

LEARNING GUIDE

GRADES 3-5

The Quetzal & The Cloud Forest

How are all living things connected within an ecosystem?

Purpose

This module introduces students to the interconnected nature of ecosystems and the importance of biodiversity. Through the story of the resplendent quetzal and its relationship with the cloud forest, students investigate how plants, animals, and people depend on one another to survive. Students will explore the concepts of ecosystems, symbiotic relationships, and conservation while developing an understanding of how human actions can both threaten and protect natural environments. By connecting the cloud forest to ecosystems in their own communities, students will recognize that everyone has a role to play in protecting biodiversity and promoting environmental stewardship.

Students Will:

1. **Describe** how living and nonliving components work together to support biodiversity
2. **Explain** the symbiotic relationship between the resplendent quetzal and the aguacatillo tree how organisms depend on one another for survival
3. **Analyze** how human activities impact ecosystems
4. **Apply** their understanding of ecosystem interdependence by identifying actions they can take to help protect biodiversity in their own communities

Next Generation
Science Standards

Virtual Field Trip
Watch Guide

Lessons

- 1 Exploring the Cloud Forest
- 2 Nature Works Together
- 3 Protecting Biodiversity
- 4 Resources

Learning Guide

The Quetzal & The Cloud Forest

Grades & Performance Expectation

- **3–5 Life Science: Ecosystems**
- **3–5 Earth and Human Activity**

Disciplinary Core Ideas

- **LS2.A:** Interdependent Relationships in Ecosystems
- **LS4.D:** Biodiversity and Humans
- **ESS3.C:** Human Impacts on Earth Systems

Crosscutting Concepts

- Systems and System Models
- Cause and Effect
- Stability and Change
- Patterns

Science & Engineering Practices

- Developing and Using Models
- Constructing Explanations
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

Activities in this lesson can help support achievement of these Performance Expectations

- **3-LS4-3** Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
- **3-LS4-4** Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
- **4-LS1-1** Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
- **5-LS1-1** Support an argument that plants get the materials they need for growth chiefly from air and water.
- **5-LS2-1** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
- **5-ESS3-1** Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment

**Common Core State Standards:
English Language Arts
(Grades 3–5)**

Reading Informational Text (RI)

CCSS.ELA-LITERACY.RI.3.1 / RI.4.1 / RI.5.1 Ask and answer questions to demonstrate understanding of an informational text, referring explicitly to the text as the basis for the answers.

CCSS.ELA-LITERACY.RI.3.3 / RI.4.3 / RI.5.3 Explain relationships between events, ideas, concepts, or scientific information in an informational text.

CCSS.ELA-LITERACY.RI.3.7 / RI.4.7 / RI.5.7 Interpret information presented visually, orally, or quantitatively and explain how it contributes to understanding the topic.

Writing (W)

CCSS.ELA-LITERACY.W.3.2 / W.4.2 / W.5.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

CCSS.ELA-LITERACY.W.3.7 / W.4.7 / W.5.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic.

CCSS.ELA-LITERACY.W.3.8 / W.4.8 / W.5.8 Recall information from experiences or gather information from print and digital sources; summarize or categorize information and provide a list of sources when appropriate.

CCSS.ELA-LITERACY.W.3.9 / W.4.9 / W.5.9 Draw evidence from literary or informational texts to support analysis, reflection, and research



VIRTUAL FIELD TRIP

Quetzal & The Cloud Forest

1 Watch [The Quetzal & The Cloud Forest](#)

2 Complete the [Watch Guide](#) to capture primary points and reflection.

Downloads

The Quetzal and The
Cloud Forest
Watch Guide





Exploring the Cloud Forest



Background



Vocabulary



Questions



Activities

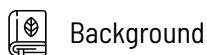
- 1 What Belongs?
- 2 Cloud Forest Match
- 3 Draw the Layers

Background

Cloud forests are unique **ecosystems** found at high elevations in tropical and subtropical mountain regions. Unlike many other forests, they are frequently covered in clouds or mist, creating cool, humid conditions that allow an incredible variety of plants and animals to thrive. Mosses, ferns, orchids, and bromeliads grow on tree trunks and branches, while dense vegetation provides food and shelter for countless species. Because of these conditions, cloud forests are considered **biodiversity** hotspots, meaning they contain an exceptionally high number of different living organisms.

