

Ecological Relationships
Created by Denise Grant
Knifley Grade Center, Adair County

Grades 6 – 8

App. Time: 10 days

Overview:

Students will learn to identify ecological elements such as biotic and abiotic factors, species interactions (populations and food webs). They will analyze ecosystems for these elements and research how these factors influence species survival rate.

Academic Expectations:

- 2.2 Students identify, analyze, and use patterns such as cycles and trends to understand past and present events and predict possible future events.
- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.4 Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.
- 2.5 Students understand that under certain conditions nature tends to remain the same or move toward a balance.
- 2.6 Students understand how living and nonliving things change over time and the factors that influence the changes.

Program of Studies:

- S-8-LS-4 Students will investigate and analyze populations and ecosystems.

Core Content for Assessment:

- SC – M – 3.5.1 A population consists of all individuals of a species that occur together at given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.

- SC – M – 3.5.2 Populations of organisms can be categorized by the functions they serve in an ecosystem. Plants and some microorganisms are producers because they make their own food. All animals, including humans are consumers and obtain their own food by eating other organisms. Decomposers, primarily bacteria and fungi are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.
- SC – M – 3.5.3 For most ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.
- SC – M 3.5.4 The number of organisms an ecosystem can support depends on the resources available and abiotic factors (e.g., quantity of light and water, range of temperatures, soil composition). Given adequate biotic and abiotic resources and no diseases 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.

National Standards

- NSS8_3.16 A population consists of all individuals of a species that occur together at a given place and time. All populations living together and the physical factors with which they interact compose an ecosystem.
- NSS8_3.17 Populations of organisms can be categorized by the function they serve in an ecosystem. Plants and some micro-organisms are producers--they make their own food. All animals, including humans, are consumers, which obtain food by eating other organisms. Decomposers, primarily bacteria and fungi, are consumers that use waste materials and dead organisms for food. Food webs identify the relationships among producers, consumers, and decomposers in an ecosystem.
- NSS8_3.18 For ecosystems, the major source of energy is sunlight. Energy entering ecosystems as sunlight is transferred by producers into

chemical energy through photosynthesis. That energy then passes from organism to organism in food webs.

- NSS8_3.19 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.

Essential Content:

- What is an ecosystem?
- What are biotic and abiotic factors and examples of each?
- What is a “species”?
- What are food chains and food webs?
- What is a population?
- What are the terms “threatened”, “endangered”, and “extinct” and how they relate to ecosystems?

Organizer:

All living things on this planet are related somehow, nothing exists on its own.

Essential Question:

- ❖ How many ecosystems can you name in your neighborhood, are they important to you?
- ❖ How does a decaying log feed you?
- ❖ How many different populations are you a part of?
- ❖ Where did the dinosaurs go?

Culminating Performance:

There will be a written unit test covering the presented content.

Project:

Divide students into groups of 3 or 4 people. Assign each group an organism to study. While on their field trip to Clay Hill, students will be able to take pictures of their organism, see its natural habitat and surroundings, and ask any applicable questions. They will create a presentation (using any format posters, power-point etc.) about this organism and include the following information.

- What the organism is, accurate description
- What the organism's habitat and niche is
- Where it belongs in the food web or food chain
- What or how many populations this organism is a part of
- What type of abiotic factors directly affect the organism's survival

Students will make this presentation to the class, and answer any questions. They will be the "expert" on this organism for the rest of their peers.

Lesson Plan Format

Name _____ Date: _____ Age/Grade Level 7th or 8th

Subject Science # of Students _____ # of IEP Students _____

Major Content Ecology Unit Title Relationships

ACTIONS

Goals and Objectives: Students will gain an understanding of ecosystems by observing the many systems in which they belong.

Context: This is the introductory lesson to this unit. Students will investigate the many different ecosystems that exist in Kentucky and identify the differences and similarities that may exist. They will then interpret their role in each ecosystem and consider why it is important.

Resources: Computer with Internet access, projector, overhead screen

Procedures: 1) Begin class with asking students if they can define what an ecosystem is, and can they name several different ones.

