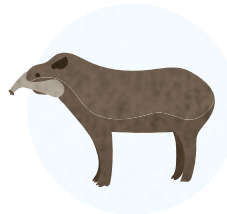
**Páramo
white-tailed deer**
(*Odocoileus goudotii*)



Spotted salamander
(*Bolitoglossa ramosi*)



Black elder
(*Sambucus nigra*)



Tapir
(*Tapirus terrestris*)

What is the appropriate clothing for visiting the páramo?

Draw yourself wearing it!



Mystery Questions:

- 1.** What characteristics are common to all species of plants and animals in the páramo? And what characteristics allow them to adapt to this ecosystem?
- 2.** How many species of insects inhabit the Colombian páramos?



Challenge 2. Thermal Layers

The páramo climate is cold and humid, ranging from 0 to 15 degrees Celsius, depending on the time of day. Most of the páramo ecosystems are located between 3,000 and 4,000 meters above sea level. **Observe the following image:**

1. Find out which are the most common foods grown at **páramo altitudes**.
2. **At what altitude do you live?** Point it out.

Glacier < 6°C

> 4000 meters

Páramo 6°C a 12°C

3000 meters

Cold 12°C a 17°C

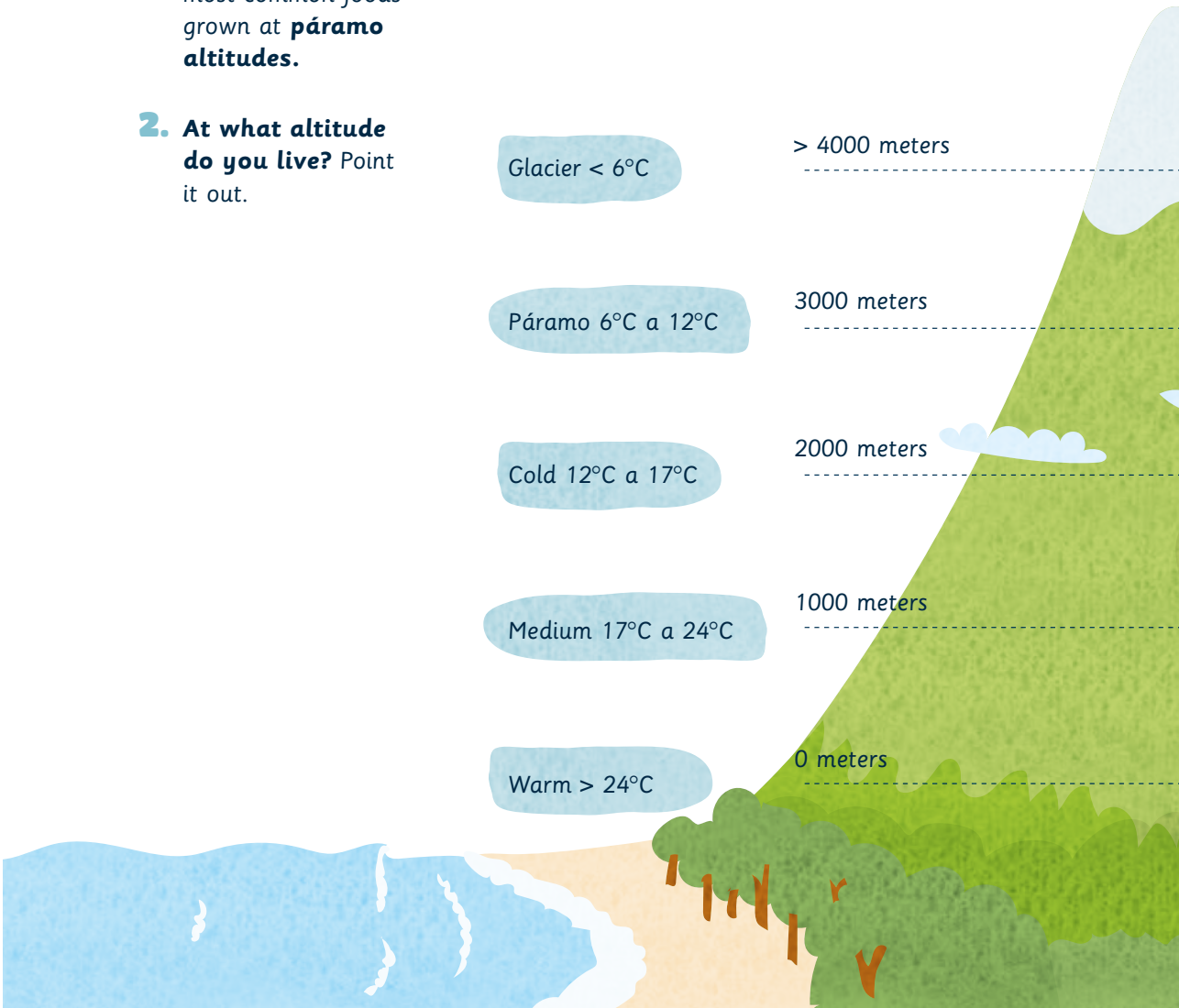
2000 meters

Medium 17°C a 24°C

1000 meters

Warm > 24°C

0 meters



3. Next, make a list of the main foods **grown in your territory** and the animals that live there.

EnviroClues

Colombia doesn't have seasons, but it does have a variety of thermal layers and geographic regions, from its coasts—less than 1,000 meters above sea level and with an average temperature of 30° Celsius—to high-mountain glacial regions—more than 5,000 meters above sea level and with temperatures that reach 0° degrees Celsius (or less)—. Do you remember the hottest and the coldest days in the area where you live?

4. **Contrast:** What are the similarities and differences between the páramo ecosystem and where you live?



Mystery Questions:

1. What are the characteristics of an ecosystem located at more than 3,000 meters above sea level?
2. What recipe could you prepare with the food that grows on the páramo?

Challenge 3. Where Rivers Are Born

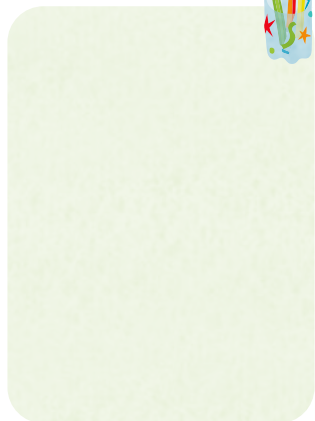
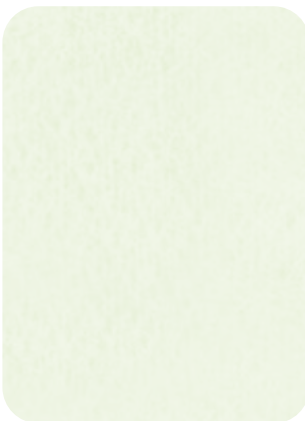
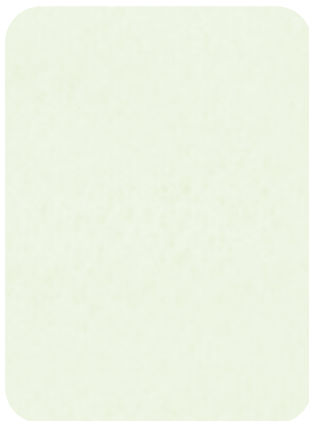
One of the ways that rivers form is when clouds laden with water vapor reach the páramos. There, plants like the frailejones trap the steam and transform it into water, then draw it down into the earth through their roots. The water is stored under the ground and, due to its weight, descends between the rocks, forming waterfalls, lagoons, and rivers.

**Draw the stages of this process in the spaces provided below.
Draw an arrow to indicate when each of them occurs:**

Clouds laden with water vapor reach the páramos.

Plants trap the vapor and turn it into water.

The water travels underground to rivers and other water sources.

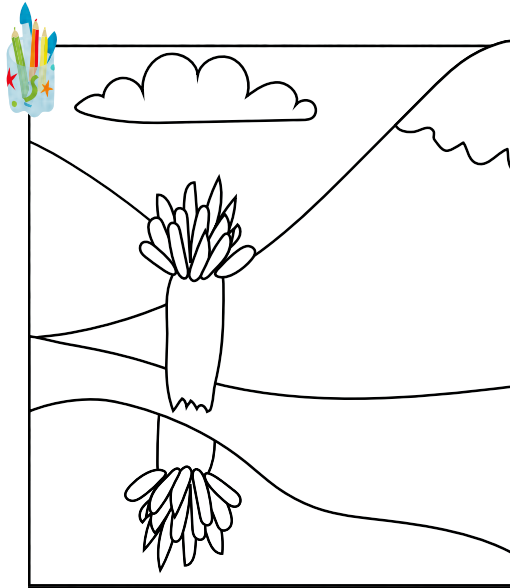


Mini-Challenge 3A. The Shapes of Water

Do you know about the different states of water? With help from a teacher, **research the states of water and identify which are present in the páramos.** Then color them and label them with their names: **solid, liquid, and gas.**

EnviroClues

At least 10 of Colombia's most important rivers spring from the páramos and cross the country to the Caribbean and Pacific coasts and to the Orinoquía and Amazonia. An estimated 70% of Colombians depend on the páramos for fresh drinking water, food production, agriculture, and industry and energy production, among others.



Mystery Questions:

1. What is the importance and role of the páramos in the water cycle?
2. In what other ways are rivers formed?

Challenge 4. Wisdom From Above

The páramo has been a very important place for the communities that have inhabited it historically. They have found food, water, medicines, wisdom, plants, animals, mist, and rocks there. Certain communities have gained knowledge from rocks and learned to respect them as equals, or even superior beings. **Read the following story and draw the place it describes.**

EnviroClues

Colombia's more than **80 páramos** are grouped into **36 complexes**; **17 of them are part of the territory belonging to 31 indigenous reservations and six are part of the territory belonging to Afro-Colombian communities**. Indigenous communities have had a historical presence in these territories, perceiving and relating to the páramos through rituals and interacting with the flora and fauna as sacred spaces from which they receive wisdom, food, and medicine, and to which they offer respect, care and admiration. But their ways of life and their knowledge are threatened by phenomena such as climate change, mining, and the expansion of agriculture and cattle ranching.

“ On Chiles Hill there is a botanical garden. Juan Chiles's garden of remedies is nature itself; our ancestors placed it there and it still exists. There are three natural armchairs with natural cushions where our wise Taitas met to heal, take flight, see into the future, and fulfill their functions. It is surrounded by chilcuara, a very pretty plant. At the entrance to the garden is a reptile that changes color: when it's blue you can enter, when it is red you must go back. It is fierce and will not let you enter. This is the mystery! And you must not enter with bad thoughts in your mind, just to see it. You mustn't pick or bring any plants out of the garden; you can only look. To get there, the *jerjel*¹ will show you the way. An aroma will

lead you to the garden, but not everyone will find it, because it is enchanted. When my father, José Domingo Chiles, took me to see the garden of remedies, I tried to pick a little flower, but when I went to do so it flew to one side like a little butterfly. My father said, “don’t touch it; no one must touch that plant.” That plant had the same color and shape as the dictamón² plant and it is found at the entrance to the garden and deer feed on it. ”

*Told by Bolívar Chiles, traditional healer, Pasto.
Páramo de Chiles, Nariño, Colombia.³*

1. Aroma of several plants together.
2. Creeping plant.
3. Mena Vásquez, P, H. Arreaza, T Calle, L.D. Llambí, G. López, M.S. Ruggiero and A. Vasquez (Eds.). 2009. In the Mist. Myths, Legends, and Stories from the Páramo. Proyecto Páramo Andino and Editorial Abya-Yala. Quito.

**Answer on
a notebook**



Mystery Questions:

- 1.** Why is the páramo so important to indigenous communities?
- 2.** What are the consequences of cattle ranching, mining, agriculture, and climate change for the páramos?
- 3.** How do these activities affect the indigenous communities that inhabit these ecosystems?

Challenge 5. Páramo Stories

As you can see, the páramo can be a place of great wisdom. The beings that live there may have many stories to tell us. Read the following data sheets and do some research to fill in the missing information.

Next, choose one of the plants or animals from the sheets and write a story from their point of view.

For example: "My name is Spectacled Bear, although I don't wear glasses. I live on the páramo..."



Spectacled Bear (*Tremarctos ornatus*)



Class

Mammal

Adult size

190 centimeters

Favorite foods

Bromelia gigante

Benefits it provides to its environment

It transports seeds and disperses them so that new plants are born.

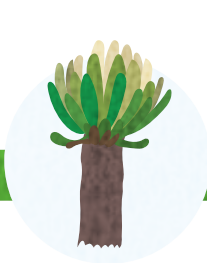
Superpower

Sense of smell 200 times superior to that of a dog.

EnviroClues

Between the months of July and August, some species of frailejones are adorned with flowers in striking colors such as yellow, red or orange, and are covered with a kind of poncho called a **palea** made of thin fibers joined together to create an extra layer of protection against the extreme cold on the páramo. This protective layer is a form of adaptation developed by these organisms.

Do you wear or have you worn a ruana or a poncho?



Frailejón (*Espeletia*)



Class

Plant

Adult size

[Empty rounded rectangular box for adult size]

Favorite foods

Water, nitrogen, and phosphorus

Benefits it provides to its environment

It is home to several species of insects, and its flowers and leaves are a natural remedy for coughs.

Superpower

Captures and transforms mist into liquid water.



Giant hummingbird (*Pterophanes cyanopterus*)



Class

[Empty rounded rectangular box for class]

Adult size

16 cm

Favorite foods

Bromeliad flower nectar

Benefits it provides to its environment

[Empty rounded rectangular box for benefits]

Superpower

They endure the extreme cold at night on the páramo by fluffing up their plumage and reducing their vital activity to save energy.



Páramo Chameleon (*Anolis heterodermus*)



Class

Reptile

Adult size

15 cm

Favorite foods

Benefits it provides to its environment

Controls insect and parasite species that feed on páramo plants.


Superpower

Thanks to its colors it can camouflage itself from predators and its size allows it to scramble under rocks or onto the branches of the frailejón.

Your Story

Character in your story:

Title:



Mini-Challenge 5A. Slow but Safe

Did you know that the frailejón plant grows very slowly? On average, they grow one centimeter per year, but they can live a long time.

How tall would you be if you were a frailejón? And how old would you be if you grew at the rate of a frailejón?

With the help of an adult, measure your height and place it on the chart below.

Height

(eg. 1.50 m.)

Your height:

Age

(eg. 150 years old)

Your **age**, if you were a frailejón:

Age

eg. 10 years old

Your age:

Height

(eg. 10 centimeters)

Your **height**, if you were a frailejón:

Draw yourself as a frailejón:



Mystery Questions:

1. What are the most amazing superpowers of the species that inhabit the páramos?
2. How might you help raise awareness about the protection of these species?
3. Why do frailejones grow only one centimeter a year?



Challenge 6. Map of Effects

Although many of the animal and plant species that inhabit the páramo have managed to maintain a balance with their environment, humans are still learning to live without harming their ecosystem. Approximately one hectare of illegal mining, agriculture, or cattle ranching affects the health of four hectares of soil and the living beings that inhabit it.

