PURDUE UNIVERSITY

PURDUE EXTENSION

FNR-431-W

EXPERT REVIEWED

The Nature of Teaching

Eco-llapse Lesson Plan

Ecosystems are useful for describing how organisms depend on and interconnect with one another.

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Lesson Plan Overview

Estimated Time

50 minutes

Vocabulary

- Producer
- Primary consumer
- Secondary consumer
- Individual
- Population
- Community
- Ecosystem

Objectives

Students will be able to:

- Understand the different proportions of producers, primary consumers, and secondary consumers within an ecosystem
- List the different levels of an ecosystem
- Understand how each level is dependent on and interconnects with another

Required Materials

(all pictures are from public domain sources)

- **Eco-llapse or Jenga® pieces**
- **Sticky tack**
- **Eco-llapse Game Spinner**
- **Eco-cards**
- **Ecosystem Components Worksheet**
- **Eco-llapse Game Worksheet**
- **Eco-llapse Bar Graph Worksheet**
- **Ecosystem background image** (to print and laminate to create a poster)
  www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=1287&CISOBOX=1&REC=19
- **Pictures of different organisms** (to print and laminate)

  Producers (print 10 of each species)

  White water lily
  www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=8292&CISOBOX=1&REC=1

  Sunflower
  www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=2549&CISOBOX=1&REC=2

Targeted Grade-Level Indiana Standards

K–5 Science Standards

K1.1, K.2.1, K.4.1, K.4.2
1.4.3, 1.4.4, 1.5.2
2.2.4, 2.3.4, 2.4.2, 2.4.3, 2.5.3
3.1.3, 3.5.3
4.4.3, 4.4.4, 4.5.4
5.4.5

K-5 Math Standards

K.3.1
2.1.11, 2.1.12
4.6.2, 4.7.4

K-5 English Standards

K.4.3, K.4.5, K.4.6, K.7.1
1.4.1, 1.6.1, 1.7.1
2.6.1
3.7.1, 3.7.2, 3.7.3, 3.7.15
4.1.2, 4.4.1, 4.5.1, 4.7.15

Primary Consumers (print 5 of each species)

White-tailed deer

Fawn:

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=2913&CISOBOX=1&REC=6

Male:

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=3773&CISOBOX=1&REC=13

Female:

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=6615&CISOBOX=1&REC=6

Eastern cottontail

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=1254&CISOBOX=1&REC=3

American robin

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=7392&CISOBOX=1&REC=10

Northern cardinal

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=7539&CISOBOX=1&REC=1

Red squirrel

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=2731&CISOBOX=1&REC=2

Secondary Consumers (print 1-3 of each species)

Raccoon

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=5256&CISOBOX=1&REC=7

Red fox

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=4311&CISOBOX=1&REC=8

Coyote

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=2975&CISOBOX=1&REC=2

River otter

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=2230&CISOBOX=1&REC=1

Red-tailed hawk

www.fws.gov/digitalmedia/cdm4/item_viewer.php?CISOROOT=/natdiglib&CISOPTR=7369&CISOBOX=1&REC=2

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Procedure

1. Read through the Teacher's Notes section before beginning the lesson.
2. Display the laminated ecosystem poster in the classroom.
3. Explain to the students that different components make up an ecosystem, including living and nonliving things.
4. Introduce the terms producer, primary consumer, and secondary consumer as defined in the Teacher's Notes section.
5. Explain to the students that producers are the most abundant component of an ecosystem, and secondary consumers are the least abundant.
6. Using your laminated pictures of the different species, ask the students where each belongs on the ecosystem poster. You can either let the students place them on the poster with the sticky tack, or you can do this. Use the pictures to explain the terms individual, population, community, and ecosystem. (You can help them further understand by saying each of them is an individual, their class is a population, all 3rd grade classes are a community, and the whole school is an ecosystem.) Emphasize that an ecosystem consists of both living and nonliving parts and all plants and animals need each other to survive.
7. On the Ecosystem Components Worksheet, have the students make a list of some of the producers, primary consumers, and secondary consumers from the poster. Define the terms individual, population, community, and ecosystem again while having the students write the definition on the worksheet. Use the poster as a visual while defining terms.
8. Break the students into small groups and provide each group with an Eco-llapse game.
9. Show the students the different colored Eco-llapse game blocks (producer—dark wood, primary consumer—white wood, and secondary consumers—tan wood). Emphasize the terms again by explaining that one block represents an individual, two blocks of the same type are a population, many blocks of different types are a community, and the entire game makes up an ecosystem. Also, explain that there are more producers than primary and secondary consumers, and more primary consumers than secondary consumers (just as the poster demonstrates).
10. Have the students stack the blocks to build an "ecosystem". When a student spins the spinner he or she must remove a block that the spinner indicates. If someone's spin lands on the Eco-card spinner space, that person must draw a card and do what the card instructs. As a student pulls out a block (using only one hand!), have each group keep a tally on the Eco-llapse worksheet of which blocks were pulled. Repeat this until the ecosystem collapses.
11. Once the Eco-llapse ecosystem collapses, explain to the students that the game collapsed because too many blocks were pulled. Compare that to a real ecosystem: if a species disappears, the whole ecosystem could collapse! Reasons for the collapse can be anything: disease, development, natural disaster, etc.
12. Combine the tallies from each of the groups. Producers should have the most tallies and secondary consumers should have the least. Construct a bar graph or pie chart from the tallies.