An ecosystem includes all of the living organisms in an area, such as plants, animals, fungi, and microorganisms, as well as the nonliving components, including water, air, soil, sunlight, and climate. In a cloud forest, these living and nonliving parts interact continuously. The constant moisture supports plant growth, trees stabilize the soil, and water filtered through the forest supplies clean streams and rivers to communities below. Understanding these interactions helps students recognize that every ecosystem depends on a balance of connected parts.

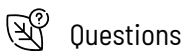
Exploring the Cloud Forest



Background



Vocabulary



Questions



Activities

- 1 What Belongs?
- 2 Cloud Forest Match
- 3 Draw the Layers

Vocabulary

Cloud forest

A mountain forest that is often covered in clouds or mist, creating a cool, wet environment.

Ecosystem

A community of living and nonliving things that interact with one another.

Biodiversity

The variety of different plants, animals, and other living things in an area.

Habitat

The natural place where a plant or animal lives.

Species

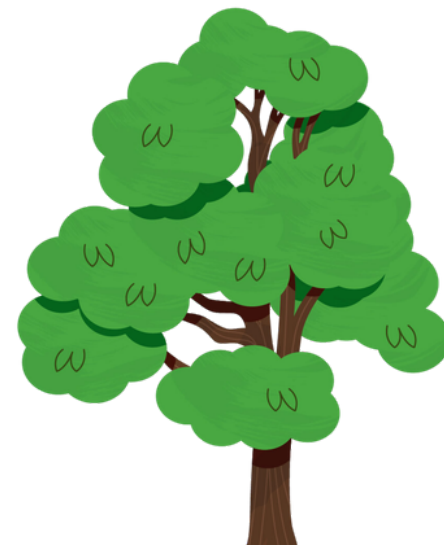
A group of living things that are alike and can reproduce.

Moisture

Water in the air, soil, or on surfaces.

Canopy

The upper layer of a forest formed by the tops of trees.



Exploring the Cloud Forest



Background



Vocabulary



Questions



Activities

- 1 What Belongs?
- 2 Cloud Forest Match
- 3 Draw the Layers

Questions

- 1 What is a cloud forest?

- 2 Why are cloud forests rich in biodiversity?

- 3 How do living and nonliving parts of the ecosystem work together?

ACTIVITY 1



DEMONSTRATION

Exploring the
Cloud Forest

Background



Vocabulary



Questions



Activities

1 What Belongs?

2 Cloud Forest Match

3 Draw the Layers

What Belongs? Part 1

- 1 Display the picture or word cards for the cloud forest components (clouds, water, sunlight, soil, quetzal, aguacatillo tree, moss, orchids, bromeliads, and small animals). Tell students they will work together to build a cloud forest ecosystem.
- 2 Hold up the clouds card and ask, "Does this belong in the cloud forest?" Discuss how clouds provide moisture that keeps the forest cool and wet.
- 3 Add the water, soil, and sunlight cards. Explain that these are nonliving parts of the ecosystem that all living things need to survive.
- 4 Hold up the aguacatillo tree card and ask students what the tree needs to grow. Place it in the ecosystem and discuss how it provides food and shelter for other organisms.
- 5 Add the moss, orchids, and bromeliads cards. Ask students how these plants might benefit from living in a cloud forest.



Materials

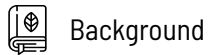
- ☐ A large sheet of paper, whiteboard, or chart paper
- ☐ Picture cards or word cards featuring cloud forest components:
 - Quetzal
 - Aguacatillo tree
 - Orchids
 - Bromeliads
 - Moss
 - Small animals
 - Clouds
 - Water
 - Soil
 - Sunlight
- ☐ Optional: A clear container or classroom display space to build a model ecosystem

ACTIVITY 1



DEMONSTRATION

Exploring the Cloud Forest



Background



Vocabulary



Questions



Activities

1 What Belongs?

2 Cloud Forest Match

3 Draw the Layers

What Belongs? Part 2

- 6 Hold up the quetzal card and ask students why a bird might be important to the forest. Explain that the quetzal eats aguacatillo berries and helps spread the tree's seeds.
- 7 Add the remaining small animal cards and ask students how each living thing depends on another part of the ecosystem. Encourage them to describe at least one connection.
- 8 Review the completed ecosystem together. Ask students to identify which cards represent living things and which represent nonliving things.
- 9 Remove one card, such as the quetzal or the aguacatillo tree, and ask students what might happen if that part of the ecosystem disappeared. Discuss how one change can affect many other organisms.
- 10 Conclude by asking students what they learned about ecosystems. Reinforce that healthy ecosystems depend on many connected living and nonliving parts working together.