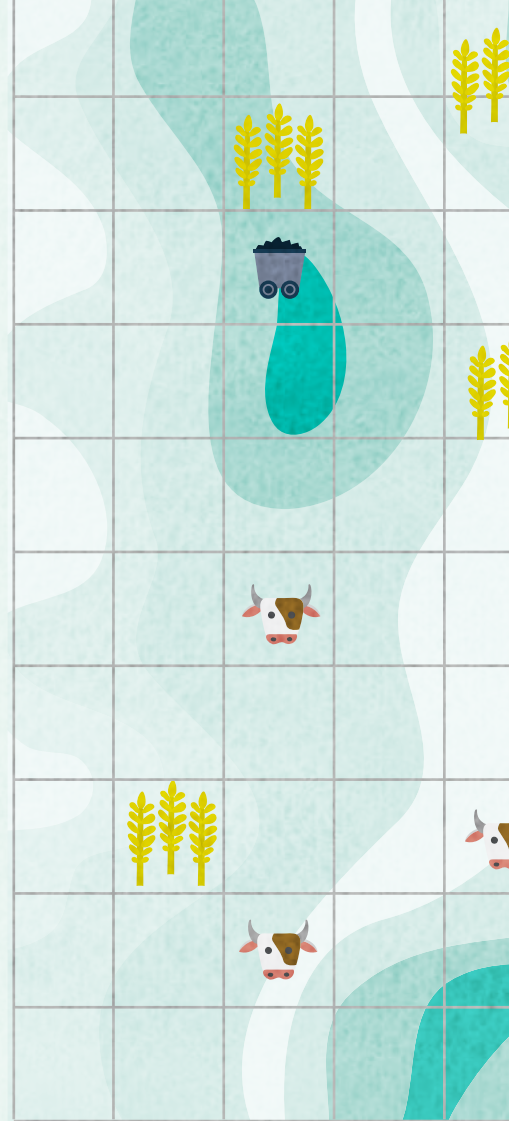
Observe the following map; keep in mind that one square equals one hectare of land. Identify the icons for livestock, agriculture, and mining. The hectares directly surrounding the hectare where humans are active are areas at **high risk of damage**. The hectares not directly bordering the hectares where the icons are located are at **average risk of affection**.

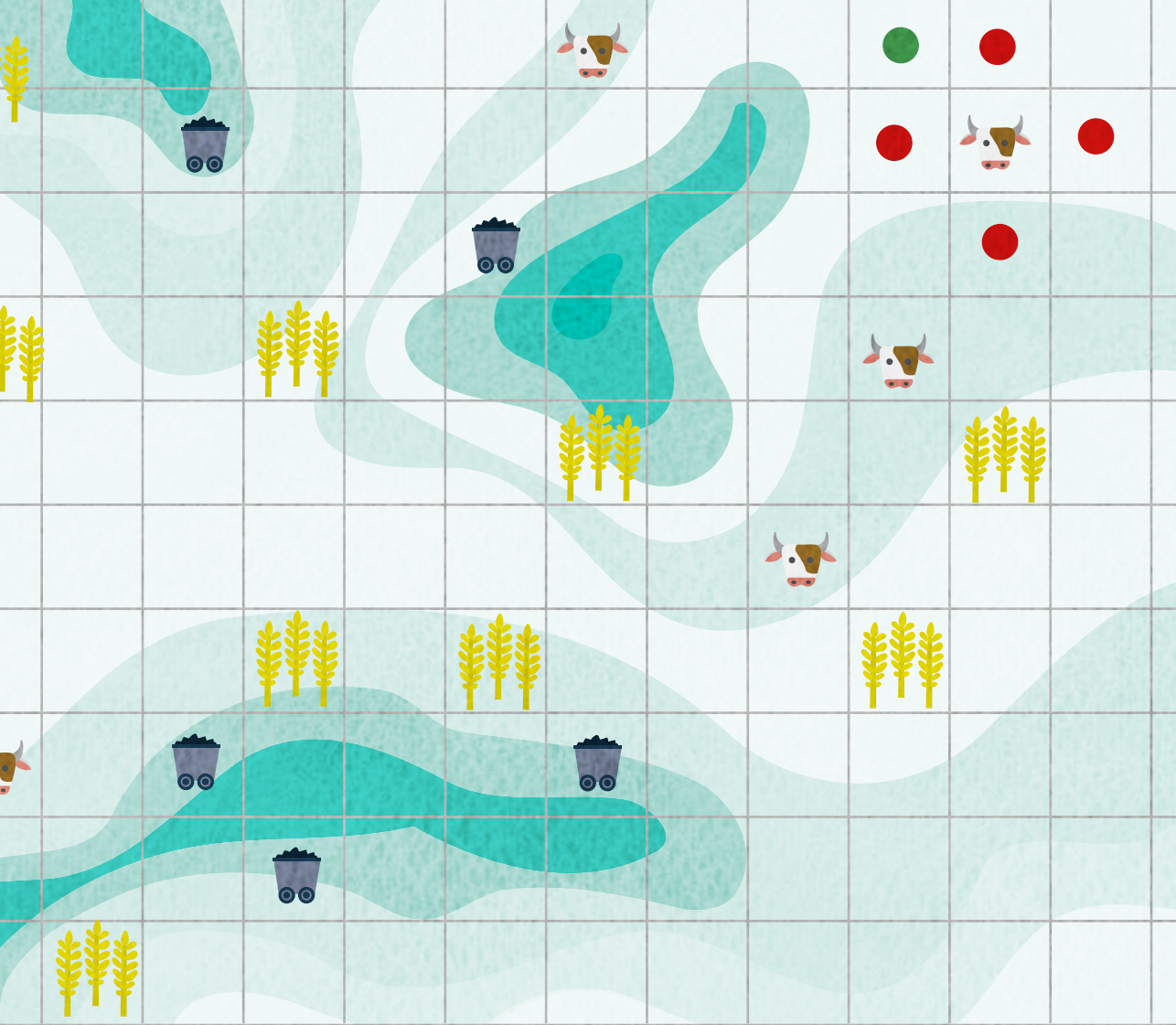
Follow the example in the upper right corner of the map and:



Mining

- Mark in red the areas at **high risk of affection**.
- Mark in green the areas at **average risk of affection**.
- Count all the hectare squares and calculate the percentage at high risk of being affected.





Farming



Livestock



High risk of
affectation



Average risk
of affectation



Mystery Questions:

1. How much does human activity affect the health of the páramo?
2. What impacts does mining have on the ecological balance of the páramos?
3. How might sustainable agricultural practices be implemented in the páramos?

Challenge 7. Extreme Temperatures

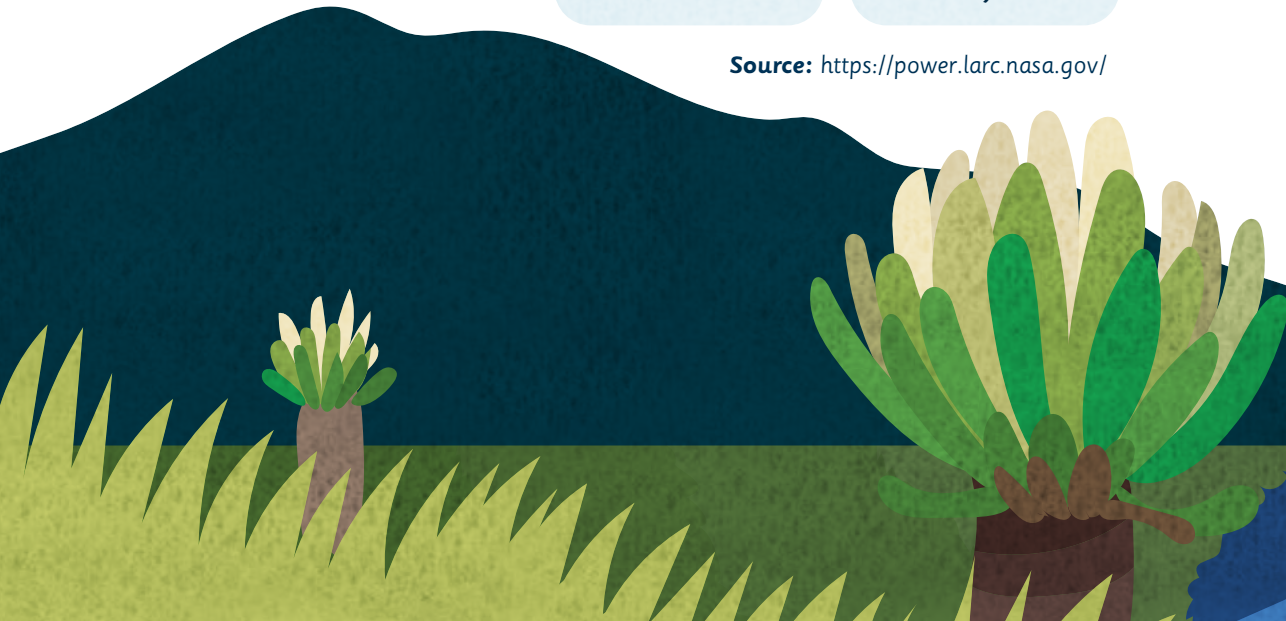
Temperature changes are extreme on the páramo. They can range from below zero to 20-22 degrees, in the same day. The species that live there must therefore adapt to these conditions. In recent years, however, due to accelerated climate change, it has been proven that temperatures are rising. This will directly affect the survival of these species.

The following table shows the annual maximum temperatures for the Páramo in Sonsón, Antioquia:

Annual Maximum Temperature (in Celsius) for the Sonsón Páramo

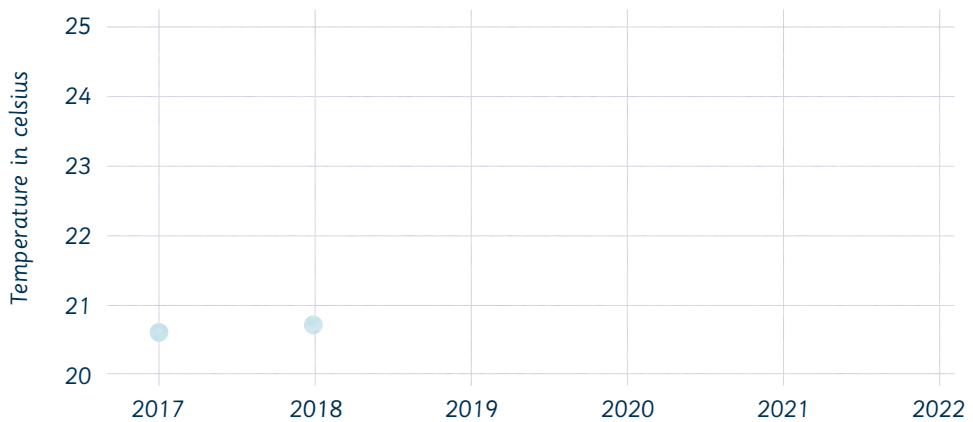
Year	Temperature
2017	20,72
2018	20,80
2019	21,33
2020	21,58
2021	22,13

Source: <https://power.larc.nasa.gov/>



Using the data from the table above, **fill in the graph below with the annual maximum temperature for the Sonsón Páramo. Next, connect the dots and observe the trend.**

Annual Maximum Temperature for the Sonsón Páramo



- How has the maximum temperature been affected over the last five years?
- What is the average maximum temperature during this period?
- What do you think the temperature of the páramo might be in 2022? Draw a point on the graph to represent this.

Share your discoveries with your classmates and family. Look for answers that explain this phenomenon.



Mystery Questions:

- How might an increase in maximum temperature impact the ecosystem?
- What do you think are the causes of this rise in temperature?



Challenge 8. Potatoes and Cows on High

Due to accelerated climate change—which increases the average temperature of certain places—, farmers have had to move their crops and cattle to higher altitudes.

How does the presence of crops and livestock affect the páramo ecosystem?

EnviroClues

Although the páramo's natural pastures lack the nutrients that cattle need, grazing at higher altitudes has intensified in recent years. Cows, horses, sheep, and goats have become regular inhabitants, even at 4,500 meters above sea level. Agricultural practices include burning the páramo soil to increase productivity, an action that—added to trampling of the ground by animals, the presence of their organic waste, and their encounters with wild species— affects the soil and the environmental balance of the páramos.

- a. Read carefully the list of human activities necessary to food production and the list of their effects on the páramo ecosystem.
- b. Draw a line to connect each **action** with the **effect** you believe it causes. It is possible for the same action to cause different effects.



Activities Linked to Agriculture and Livestock Production

Burning of local plant species

Breaking up and removing soil to release nutrients

Irrigation with chemical fertilizers and pesticides

Repetitive use of hoes or machines to till the soil

Cattle grazing

Effects on the Páramo Ecosystem

Presence of urine and excrement that increase carbon dioxide and acids and nitrates in the soil

Trampling and compacting of soil and reduced capacity for water absorption

Loss of soil porosity and decreased capacity to absorb and store water

Decreased habitats and food for local animal species

Soil erosion and increased exposure to wind and rain

Alteration of soil nutrients and contamination of groundwater



Mystery Questions:

1. What solutions can you suggest for each of these effects?
2. How might we continue to use the páramo's natural resources without affecting its health and balance?



Challenge 9. A Bridge for the Bears


The survival of the páramo's animal and plant species is threatened by the construction of mines, which requires the destruction of mountains in order to extract metals and minerals, and the construction of roads, needed to transport these minerals and agricultural products and livestock.

This family of spectacled bears has been separated by the construction of a road.

Help them get back together and wander the páramo without barriers:



Imagine a bridge made from dirt and vegetation that could be safely crossed by animals.



Draw the bridge you imagined to connect the sides of the road and reunite the bears.

Work with your family to build a model of this bridge using recycled materials.

Use modeling clay to create two bears like the ones in the drawing and place them on the bridge. Can the bridge hold their weight?

EnviroClues

Ecological corridors are safe routes for species migration and mobility. They consist of artificial or natural bridges that connect ecosystems separated due to agriculture, cattle ranching, urbanization, or infrastructure such as roads or dams. These corridors allow animals and plant species to move from one territory to another, increasing their possibilities of survival.



Answer on a notebook



Mystery Questions:

1. How important are ecological corridors to the conservation of ecosystems?
2. What priority should be given to the construction of ecological corridors in urbanization plans and infrastructure projects and what should be taken into account when designing them?

Challenge 10. Silence for the Frailejones

Eighty-eight of the 144 species of frailejones known to the world are found on Colombia's páramos. **That's more than half!** Several of these species, however, are in a state of vulnerability or threatened with extinction due to human activities. **What is happening to them?**

- a. Create a team with three of your classmates and read the following article. **Pay attention to the details and answer the following questions:**

So far in 2020, a total of 179 vegetation cover fires have been recorded in 59 of Boyacá's 87 municipalities.



Fires have occurred in the páramo complexes of: Tota-Bijagual-Mamapacha; Pisba; Guantiva-La Rusia; the Pan de Azúcar-El Consuelo sector; and the Rabanal-Río Bogotá páramo, where 947 hectares have been affected. Their recovery could take 50-70 years.

Several environmental authorities have made technical visits to the Siscunsi-Ocetá Biogeographic Regional Natural Reserve, finding that at least two of the forest fires were set in order to expand the agricultural frontier. **This means that they burned frailejones to plant potatoes and other crops, a cultural practice in the area.**

The preliminary report also reported the burning of more than 3,480 frailejones, mainly of the *Espeletia lopezii* and *Espeletia incana* species, in addition to a small patch of forest shrubs, consuming more than 16 hectares in events occurring in May and April 2020. ”

Why was 2020 the worst year for the Boyacá páramos?:
Corpoboyacá reports 3,480 frailejones burned to make room for potatoes. ENVIRONMENT. July 14, 2020, El Tiempo.

Recuperado de: <https://www.eltiempo.com/vida/medio-ambiente/porque-el-2020-ha-sido-el-peor-ano-para-los-paramos-de-boyaca-517654>

b. Discuss the article with your classmates and answer the following:

What happened?

What happened to the frailejones and how many were affected?

Where did it happen?

What caused the events?

- C. Observe the following image and share with your classmates what you feel when you see it. **What do you think about the image after reading the article?**



Photo: Daniel Castillo. Parque Natural Regional Siscunsi Ocetá Regional Nature Reserve, Boyacá. February 24, 2022. Recuperado de: <https://www.eltiempo.com/vida/medio-ambiente/denuncian-quemas-en-paramos-del-pnr-siscunsi-oceta-654116>





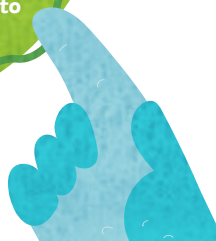
Mystery Questions:

1. What will happen to the birds, insects, amphibians, and reptiles who made their homes on these frailejones?
2. How might we guarantee the protection of the frailejones?
3. What collective actions could be implemented to prevent the burning of vegetation in the páramos?

EnviroClues

Researchers from the Humboldt Institute (Colombia) and the Alpine Ecology Laboratory of the National Center for Scientific Research (France) discovered a new species of frailejón this year at the highest and wettest point of the Savoyá Páramo, in the department of Boyacá. This species, which they christened savoyard speletia, has a yellow flower and can grow to be five meters tall. Human activities have made it highly vulnerable.

