THE DISAPPEARING RAINFOREST: TEACHER GUIDE

Subject: Life Science
Grade Level: Middle School
Last Updated: August 22, 2008

Case Summary

A ranger of the Costa Rica rainforest is in need of your help! To make room for agriculture, Mr. Cutatree and his construction company are destroying Costa Rica's most precious commodity, the rainforest. As young scientists, who just happen to be vacationing on the sunny beaches, your group will need to help the ranger and explain to Mr. Cutatree how destroying the rainforest affects the rest of the world.

Credits

This case was written by Eleanor Lovelace (teacher, Columbia Middle School, Decatur, GA) and Vijay Mittal (PhD student, Psychology, Emory University, Atlanta, GA) fellows of the Emory University PRISM program (http://www.prism.emory.edu). Authors may be contacted at vmittal@emory.edu, Eleanor_R_lovelace@fc.dekalb.k12.ga.us

Learning Objectives

After completing the case students will be able to:

1. Demonstrate in the food web how matter is transferred from one organism to another and can be recycled between organisms and the environment.
2. Explain that sunlight is the source of energy in the food web and this energy moves from organism to organism.
3. Recognize that changes in environmental conditions can affect the survival of both individual and subsequently multiple species and ecosystems.
4. Categorize relationship between organisms that are competitive or mutual beneficial.
5. Describe the characteristics of earth's major terrestrial biome and aquatic communities.

Georgia Performance Standards

S7CS1. Students will explore of the importance of curiosity, honesty, openness, and skepticism in science and will exhibit these traits in their own efforts to understand how the world works. (NSES Content Standard A)

S7CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters. (NSES Content Standard D)

S7CS9. Students will investigate the features of the process of scientific inquiry. (NSES Content Standard A)

S7L4. Students will exam the dependency of organisms on one another and their environments. (NSES Content Standard C, F)

Assessment

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At the end of each scene, students will turn in their box chart, which will be graded based on clarity and completeness. Students stay on task because they are responsible for turning in their box chart. The case is graded on their combined grades of the box chart and products. A 5-point scale will determine their grade (5=excellent, 4=very good, 3=good, 2=fair, and 1=poor) that will be converted into a percentage depending on the wait of the assignment. For each criterion:

- Accuracy and depth of product component; attention to grammar and mechanics
- Individual/contribution within the team
- Individual research ability and effort – online, print, investigative questions

Grading rubrics for each assignment are included in the ***Student Materials***.

The last two criteria (participation and individual effort) will be judged not only by the facilitator, but also by the students to be completed at the end of the case. (See Self/Group Evaluation form in ***Student Materials***).

For the Scene 1 final product, students will design and present (1) a colorful food chain, and then take the classes' chains and (2) create a food web. Students will then (3) demonstrate links in the web that are potentially affected by deforestation/pollution, and finally, (4) design a brochure that convinces Mr. Cutatree's company that deforestation of the rainforest affects the survival of the individual species and subsequently, a far broader system of organisms and ecosystems.

For the scene 2 product, students will (1) use interesting symbiotic relationships to create a commercial or advertisement designed to increase tourism in the rainforest (the ranger feels that this attention will secure the forest as a "protected" habitat.

For the scene 3 product, students will write a letter to the Environmental Protection Agency (EPA) explaining how pollution or disruption of their own local habitat affects their own biome and subsequently, the other biomes in the world. To do this, they must research each of the world's biomes.

Implementation Strategy

This case is designed to take place over seven 120-minutes class sessions. It has three scenes. This case can be facilitated by one or two facilitators. The students will be responsible for their own learning by brainstorming ideas within their group and then with the whole class.

Students will read, discuss and write notes on their box chart in small groups and then discuss facts, questions, hypothesis and learning issues(learning issues are questions that students need to know by researching the unknown terms from their box chart, answer their questions and/or test their hypothesis) in a whole group. During the small group discussion, the facilitator/teacher monitors each group by checking for understanding and helping students with any problems that may arise. During the whole group discussion, the

teacher/one of the facilitators write down notes on a overhead projector, white board or smart board.
The teacher may want to assign students to record as well. With this method, students learn to work together in their team as well as in a whole group, sharing their information and possible competing against other teams.

Implementation Schedule:

Day 1 (120-mins.)

- Show a clip of deforestation in the Rainforest/locate Costa Rica on map (5 mins.)
- Read Scene 1 (10 mins.); complete box charts (20 mins.); share and discuss as a whole class (30 minutes);
- Divide up learning issues among group (10 mins.)
- Using the jigsaw method, each group member will work with students from other group with the same learning issue to research, discuss, and develop product prior to teaching original group. In original group, each expert will teach group members.
- Computer Lab: Research learning issues (45 mins.)
- Homework: Finish researching learning issues.