Materials

- ☐ A large sheet of paper, whiteboard, or chart paper
- ☐ Picture cards or word cards featuring cloud forest components:
 - Quetzal
 - Aguacatillo tree
 - Orchids
 - Bromeliads
 - Moss
 - Small animals
 - Clouds
 - Water
 - Soil
 - Sunlight
- ☐ Optional: A clear container or classroom display space to build a model ecosystem

Exploring the Cloud Forest

 Background

 Vocabulary

 Questions

 **Activities**

1 What Belongs?

2 Cloud Forest Match

3 Draw the Layers

ACTIVITY 2

 GROUP WORK

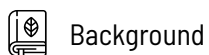
Cloud Forest Match

- 1 Provide students with matching cards that include cloud forest features and their descriptions.
- 2 Ask students to work individually or with a partner to match each feature with its correct role.
- 3 Encourage students to use clues from the virtual field trip to justify their matches.
- 4 Review each match as a class and discuss why each feature is important.
- 5 Challenge students to identify which feature they think is most important and explain their reasoning.
- 6 Discuss how these features work together to create a healthy cloud forest.

Downloads

Cloud Forest Features Cards 

Exploring the Cloud Forest



Background



Vocabulary



Questions



Activities

- 1 What Belongs?
- 2 Cloud Forest Match
- 3 Draw the Layers**

ACTIVITY 3



HANDS-ON LEARNING

Draw the Layers

- 1 Ask students to imagine they are standing inside a Guatemalan cloud forest and describe what they might see, hear, and feel.
- 2 Students draw a cloud forest scene that includes trees, clouds, plants, animals, and water.
- 3 Require students to label at least five parts of the ecosystem and identify whether each is living or nonliving.
- 4 Encourage students to include examples from the field trip, such as quetzals, aguacatillo trees, moss, orchids, or bromeliads.
- 5 Have students share their drawings with a partner and explain one ecosystem connection they included.
- 6 Display student work and discuss the variety of life found in cloud forests.



Nature Works Together



Background



Vocabulary



Questions



Activities

- 1 Ecosystem Connections
- 2 Cause and Effect
- 3 Seed Disperser

Background

One of the most remarkable relationships in Guatemala's cloud forests exists between the resplendent quetzal and the **aguacatillo tree**. The quetzal feeds on the tree's fruit, swallowing the berries whole. Later, the bird regurgitates the large seed in a different location, allowing new aguacatillo trees to grow throughout the forest. This process, known as **seed dispersal**, benefits both the bird and the tree, demonstrating how different species can depend on one another for survival.

This type of interaction is called a **symbiotic relationship** because both organisms benefit. The quetzal receives a reliable food source, while the aguacatillo tree gains an effective way to spread its seeds. The tree also supports the broader ecosystem by holding soil in place, slowing rainwater, and helping maintain clean water supplies. Through these interconnected relationships, students can explore the concept of **interdependence** and understand how changes to one organism can affect many others within an ecosystem.

Nature Works Together

 Background

 **Vocabulary**

 Questions

 Activities

1 Ecosystem Connections

2 Cause and Effect

3 Seed Disperser

Vocabulary

Symbiotic relationship A close relationship between two different species in which one or both benefit.

Interdependence The way living things depend on one another to survive.

Seed dispersal The movement of seeds to new places where they can grow into new plants.

Adaptation A feature or behavior that helps a living thing survive in its environment.

Organism Any living thing, such as a plant, animal, fungus, or microorganism.

Native species A plant or animal that naturally lives in a particular area.



Nature Works Together



Background



Vocabulary



Questions



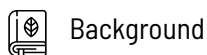
Activities

- 1 Ecosystem Connections
- 2 Cause and Effect
- 3 Seed Disperser

Questions

- 1 What is a symbiotic relationship?
- 2 Why are quetzals important to the cloud forest?
- 3 How do plants and animals help one another?

Nature Works Together



Background



Vocabulary



Questions



Activities

1 Ecosystem Connections

2 Cause and Effect

3 Seed Disperser

ACTIVITY 1



GROUP WORK

Ecosystem Connections

- 1 Provide student small groups with cards showing organisms and ecosystem components, including the quetzal, aguacatillo tree, water, soil, and other plants.
- 2 Ask students to connect each item with another part of the ecosystem that helps it survive.
- 3 Have students draw arrows between connected organisms to create an ecosystem web.
- 4 Ask students to explain one connection using the sentence frame: "The _____ depends on the _____ because _____."
- 5 Discuss how some organisms can have more than one important relationship.
- 6 Reinforce that ecosystems are networks where changes can affect many living things.