What name would you give to a frailejón born in your territory?



Mini-Challenge 10A. Frailejón News on the Air!

Use your creativity and empathy for the life and well-being of the páramos and their inhabitants. **Create your own eco-newsletter**

- a. With help from your family or teachers, find a picture of the *Espeletia lopezii* or the *Espeletia incana frailejón* species. **Design a puppet based on the picture.**
- b. Investigate the main threats to the páramos and **create a story from the point of view of a frailejón.**
- c. Share your work with your family and classmates. **This puppet will host the news program.**



Mystery Questions:

1. Why is it important to publicize what is happening to the Colombian páramos?
2. How can the media and social networks help protect ecosystems?

Answer on a notebook

Congratulations!

You've solved all the challenges.

This medal recognizes you as a member of the Earth Mission Team: **kids and families to the rescue!**

Look for the sticker for this chapter at the end of the book and place it here.



A Meeting Place



Scan the QR code or visit www.mellamotierra.com
to listen to the audio for this story!



Who am I?

I am the place where the salt water of the sea finds the fresh water of rivers. The trees that grow here don't look like any you've ever seen. They can be green, they can be red. Their roots are so long that they come out of the earth and the iguanas walk quietly around them.



"It's an ideal place to lay our eggs," they say.

"For us too!" Freshwater and
saltwater fish reply in unison.

They are right. I am home and refuge for many living things. If you come, you will hear the birds singing, you will see starfish, fish, shrimp, reptiles, monkeys and the shy pinguia that hides in its shell. You will also meet the speedy blue crabs. They tirelessly dig my soft ground with their pliers to make tunnels that help water and oxygen flow through the roots and soil.

I am the natural barrier that protects the coast from the impacts of climate change, erosion and floods. I have allowed man to build his home without fear, and find food to eat and sell.



The fishermen who visit me know how important I am.

"Look, son, this place is good to us. It gives us food and sustenance, and it also protects us."

"Does it really protect us, Dad?"

"It does, son. Thanks to it we have no floods and our people are safe. Over there, higher up, they tried to build a place like this, and water came and took everything."



"But why did they destroy it? Didn't they know it was important to take care of it?"

They didn't know. They thought I was just some dirty still water surrounded by strange trees. They decided to fill me with dirt so they could build. They wanted a world made of cement, with houses and avenues, but they forgot that I was the one who was protecting them.

If they did something like this here, they would destroy the tunnels built by the crabs, the birds would go away, the reptiles and monkeys would flee, the fish and the pinguas would no longer be here. The fishermen wouldn't come anymore. Freshwater reserves would be affected and nearby populations would be at risk of flooding.

Who wins with that?

I don't have the answer to that question.

I am a unique ecosystem that allows diverse organisms to grow and develop. I am a source of food and protection.

I am the mangrove.



Challenges

For millions of years, forests have covered and accompanied me, even during periods of great change. They've adapted to extreme climates, which has allowed them to survive and develop superpowers. The plants that make up the mangrove forest, for example, have learned to extract nutrients from both fresh and salt water and because they have strong, flexible roots they form a very resistant natural barrier against the huge ocean waves. **Let's get to know the mangrove, the living organisms that make it so resistant, and the challenges it faces for its survival.**

Pay attention to the **EnviroClues**, solve the challenges, and let the roots and the magic of the mangrove forest draw you in.



Challenge 1. Sharp Senses

The mangrove is a unique ecosystem, full of secrets and superpowers. **Read the beginning of the story again, connect with your senses, and imagine for a moment that you're in that extraordinary place.**

"I am the place where the salt water of the sea meets the fresh water of the rivers. The trees that grow here are unlike any you've ever seen. They can be both green and red, their roots are so long that they extend out of the ground, and the iguanas walk among them peacefully."

- a. What do you **think** the mangrove looks like?
- b. How does this unique place **smell**?
- c. How do you **think** the water there tastes?
- d. What **sounds** do you hear in that place?
- e. How does the mangrove feel on your **skin**? How do you imagine salt water mixed with fresh water **feels**? What **textures** does a place like this make you think of?

Now, **investigate other characteristics of the mangrove. Based on your research and the answers you discovered using your senses, create a model of the mangrove using reused materials.** Organize an exhibition of your mangrove models with your classmates. **Compare and contrast: How are they alike? How are they different?**



Mystery Questions:

1. What are the living organisms that inhabit this magical ecosystem like?
2. Why are the mangroves important to protecting biodiversity?

Challenge 2. Mangrove Plants

The mangrove forest is a group of special trees and shrubs called mangroves that grow on the Caribbean and Pacific coasts of Colombia (and other coasts around the world). These plants have adapted to survive in muddy, sandy, or clay soils, poor in oxygen and constantly flooded by fresh and salt water.

EnviroClues

The trees and shrubs of the mangrove forest have adapted to resist the elevated salt levels in their environment due to the flooding caused by high tides for much of the year. Some have a filtration system in their roots that only lets through a part of the salt present in seawater, and others expel excess salt through the pores in their leaves in a respiration process. That's not all! Another of their superpowers is capturing oxygen from the air through their roots, which protrude up to 20 centimeters above ground and, together with fallen leaves, create a mass of organic material that accumulates carbon dioxide and keeps it out of the atmosphere.

Observe these images of some of the mangrove species that exist in Colombia and, with help from these pictures and the descriptions in the table, draw each one above its name in the outline provided.



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the next
page**



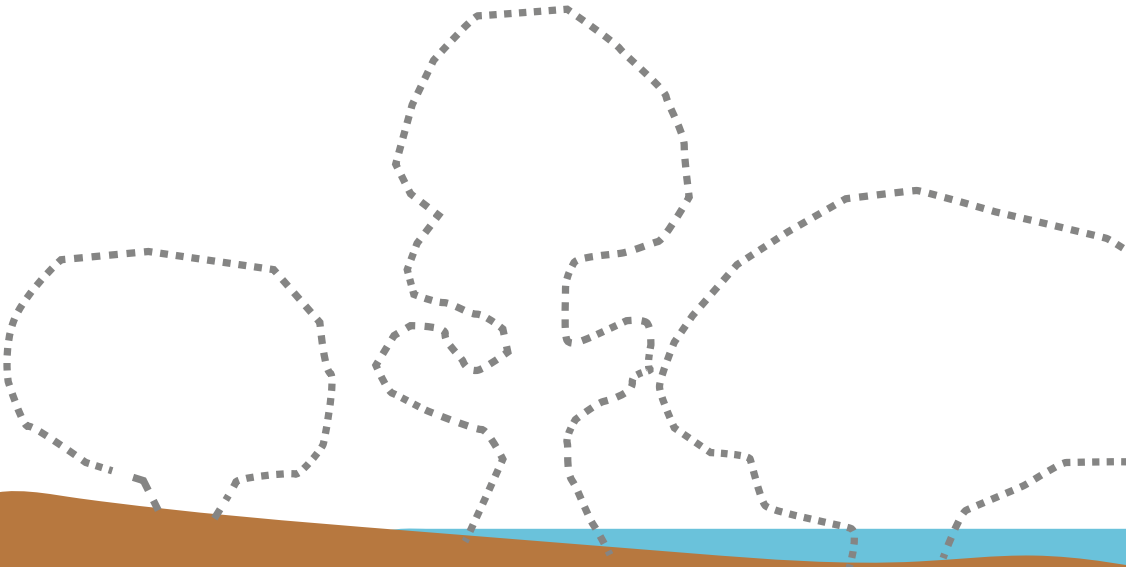
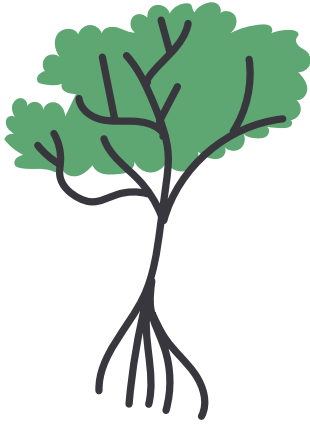
Button mangrove (*Conocarpus erectus*): they don't generally measure more than 10 meters in height and grow on high ground, closer to the river than to the sea, with sandy soil. Their outer bark is white or gray.

Tea mangrove (*Pelliciera rhizophorae*): they are native to the Pacific Ocean coasts and their roots resemble the legs of an elephant. Their trunks are smooth and light brown in color and their branches are interspersed and far apart. They grow better further from the sea, although they tolerate the presence of salt.

Black mangrove (*Avicennia germinans*): they have vertical roots called pneumatophores, which emerge approximately 20 centimeters from the ground to capture oxygen. They can grow up to 20 meters high. They have a yellow inner bark and a dark outer bark

White mangrove (*Laguncularia racemosa*): they have a cracked gray trunk and white flowers that bloom from May to November. They measure between 4 and 20 meters high. Their roots also protrude from the ground and spend most of the year underwater. They generally grow between the red and black mangroves, where these species cohabit.

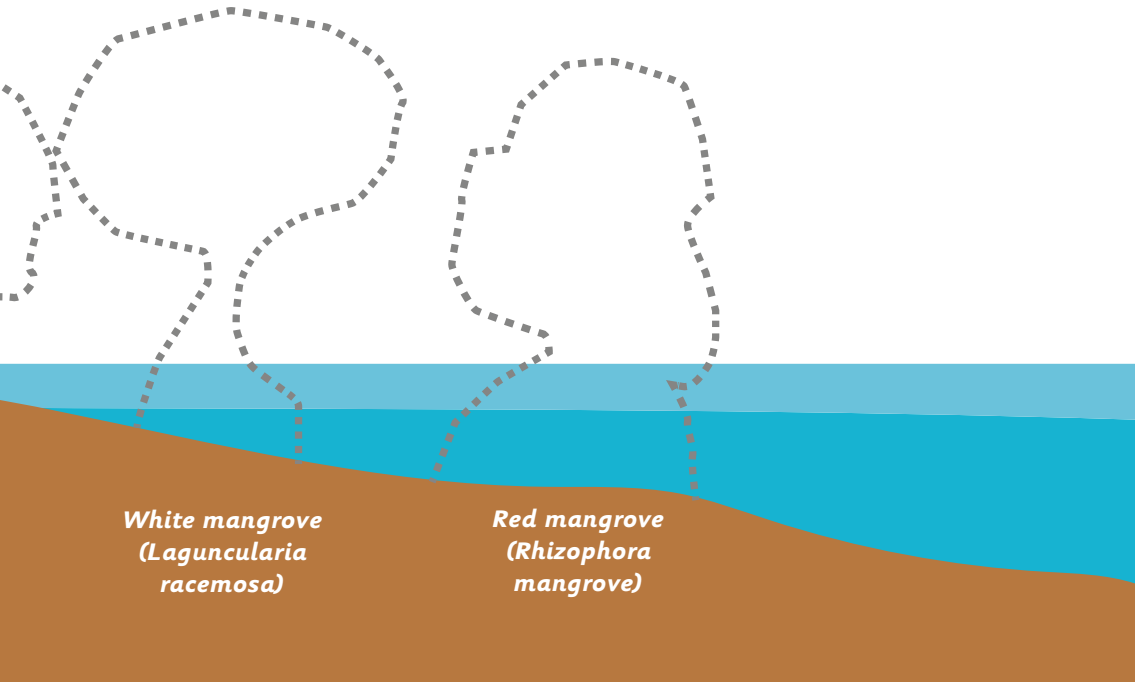
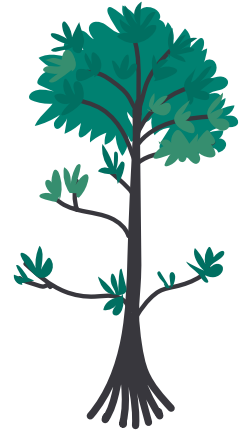
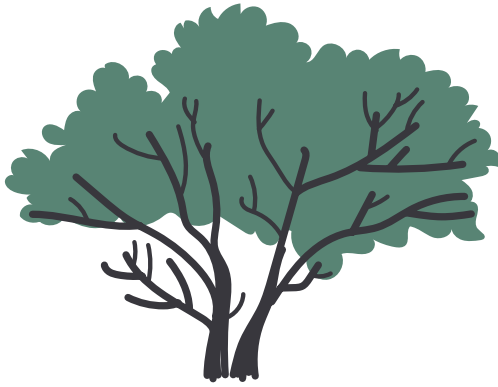
Red mangrove (*Rhizophora mangrove*): their wood and roots are reddish in color. Their numerous roots protrude from the ground in the form of stilts that help brace them against strong waves. This mangrove remains in contact with sea water the longest. Its minimum height is five meters and its maximum height is 50 meters.



Button mangrove
(*Conocarpus erectus*)

Tea mangrove
(*rhizophorae*)

Black mangrove
(*Avicennia germinans*)



*White mangrove
(Laguncularia
racemosa)*

*Red mangrove
(Rhizophora
mangrove)*

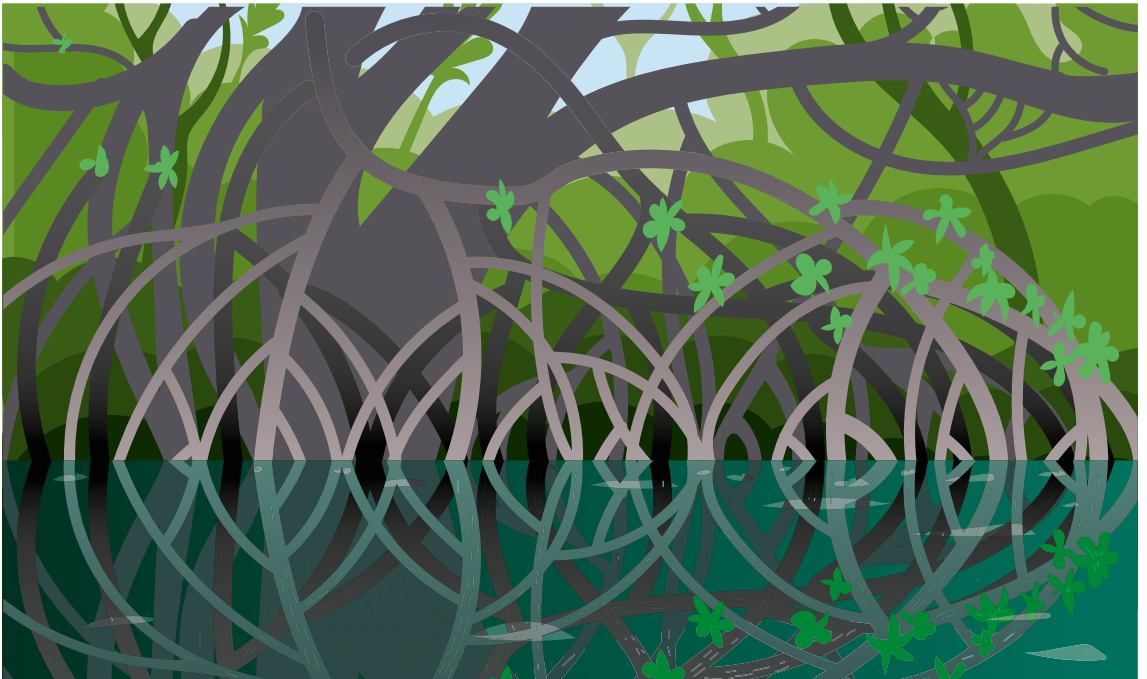
Mini-Challenge 2A. Mangrove Connection!

But how many roots do these trees have? They look like cables that keep everything connected. Can you count them all? **Take a close look at the image and identify which elements are part of the mangroves and describe their characteristics.**

- a. Describe the image out loud to your classmates. Each one of your classmates can contribute something different to the description.

EnviroClues

The name mangrove comes from the Guarani word “*mangle*”, meaning “crooked tree”, and “grove”, which means a group of trees. This ecosystem is located in coastal areas, generally at the mouth of rivers, where they flow into the sea. According to the Ministry of the Environment, Colombia has 371,081 hectares of mangrove forests, 80% of which are located on the Pacific coast and 20% on the Atlantic coast.