Day 2 (120-mins.)

- Share and discuss learning issues research with small group (20 mins.) and then with whole group (40 mins).
- Create a colorful food chain and food web incorporating how photosynthesis fuels the process. Present the food chains (60 mins.)
- Homework: Finish researching any remaining learning issues.

Day 3 (120-mins.)

- Discuss new learning issues from homework research (10 mins.)
- Complete case 1 evaluation; wrap up (5 mins.)
- Show a clip of symbiotic and mutualisms relationships among animals (5 mins.).
- Read Scene 2 (10 mins.); complete box charts (20 mins.); share and discuss as a whole class (20 minutes).
- Divide the learning issues among the group (10 mins.)
- Using the jigsaw method, each group member will work with students from other group with the same learning issue to research, discuss, and develop product prior to teaching original group. In original group, each expert will teach group members.
- Computer Lab: Research learning issues (40 mins.)
- Homework: Finish researching learning issues

Day 4 (120-mins.)

- Share and discuss learning issues research with small group (20 mins.) and then with whole group. Use textbook to research any additional issues (40 mins.).
- Design a commercial on how organisms depend on one another demonstrating symbiotic relationships. Students can create props to help with designing the commercial. (60-mins).
- Homework: Bring any props from home to help with commercial.

Day 5 (120 mins)

- Each group will present a 5-minute commercial to the class. Students commercial can be video or presented live. (30-mins). (Optionally you can have students prepare a print advertisement, but that advertisement should still be presented to the class orally – as if they were pitching their advertisement.)
- Complete case 2 evaluation; wrap up (5 mins).
- Read Scene 3 (10 mins.); complete box charts (20 mins.); share and discuss as a whole group (25 mins.)
- Divide the learning issues among the group (10 mins.)
- Using the jigsaw method, each group member will work with students from other group with the same learning issue to research, discuss, and develop product prior to teaching original group. In original group, each expert will teach group members. (20 mins)
- Homework: Finish researching learning issues. Find a local issue of deforestation in Metro Atlanta (or your area).

Day 6 (120 mins)

- Show slides/pictures of different biomes (10 mins.)
- Review and add to learning issues (5 mins.)
- Divide the learning issues among the group (5 mins.)
- Computer Lab: Research learning issues (40 mins.).
- Share and discuss learning issues research with small group (20 mins.) and then with whole group (40 mins.)
- Homework: Research new learning issues. Find a local issue of deforestation in Metro Atlanta (or your area).

Day 7 (120 mins)

- Discuss new learning issues small groups (5 mins.) then in whole group (10 mins.).
- Students will write a rough draft of a letter to the Environmental Protection Agency persuading on how deforestation of the rainforest affects the global climate (all biomes) as well as our very on biome. Students will find a local issue and apply it to what they have learned about ecology (40 mins.).
- Students will type and print their letter on Microsoft words. Students can include graphics on their letter (10 mins.).
- Share letter to EPA (50-mins.)
- Complete case 3 evaluation; wrap up (5-mins.).
- Homework: Reflect on what you have learned from the Ecology unit.

Case Notes

Suggested PBL Instructions

1. Students can use notebook paper fold it in half width wise, then fold it lengthwise.
2. Open up and you have four boxes.
3. Have then to label the boxes as shown above.
4. Have students to work in groups of 3 – 4.

5. Assign roles: Reader; Recorder (all but the reader has this position), Reporter. Remind the reader to copy the info from a teammate.
6. Roles: Reader: Reads the case (scenario) slowly, the recorders are writing the facts from the case that's related to the science concept.

Recorder(s): Writing the facts, questions, etc. in the box chart.

Reporter(s): During whole group the reporter does the speaking for the group.

7. As the reader reads the case, the recorders or writing the facts, not the opinions.

After about 15 minutes, bring class back together, have the reporter from each group to state a fact. If any other groups has that fact they check it off, if not and the class agrees it is a fact they must add it to their list. Continue going from group to group until all facts are exhausted.

8. Have groups complete the "Questions" box, things they wonder about after reading the case. There may be a term that's unfamiliar, or a question they would like to ask someone from the event.
9. Repeat step 7.
10. To form the pre-hypothesis have students go through each question or fact to see if they can develop an If (fact) then statement.
11. Repeat step 7.
12. For any questions the students need information on, have them to record these in the "Learning Issues" box.
13. Repeat step 7.
14. Have the groups to divide the learning issues, and complete the research. This can be done through the text, media center and Internet, etc.

