

# HOW CLOUD FOREST PLANTS SURVIVE AND THRIVE

Erin Dukeshire, Academy of the Pacific Rim, Hyde Park, MA

**Grade Level:** 5<sup>th</sup>

**Introduction:** Students will determine what resources are required to support plant life and how plants acquire these resources. They will evaluate and expand their prior knowledge by investigating interactive panoramic photographs and video from the Monteverde Cloud Forest in Costa Rica. Time is provided for students to familiarize themselves with the media so that they can utilize the technology in future lessons.

**Major Themes:** Ecosystems

**Connections to the National Science Standards:**

Populations and Ecosystems: The number of organisms an ecosystem can support depends on the resources available and abiotic factors, such as quantity of light and water, range of temperatures, and soil composition. Given adequate biotic and abiotic resources and no disease or predators, populations (including humans) increase at rapid rates. Lack of resources and other factors, such as predation and climate, limit the growth of populations in specific niches in the ecosystem.

Scientific Inquiry: Use appropriate tools and techniques to gather, analyze, and interpret data.

**Time:** 1-2 hours.

**Materials Required:** This activity is particularly effective using the panoramas at high elevation on the gradient, as those elevations have an incredible diversity of epiphytes (plants growing on other plants). Computers with internet access. The exercise can be completed with a single computer with access using an LCD projector. Students can be called up to “navigate” through the panoramas. Student handouts are all included in an associated package.

**Objectives:** Students will be able to 1) identify resources that support plant life, 2) describe how plants acquire necessary resources and 3) demonstrate independent use of interactive panoramic photographs and video in order to collect data.

**Potential Misunderstandings:** Notably, students may have the following misconceptions:

- 1) Some students see that the canopy casts a shadow on the forest floor and assume that plants need shadows to survive.
- 2) Many students believe that plants must be rooted in the soil to survive. They do not see soil as a resource for water and nutrients. *Epiphyte* is a new term for many middle school students.
- 3) Lower middle school students may still need reminders that plants absorb sunlight through their leaves to produce food through photosynthesis. Some think that plants absorb food through their roots.
- 4) Unique adaptations of plants in the cloud forest will broaden younger students’ simplistic ideas how plants acquire resources.

## PROCEDURE

**Opening:** Elicit students' prior knowledge about what living things need to stay alive. What do we need to stay alive? What do you think plants need to stay alive? Students should record the resources that they think plants need to live in the table on the student handout that they will use for data collection.

Tell students that they will be deciding which of the things they have listed are really needed for plants to stay alive. They may find that they need to add or subtract from their list. They will also figure out how plants get these resources. Tell students that they will be learning about plants' needs by using interactive panoramic photographs from the cloud forest in Monteverde, Costa Rica. Briefly introduce students to the Monteverde cloud forest using the information provided on the website cloud forest primer.

**Development:** Introduce students to the panoramas by modeling their use on the LCD projector. Think aloud as you demonstrate how to access the website, open the photograph, and open the full screen view. Students may follow along on their student handout. Continue modeling use of the panoramas, playing the introductory video clips. Demonstrate the features that students will need to use today and in the future, and remind them to refer to their student handouts to find directions for using the panoramas.

Tell students to move into partners at student computers. Provide each pair with time to explore the panoramas and practice navigating through the media. As they explore, they should complete the initial observations on page 1 of the student handout (*Data Collection*). Observe students during their partner work at the computers to ensure that they are using the media appropriately. Offer support, as needed. At this point, you may want to introduce vocabulary that is new to students and essential for understanding the video content, including *epiphyte*, *detritus*, and *nutrients*.

Next, instruct students to continue working through page 2 of their handout (*Data Collection on Resources*). They are looking for evidence that plants do need some of the resources that they listed during the class opening. They may also add to their lists. Once students have decided that a plant needs one of the resources, they must then describe how plants acquire it, using evidence from the photograph and videos.

Once partners have recorded their data, ask them to team up with another pair to share their findings. After listening to the other partners, they may revise their own data sheets.

After partners have finished collaborating, begin a class discussion. Ask students to look at their initial list and share the resources they still think plants need to survive. Allow them to add and combine ideas. Require students to use evidence from the panoramas to support their answers. Prompt students in order to lead them toward a correct and comprehensive list that can be copied onto page 3 of their handout (*Summary Of Plant Resources*). Allow for discussion and replay video clips as needed.

Ask students to apply their knowledge by responding to the following questions alone or with a partner.

- What resource do clouds provide for the plants?
- Why do plants use soil?
- Why do epiphytes grow on other trees, rather than on the forest floor?
- How can a tree trunk provide resources for other plants?

**Closing:** Have students share their answers and provide feedback. Ask students to respond to the closing questions on their student handout. Have them share out their responses with the class. They will be comparing their current knowledge with their prior knowledge, and describing the experience of using the panoramas. They will also suggest future questions that they want to investigate with the panoramas.

**Suggested Student Assessment:** Students complete page 4 of the handout, the *Open Response Student Assessment: What Do Plants Need?* Given an image of the cloud forest, students must identify at least four resources they are necessary for plant life and describe one way that plants acquire these resources in the cloud forest. Student responses should be specific and use appropriate scientific vocabulary. Refer to page 5 of the handout for a possible grading rubric.

**Extending the Lesson:** Ask students to make a plan for how they can grow and care for a plant in their

school or playground. Have them carry out their plan, making regular observations to determine whether they are providing their plants with sufficient resources.

**Vocabulary:** canopy, detritus, epiphyte, leaf litter, nutrient and other general vocabulary as necessary from the glossary.