- b. Complete the sentences to help provide a detailed description of the mangrove forest.

We are a very particular family of _____. Our _____
grow and are _____ to different fresh and salt water _____.

Our leaves contain many secrets:
they absorb oxygen, the sun's _____, and salt too.
We protect the _____ from the strong waves.
River and ocean flood us to maintain _____
and the lives of mammals, crustaceans,
insects, fish, and amphibians.

home, species, roots, earth, balance, rays, trees



Mystery Questions:

1. What characterizes the mangrove and differentiates it from other ecosystems? What "skills" or physical characteristics have mangrove trees developed to adapt to their environment?
2. How do mangrove trees help prevent coastal flooding and reduce the impacts of climate change?




Challenge 3. Creature-torium

Different species of mammals, amphibians, mollusks, birds, fish, insects, and reptiles inhabit the mangrove. **Observe these images of some of them and investigate their characteristics and their role in the mangrove ecosystem.** Write down your findings in the blank space provided. Next, **imagine, create, and draw** a fantastic creature with a mixture of the powers that these animals use to inhabit, care for, and maintain the health of the mangrove. **Describe what it would look like.** An alligator with feathers? A frog with pincers? A pollinator that flies through the air and swims in the water? Let your imagination soar.

Greater kingfisher



Characteristics



Crab-eating raccoon



Characteristics

Fiddler crab



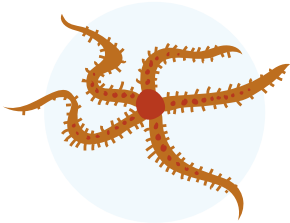
Characteristics

Bee



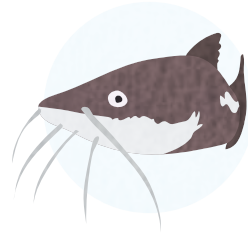
Characteristics

Star snake



Characteristics

Bearded dogfish



Characteristics

**Continue on
the next
page**



Let's Create!



Characteristics of your fantastic creature

EnviroClues

Mangrove species come and go and make exchanges with other ecosystems. Although much remains to be explored and understood about these forests, in Colombia at least 22 species of mangroves have been classified, along with many other plant species. Animal species include at least 60 species of fish, 18 species of amphibians and reptiles, more than 30 species of birds, 27 species of mammals—ranging from mice, rabbits, and raccoons to manatees, jaguars, anteaters and sloths—and 12 species of mollusks, starfish, and crustaceans.



Mystery Questions

1. What relationship might a greater kingfisher and a bee have in the mangrove ecosystem? How do you imagine they help each other?
2. What characteristics are essential in order to inhabit and protect the mangrove swamp? Why are they important?

Challenge 4. Fishing for Information

The mangrove represents survival and well-being for both humans and other animal and plant species. Would you like to know how? **Look sharp, pay attention, and fish for information!**

EnviroClues

Mangroves depend on water and interact with it in different ways. After receiving fresh water from the rivers that flow into oceans, they use their roots and the microorganisms that inhabit them, such as fungi and bacteria, to filter all kinds of pollutants and toxins that end up in rivers due to industrial, agricultural, and mining activities, as well as the liquid and solid wastes from homes. This limits the pollution that reaches the ocean.

- a. Read the following text and use a highlighter or colored pencil to point out the benefits provided by the mangrove forest.**

“ Mangroves, because they are home to the early developmental stages of countless fish, constitute an essential habitat for the life cycle of certain species (...) They provide other benefits as well, including supplying food to nearby communities, contributing to the formation of the soil, and helping to retain sediments and accumulate organic matter, which favors the consolidation of new lands.

They also play an important role in cultural and regulation services by providing recreation, aesthetics, transportation, and education, (...) they purify the water by filtering out excess nutrients, prevent erosion, and reduce the risks of natural disasters for communities by acting as barriers against extreme waves and hurricanes and

helping to prevent possible flooding. In addition, they provide food and shelter for other species and promote ecotourism.

Mangroves are part of blue carbon ecosystems, which, together with seagrasses, are strategic elements for fighting climate change (...) since these natural resources store, on average, up to five times the amount of carbon per hectare that can be stored in a continental forest, capturing it for decades and even centuries. ”

Mangroves: A Source of Life that Colombia Preserves. July 26, 2021. MINAMBIENTE Colombia. News. Taken from: <https://www.minambiente.gov.co/asuntos-marinos-costeros-y-recursos-acuaticos/los-manglares-una-fuente-de-vida-que-colombia-conserva/>

b. List the benefits and create an icon for each one. Look at the example.

Benefits	Icon
Water purification and cleansing	

Mini-Challenge 4A. Blue Carbon

Mangroves and other aquatic plants have the ability to capture CO_2 (carbon dioxide) and store it underground or under the ocean's surface. This "sequestered" carbon is called blue carbon and, in some places, as long as mangrove areas are not cleared, it can remain trapped for thousands of years.

Would you like to know how the mangrove performs this task?

EnviroClues

Because there are limited amounts of oxygen in mangrove soils and seawater, the CO_2 extracted by plants from the atmosphere in their feeding process can get trapped. This is a very efficient natural strategy to maintain the balance of the atmosphere's chemical composition. Some investigations state that one hectare of mangrove swamps can capture and extract 10 times more CO_2 from the atmosphere than one hectare of tropical forest. Mangroves are powerful allies in reducing the impact of greenhouse gases and dealing with the effects of climate change!

- a. Read the descriptions of each step in the process carefully and place their corresponding letters in the boxes provided in the illustration.**

Process Step	Description
A	CO_2 travels as a component of the atmosphere.
B	Mangrove tree leaves absorb CO_2 particles, along with sunlight and water, as part of their feeding process.
C	A portion of this CO_2 is transformed into oxygen during photosynthesis and is released by the leaves into the atmosphere.
D	Another portion of the CO_2 is transported upward through tree trunks, branches, leaves, and roots. Part of this material will fall to the ground to form CO_2 -containing biomass.

Process Step

Description

E

Through the roots, CO_2 is introduced into the muddy soil where it is trapped.

F

Another portion of the CO_2 is transported to the ocean water where the particles are trapped by seagrass and transformed, through photosynthesis, into oxygen, which is then released into the atmosphere.



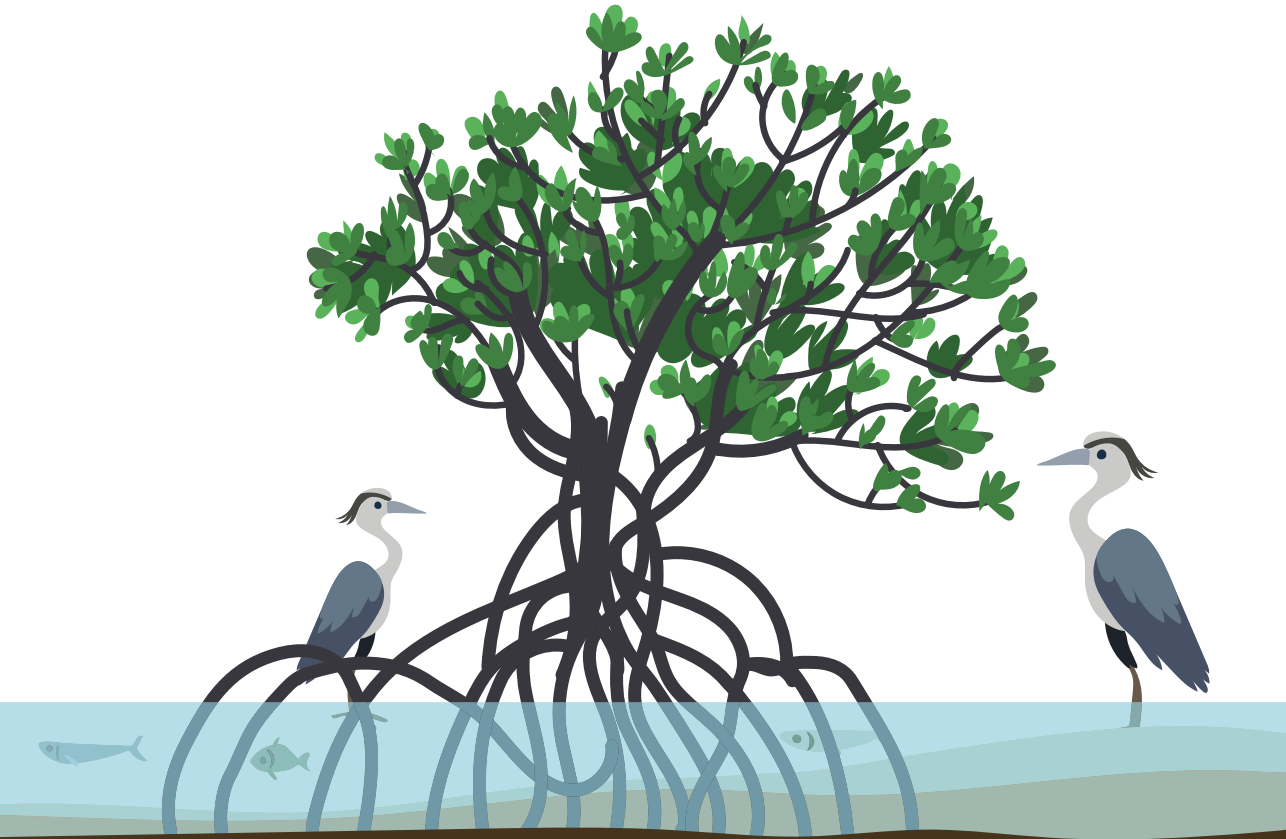
Mystery Questions

1. What are the main benefits provided by mangroves?
2. Why is it important for mangroves and other plants to capture and store the CO_2 present in the atmosphere?
3. Have you ever wondered what you absorb when you inhale and what you expel when you exhale? What is the difference between your breath and the breath of plants?

Challenge 5. The Shell Game

The piangua is a shell mollusk highly-prized in the cuisine of the Colombian-Ecuadorian Pacific. It lives in the mud of the mangroves and the piangueros, or people who extract the pianguas, must wade through the mud to search for these small animals. The job is generally done by women and their work day depends on the pujas, or tides (rises and falls in sea level).

Get together with some of your classmates and find out what a day in the life of a pianguera is like. What skills or knowledge do you think these people have acquired about their trade and the mangrove? What do you think they do on the days when they can't look for pianguas?



Guiding questions for your research:

- a. How do they get to the areas where they work?
- b. What difficulties do they encounter when carrying out their work?
- c. What is the importance of their work?
- d. Why is it considered women's work?
- e. How do you know which pianguas you can collect and which you can't?
- f. What are the characteristics of a piangua?
- g. How many pianguas can they collect in one day?
- h. How has the piangua adapted to the mangrove ecosystem?
- i. Describe the relationship between the pianguas, the mangrove swamp, and the piangüero trade (the job of collecting pianguas).


**Answer on
a notebook**

Research notes:



Mystery Questions:

1. How does the mangrove influence the lives of the people who live there?
2. What is the importance of the role of the piangüeras in community development? How can this trade be preserved in a way that is sustainable for the ecosystem?
3. Why is the protection of traditional trades important?

Mini-Challenge 5A. More than Pretty Plants

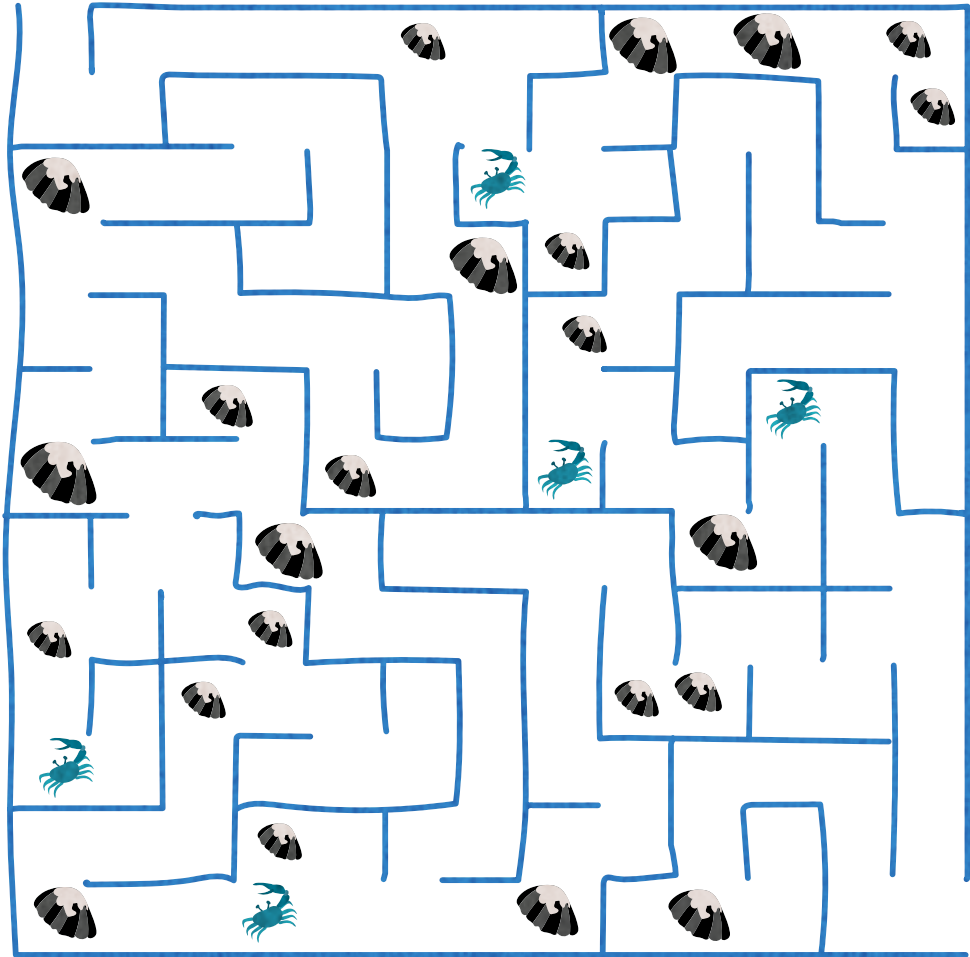
In addition to remaining green for most of the year and creating an attractive landscape, the mangrove trees and shrubs protect coastal communities from waves and storms, reducing their impact on the mainland. Hidden among their roots, humans have found food such as pianguas, crabs, shrimp, and plants that offer relief from physical ailments. Some of the mangrove trees are revered for their longevity and wisdom and others have served as materials for building canoes and buildings and inspired many campfire stories.

Help a piangua collector get to her food treasure!

EnviroClues

As soon as the tide goes out, piangüeras and piangüeros from the Pacific coast make their way to the labyrinth of mangrove roots. From an early age, they learn the trade of looking for the shell mollusk called the piangua (tuberculous anadara) that serves as food and for economic exchange. Mosquitoes, high temperatures, attacks by spiny fish such as the silverside, and the growing scarcity of these mollusks make it increasingly difficult for this tradition to survive. And the piangüeros are not alone! Legend has it that a mysterious character known as the Tunda watches over them from a distance and tempts them with an abundance of shells to lure them away. It's best not to be ambitious—not only to avoid the Tunda, but also so that the next generations has this food to eat.

- a. Use a red pencil and help the piangüeras collect their food for the day.**
- b. Be careful to avoid collecting the small pianguas, as they are still babies and need to grow bigger. Also avoid touching the crabs with your pencil, they can get angry and pinch you..**



Mystery Questions:

1. Why is it important for piangueros to only take large pianguas?
2. Are there plants or animals in your territory currently in need of protection? What are their names and why should they be protected?
3. Do you know of any traditional trade in your territory that is important to protect and promote? Which one?

Challenge 6. Mangrove Alert

EnviroClues

Due to the Zancudo mangrove swamp's exuberant beauty, a group of people have decided to build a luxury hotel there, with a seaport and a private road through the middle of the mangrove. This is a drawing of their proposed project.

Observe and analyze the drawing and make a list of the negative and positive consequences that this project will bring to the mangrove ecosystem.