Facilitator Guide:

Facilitator Box Charts With Key Concepts/Issues Included:
Scene I The Disappearing Rainforest

FACTS	**HYPOTHESIS**
1. Vanishing Construction Company is planning to cut down trees. 2. Mr. Cutatree doesn't care about the organisms that live in the rainforest. 3. Canopies store chlorophyll 4. Branches provide shelter and food for living organism. 5. All living things need oxygen. 6. Deforestation affects all living things.	1. If Mr. Cutatree cut down the trees in the rainforest then the organism will eventually die out. 2. If deforestation occurs then removing the oxygen in the rainforest will interrupt the entire whole. 3. The living and non living things depend on one another. 4. Decomposers, producers, and consumers have an predator vs. prey relationship.

LEARNING ISSUES	ACTION TASK (Where will you find the information for your learning issues (lab, expert, product, etc...)?)
1. How does deforestation affect the ecosystem? 2. What is an ecosystem? 3. What is a canopy? 4. How does a canopy beneficial to organisms? 5. What are decomposers, producers, and consumers? 6. What is the process of photosynthesis? 7. How are carbon dioxide and oxygen related to the photosynthesis? 8. What are herbivores, carnivores, omnivores, and scavengers? 9. What is the difference between a food web, food chain, and energy pyramid? 10. Compare and contrast abiotic and biotic. **11.** Describe a predatory vs. prey relation. Give an example.	**1.** Use reference material from the media center and internet. **2.** Use the science textbook. **3.** Ask other group members. **4.** Ask the teacher. **5.** Use old science textbook. **6.** Use note in class as well as handouts. **7.** Seek help from my parents. **8.** Develop experimental design to test my hypothesis. **9.** Interview an expert **10.** Reference books at home **11.** Ask an older sibling

Facilitator Box Charts With Key Concepts/Issues Included:
Scene 2 The Disappearing Rainforest

FACTS	HYPOTHESIS
1. There is a rumbling sound coming from the near by trees. 2. Mr. Ranger needs tourists to visit the rainforest. 3. Mr. Ranger need the scientists to design a tourist Brochure.	1. If the student scientists design a brochure then this will increase tourism to the rainforest. 2. If the student scientists find animals in a symbiotic relationship then the students will be able to design a commercial.
LEARNING ISSUES	**ACTION TASK**
1. What is a symbiotic relationship? **2.** What is mutualism? **3.** What is competition?	1. Use reference material from the media center and internet. 2. Use the science textbook. **4.** Ask other group members. **5.** Ask the teacher. **6.** Use old science textbook. **7.** Use note in class as well as handouts. **8.** Seek help from my parents. **9.** Develop experimental design to test my hypothesis. **10.** Interview an expert **11.** Reference books at home **12.** Ask an older sibling

Facilitator Box Charts With Key Concepts/Issues Included:
Scene 3 The Disappearing Rainforest

FACTS	**HYPOTHESIS**
1. Students help save the ecosystem. 2. Biome can affect other biome. 3. Ecosystems are affected by change. 4. Pollution affects the environment. 5. Changes in a habitat affect vegetation.	1. If the trees are cut down then the environment is affected. 2. Changes in biome affect other biomes. 3. If the environment is polluted then organism and vegetation are destroyed. 4. If there is a change in a habitat then the vegetation will be destroyed.
LEARNING ISSUES	**ACTION TASK**
1. What is an ecosystem? 2. What is a biome? 3. What does EPA stand for? What is EPA? 4. What is conservation? 5. Explain the three R's (reduce, reuse, recycle). 6. How does pollution affect the climate? 7. What is an aquatic environment?	1. Use reference material from the media center and internet. 2. Use the science textbook. 3. Ask the teacher. 4. Use old science textbook. 5. Use note in class as well as handouts. 6. Seek help from my parents. 7. Develop experimental design to test my hypothesis. 8. Interview an expert 9. Reference books at home 10. Ask an older sibling 11. Ask another group member.

Resources

Enchanted Learning. (n.d.). A sampling of tropical rainforest animals. Retrieved July 11, 2008 from www.enchantedlearning.com/subjects/rainforest/animals/Rfbiomeanimals.shtml

Raintree Nutrition. (1996). Rainforest facts. Retrieved July 11, 2008 from www.rain-tree.com/facts.htm

Rainforest Action Network. (2001). World rainforest information portal. Retrieved July 11, 2008 from www.rainforestweb.org