Materials

- ☐ Yarn or string or paper & pencil
- ☐ Index cards or labels that feature the different organisms listed below:

Quetzal
Aguacatillo tree
Tree roots
Clouds
Bromeliads
Water
Soil

Nature Works Together

 Background

 Vocabulary

 Questions

 **Activities**

1 Ecosystem Connections

2 Cause and Effect

3 Seed Disperser

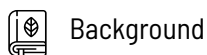
ACTIVITY 2

 DISCUSSION

Cause and Effect

- 1 Introduce the idea that ecosystems are connected and that one change can create many effects.
- 2 Provide students with a cause-and-effect chain beginning with a change, such as “Cloud forests are destroyed.”
- 3 Students fill in the missing effects using information from the virtual field trip.
- 4 Ask students to explain how the loss of one species or resource impacts others.
- 5 Challenge students to create their own cause-and-effect chain using another ecosystem change.
- 6 Discuss how understanding these connections helps people protect ecosystems.

Nature Works Together



Background



Vocabulary



Questions



Activities

1 Ecosystem Connections

2 Cause and Effect

3 Seed Disperser

ACTIVITY 3



HANDS-ON LEARNING

Seed Disperser

- 1 Scatter the "berries" around one area of the classroom to represent an aguacatillo tree.
- 2 Choose several students to be quetzals while the rest observe or take turns in later rounds.
- 3 The quetzals collect one berry at a time, walk or "fly" to another location, and place it on a paper circle labeled "New Tree" to represent seed dispersal.
- 4 Repeat until several new tree locations have been created throughout the room.
- 5 Compare what happened when the quetzals spread the seeds versus what would happen if the berries stayed beneath one tree.
- 6 Discuss how animals help forests grow simply by moving through their habitats.

Materials

- ☐ Small pom-poms, beans, or paper balls ("berries")
- ☐ Small cups or baskets
- ☐ Open classroom space
- ☐ Paper circles labeled "New Tree"





Protecting Biodiversity



Background



Vocabulary



Questions



Activities

- 1 Threats and Solutions
- 2 Be a Helper
- 3 Ecosystem Reflection

Background

Cloud forests around the world are under increasing pressure from human activities such as deforestation, land conversion, wildfires, wildlife trafficking, and climate change. As forests shrink or become **fragmented**, many species lose the habitats and food sources they need to survive. Because cloud forests support so many interconnected organisms, the loss of even one important species can have lasting effects throughout the ecosystem, including impacts on water quality, soil stability, and biodiversity.

Conservation efforts help protect these valuable ecosystems for both wildlife and people. In Guatemala, Indigenous communities and conservation organizations work together to restore cloud forests by growing native trees in nurseries, planting them in degraded areas, and protecting wildlife habitats. These efforts strengthen ecosystems while supporting clean water, healthy soils, and sustainable livelihoods. By learning about conservation in Guatemala and reflecting on their own communities, students discover that protecting biodiversity is a shared responsibility and that even small actions can contribute to healthier ecosystems.

Protecting Biodiversity

 Background

 **Vocabulary**

 Questions

 Activities

1 Threats and Solutions

2 Be a Helper

3 Ecosystem Reflection

Vocabulary

Conservation Protecting and caring for natural resources and wildlife.

Restoration Helping damaged habitats or ecosystems recover.

Deforestation The clearing or cutting down of forests.

Erosion The wearing away or movement of soil by wind or water.

Stewardship Taking responsible care of the environment.

Endangered species A species that is at risk of becoming extinct.

Fragmented Broken into pieces, or divided into separate, unconnected parts



Protecting Biodiversity



Background



Vocabulary



Questions



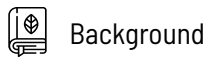
Activities

- 1 Threats and Solutions
- 2 Be a Helper
- 3 Ecosystem Reflection

Questions

- 1 What threats do cloud forests face?
- 2 How does protecting forests help people?
- 3 What actions can individuals take to protect biodiversity?

