



CRITICAL THINKING ACTIVITY: SYSTEM SCIENCE and THE LORAX

The Lorax is a modern fable about the destruction of an ecosystem and perhaps the world itself. It is a warning illustrating the unintentional consequences of uncontrolled & reckless growth and how it can unleash such destruction. An industry can create its own market and/or the need for its own product; a fad can develop for unneeded and useless items. Unregulated destruction of resources can occur when profits are involved. Yet hope is given at the end that even near total destruction of a species or an ecosystem may be reversed with dedication, hard work and diligence.

Dr. Seuss's *The Lorax* provides an excellent opportunity to combine ecological consequences within a systems approach. The inquiry-based lesson described here is designed to develop students' critical-thinking skills as they create concept maps/causal or connection loops to depict the relationships among components of a larger system. After reading or viewing *The Lorax*, students discuss the interrelationships of the characters in the story and create a causal loop diagram, so as to further understand the nature of systems' interactions and their use in problem solving.

OBJECTIVES: Students will:

1. Explore the inputs and outputs of a system in a complex global context (climate change, *The Lorax*):
 - Discuss the events and interrelationships within a system;
 - Offer advice on a problem based on the relationships between parts of a system;
 - Adjust a feedback loop with the addition of new information;
 - Understand how human actions change the environment;
 - Write a persuasive letter in correct form with supporting evidence;

Teacher Sheet 2

MATERIALS:

- Dr. Seuss (1971) **The Lorax**. New York: Random House (Book/DVD)
- Copies of the **Connection Circle** template for each student;
- **Questions for Discussion** worksheet
- **Element Information Chart** worksheet
- **Letter to the Once-ler**

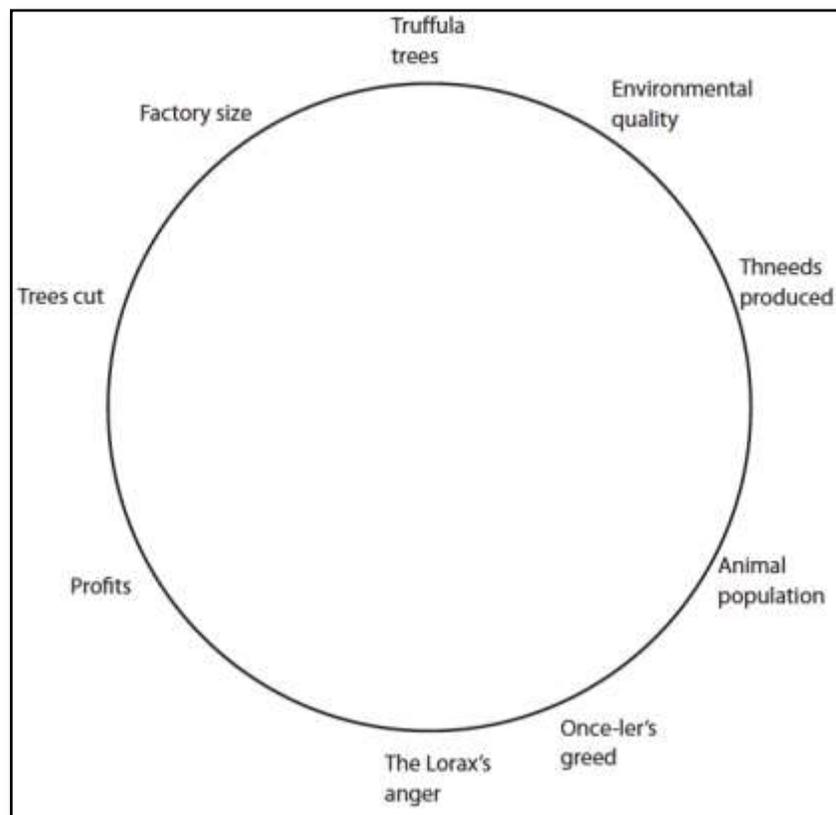
PROCEDURE:

1. As a class, read **The Lorax** or view the movie. Ask students to identify each character (or object) in the story (Barbaloots, Once-ler, Lorax, Thneeds, Swamee-swans, Truffula trees, Truffula fruits, Humming Fish, pond, Grickle-grass, Gluppity-glup, schloppity-schlopp) and record information about them on the **Element Information Chart**.
2. Explain that a system is a group of object or units combined to form a whole and to move and work together. The work of the Lorax and the Once-ler described in the story is a system, just as the Earth is a system. The human body is also a system, as each organ in the body works together to carry out vital functions. Earth's weather is also a system, which includes the atmosphere, water, solar radiation, and aerosols, etc. Discuss why the study of systems is important to scientists.
4. Read the book/View the movie again. This time, pause after each creature is sent away and discuss the cause for their leaving. Students may add to their **Element Information Chart** during this discussion.
5. Use the **Questions for Discussion** to work through the dynamics of the story and clarify the interactions that take place.
6. As a class, create a **connection circle** to illustrate the connections between the figures identified in Step 1.
(See **Connection Circle 1**)

