



CLOUD FOREST ADAPTATIONS

Trysta Wall, The New Teacher Project, Philadelphia, PA

Grade Level: 6-8th

Introduction: Students will examine environmental factors that make surviving in an ecosystem difficult for organisms, focusing on the tropical montane cloud forest of Monteverde, Costa Rica. The adaptations used by organisms to increase chances of survival in the forest will also be studied. Students will be divided into groups in which they use *Canopy In The Clouds* media to investigate a type of organism that lives within the cloud forest ecosystem. Students will become experts in elements of the ecosystem that threaten the survival of a species and corresponding adaptations. Student groups will then share their findings with the class in a presentation that includes *Canopy In The Clouds* media.

Major Themes: Adaptations

Connections to the National Science Standards: Diversity and Adaptations of Organisms, Scientific Inquiry

Time: 60 minutes (5 minutes for opening activity, 10 minutes for initial *Canopy In The Clouds* media viewing, 20 minutes for student group media viewing, 20 minutes for group preparation and presentations, 5 minutes for closing question)

Materials: One computer with internet access for each student group. Computer with internet access & LCD projector for teacher. Student handouts included. *Canopy In The Clouds* media:

- Panoramas #1-5: Natural Scenes and Site Intros
- Additional media as needed: described in *Suggested Media* (p.4 student handouts)

Objectives: Students will be able to 1) define adaptation 2) create lists of environmental factors that threaten the survival of organisms within the cloud forest 3) determine the adaptations that species have developed to face challenges 4) support findings with evidence from *Canopy In The Clouds* media.

Potential Misconceptions: Students may have the following misconceptions:

- 1) Some students may believe that organisms develop new traits because they need them to survive. Similarly, they may believe that adaptation is a conscious process used by an individual to fulfill some need or want. It is a common misconception that a single organism may adapt to its environment within its lifetime. A discussion surrounding natural selection is essential to help students understand that species adapt and evolve, not individuals, over long periods of time.



- 2) Clarification regarding insects may be needed before beginning the group investigations. Many students may include organisms into the “insect” classification that are not correct. Insects have an exoskeleton with segmented bodies, which includes moths and butterflies. For instance, slugs (phylum mollusca) and worms (phylum annelida) are not insects.

PROCEDURE

Opening: Prepare a half sheet of paper for each student in the class with one of the group names at the top. (Group options are listed below. Lesson may include as many, or as few of the groups as determined by the teacher.) Hand each student a piece as s/he enters the classroom. Give students three minutes to write down what they already know about the type of organism assigned to them.

Ask students to share their knowledge with the class. This will allow the teacher to determine the level of previous knowledge for each group. Some groups, such as epiphytes and woody plants, may not have a great deal of previous knowledge. If needed, help students by clarifying the terms *epiphyte* (a plant that grows entirely on another plant) or *woody plant* (plant that forms wood as structural tissue) and providing basic information.

Tell students that they will become experts on the type of organism given to them. They will be using a tropical montane cloud forest in Monteverde, Costa Rica as the basis of their investigations. Inform students that when their investigations are complete they will be responsible for teaching the class, since they have become experts in that subject matter.

Possible groups to utilize:

- Birds
- Mammals
- Insects
- Epiphytes
- Woody Plants

Development: Write the word “adaptation” on the board and ask students to share their knowledge about the term. Clarify any misconceptions about adaptations and ensure students have concrete knowledge of the term (any heritable trait of an organism that increases fitness and ultimately reproduction in its environment).

Pass out p.1 of the student handouts *Intro to the Cloud Forest*. Display the *natural scene* of each panorama or the site introduction media clip on an LCD projector. As they are viewing, students should complete the chart provided independently. They are asked to look for challenges that are present within each site of the cloud forest and then think about an adaptation that will help organisms survive in response to that challenge. Remind students that they are to focus only on the type of organism they were given when entering class.



Organize students into the groups assigned. For a large class, several smaller groups within each category may be necessary for more effective student work and media viewing. Allow students within the groups to share their thoughts from viewing the panoramas and discuss the challenges that they believed to be present for the type of organism assigned.

Students will now investigate the *Canopy In The Clouds* media with their group. Students should be searching for evidence of challenges within the cloud forest as well as adaptations, and recording this on p.2 of the student handouts *Investigating the Cloud Forest*. A list of suggested media is included on p.3 of the handouts for reference and guiding the students.

After giving students 20 minutes to view the media on their organisms, ask them to organize their presentation. Each presentation should last about 3 minutes, include basic information about the group of organisms, teach the class about challenges and adaptations of the organism assigned, and include at least one piece of *Canopy In The Clouds* media to support their findings and instruction. A rubric is included on p.4 of the student handouts if the teacher wants to assess students based on the presentation. Students who are listening to others' presentations should take notes on what they are learning.

Closing: Ask students to answer one of the following questions on the bottom of the *Investigating the Cloud Forest* chart:

- What is an adaptation and why is it essential for species to adapt to an ecosystem?
- How did your predictions regarding challenges and adaptations in the cloud forest differ from your actual findings?
- Discuss the similarities and differences between what you wrote on the *Intro to the Cloud Forest* chart and the *Investigating the Cloud Forest* chart.
- Were there any differences in the challenges present for organisms at different sites within the cloud forest? Explain the differences you found and why these differences might exist.

Collect the charts and writing as students leave class. Read the answers to determine students' mastery of the concept of adaptations within the cloud forest.

Suggested Student Assessment: Assess students individually or as a group during their presentation to the class (rubric included p.4 *Student Presentation Rubric*). Alternatively, ask students to write a paragraph using information they learned from another group's presentation. In their writing, students must explain: what an adaptation is, basic information about the type of organism assigned, challenges the organism faces within the cloud forest, and adaptations that organism has in response to the challenges. Students can compare the challenges and adaptations of their own organism to the challenges and adaptations of an organism belonging to a different student group.

Extending the Lesson: Provide students with another biome to study and analyze. This may be a marine biome, extreme biome (such as tundra in the Arctic or geothermal vents on the ocean floor), or local biome. Ask students to research the challenges faced by populations within the biome and



compare it to the cloud forest. In order to share what they have learned, students may write a research paper, author a comic strip, prepare a multi-media presentation, or act out a play.

Vocabulary: epiphyte, woody plant, adaptation