Protecting Biodiversity



Background



Vocabulary



Questions



Activities

1 Threats and Solutions

2 Be a Helper

3 Ecosystem Reflection

ACTIVITY 2



HANDS-ON LEARNING

Threats and Solutions

- 1 Divide students into small groups and give each group a different Challenge Card. Explain that they are members of a conservation team working to protect Guatemala's cloud forest.
- 2 Ask each group to read its challenge and discuss how the problem might affect plants, animals, water, and people who depend on the forest.
- 3 Working together, students create a simple "Conservation Action Plan" on chart paper that includes:
 - The problem
 - Who or what is affected
 - Two or three actions that could help solve the problem
 - Why they think their solution will work
- 4 Encourage students to include both community actions (such as planting native trees or protecting wildlife habitats) and individual actions (such as reducing waste or educating others).
- 5 Have each group present its Conservation Action Plan to the class. Invite classmates to ask questions or suggest one additional idea that could strengthen the plan.
- 6 Conclude by discussing how conservation often requires many people working together over time. Emphasize that protecting biodiversity is a shared responsibility and that small actions, when combined, can make a meaningful difference

Materials

- ☐ Chart paper or poster paper
- ☐ Markers or colored pencils
- ☐ "Challenge Cards" (one per group) describing a conservation problem

Downloads

Challenge cards



Protecting Biodiversity

 Background

 Vocabulary

 Questions

 **Activities**

1 Threats and Solutions

2 Be a Helper

3 Ecosystem Reflection

ACTIVITY 2

Be a Helper



GROUP WORK

- 1 Explain that conservation is not only something scientists and organizations do —everyone can help protect nature.
- 2 Ask students to brainstorm ways people can help ecosystems at home, school, or in their community.
- 3 Students complete the statement: “I can help biodiversity by _____ because _____.”
- 4 Encourage students to choose an action that is realistic and meaningful.
- 5 Have students share their ideas with a partner or small group.
- 6 Discuss how many small actions can create positive changes for the environment.

Protecting Biodiversity

 Background

 Vocabulary

 Questions

 **Activities**

1 Threats and Solutions

2 Be a Helper

3 Ecosystem Reflection

ACTIVITY 3

Ecosystem Reflection

- 1 Review the major ideas from the virtual field trip: ecosystems, relationships, biodiversity, and conservation.
- 2 Provide students with reflection questions about the quetzal, cloud forest, and human connections to nature.
- 3 Students respond through writing, drawing, or discussion.
- 4 Ask students to explain why the quetzal is important beyond being a beautiful bird.
- 5 Invite students to share one new idea they learned or one question they still have.
- 6 End by revisiting the unit question: "How are all living things connected within an ecosystem?"

Downloads

Reflection Questions





Nature Lab Sustainability Commitment

Each component of a Nature Lab collection is designed to embrace the concepts of recycling, upcycling and sustainability.

Additional Resources

[Visit \[nature.org/NatureLab\]\(https://www.nature.org/NatureLab\)](https://www.nature.org/NatureLab) for more educator resources.

[Sign up for our e-newsletters](#) to stay up-to-date on the latest teaching guides and videos.

[Follow @TNCNatureLab](#) on your favorite social channel to see how people and nature thrive together.



Working Trees: Reforestation and Responsible Forestry

In this virtual field trip, students will take a deep dive into responsible forest management and gain a better understanding of how conservation and environmental stewardship can tackle the effects of deforestation.



Climate Heroes: The Power of Trees

This virtual field trip provides a closer look at how exactly photosynthesis helps trees survive, clean the air we breathe and remove carbon from the atmosphere.



The Incredible Power of Forests

Journey through the Maya forests of Central America to learn firsthand from Indigenous communities how they have protected forests for thousands of years through sustainable forestry and farming practices.

The Quetzal and The Cloud Forest



[← Back to instructions](#)

While You Watch

What makes a cloud forest different from other forests?

Why is the cloud forest considered a biodiverse ecosystem?

How does the quetzal help the aguacatillo tree?

Describe one example of how living things in the cloud forest depend on one another.

What are some threats facing the cloud forest?

What are communities in Guatemala doing to protect the cloud forest?

Reflect & Discuss

What might happen if the quetzal disappeared from the ecosystem?

What can you do to help?

How does this virtual field trip help answer the unit question: How are all living things connected within an ecosystem? What is one way you can help protect biodiversity where you live?



