



WHAT'S A NICHE?

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Grade Level: 6-8

Introduction: Students will collect information about a cloud forest species: the white-faced capuchin monkey, mantled howler monkey, bromeliad, or orchid. Students will collect information about the niches of these species then analyze the similarities and differences between them. They will then consider how two similar species can co-exist in a localized area.

Major Themes: Niches, biodiversity

Connections to National Science Education Standards: Develop descriptions, explanations, predictions, and models using evidence (A); think critically and logically to make the relationships between evidence and explanations (A); recognize and analyze alternative explanations and predictions (A); communicate scientific procedures and explanations (A); structure and function in living systems (C); regulation and behavior (C); populations and ecosystems (C); diversity and adaptations of organisms (C).

Time: 60 minutes (5 minutes for Opening, 30 minutes for Part 1, 20 minutes for Part 2, 5 minutes for Closing). (Part 3 of the lesson will be completed as homework.)

Materials: Students may view the following *Canopy in the Clouds* resources:

Panorama 1: Canopy video 5 (howler monkey)

Panorama 2: Canopy video 5 (epiphytes)

Panorama 3: Ground video 3 (plant competition), canopy video 1 (orchids)

Panorama 5: Ground photo/text 4 (white-faced capuchin)

Panorama 6: Canopy photo/text 2 & 3 (orchids and bromeliads)

In addition, students may visit the Media page to access photographs in the “Vertebrates” photo album.

Computers with internet access (at least one, preferably enough for one per pair of students)

LCD projector (recommended)

Student handouts (*Niches in the Cloud Forest: Warm Up, Niches in the Cloud Forest, and Niches in the Cloud Forest Venn Diagram*)

Print resources about howler monkeys, white-faced capuchin monkeys, orchids, and bromeliads (especially if computer access is limited)



Objectives: Students will be able to: (1) define “niche” and use it in appropriate contexts, (2) describe the niches of selected cloud forest species, (3) relate the role of niches in supporting cloud forest species diversity.

Potential Misconceptions:

(1) Species are not always competing fiercely over resources. Some species have evolved to work in concert with other species. Others have allocated their energy into maintaining a specialized niche, thus avoiding much of the competition in which they might otherwise need to engage.

(2) When we talk about niches, we refer to the niche of an *entire species* rather than that of an *individual* within that species.

(3) It is easy to anthropomorphize when discussing niches. Work with students to identify anthropomorphic language and to replace it with appropriate scientific terminology.

PROCEDURE

Opening: On the night before you teach this lesson, assign the short homework assignment *Niches in the Cloud Forest: Warm Up*. This assignment asks students to describe a profession in detail.

When students come in to class the following day, have them share their work with one another. You may want students to work in pairs or you may prefer to have students work in larger groups with others who described the same profession.

When students are done sharing, ask students if they think it would make sense to describe a plant or animal just as they described the professionals. Allow students to share their ideas, then explain that in today’s class they will be exploring and describing the roles of cloud forest plants and animals in much the same way. These roles are called niches.

Development: In this lesson, students will focus on the mantled howler monkeys, white-faced capuchin monkeys, orchids, or bromeliads. Before beginning this lesson, assign a species to each student such that all species are equally represented in the class.

Distribute the *Niches in the Cloud Forest* student handout. Read the introduction aloud together. Next, use the computer and LCD projector to guide students to the appropriate *Canopy in the Clouds* resources. Take time now to introduce students to the other resources they’ll need to use for this activity.



Remind students that as they take notes from any resource, they must record 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. The following websites stand out as particularly thorough, relevant, and accurate:

- National Geographic (<http://animals.nationalgeographic.com/animals/>)
- Encyclopedia of Life (<http://www.eol.org>)
- Bromeliad Society International (<http://www.bsi.org/>)
- University of Michigan's Museum of Zoology (<http://animaldiversity.ummz.umich.edu/site/index.html>)
- BBC Science and Nature Pages (<http://www.bbc.co.uk/nature/wildfacts/factfiles/659.shtml>)
- Miami University of Ohio, Tropical Ecology Course (<http://jrscience.wcp.muohio.edu/fieldcourses04/PapersCostaRicaArticles/Orchids.html>)

If students are working alone or in pairs at computers, you can allow them to complete Part 1 of the handout on their own. If computer access is limited you should ensure that there are adequate print resources available for students to use. In these instances, students can work in shifts with the print resources and internet resources. 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.

Once students have completed Part 1, have them meet with a partner. Students who researched mantled howler monkeys should pair up with those who researched white-faced capuchin monkeys; students who researched bromeliads should pair up with those who researched orchids. It is helpful to have these pairs planned out in advance. Allow 20 minutes for students to complete Part 2 of the handout.

Closing: Bring the class back together for the final 5 minutes of class. Ask students if they think that the animal niches overlap at all with the plant niches. Encourage students to explain what aspects of the niches might overlap and which might not. Using the prompts from the graphic organizer in Part 1, ask students to predict and then share information about certain facets of the species' niches. For example, ask students whether they think that the organisms that threaten/harm a mantled howler monkey might be similar to the ones that threaten/harm an orchid. After students share their ideas, solicit relevant information from students who researched the species in question. This activity will help prime student thinking for Part 3 of the handout.

Alternatively, you can write the following words on the board or cut the words out on slips of paper and give each pair of students a set:



THE ECOLOGICAL ROLE OF A SPECIES WITHIN ITS COMMUNITY.

Be sure to scramble the words before presenting them to your students! Ask students to rearrange the words to create a sensible definition of niche. Allow students a few minutes to work, then ask them to share their “unscrambled” answers.

Suggested Student Assessment: Assign Part 3 of the handout as homework. Begin the following day’s class with a discussion of student responses to the questions. You may wish to conduct a full class discussion or break students up into groups of four. Allow students to amend their work if their ideas change as a result of the conversation. At the close of the discussion, collect student work for closer evaluation.

Extending the Lesson: This lesson lends itself naturally to extension lessons about natural selection, competition, and competitive exclusion.

Vocabulary: niche, resources, competition, bromeliad, orchid, epiphyte, community, ecological role, species, unique, natural system

WORKSHEETS: *Niches in the Cloud Forest: Warm Up, Niches in the Cloud Forest, and Niches in the Cloud Forest Venn Diagram*