Ecotourism or sustainable tourism is a growing human activity. It consists of traveling to and interacting in conscientious, respectful, and responsible ways with natural spaces to preserve the environment and improve the well-being of the local population. The goal of ecotourism is to generate enjoyment and learning through practices that do not affect ecosystems by reducing pollution, resource exploitation, energy consumption, and noise as much as possible. It also encourages sustainable interaction with local communities, stimulating the local economy. Utría National Natural Reserve, located in the Chocó department, boasts the country's first certified beach for Sustainable Tourism.

What will happen to the trees when they build the road?

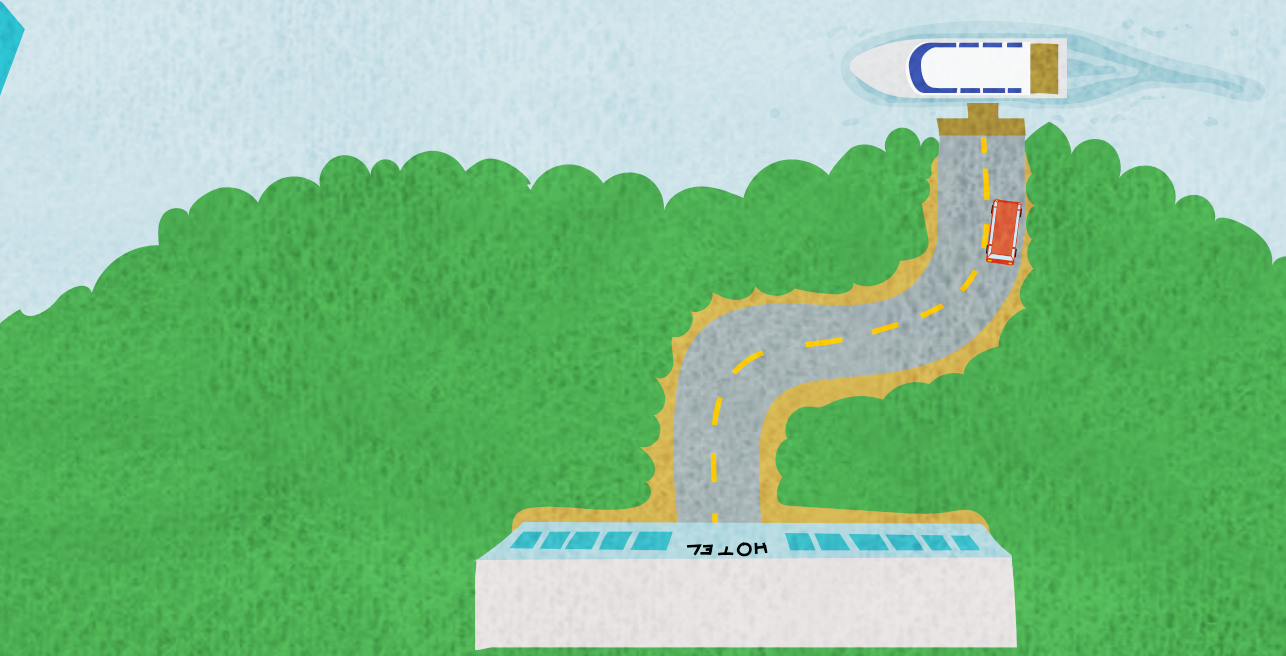
What will happen to the animals that live there?

Will the arrival of numerous tourists bring contamination?
What kind?

1. Use the table to record your findings and analysis.
2. Work as a team with family and friends and use the table with your findings to help project managers approach this project in a way that is sustainable and friendly to the natural environment.

Mystery Questions:

1. What actions should you and your family take or avoid to ensure a sustainable visit in a natural setting?
2. What are the advantages and disadvantages of ecotourism?



Positive Aspects

Five empty rounded rectangular boxes for writing positive aspects.

Negative Aspects

Five empty rounded rectangular boxes for writing negative aspects.

Recommendations:

One large empty rounded rectangular box for writing recommendations.

Mini-Challenge 6A. What's Happening to the Mangrove?

The mangrove provides various benefits to humans, but if local communities don't learn to consume only what is necessary and allow the mangrove to recover naturally, soon there will be no food, no medicine, no raw materials, and no balanced ecosystem.

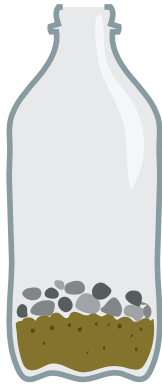
EnviroClues

Currently, there are 136,000 km² of mangroves in the world, but in recent years 4.3% of them have been lost due to human activity. According to the Ministry of the Environment, there are 285,049 hectares of this type of forest in Colombia and half this number has been lost since the 1950s (an estimated 503,600 hectares were lost in the 1960s, between the Pacific and Atlantic coasts). Although mangrove areas are now protected and strategies for their conservation are being improved, phenomena such as extensive logging, urbanization, river pollution, climate change, and mining are seriously affecting their survival.

With help from your family, build a scale using reused materials that represents the imbalance that humans are causing on the mangrove.

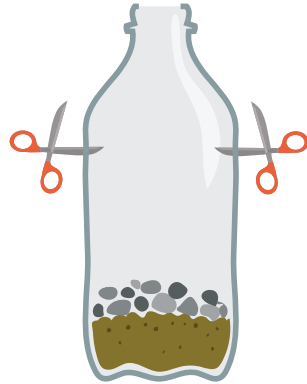
- a. Reuse a 1.5-liter plastic bottle





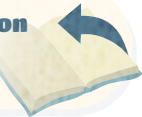
- b.** Fill the base of the bottle with earth, sand, or stones to give it weight and stability.

- c.** Very carefully, cut a hole on either side of the upper part of the bottle.



- d.** Push a wooden stick or a sturdy branch through these holes to make the arms of the scale.

**Continue on
the next
page**





- e. Wash two used disposable cups and use thread, wool, or string to secure one cup at either end of the rod, as shown in the image.

- f. Mark one of the cups with the words **human communities** and the other with the words **mangrove ecosystem**.



- g. Use modeling clay or stones to represent the mangrove mollusks and fish, and wooden twigs to represent the mangrove trees.

- h. Place mollusks, fish, and trees in the cup marked “**human communities**”. What happens to the other cup?



- i. Balance the scales so that the mangrove remains healthy and continues to enjoy its species.



Mystery Questions:

1. What is ecological balance?
2. How can species of plants or animals be recovered following excessive logging or hunting by humans?

Challenge 7. Seedlings of Hope

The felling of mangrove trees for use as timber in construction or to clear space for aquaculture or urban areas affects the survival of this ecosystem and the species that inhabit it. **Read the following paragraph with your family and help make calculations for reforestation.**

“ In Tumaco (Nariño), through the Colombia in Peace Fund's Sustainable Colombia program, 250 hectares of mangroves are being planted with the aim of restoring the trees in the area and promoting the conservation of mangrove forests.

(...) Today, 65 families, mostly women and young people dedicated to the extraction of piangua and fish, have joined this initiative included in the Territorial Development Programs (PDET, in Spanish).

(...) This restoration exercise has been planned for 250 hectares of mangrove forest in Tumaco. The goal is to plant 1,000 red mangrove seedlings per hectare, of which approximately 140-150 hectares have already been planted and fully restored so far in the program. ”

Calderon Garcia, Andrea. October 24, 2021. Planting Mangroves in Tumaco: Reforesting the Colombian Pacific. Radio Nacional de Colombia. **Taken from:** <https://www.radionacional.co/actualidad/campo-colombiano/siembra-de-manglares-en-tumaco>





Investigate, Calculate and Answer:

- a. How long does it take for a red mangrove seedling to grow?
- b. How many red mangrove seedlings have been planted to date in the 150 hectares intervened?
- c. How many hectares are left and how many seedlings will have been planted by the end of the project?

EnviroClues

On July 8, 2022, the Presidency of the Republic of Colombia issued Law 2243 for the protection of mangrove ecosystems.

The law created the National Mangrove Restoration Plan, as well as the Regional Mangrove Restoration Programs under the direction of environmental authorities with jurisdiction in these ecosystems.

- d. Research the Sustainable Colombia Program and make a presentation in which you explain three facts that catch your attention.
- e. Additionally, share information on other projects that are being implemented to protect the mangroves.



Answer on a notebook



Mystery Questions:

1. Why is it necessary to issue laws for the protection of natural places?
2. How does the planting of new red mangrove trees help the survival of other plant and animal species present in the mangrove ecosystem?

Challenge 8. Singing the Transformation

The **veda** is a practice of self-regulation used by communities to limit the collection of species such as *piangua*, crab, fish, or shrimp so they can reproduce naturally and continue to provide food for other species.

- a. Listen with your family and friends to the song CVC ARA Cajambre**, produced as part of the “Territory, Community, Fishing, and Sea Mangroves of Cajambre: Together We Will Conserve” project by leaders of the Cajambre Community Council and the Regional Autonomous Corporation of Valle del Cauca’s Reciprocal Agreements for Water (ARA) program.



Mystery Questions:

- 1. What thoughts and emotions does the song inspire in you?**
- 2. How did your perception of mangroves change after reading this chapter?**
- 3. How might you celebrate International Mangrove Defense Day in your school and integrate it into the Environmental Educational Project?**

EnviroClues

In 2015, the General Conference of UNESCO (United Nations Educational, Scientific and Cultural Organization) declared July 26 International Mangrove Defense Day. Even if you don't live near a mangrove, you, your family, and your community can help conserve mangroves by researching them and sharing with others the importance of caring for them.



Example of creativity and art in the service of environmental conservation!



Scan me or visit the link: <http://bitly.ws/wZHo>

- b. Read the song's lyrics and write a verse** to add to them, expressing how you feel about the mangrove and what you have learned so far.

“ Punta Bonita, Pital,

Timba Grande, Guayabal
We ask the loggers
To help with conservation.
To cut back on tree-cutting in the mangrove
Because the pianguas are running out!

Punta Bonita, Pital,

Timba Grande, Guayabal
Women of La Bocana
I want to remind you
To collect only the big pianguas
If we want to preserve the mangroves.
Nature is life
We must take care of it
Because without the mangroves

We can't breathe
The mangrove is our treasure
It's our survival
Because our resources are scarce
We must respect the veda.
Punta Bonita, Pital,
Timba Grande, Guayabal ”

**Continue on
the next
page**



Let's Create!





Congratulations!

You've solved all the challenges.

Look for the sticker
for this chapter at
the end of the book
and place it here.

**This medal recognizes you as a
member of the Earth Mission
Team: kids and families to
the rescue!**








At the Center of the World



Scan the QR code or visit www.mellamotierra.com
to listen to the audio for this story!





Morning dawns. I spread my huge wings and begin my usual journey. I am the great Condor of the Andes. In the morning, I fly over the blue waters of the sea and then I stop to rest in a leafy forest next to a fast-flowing river. In the afternoon, I recharge on a silent moor and glide before nightfall over the perpetual snows of the highest peak. All these places are in one place: my home.

There are hundreds of living beings that inhabit different climate regions. There are birds like me, which come in all shapes and sizes. There are also howler monkeys that can be heard near the coffee plantations, and big cats like the jaguar, which pass through it stealthily. We live in harmony, connected to each other, all part of this rich, diverse land.

The indigenous peoples who live here say that this is a sacred place, one that needs to be cared for and protected.

"It is the center of the world," they say without hesitation, and I believe it to be true.

From above I contemplate all those who live here and those who come to visit, amazed by its beauty and biodiversity.

"This place is unique in the planet. Nowhere else can you see a huge snowy mountain by the sea, surrounded by so many rivers!"

However, multiple threats put this special territory at risk. Where once there were forests there are now crops and some of those who come to visit leave polluting waste. In addition, the climate is changing: the rains have become stronger, the droughts have been prolonged and the ice on the mountaintops won't stop melting. This has affected ecosystems. Humans who live there and many animals have left their territories in search of places where they can live a better life.

"I must travel further and further to find food," the jaguar told me one day. "Sometimes I spend days and days walking without finding anything to eat. Without realizing it, I end up approaching places where I run into humans who fear me and sometimes want to hurt me."





I understand what the jaguar says. There are no more trees where my family used to live. The waters were polluted and we were forced to move. We bumped into humans who feared that a bird as big as us could hurt their cattle. We've been poisoned and hunted. That's why there aren't many left like me.

I like living here. This is my home and the place where I have been able to find shelter and food. I glide over the green ocean of trees that grow along this imposing mountain that seems to contain everything. I hope that more and more people will be encouraged to visit in a respectful way, who want to take care of her and protect this land. I ask her to introduce herself, to say her name so that no one will ever forget it.

With a deep, crystalline voice, she replies:

I am the Sierra Nevada.



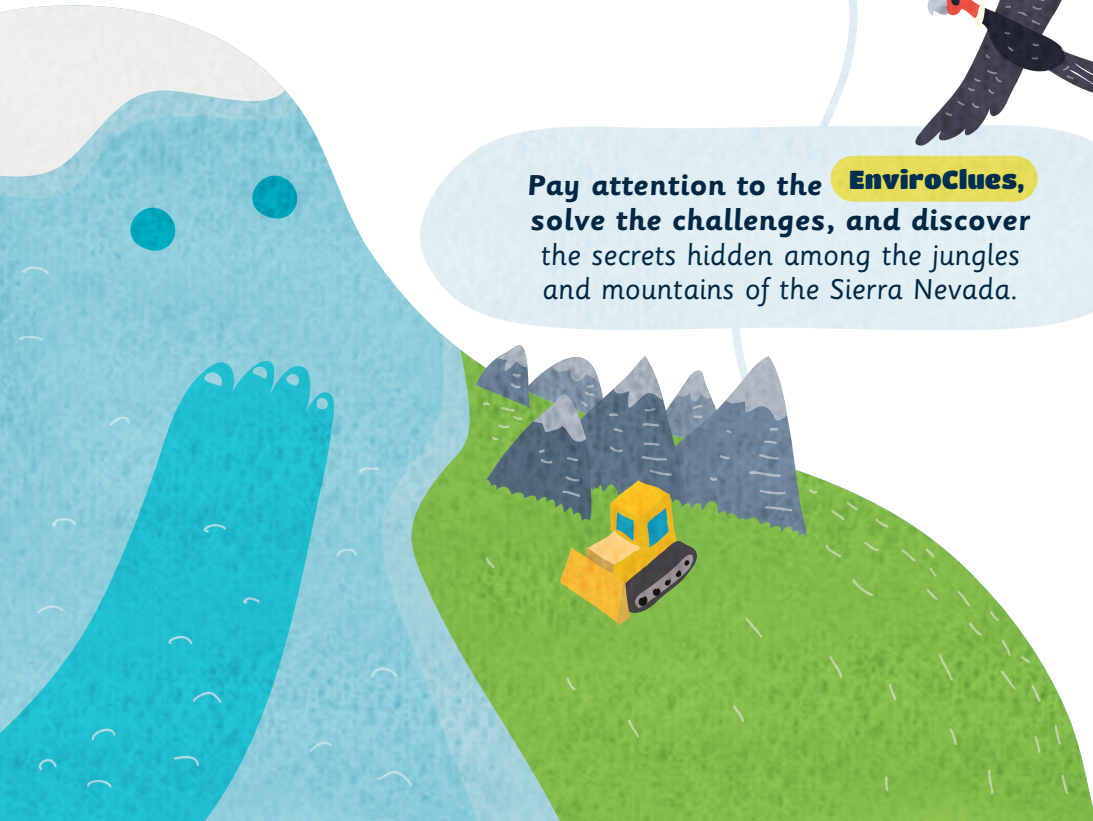


Challenges

In northern Colombia, between the jungle and the sea, stands the highest coastal mountain in the world: **The Sierra Nevada de Santa Marta**. Flowing down from this magnificent mountain are rivers and streams that supply water to the communities around it. This territory, sacred to many, is also home to a great biodiversity of plants, animals, insects, and ancestral indigenous communities that safeguard these precious ecosystems. Let's take a close look at the mysteries and the abundance that lie at the heart of Mother Earth.



Pay attention to the **EnviroClues**, solve the challenges, and discover the secrets hidden among the jungles and mountains of the Sierra Nevada.



