



ANIMAL DIVERSITY IN THE CLOUD FOREST

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Grade Level: 6-8

Introduction: The tropical montane cloud forests of Monteverde are widely regarded as a biodiversity hotspot. Students will gain a greater appreciation of this biodiversity by selecting a cloud forest animal and becoming the class expert on it. Students will collaborate to create a cloud forest field guide and will share information with one another to learn about a wider variety of cloud forest animals.

Major Themes: Biodiversity

Connections to National Science Education Standards: Regulation and behavior (C); populations and ecosystems (C); diversity and adaptations of organisms (C).

Time: 2 or 3 60-minute periods.

Day 1: 60 minutes (5 minutes for Opening, 5 minutes for Step 1, 50 minutes for Step 2)

Day 2 (optional): 60 minutes for Step 3

Day 3: 60 minutes (40 minutes for Step 4, 20 minutes for Step 5 and accompanying Animal Diversity Awards activity)

Materials: Students will use an assortment of videos and other media on the *Canopy in the Clouds* website including the “Cloud Forest Introduction” and “Canopy Introduction” overviews on the student materials page (located in “Learn”).

Students may also view the following videos (depending on the animal they select):

Panorama 1: Ground video 7 (leafcutter ants), canopy video 2 (howler monkeys)

Panorama 2: Canopy video 3 (resplendent quetzal)

Panorama 3: Ground video 6 (beetles), 7 (hummingbirds)

Panorama 4: Ground video 4 (leaf litter frog)

Students may also use photographs of vertebrates and invertebrates found in “Media”.

Computers with internet access (at least one; preferably enough for one per student)

LCD projector

Print resources about animals (e.g., encyclopedia, field guide, magazine)

Student handouts (*Animal Diversity in the Cloud Forest*, *Animal Diversity Lesson: Animal Index*, *Animal Diversity Research*, *Field Guide Template*, *Animal Diversity Awards*, *Animal Diversity in the Cloud Forest: Student Assessment*)



Objectives: Students will be able to: (1) observe and describe animal diversity as it exists in the cloud forest, (2) gain expertise on one cloud forest animal.

Potential Misconceptions:

1) When people walk through the cloud forest or view images of it, they are often overwhelmed with the diversity and abundance of plant life. As a result, they may conclude that cloud forests are places where plants, rather than animals, thrive. The animals of the cloud forest may be nocturnal, have camouflage coloring, or make few sounds, all of which makes them less apparent to observers. This does not mean that cloud forest animals are few and far between. In fact, cloud forest systems possess a very high number of animal species.

2) Some students mistakenly believe that insects and animals are separate kingdoms. The kingdom Animalia includes mammals, birds, fish, reptiles, amphibians, and arthropods (e.g., insects, spiders, crabs). Interestingly enough, over half of all of the animals on Earth are arthropods.

PROCEDURE

Opening: Use the computer and LCD projector to take the class on a short tour through at least one panorama. Ask students to describe what they see. They will likely describe a great deal of plant life. Next, ask students to infer what else is going on in these scenes that was not captured by the camera (or is not readily apparent from our viewpoint). If students do not mention animals, tell them that there are thousands of species of animals that live in this cloud forest. Ask where those animals might be and what photographic strategies might work better to capture images of them.

Development: Day 1: Distribute the *Animal Diversity in the Cloud Forest* student handout. Solicit volunteers to read it aloud. Address any questions that students have about the assignment.

After reading through the handout in its entirety, use the designated computer and LCD projector to guide students to the “Cloud Forest Introduction” and “Canopy Introduction” overviews on the student materials page. If there are enough computers for students to work alone or in pairs, they may watch this video and read through this information on their own. If there is only one computer with a projector, go through these materials together as a class.

Decide ahead of time whether you will assign animals to students, have students pick animal names out of a hat, or allow students to choose on their own. No matter what your method, be sure that each student researches a different animal.



Explain the resources to which students will have access for this project. Remind students that as they take notes from any resource, they must make note of the resource's bibliographic information. If need be, review literature and website citation procedures with the students. Students may also need your guidance in determining which websites are credible and which are best avoided. While reputable animal information sites abound on the internet, these three stand out as particularly thorough and accurate:

- National Geographic (<http://animals.nationalgeographic.com/animals/>)
- Encyclopedia of Life (<http://www.eol.org>)
- International Union for Conservation of Nature and Natural Resources (IUCN) Red List (<http://www.iucnredlist.org/>)

Allow students to begin their research. If there are not enough computers for every student, have students work in shifts with the print resources and internet resources. Students should use the *Animal Diversity Research* handout to organize their notes as they work. As students are working, circulate around the room and stop to interact with every student at least once. Ensure that students are on task and able to find the information they need.

Notify students when they have about ten minutes of working time left before the end of class so that they can manage their time accordingly. If a student has not gathered all of the necessary information by the end of class, s/he may do so for homework.

Day 2 (optional): If you would like to have students create their field guide pages in class, allow one 60-minute class period for this work. Alternatively, you may assign the field guide page as a homework assignment.

Day 3: Separate class into three evenly-sized groups (approximately eight students per group). Allow the students of each group to arrange themselves into a circle. Students should then give a short presentation about the animals that they studied. Allow five minutes per presentation. Before students begin, remind them that they may use their field guide page as a reference, but they should not read all of the information straight from the page. Encourage all students to be active listeners and to ask questions of one another.

When a group finishes its presentations, students should begin working on the *Animal Diversity Awards* sheet. You may choose to have the same group of students work together on this, or you may break it up into smaller groups.

Closing: When there are five minutes left in class, bring everyone back together (if they have not finished the *Animal Diversity Awards* sheet you can assign it as homework or allow time for it on another day). Choose a few awards and solicit student choices and explanations for each. If students disagree with one another, encourage them to explain



their opinions. In this way, students will review some of the information they learned and be exposed to information about animals that were not described in their break-out groups.

Suggested Student Assessment: Have students complete the *Animal Diversity in the Cloud Forest: Student Assessment* assignment. This assignment asks students to prepare materials for use if their animal were to be included on the *Canopy in the Clouds* site. Students will select an appropriate panorama location and write a brief (2-4 paragraph) description of the animal for a pop-up text box at that location. Contact *Canopy in the Clouds* via (info at canopyinthecLOUDS.com) to have your students' links uploaded.

Extending the Lesson: As an extension of this activity, you may wish to have your students: (1) investigate other biodiversity hotspots around the world, or (2) find out if any animals are endangered in your local area. This resource from Conservation International is worth exploring:

<http://www.biodiversityhotspots.org/xp/hotspots/Pages/default.aspx>

Vocabulary: biodiversity, hotspot, endemic, malaria, scientific name, common name, threatened, endangered, extinct

WORKSHEETS: *Animal Diversity in the Cloud Forest, Animal Diversity Lesson: Animal Index, Animal Diversity Research, Field Guide Template, Animal Diversity Awards, Animal Diversity in the Cloud Forest: Student Assessment*