Supplemental Activity:

Have the students write a story about their ecosystem and why it collapsed. Examples include development, wildfires, and disease. Other scenarios can be obtained from the Eco-cards.

Teacher's Notes

Definitions

Producer: Organism that can make its own food

Primary Consumer: Organism that eats producers

Secondary Consumer: Organism that eats primary consumers and/or producers

Individual: A single organism

Population: A group of individuals of the same species interacting and interbreeding

Community: A group of multiple populations interacting within a given area

Ecosystem: Interacting communities as well as all the nonliving parts of the environment

Notes

Food Habit Types

Producers are trees, flowers, grasses, and all other plants that use photosynthesis to make their own food. They need water, nutrients, and sunlight to do this. Primary consumers are animals such as birds, mice, or rabbits that eat plants or seeds (producers). Secondary consumers can either be carnivores or omnivores. Carnivores, such as foxes and coyotes, eat only meat (primary consumers). Omnivores, such as raccoons or skunks, eat both plants and meat.

Ecosystem Organization

This lesson plan is meant to show how an ecosystem is organized and that everything in the environment is interconnected. A population is defined as a group of individuals that can breed with one another. The difference in a population and a community is that a population is made up of the same species. A community is several different populations co-existing together. An ecosystem is made up of different communities. There are many different kinds of ecosystems (e.g., a whole forest or the environment inside a small pitcher plant).

Example:

Individual: A deer

Population: A herd of deer

Community: The herd of deer, rabbits, birds, plants, etc., all sharing the same space as their environment

Ecosystem: The herd of deer, the rabbits, skunks, birds, air, water, sunlight, and rocks within an area.

Activity

After you have displayed the ecosystem poster in the classroom, explain to the students that they are going to build their own ecosystem. Explain the terms *producer, primary consumer,* and *secondary consumer.* You or the students can place the pictures on the poster. Once all of the pictures are on, point to and explain the term *individual.* Explain that a population is a group of animals or plants of the same species and have them find one on the poster. Then explain that a *community* is made up of many populations and an ecosystem is made up of all the plants, animals, and nonliving things such as water, air, sunlight, and soil. Then ask what a specific animal needs to survive (examples: What does the coyote eat? What do the plants need to grow?), and explain that all of these organisms need each other to survive and make up an ecosystem.

Eco-llapse Game

There are many different kinds of ecosystems: every forest, pond, and desert can be its own ecosystem. The ecosystem for this game consists of producers (dark wood), primary consumers (white wood), and secondary consumers (tan wood). Each component of this ecosystem is present in different numbers; there are more producers than consumers; and there are more primary consumers than secondary consumers. The different colored blocks are represented in these proportions.

Students should be placed in small groups (up to six per group). To play the game, have the students build the ecosystem by stacking all the blocks. The blocks can be added in any order. On a student's turn, that student will spin the spinner and pull the block according to the spinner's instructions (brown—producer, white—primary consumer, tan—secondary consumer). If the spinner lands on the Eco-card space, the student will pick up a card and add or remove the specified number of blocks. (Note: players can only use one hand to remove blocks.) Each group will keep a tally on their Eco-llapse worksheet of the types of blocks pulled. Once the ecosystem collapses, you can explain that when too many organisms are pulled from the environment, the ecosystem will collapse. If an Eco-card makes the ecosystem collapse, explain that outside factors can lead to the collapse. The game can be played several times.

After playing the game, combine all the tallies of the class and construct a bar graph. The number should reflect the proportions of the ecosystem.

Jenga®

If you do not have access to an Eco-llapse game, you can buy Jenga® at a toy store and color the ends to represent producers (brown), primary consumers (white), and secondary consumers (tan). Make sure to represent the correct proportions: 60% producer, 30% primary consumer, and 10% secondary consumer.