Challenge 1. Guardians of the Sierra

The four **indigenous nations** that live in the Sierra consider it a sacred place. Each nation lives in a specific place within this ecosystem: **the Arhuacos** on the southern slope of the Sierra; **the Koguis** on the **northern slope**; **the Wiwas** in the **Cesar department**; and **the Kankuamos** near the **city of Valledupar**.

Investigate each of the communities that protect the Sierra and find out where they live, which practices they use to care for it, the number of people in each community, and the different types of climate in each of the territories.

EnviroClues

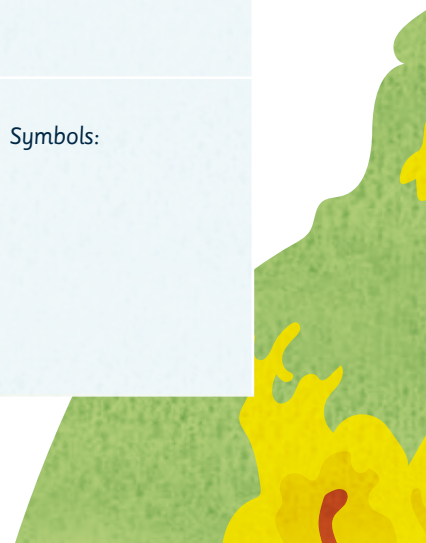
At the request of the indigenous communities that inhabit the Sierra Nevada, Tayrona National Nature Reserve closes its doors to visitors three times a year, for 15 days at a time, to allow the ecosystem to regenerate and stabilize after the visits it receives. In addition, during these closures, the ancestral peoples make pagamentos, or tributes, to Mother Earth and perform traditional cultural practices such as cleansing, healing, and environmental and spiritual protection. This is one of the protection strategies carried out in the Sierra by the communities that care for it.

Continue on
the next
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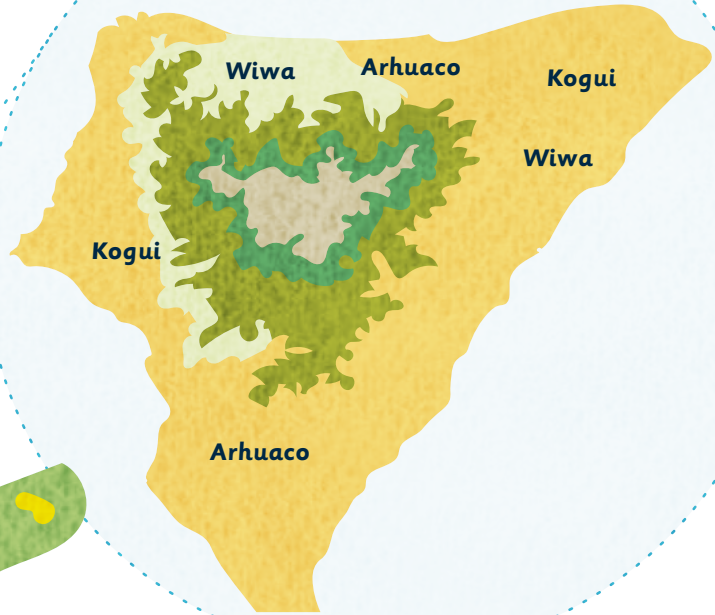
Conventions Table

Arhuaco	Location: Population: Practices: Climates:	Symbols:
Kogui	Location: Population: Practices: Climates:	Symbols:
Wiwa	Location: Population: Practices: Climates:	Symbols:
Kankuamo	Location: Population: Practices: Climates:	Symbols:



Record your findings on **the Conventions Table** and draw a symbol for each convention.

Place the corresponding symbols on the map.



Mystery Questions:

1. What characterizes the Sierra Nevada territory?
2. Why is it important for communities to take charge of protecting and conserving the Sierra?

Mini-Challenge 2A. The Law of Origin

Watch the following video made by the Universidad de los Andes on the ancestral knowledge system of the peoples of the Sierra Nevada de Santa Marta. **Based on the video, answer the following questions:**



Scan me or visit the link: <http://bitly.ws/x56G>

In what way do you feel that nature is part of your life?

Who are the Older Brothers and why are they called that?

What does it mean that “our thoughts cannot be selfish”?

What does it mean to “commit ourselves to the integral life of the planet”?

What can we do in favor of nature and to take care of Mother Earth?



Mystery Questions:

1. Why are collective agreements important to protecting the environment?
2. How can we achieve greater harmony between humans and Mother Earth?
3. How can you commit to maintaining integral life on the planet?

Challenge 3. Nature's Protector

In the Arhuaca cosmogony, **the jaguar is responsible for supporting the sun so that it doesn't touch the earth, thus regulating and maintaining the balance in nature.**

Write a narrative in which you designate a plant or animal as protector of your territory or community. Give free rein to your imagination and use these questions as a starting point:

Why do I choose that animal or plant as protector of my territory?

How can we take care of this plant or animal so that it continues to be our guardian?

How would it protect your territory or community?

Which of this living organism's characteristics will allow it to protect this place?



They say that a long time ago...

Challenge 4. The Center of the World

The **Sierra Nevada de Santa Marta is unique in the world** as it contains almost all the ecosystems that can be found in Colombia: from mangroves, coral reefs, and dry and humid forests to arid areas, páramos, snow-capped mountains, and lagoons. Its location and diversity of ecosystems make it one of the most biodiverse places in Colombia and the world.

- a. Visit your school or community library and **research the ecosystems of the Sierra Nevada.**
- b. **Observe the image and in each box write down the type of ecosystem** that exists at each altitude and name some of its characteristics.

Mini-Challenge 4A. A Biodiverse Community

Visit your school or community library and **research the fauna and flora** found in the different ecosystems of the Sierra Nevada.

- a. **Write down the number** of birds, mammals, reptiles, amphibians, insects, plants, and fungi found in each ecosystem.
- b. **Add to this image drawings** of some of the species of fauna and flora that are threatened in each ecosystem.



Mystery Questions:

1. What differentiates the Sierra Nevada from other sierras in Colombia and the world?
2. How would it affect the planet if the Sierra Nevada disappeared?





Ecosystem

5000

4000

3000

2000

1000

0

Challenge 5. Singer of the Night

In certain parts of the Sierra at night, a very particular sound is heard. It sounds something like **"croak, croak, croak"**. This is the synchronized song of hundreds of frogs, which the Arhuaco people call the gouna, and it is a sign that the territory is stable. This song also signals the proper time to sow plants for food or hold special community meetings. This frog is known as the starry night harlequin frog and it takes its name from the white spots on its black body. It is found only in the Sierra Nevada de Santa Marta.

Hidden in the jungle are 12 harlequin frogs. Find them and color them blue. Research the harlequin frog, write down three facts about it, and write down your thoughts about why this amphibian is important to the communities of the Sierra Nevada.



**Answer on
a notebook**



Mini-Challenge 5A. Nature Speaks

Use your detective skills, do research at your community or school library, and ask your grandparents, neighbors, teachers, and other people about the nature indicators in your region. Is there any sound that tells you that the climate is going to change? Is the appearance of any animal a sign of stability and well-being in the ecosystem?

Record your findings:

Indicator

1. Starry Night Harlequin Frog.
- 2.
- 3.
- 4.

What does it indicate?

1. Planting time, ecosystem stability.
- 2.
- 3.
- 4.

EnviroClues

Although biologists believed that the **harlequin frog** had been extinct for more than 30 years, indigenous communities had been protecting and living with it during all that time. **Eighty of the 96 known harlequin frog species are threatened with extinction or extinct** due to infectious disease, habitat destruction and degradation, invasive species, and climate change.



Mystery Questions:

1. What actions could be taken to help protect the harlequin frog?
2. What connection is there between plant and animal species and the rhythms and changes of nature?

Challenge 6. To the Rescue!

“However, multiple threats put this special territory at risk”

Let's return to the story of the Condor and search for phrases that provide clues about the various threats that affect the Sierra Nevada. Write them down in the left column. Investigate the causes of these threats and the actors involved and write down your findings in the corresponding columns. Consult your research and write down other possible threats facing the Sierra Nevada.

Imagine possible actions or solutions to deal with those threats and write them down in the last column.

Threats to the Sierra Nevada	Causes	Actors Involved	Actions to Confront These Threats



Mystery Questions:

1. What do you consider to be the worst threat facing the Sierra? Why?
2. Which of these threats are the responsibility of human activities?

Challenge 7. Where did they go?

As the Condor told us, in the Sierra "...the climate is changing: the rains have become heavier, the droughts have lasted longer than expected, and the snow on the Sierra has not stopped melting."

Due to climate change, many animal species have been forced to move from their territories, either migrating higher up the mountain to find a new habitat or moving closer to urban centers in search of food. Although they have adapted to survive, this involves risk: some fail to adapt to their new territory and others get so close to the city that they are threatened by human activity.

Look at the images of several Sierra Nevada species that are threatened to some degree or have had to adapt to survive. Research each of these species and:

- a. Write down the **data** that interests you most about each one of them (size, diet, physical characteristics, etc).
- b. Research **the function** that each species fulfills within the Sierra Nevada ecosystem and write it down in the corresponding column.
- c. Research why each species is **at risk** and what each has done to survive.
- d. Formulate a hypothesis regarding the **implications of the disappearance** of these species for the Sierra.


**Answer on
a notebook**



Species



Vultur gryphus

Panthera onca

Ikakogi tayrona

Praying mantis

Data (size, diet, physical characteristic, etc.)



--	--	--	--

What is its role in the ecosystem?

--	--	--	--

Why is it at risk and what has it done to survive?

--	--	--	--

Possible implications of its disappearance

--	--	--	--

Mini-Challenge 7A. Flying Over the Sierra

Who's that gliding over the mountains of the Sierra? The great Andean condor!

As you probably already discovered in the previous challenge, the Andean condor is one of the largest and longest-lived flying birds on the planet, and is also the national symbol of Colombia. The mountainous areas of the Sierra Nevada have become one of their rare homes, where very few specimens of this species inhabit.

EnviroClues

It is estimated that, so far, 91% of the glacier area in the Sierra Nevada de Santa Marta has disappeared due to global warming. While in 1939 the Sierra had 21.4 km² of glacier area, in 2020 only 5.81 km² of snow were thought to remain. In other words, in just 83 years the Sierra's glacier area has been reduced by 72.9%. If things don't change, within seven years the Sierra Nevada could lose all of its glaciers. **Remember that in nature everything is connected and, therefore, everything that happens in the natural world has a domino effect: what happens to some affects everyone.**

Answer on a notebook

So far away, up in the sky, yet so close, and few know it well. **Design a poster or an infographic** in which you use drawings or words to tell your colleagues and family why it's important to protect the Andean condor.



Mystery Questions:

1. What actions can we take to protect the Sierra and its inhabitants?
2. Why is it important to preserve endangered animal species?

Challenge 8. Snow-Cap Hat

The tutusoma is a hat woven from cotton or wool that is made only by the men of the Arhuaco community. To weave it, a support is used to wind the wool in a spiral, stitch by stitch, to create a truncated cone shape.

When a young Arhuaco wears his tutusoma for the first time, he promises to protect the balance and harmony of the mountain. The hat's light color contrasts with the Arhuacos' long black hair, representing the snow on the Sierra Nevada de Santa Marta. And the spiral weave reminds them of the way the world was created and of their commitment to replicate this design and ensure Mother Earth's integrity.

Inspired by the guardians of the Sierra, create a hat that represents your territory:

- 1. Use materials that you find** at hand and that interest you. You can reuse cardboard, old clothes, plastic bottles, or anything else you can think of.
- 2. Give your hat a base** (round, square, triangular, etc.) and think about what your chosen shape means to you.
- 3. Close your eyes and imagine your territory.** What shapes do you see? What colors predominate? What elements are important in the landscape? Now start shaping your hat! You can decorate it or paint it to give it a personal touch. Add leaves, flowers, feathers you find on the ground, or any other decorative element to bring it to life.



4. **Organize a hat show** to display your creations and celebrate your commitment and the important work you do as guardians of your territory.

EnviroClues

The highest peak in the Sierra Nevada is Pico Colón —known as Nobacá to the communities of the Sierra—, located 5,775 meters above sea level. Nobacá, the sacred axis of the Sierra considered the center of the Universe, is the peak represented by the tutusoma.

Answer on a notebook



Mystery Questions:

1. In what ways is the Sierra Nevada de Santa Marta part of the culture of the indigenous communities that live there?
2. Why do communities represent natural places in their clothing? Would you do it too? Why?

Challenge 9. Sacred Water

Water is the greatest resource of the Sierra Nevada de Santa Marta. This great mountain is home to more than 380 lagoons and is embraced by 35 rivers, including the Guatapurí and the Aracataca. These abundant waters have made it possible to preserve the Sierra's incredible biodiversity for centuries and ensure that nearby communities have access to water resources.

However, climate change and human activity are threatening this beneficial source of water and life. Many of the rivers that supply the communities with water spring directly from the Sierra's glacier area and if these glaciers continue to melt, water will become increasingly scarce.

Follow the water routes and collect data on the populations that you find along the way. Record them in the table and answer the following questions.

- a. Add up all the data in the population column. How many people get their water from the rivers that originate in the Sierra Nevada?
- b. If the rivers start to dry up, how will it affect the lives of the people who live around the Sierra Nevada?



Mystery Questions:

1. Why is water so important for life?
2. Where do the rivers of the Sierra Nevada begin?

EnviroClues

In the Sierra you can find fresh, salty, underground, and ice cap water. For many years it was one of the most abundant water sources on the planet, providing more than 10,000 million cubic meters of water per year. Now, Santa Marta, one of the cities that benefits from this abundance of water, is forced to follow an emergency water plan due to scarcity. The three rivers that supply the city —Piedras, Manzanares, and Gaira— are no longer able to meet the demand for water.

Place	Population	Place	Population	Place	Population

Total population



Challenge 10. Gratitude to the Sierra

The indigenous people who inhabit the Sierra Nevada have a sacred ceremony that is part of their culture and tradition: **pagamentos**, or tributes. These consist of an offering that is made to Mother Earth to return something in gratitude for what is taken from her. **Pagamentos** are a way to maintain balance with nature, and to respect and honor it.

Pagamentos can be made to all of nature in general, to water, to mountains, to the air, to the sun, to plants, and even to animals and can be offered up in sacred ceremonies or through harmonizing actions such as planting a plant or dancing and singing.

Organize an activity with your friends or family in which all of you, in your own way, thank your territory for what it provides. You can organize a garbage collection day, plant trees, leave food for the animals, or even make up a song. To do so:

- a. Take a walk around your territory** to identify those aspects or living organisms to which you'd like to express your gratitude.
- b. Keep in mind** who you would like to thank. For example: the plants, for purifying the air we breathe.
- c. Plan for and organize** the activities you will carry out on that day and what materials you'll need. How about making it a recurring event?
- d. Make a visual record** of the activity. At school, create a wall of photos or drawings to share the activities carried out to promote balance in your territory.



Mystery Questions:

- 1. Why is it important to give thanks and return something to nature for what it gives us?**
- 2. What other actions would help you maintain balance with nature?**



Congratulations!

You've solved all the challenges.