Teacher Sheet 3

NOTE: If students have never used causal loop diagrams or connection circles before, go over the rules for finding the elements of the story as listed on the template at the end of this lesson plan. Each student can use a copy of the template or they can draw their own circles. Working in teams encourages sharing of ideas. It may help to bundle the animals affected by the habitat degradation into one element rather than listing them individually. After students have worked in teams for a short time, lead a whole class session, allowing students to share the elements they have chosen. Build a circle on the overhead or a chart pad. Each team may have a different interpretation, so the circle produced by the whole class may have more elements than individual team circles.

Connection Circle 1

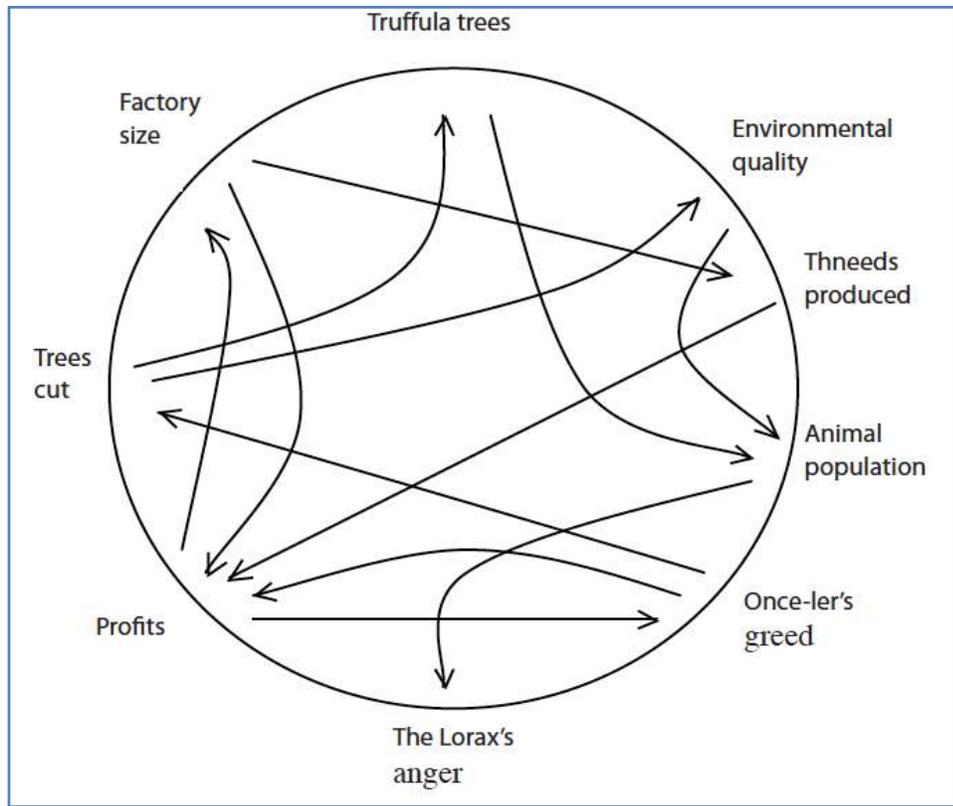


7. Students should identify the important elements that change in the story. Encourage them to talk in teams while each student in the team creates his or her own connection circle. Possible elements include Truffula trees, Thneeds, pollution, Once-ler's greed, Once-ler's profits, the Lorax's anger, factory size, and other things that change quantitatively during the story.

Teacher Sheet 4

8. Have them work in teams drawing their own connections. After students have had about 15-20 minutes to work in teams, bring the class together to share some of the connections. The circles will look cluttered with arrows at this point. (See **Connection Circle 2**)