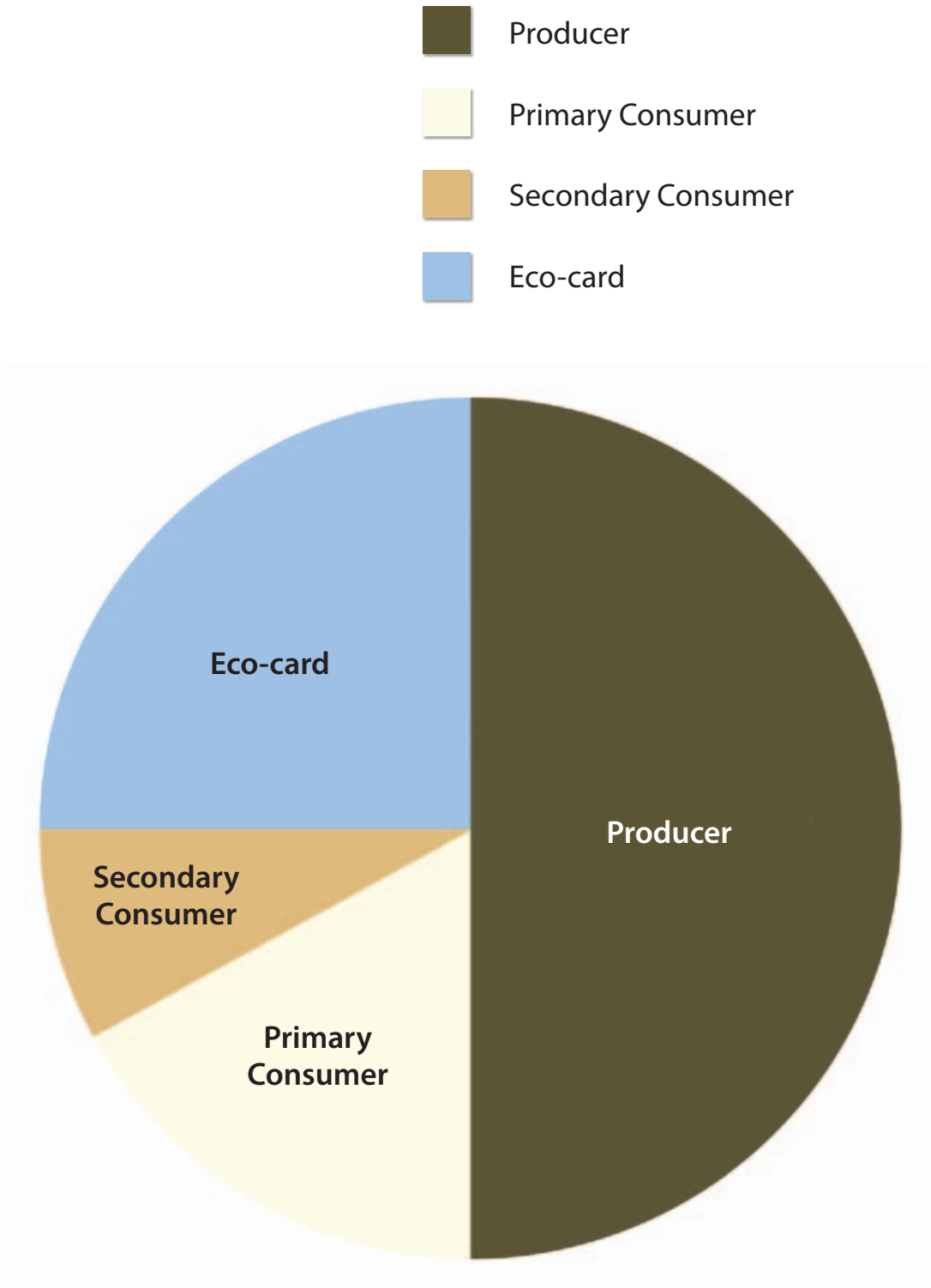
To Make the Eco-llapse Game Spinner

Materials:

- Thick cardboard (a piece from a box will work)
- Thin cardboard
- Brads
- Eco-llapse Game Spinner

1. Print the Eco-llapse Game Spinner pie graph (50% producers, 17% primary consumers, 8% secondary consumers, and 25% Eco-card) and cut it out. Spinners approximately 4 inches or larger will work best.
2. Make an arrow from the thick cardboard. It should be approximately 1/2-inch wide and long enough to reach more than half way across the spinner pie graph when placed in the center.
3. Glue the spinner to the thin piece of cardboard.
4. Make a hole in the very center of the spinner pie graph using a hole punch.
5. Make a hole in the back center of the arrow. (You may need to do this with a knife. A drill bit on high speed works well, too.)
6. Put the brad through the arrow and then through the hole in the spinner pie graph. Push down the clasps on the back, but make sure they are loose enough for the arrow to spin. To do this, you can place a ruler against the cardboard and fold the clasps over the ruler.

Eco-llapse Game Spinner



Eco-cards

You can print off the text for each card, and then glue the text onto a 3x5 inch index card.

A bark beetle kills most of your trees.

Remove 3 producers.

Oh, no! A new Super Store is being built.

Remove any 3 blocks.

Eco-cards

People plant trees on their property.

Add 2 producers.

An invasive species starts growing in your ecosystem!

Remove any 2 blocks.

Eco-cards

The state releases native birds into your ecosystem.

Add any 4 blocks.

An endangered species is found in your ecosystem, and it becomes protected!

Add 4 blocks.

Eco-cards

Part of your ecosystem gets converted to a cornfield!

Remove any 2 blocks.

The community cleans up the river that runs through your ecosystem.

Add any 2 blocks.

Eco-cards

A tornado rips through your ecosystem!

Remove any 3 blocks.

A new population of Northern Cardinals moves into your ecosystem.

Add 2 primary consumers.

Ecosystem Components Worksheet

Name: _____

Producer	Primary Consumer	Secondary Consumer	Non-living

Individual: _____ Community: _____

Population: _____ Ecosystem: _____

Eco-llapse Game Worksheet

Name: _____

Producer	Primary Consumer	Secondary Consumer

Eco-llapse Bar Graph Worksheet