This medal recognizes you as a member of the Earth Mission Team: **kids and families to the rescue!**

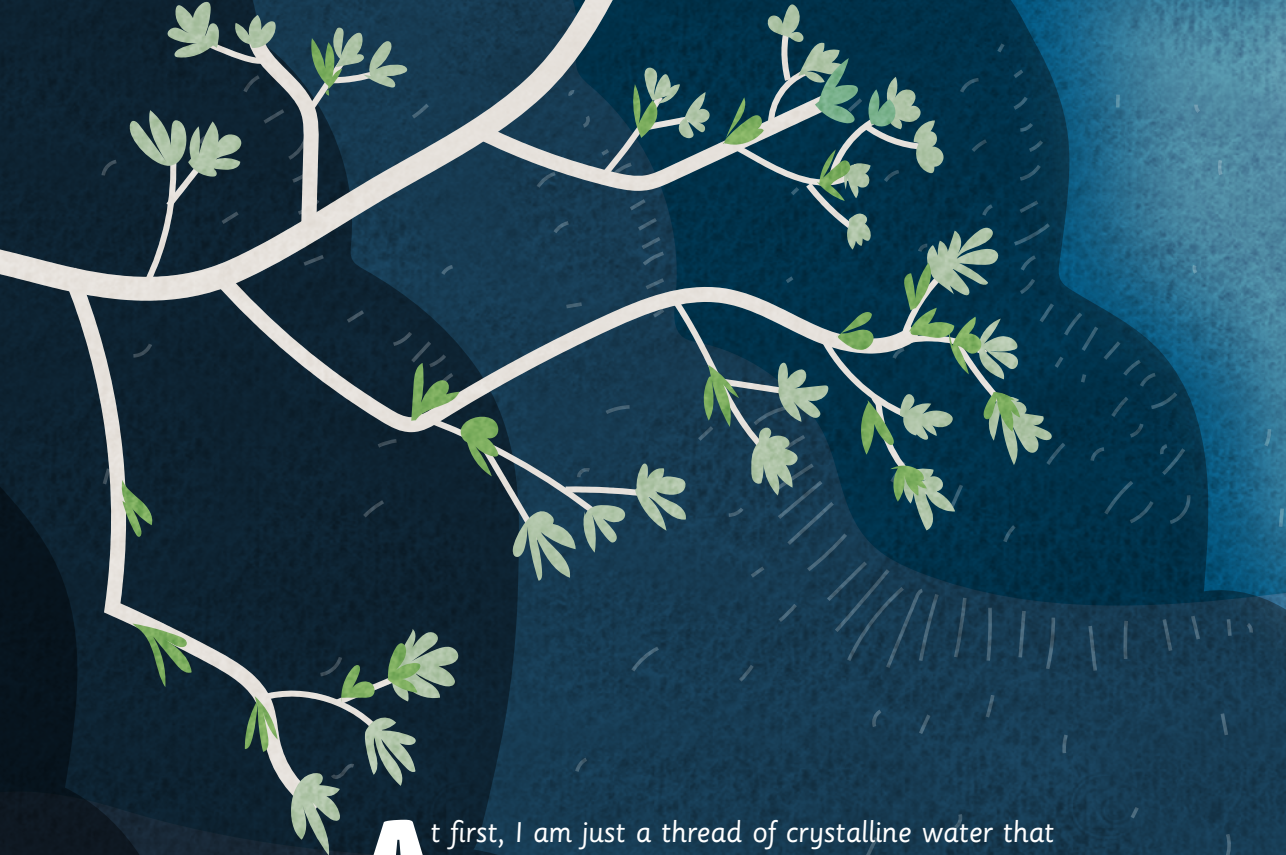
Look for the sticker for this chapter at the end of the book and place it here.



Fountain of Life



Scan the QR code or visit www.mellamotierra.com
to listen to the audio for this story!



At first, I am just a thread of crystalline water that emerges from the depths of the earth. I sprout from among the stones and come to the surface to catch the sun's rays. I start my journey at the top of the mountain and slide between rocks. As I go forward, I come across and bind with other waters. We become one: a single, wider, and stronger stream.

I'm always on the move. My waters connect with those of lakes, lagoons, ponds and wells. A multitude of plants, reeds, ferns, or large trees such as the ceiba and the guayacan grow on my shores. Many species thrive and reproduce here. They change as I descend into flatter, warmer lands. There are fish, turtles, stingrays, crabs, and many others, such as herons, chigüiros and otters. They all add to the great diversity that visits me to cool off and quench their thirst.

In my journey I cross crops
that need my water to
grow. I meander the boats
of the fishermen who come
in search of food. I border
cities and towns that hold
parties on my shores, while
I delight with the laughter
of the children and adults
who dive into my waters.

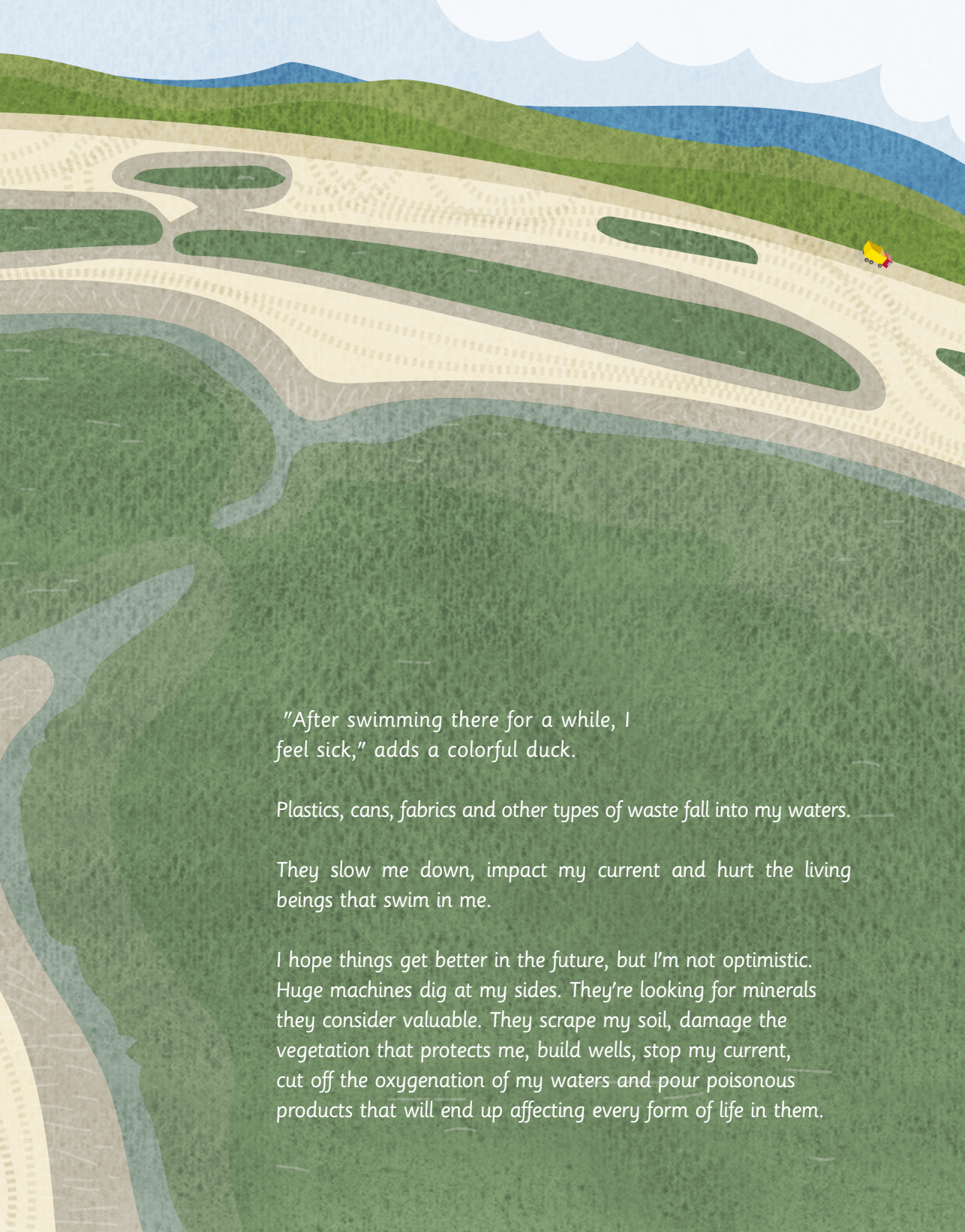




But not everything is happiness. In some places, men have put large tubes that come out of houses and industries and dump large amounts of waste in my stream. Dark waters, full of foam, mix with mine, affecting those who inhabit me and driving away those who need me.

"It smells awful! I can't drink this water. What are we going to do?" a concerned otter exclaims.

"We can't even see where we're going," says a Savannah catfish.



"After swimming there for a while, I feel sick," adds a colorful duck.

Plastics, cans, fabrics and other types of waste fall into my waters.

They slow me down, impact my current and hurt the living beings that swim in me.

I hope things get better in the future, but I'm not optimistic. Huge machines dig at my sides. They're looking for minerals they consider valuable. They scrape my soil, damage the vegetation that protects me, build wells, stop my current, cut off the oxygenation of my waters and pour poisonous products that will end up affecting every form of life in them.

I feel sick and sad. If you could see me,
you wouldn't recognize me.

A part of me manages not to get trapped in the well. I
struggle to resume my course and continue my journey.
I find other waters and, although I still carry pollutants, I
recover some of my clarity. I feel better. I hear the voices of
those who wish to take care of me, and I feel hopeful. They
have planted trees on my shores; they have understood
that what they see is only a piece of me. They understand
that I am long and great, that I am united to other currents
and that my path is extensive because I want to reach the
sea and join my fresh water with its salt water. But I can't
do that if those who need me do not take care of me.

"This is going to be very hard! Look how contaminated it is."

"True, but with care and patience we can begin to
recover it." "We need more people to come together
and understand its importance. There is no life without
water. We have to learn to take care of it."

I hope people hear them. As for me, I hope to
regain my strength and resume my path.

I am a bearer of life. A moving thread that ties what is on my
shores with what circulates through my course. I am food and
I am home. A source of union between different species that
need to be cared for and preserved. Come and meet me.

I am the River.

Challenges

You've seen how a large portion of me is made up of salt water, and also of fresh water that comes from the rivers born in lagoons, wetlands, and mountains. Rivers run for countless miles without stopping and their courses seem endless, but these waters are no longer as crystal-clear as they once were and more and more intruders, like mercury, mix with their currents.

Pay attention to the **EnviroClues**, solve the challenges, and let yourself be carried away by the river's current to find out what is happening to it.



Challenge 1. Following My Trail



San Andrés,
Providencia and
Santa Catalina



- a. **Look** at the map of Colombia below and mark the city or municipality where you live.
- b. **Identify** three additional places you know or have visited, and mark them with a star.

 **Places you have visited**

- c. **Describe** these places to your classmates: their climate, landscape, sounds, etc.
- d. **Answer:** Are there rivers near those places? If so, what are their names? Have you ever been to any of them?

Mini-Challenge 1A. Navigating the Rivers

Colombia is one of the countries with the greatest water wealth. Although no exact figure exists, the following rivers stand out for their length and their contribution to the lives of humans and wildlife: the Amazon, the Magdalena, the Caquetá or Japurá, the Orinoco, and the Putumayo.

- a. On the map, **mark** the rivers you know. Do they connect with any others? If so, mark them as well.
- b. Which rivers interest you most? **Choose three and research them:** Where are they born and where do they end? What are their characteristics? Why are they important to their territories? What is their current condition?
- c. **Share** your discoveries with your classmates.



**Answer on
a notebook**



Mystery Questions:

1. Why are rivers important to nature?
2. What are the most important rivers in Colombia and what makes them so important?

EnviroClue

Rivers are essential to daily life since many human communities depend on them for fresh water, food, and to carry out economic activities such as fishing and transportation. The water in rivers also contributes to the conservation of animal and plant life.



Challenge 2. Conscientious Exploration

Organize a visit to the nearest river in your territory with your family or your teacher and fill in the following table:



Where is it located?

Does it have a name?

Describe the environment around it

Write down which animals, insects, plants, and fungi you find in the area surrounding it. If you don't know their names, draw them!

A green pencil icon pointing downwards, positioned at the top right corner of a large light blue rectangular area.

How much water is in the river?

Describe the river water: color, movement, smell, etc.

Are there living things, rocks, or other objects in the river?

Would you go into the river? Why?

If it's safe to enter the river, in the company of an adult, submerge only your feet. How does the water temperature feel?

Does the river water seem fit for human consumption? Why?



Mystery Questions:

1. If the river you visited were to dry up or become seriously polluted, how would this affect the community?
2. How can you tell if a river is in good condition?

Challenge 3. Flowing Across the Earth

Rivers are vital to all living things! They are like blood vessels that connect different areas of the planet, forming a unit. In addition, they provide water for various uses: food, transportation, economic sustenance, and even entertainment. However, river waters have changed.

Read the following text, then fill in the blanks with the missing words to find out what is happening to the river.

Word Bank climate change, mountains, mining, droughts, fish, oceans, human activities, handling, domestic, invisible, overfishing, biodiversity, sewage, fresh, mercury, climate, single-use plastics, rains, consumption

Rivers are bodies of _____ water that spring from _____ or other water sources. Their presence provides shelter to a large _____. They are an essential resource for different human activities, including human _____; however, due to _____, their balance and the health of all living beings that depend on them are threatened.

Sources of contamination include _____ and other toxic chemicals used in extractive activities such as _____; waste or _____ from _____, agricultural, livestock, and industrial activities; and the presence of _____, which, due to incorrect _____, end up in rivers and _____.

_____ has also decreased the amount of _____ and has threatened several species, such as river catfish, with extinction.

Several other seemingly _____ factors also have an impact on the balance of rivers. One of them is _____, since changes in temperatures and _____ result in the absence or exacerbated presence of _____, which can cause flooding or _____.

Mini-Challenge 3A. Murky Waters

River waters are no longer crystal-clear due to pollution, and the communities that depend on them for their livelihood have also been affected by this deterioration.

Answer the following questions based on the image below:

What do you see?

What do you think caused the river to look like this?

How is this river similar to or different from those near your territory or others you have seen?



Photo from: <https://www.elcolombiano.com/colombia/minambiente-suspende-actividad-minera-en-el-rio-quito-en-choco-GC8675282>



Mystery Questions:

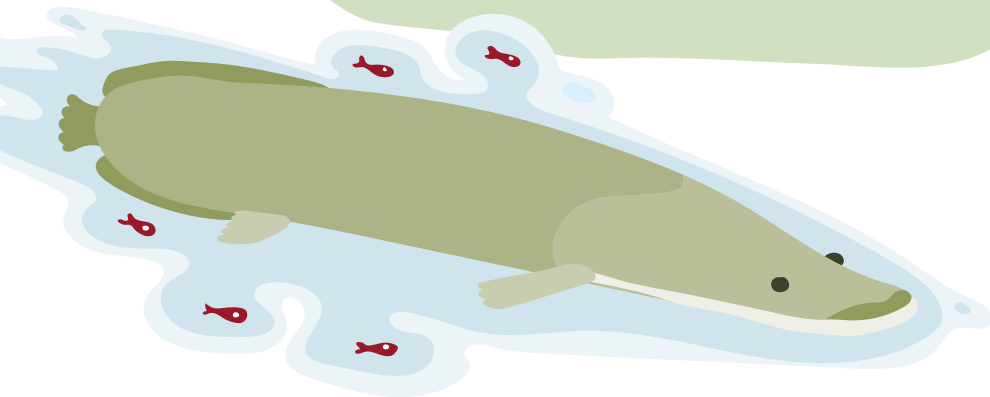
1. What do you know about the human activities that make rivers sick? If you don't know about any of them, have you heard of any of them? Which one?
2. Which do you think affects rivers the most? Why?
3. How can we help preserve rivers?

Challenge 4. Mouthful of River

Rivers are vital to the livelihoods of humans since they provide both water and food. Several typical Colombian dishes have freshwater fish and river crabs as their main ingredient:

Fried bocachico	Stewed cachama	Rampuche soup	Fried pirarucú skin	Stuffed black crab
Bocachico (<i>Prochilodus magdalenae</i>) is found in the Magdalena, Sinú, Cauca, Atrato, Ranchería and Claro rivers.	Cachama (<i>Colossoma macropomum</i>) is found in the Orinoco and Amazon basins.	Rampuche (<i>Pimelodus blochii</i>) is found in the Zulia, Pamplonita, Peralonso, Tibú and San Miguel rivers.	Pirarucú (<i>Arapaima gigas</i>) is found in the Amazon River Basin.	Black crabs (<i>Gecarcinus ruricola</i>) are found only in the archipelago of San Andrés, Providencia, and Santa Catalina.