Connection Circle 2



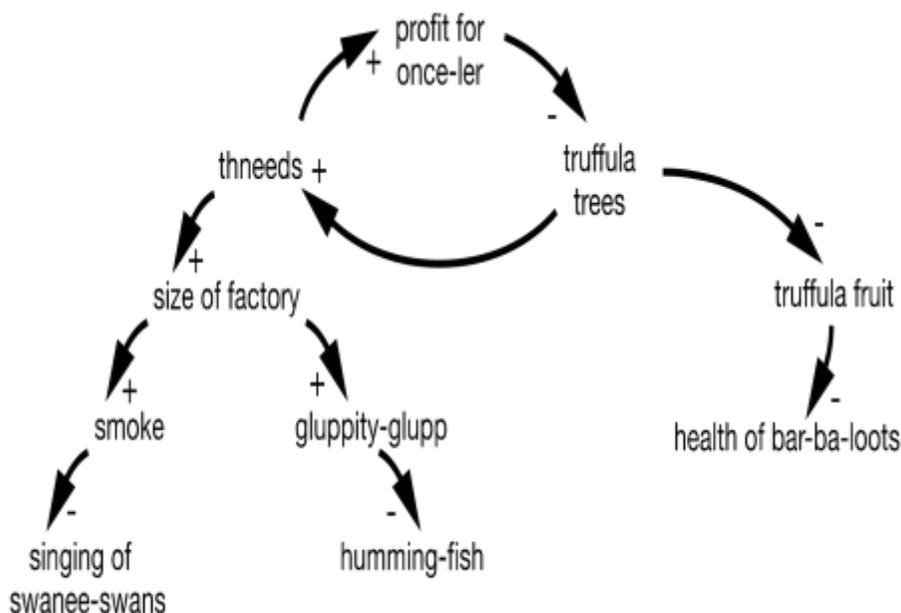
9. In the example above, the link from "Thneeds produced" to "Profits" is (+) because producing Thneeds adds to profits. The link from "Trees cut" to "Truffula trees" is (-) because cutting trees reduces the number of trees. One or two examples should be enough to get students started. As things change quantitatively in the story and causes another element to change. Draw an arrow from the cause to the effect. Label the direction of the change by putting a (+) or (-) sign near the arrowhead or coloring the arrow red or green. Use a (+) sign when the change is in the same direction and a (-) sign when the change is in the opposite direction.

Teacher Sheet 5

10. Have students work in teams to compile a list of changes and share that list with the class.

Note: Student may be confused at first when using (+) and (-) because the signs don't always mean more or less. When elements move in the same direction it is a (+) relationship. When they move in opposite directions it is a negative (-) relationship.

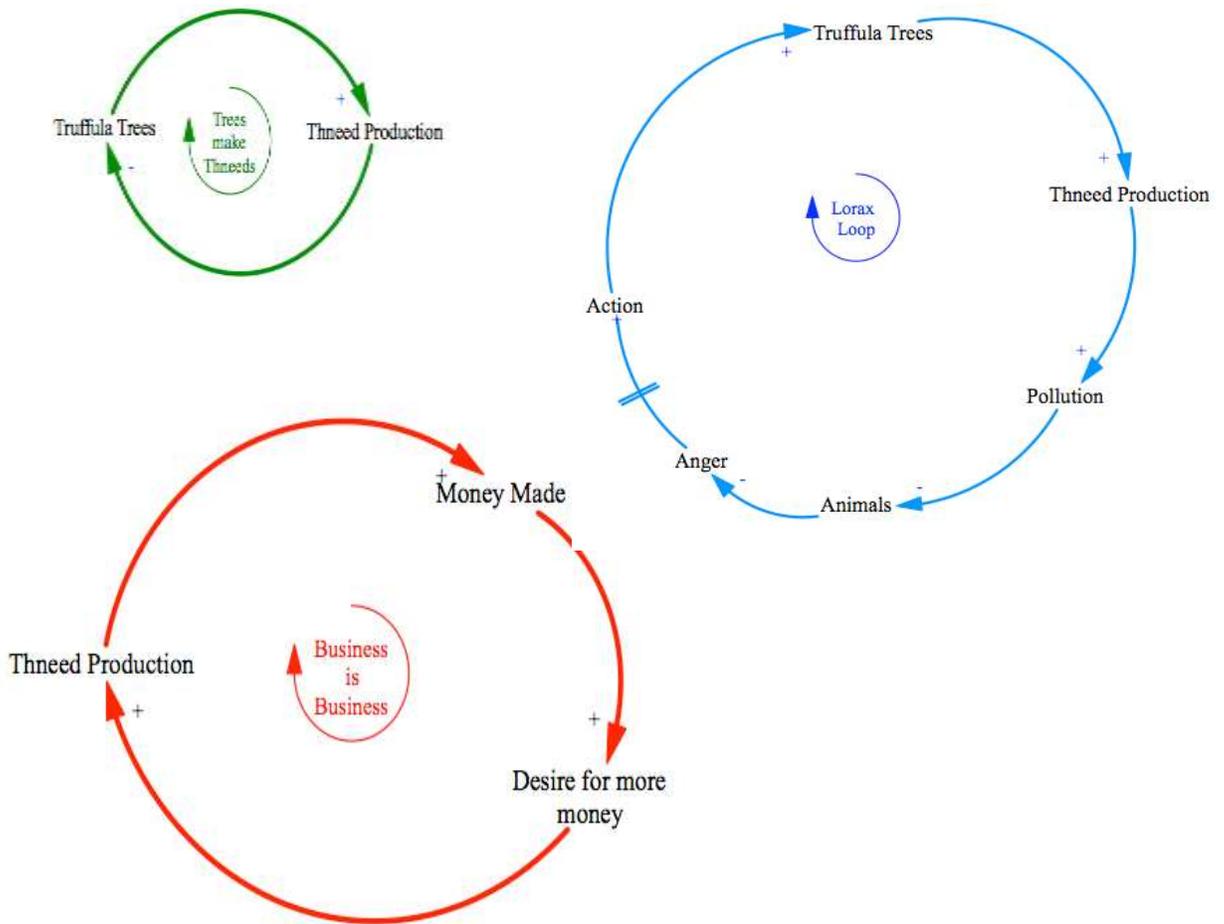
11. As a class, create a **causal loop diagram** to illustrate the interrelationships between the elements identified by the class. The diagram may look like this:



12. Ask if students can trace a path so that they can start at one element, travel along the arrows to at least one other element, and return to the starting point. Instruct students to trace over the pathways using highlighting pens or colored pencils.

13. Have them copy the pathways they have traced onto a separate page, drawing them as loops. Choose representatives to draw these loops on the board or on overhead transparencies in order to share them with the class.

Samples of causal loops



14. As a class, modify the causal loop to include the suggestions within the student's loops.

15. Ask students to pretend that they are the Lorax and are writing a letter to the Once-ler with advice on how he should run his business. The letter should mention connections identified in the causal loop diagram and make suggestions for a substitute to cutting down all the Truffula trees. Ask 2-3 students to share their letters with the class and discuss the different solutions suggested. How does the causal loop diagram help students to identify cause and effect in the situation? **(See LETTER TO THE ONCE-LER worksheet)**

QUESTIONS FOR DISCUSSION



1. What was the land like before the Once-ler came?
2. Did the Once-ler like the trees? Why did he chop down the first Truffula tree?
3. What did the Lorax mean when he said "I speak for the trees?"
4. Why did the Once-ler keep "biggering" and biggering" his factory?
5. What happened to each animal as he did it? Bar-ba-loots? Swomee Swans? Humming Fish?
6. What do you think he could have done differently while still 'biggering' his business?
7. Can you cut down trees but still keep enough in the forest for the animals?
8. How do trees help the earth: plants, animals, air quality, heat, noise, etc.?
9. What could the Once-ler have done differently to help each animal stay there?
10. Do you think the Once-ler feels good about his decisions? Why or why not?
11. What does the Once-ler say you can do with the Truffula seed?
12. Could he have done this while the factory was still making Thneeds?

EXTENSIONS

1. **Write and illustrate a sequel to Dr. Seuss' The Lorax.** The sequel might explain how the Truffula trees made a comeback through replanting and proper care or what the new managers of the Truffula Tree Company are going to do to maintain environmental quality and at the same time make Thneeds.
2. **Prepare a sequence for the key events in both Dr. Seuss' The Lorax and your sequel.** Draw a diagram or flow chart showing the connections between characters in the story (Swomee-Swans, Bar-ba-loots, Lorax) and the natural resources (Truffula Trees, clean air, clean water). Do any new characters or natural resources appear in the sequel? If so, how do they affect the outcome of the original story?

3. **Create a model of the Lorax forest community.** Include the living components, such as the Truffula Trees, Humming-Fish, Bar-ba-loots, Swomee-Swans, the Lorax, and the Once-ler and the non-living components, such as the buildings, the machinery, the equipment and the materials produced by the Thneed factory. Use a sand table, flannel board, butcher paper, crafts, cut and paste or modeling clay.
4. **Create a food chain** — Discuss and draw a food chain for the ecosystem in **The Lorax**. Why did the animals have to leave?
5. **Make a poster or flyer** that tells the story of the Lorax. Your work should include information about the reasons the Once-ler wanted to build his factory, and ideas for how he might have done so without doing so much damage to the Truffula trees.
6. **Prepare a sequence for the key events** in both *Dr. Seuss' The Lorax* and your sequel. Then, draw a diagram or flow chart showing the connections between characters in the story (Swomee-Swans, Bar-ba-loots, Lorax) and the natural resources (Truffula trees, clean air, clean water). Do any new characters or natural resources emerge in the sequel? If so, how do they affect the outcome of the original story?
7. **Create an advertisement** persuading someone to buy a Thneed.