The Quetzal & The Cloud Forest

Cloud Forest Match

[← Back to instructions](#)

Cloud Forest

**Aguacatillo
tree**

**Cool, misty
mountain
habitat**

**Produces
berries**

Moss

Quetzal

**Covers tree
trunks and
ground**

**Eats berries
and spreads
seeds**

Bromeliad

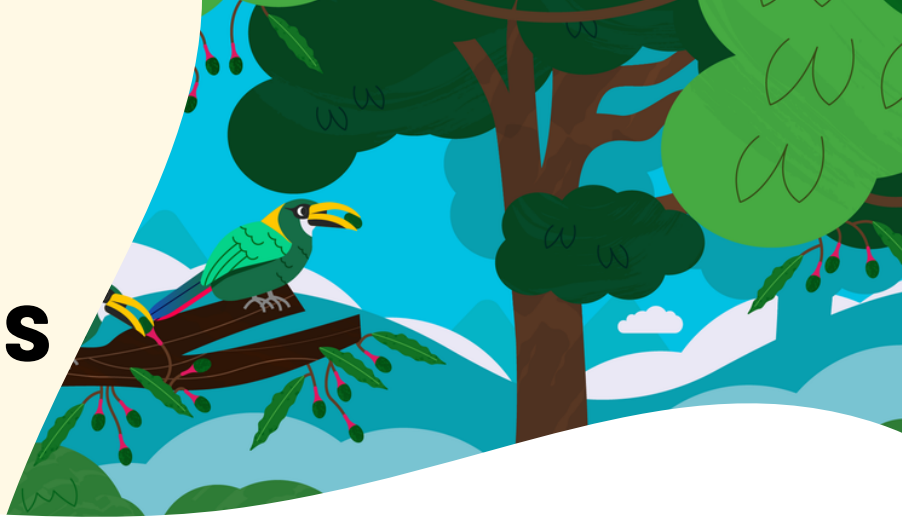
Tree roots

**Stores water
for animals**

**Hold soil in
place, helping
prevent erosion
and keeping
water clean.**

The Quetzal & The Cloud Forest

Challenge Cards

[← Back to instructions](#)

A new road is being built through part of the cloud forest, breaking up animal habitats.

Tourists are visiting the cloud forest, but some are leaving trash and disturbing wildlife.

Invasive plant species are spreading and taking resources away from native plants.

Farmers nearby are using too much pesticide, which is harming insects and birds in the forest.

A wildfire has damaged part of the forest.

A section of the cloud forest has been cleared for farming.

Fewer quetzals are being seen because their habitat is shrinking.

Climate change is causing warmer, drier conditions in the cloud forest.

Logging companies are cutting down old-growth trees that many animals depend on for shelter.

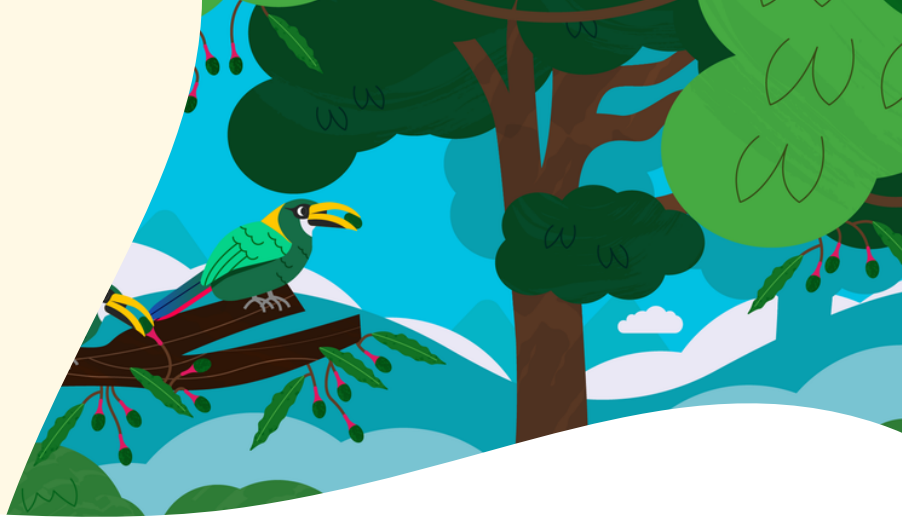
Heavy storms are causing landslides that destroy parts of the forest floor and plant life.

Fewer pollinators (like bees and hummingbirds) are being seen, affecting plant reproduction.

A protected area of the cloud forest is not being enforced, allowing illegal hunting to continue.

The Quetzal & The Cloud Forest

Reflection Questions

[← Back to instructions](#)

How has learning about the cloud forest changed the way you think about ecosystems?

Imagine you are a scientist or conservationist working in Guatemala. What is one thing you would do to help protect the cloud forest, and why?

What is one action you can take to help protect nature where you live?