Pirarucú, one of the largest freshwater fish in the world, is in danger of extinction in Colombia due to over- and illegal fishing. Pirarucú rely heavily on seasonal flooding in the Amazon for reproduction and to move around. If seasonal flooding is affected by climate change, and consumption of pirarucú continues to increase, their reproduction will become increasingly difficult.



Let's solve the following riddle:

A restaurant needs 0.2 kilograms of pirarucú to serve chicharrón de pirarucú to a diner. **How many kilograms** of pirarucú do they need to serve **fifty** diners?

Now, how many **kilograms** would the same restaurant need to serve chicharrón de pirarucú during **1 month** to 50 diners a day?

If the average weight of a pirarucú is **90 kilograms**, how many pirarucú would the restaurant need to serve this dish during **1 month to 50 diners** daily?

How many pirarucú would they need for **one year** if they serve 50 diners a day? _____

Taking your answers into account, make a mental map in which you answer the question: **How can we consume fish responsibly and sustainably?**

Answer on a notebook

EnviroClue

To preserve the pirarucú and avoid its extinction, the Colombian government issued Agreement 015 of February 25, 1987, regulated by Resolution 0089 of May 27, 1987, which prohibits the fishing and commercialization of this specimen from October 1 through March 15 every year. However, given the high demand for this fish on the gastronomic market, the regulation has not been able to prevent illegal fishing of pirarucú. **Are other species regulated in the same way?**

Mini-Challenge 4a. Fished!

Nets are said to be destroying fish; we agree, but that's not the only thing. Do you know why there were so many fish in our time? Because there was no gasoline, no motors, back then. Gasoline and engine noise are also responsible for destroying this resource

—**Sarbelio Vanegas, artisanal fisherman from Pizarro**

Electronic gillnetting makes everyone a fisherman; women, children, and adults. Without it, 70% of the fishermen in Chocó would disappear, because most of them don't know how to fish with a line or cast a net. Gillnetting affects fauna more; fish get scared and faint.

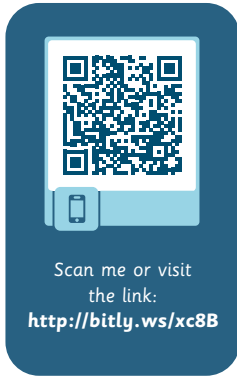
— **Francisco Alegría, artisan fisherman from Pizarro**

Source: WWF. Pesca artesanal, un oficio con arraigo ancestral en el Pacífico colombiano.
<https://www.wwf.org.co/?365516/Pesca-artesanal-un-oficio-con-arraigo-ancestral-en-el-Pacifico-colombiano>

- a.** Based on the testimonies of Sarbelio and Francisco, **write a story** in which you imagine that you are an artisanal fisherman. **Narrate** your daily fishing routine, your difficulties, and how it would feel to catch no fish for your family.



- b. **Research or watch** the following mini-documentary on artisanal fishing in the Colombian Pacific.



EnviroClue

Due to **overfishing**, several rivers in Colombia are beginning to show symptoms of **empty river syndrome**. Rivers affected by this syndrome appear stable, with circulating water, but they contain no fish. This means that many communities have to look for other sources of food and economic sustenance, since artisanal fishing is one of the predominant economic activities in regions like the Colombian Caribbean.

- c. **Contrast** your story with the daily reality of many artisanal fishermen. How are they similar and how are they different? Which part of the video or your research interested you the most? How do you feel about the idea of a fisherman catching only what he and his family can eat?





Mystery Questions:

1. What alternatives can you think of to prevent overfishing? Would you try, for example, the vegetarian version of a typical dish?
2. How are artisanal fishing and industrial fishing different? What impact does each have on the balance of the rivers?
3. How does sustainable fishing work? And what benefits does it bring to communities?

Challenge 5. From Land to River

In Colombia, **illegal mining** is associated with deforestation and environmental pollution. The dredges used to dig underwater suck up the sediment with such force that they wipe out fish, plants, and much of the underwater ecosystem. And mining uses mercury, cyanide, and other extremely toxic chemicals that pollute the waters and cause illnesses in the living things, including humans, that depend on the river for their survival.

Read the following descriptions and number them according to the order of the stages in which mining and contamination of natural resources take place. Based on the descriptions, and using your research, draw each stage of the process in space provided.

EnviroClue

In 2013, a group of students from the Antonio Anglés de San Isidro Educational Institution—one of the Río Quito villages in the Chocó department—founded the El Guayacán natural reserve. The reserve was born in response to the consequences of gold mining in the region and as a way of protecting their only source of drinking water—the Quita Arrechera stream—from contamination. This natural barrier, which covers approximately 130 hectares and has made it possible to preserve the creek, has become an Agricultural and Environmental Center for Chocó's Ethnocultural Biodiversity.

Stage _____

Aquatic species, such as fish, that live in rivers are exposed to heavy metals, the effects of which are so toxic that certain species can't survive in their natural environment, and others, when consumed, become a source of indirect and invisible contamination.

Stage _____

The rivers turn red due to the presence of mercury or cyanide used to separate gold from other extracted materials. Although the colors are striking, these chemicals are highly toxic to the environment and to living organisms.

Stage _____

Artificial bluish-green wells form where residues from heavy metals used in mining are deposited.

Stage _____

The ground turns whitish, indicating that the soil is lifeless after absorbing large amounts of mercury.

Stage _____

Dredges sink to the bottom of the river, drill into the earth, and extract sand, stones, mud, and other materials in search of gold.

Stage _____

Small muddy streams carry with them to water sources such as rivers the chemicals used in mining and the contamination from heavy metals.



Mystery Questions:

- 1. How much does illegal mining affect rivers and other ecosystems?**
- 2. What are the impacts of mercury and cyanide on the health of animals, plants, and humans?**



Mini-Challenge 5a. Quick to Disappear, Slow to Recover?

The outlook may seem hopeless, but recovery of the ecosystems affected by mining is possible! In 2001, an initiative called Garden of Eden was born in England (United Kingdom) to recover a piece of land that was turned into a desert by mining kaolin, a type of clay. Eight giant domes were built on the land to function as greenhouses and reproduce the humid tropical climate and the hot dry climate. Life sprouted again from ground that everyone thought was lost!



What project would you propose to recover a territory affected by mining?

Consider what could be done to also help the communities that inhabit the territory. Look for other references at your school or community library pointing to recovery projects in different parts of the world.



EnviroClue

Germany is one of the countries with the longest mining tradition given its geographical location, which has provided it with an abundance of selenium, coal, steel, sand, and industrial gravel. Because of this, it is also one of the countries that has made the biggest effort to recover the territories affected by mining. But this hasn't been easy or fast. It wasn't until a couple of years ago, after more than 20 years, that one of its recovery projects began to show results. Recovery is possible, but slow, **so it's time to start acting!** How long would a recovery project in Colombia take?



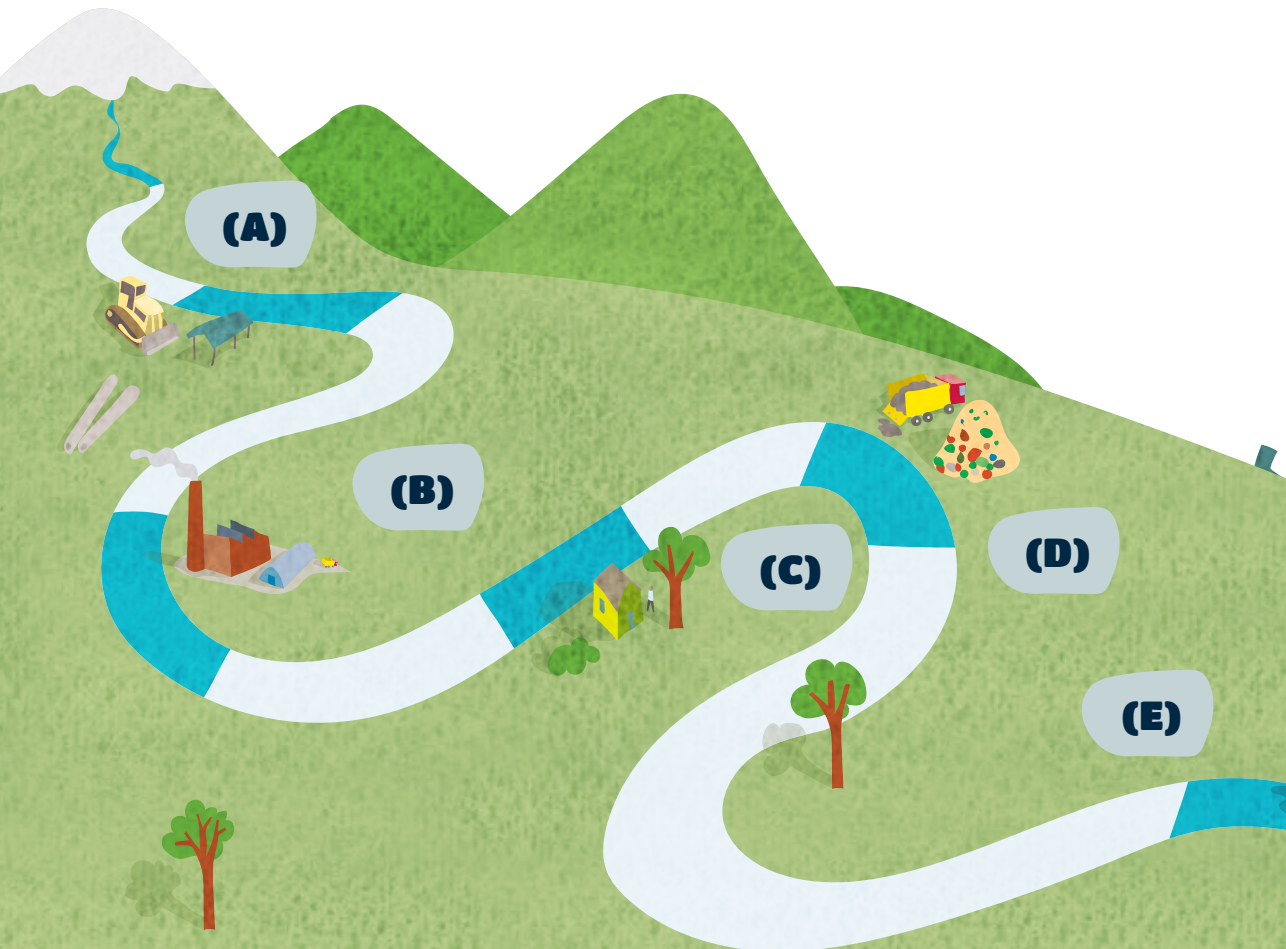
Mystery Questions:

1. What factors are important for the development of an ecosystem restoration project?
2. Are there environmental recovery projects in Colombia?

Challenge 6. It All Started With...

Rivers and oceans share currents as well as the interlopers who pollute their waters. Everything discarded into rivers ends up being dragged by the current toward the sea. What kinds of waste in rivers is washed away with its current?

Follow the path of the river as it descends the mountain toward the ocean and identify the places through which it passes. Research the waste deposited into the river at each place. How does this waste enter the river?



EnviroClue

According to the Ocean Cleanup Foundation, rivers are the arteries that transport plastic from the land to the oceans. An estimated 80% of the plastic that reaches the oceans is carried by just 1% of the world's rivers. Most of these plastics are single-use, such as bottles, food wrappers, food containers, disposable cups, personal hygiene products, cotton swabs for cleaning ears, cigarette packages, plastic cutlery, plastic bags, and even abandoned fishing items. And every time the river's flow increases, more plastic is washed into the oceans.



Mystery Questions:

1. What can we do to prevent plastic and other waste from reaching rivers?
2. How long can it take a plastic object to travel from the land, along the river, and into the ocean?

Place

What waste is deposited in the river?

How does that waste get to the river?

(A)

(B)

(C)

(D)

(E)

- b. Read the following text about the Constitutional Court's ruling recognizing the Atrato river as a subject of rights:

Through Judgment T-622 of 2016, the Constitutional Court recognizes the Atrato river as a subject of rights to guarantee its protection and conservation. The Ministry of the Environment is therefore responsible for ensuring the rights of the river and, likewise, a commission of guardians was formed that includes members of communities along the Atrato River. The construction of action plans was also ordered to solve, in conjunction with communities, the problems affecting the Atrato River. These plans include elimination of illegal mining; decontamination of water sources containing toxic chemicals that endanger health; and studies to evaluate the degree of contamination in the river; among others.

Source: <https://archivo.minambiente.gov.co/index.php/component/content/article/3573-sentencia-t-622-de-2016-rio-atrato-como-sujeto-de-derechos>

- c. Based on the text, compare your answer to a. with the Court's sentence. How are they similar? How are they different?



- d. Use your creativity to invent a way to let people know that the Atrato River is a subject of rights. You can paint, write, perform a choreography, song, or video, or whatever comes to mind! Share your creation at school and with your community.

Answer on a notebook



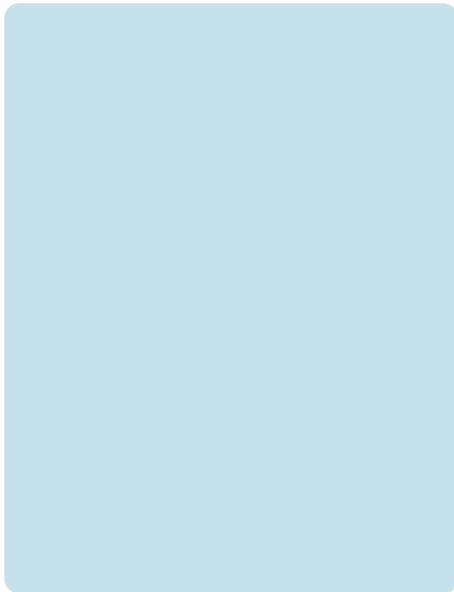
Mystery Questions:

1. What are human rights and what rights do you have?
2. Why is it important that animals and ecosystems are recognized as subjects of rights?

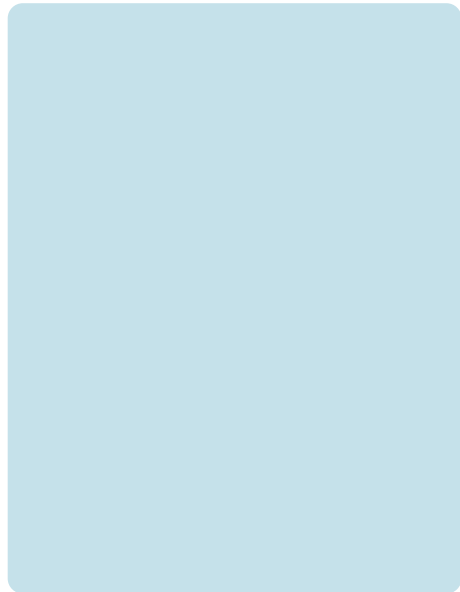
Challenge 8. Chain of Help

We've seen that several factors affect the balance of rivers. **Now is the time to take action and do something to help them!**

a. Of all the factors affecting rivers, which do you think affects your community the most?



b. What do you think you could do to change this situation?




c. Design a possible solution to implement at your school and even in your community. Use the following guide for help:

- **Identify** a factor or problem that affects rivers and your community.
- **Investigate** the causes of this problem.
- **Write** down the consequences of the problem.
- **Choose one of the causes and design a solution!** Think of actions that can be carried out with your schoolmates, your family, or your community to find an alternative solution to the problem you identified.

Consequences of the problem

--	--	--

Problem that affects rivers and my community

		
--	--	---

Causes that contribute to the problem

Continue on the next page



An Alternative to Help Rivers



- d. Plan a pilot test and implement your solution!

Answer on a notebook



Mystery Questions:

1. What student, community, citizen, or government measures exist to contribute to the care of rivers?
2. What daily actions can you carry out to contribute to the care of rivers?

Congratulations!

You've solved all the challenges.

Look for the sticker
for this chapter at
the end of the book
and place it here.

**This medal recognizes you as a
member of **the Earth Mission
Team: kids and families to
the rescue!****

My Name is Earth

First edition, December, 2022
Diana Ospina, for the stories, 2022
Nicolás Chirokoff, for the illustrations, 2022
Fredy González and Isabela Murillo, for the
activities, 2022
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