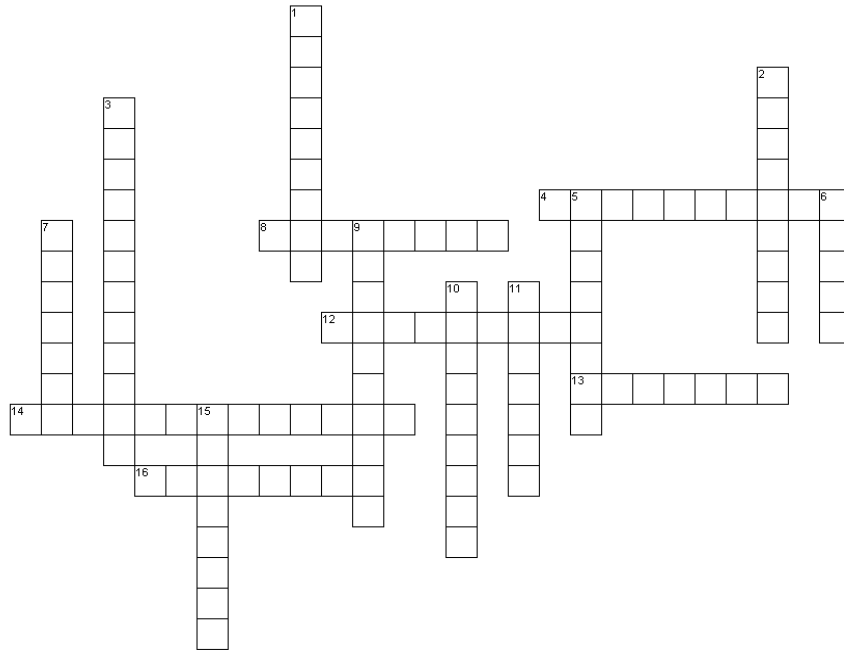
- 2) Log onto the site <http://www.kentuckyawake.org/habitatsEcosystems/> . Be sure this is projected for all students to see. (If unable to access the internet, these “posters” are available to purchase.) Click on each of the ecosystem posters listed and discuss with students the elements they see that are similar and/or different.
- 3) Introduce the following vocabulary words into the discussion: ecosystem, biotic factor, abiotic factors, species, population, producer, consumer, decomposer, herbivore, carnivore, omnivore, food chain, food web, organism, niche, and habitat.
- 4) Briefly review what has been discussed, answer any questions students may have.
- 5) Pass out crossword puzzle worksheet, allow time to begin working, observe student progress through classroom circulation.
- 6) Students will turn in at end of class, or next session depending on time allowance.

Student Assessment:

Teacher observes classroom participation during discussion, and graded worksheet. (See attached puzzle and rubric.)

***This lesson can be adapted to individual student populations based on classroom necessity.**

Introduction to Ecology Vocabulary



Across

5. meat eater
8. the "job" an organism has in its ecosystem
12. an area that contains living and non-living factors i.e. wetlands caves rivers etc.
16. plant eater

Down

1. an organism that breaks down dead organisms
2. population of similar organism capable of producing viable offspring
3. place an organism lives
4. all the food chain interactions for a given area
6. plant and meat eater
7. group of organisms of one species
9. any organism that must obtain energy by eating other organisms
10. any organism capable of producing its own food
11. flow of energy and nutrients from one feeding level to another

13. any nonliving element in an ecosystem
14. any living element in an ecosystem
15. a complete living thing

Name _____ Date: _____ Age/Grade Level 7th or 8th

Subject Science # of Students _____ # of IEP Students _____

Major Content Ecology Unit Title Relationships

ACTIONS

Goals and Objectives: Students will learn the concepts of producers, consumers and decomposers and how they interact to form food chains and food webs.

Context: This is the second lesson in the unit covering Ecology relationships. This lesson will take at least three days to complete. Students will gain the information on these topics through web-based research and then create a food web collage.

Resources: : <http://www.offwell.free-online.co.uk/decompos.htm>, :
<http://www.aliexplorer.com/ecology/e37.html>,
http://www.arcytech.org/java/population/facts_foodchain.html. These are the sites utilized in the web-based research worksheet. (See attached sheet.) Magazines with pictures of various animals, posterboards, scissors, glue, markers.

Procedures: 1) Briefly review the topics discussed in previous lesson and introduce this lesson's focus.

- 2) Pass out the worksheet and discuss with students the instructions. Students can work in pairs to perform this research.
- 3) Collect completed worksheets.
- 4) Break students into groups of three to design posters depicting a food web.
- 5) Students will collect pictures of various organisms that represent the different trophic levels and arrange them to represent an accurate food web. They must give the scientific name and common name (if available) of the organisms selected. See attached project rubric for specifics expected on posters.

Student Assessment:

- 1) Completed web-based research worksheets
- 2) Completed poster projects

Feeding Relationships Web Search Activity

Log onto each of the sites listed and answer the questions under each heading. Be sure to be complete in your answers.

Log onto the following site: <http://www.offwell.free-online.co.uk/decompos.htm>

1. On what date did the rabbit become unrecognizable?
2. How long did it take for the animal's tissues to completely disappear?
3. What is decomposition?
4. Name some organisms that allow this process to occur.
5. Why does this site state "Virtually nothing goes to waste in nature" ?
6. What is an important part of all life cycles?

Log onto the following site: <http://www.aliexplorer.com/ecology/e37.html>

1. What is often food for a decomposer?
2. List the example food chain first discussed.
3. What organisms use dead plant material as a food source?

Log onto the following site:

http://www.arcytech.org/java/population/facts_foodchain.html

1. What is the only beginning of a chain of energy conversions?
2. What is at the end of a feeding chain?
3. Name the primary consumer in the food chain illustrated.
4. What is a trophic level?
5. What is a calorie?
6. In an energy pyramid, how much larger is the volume of each feeding layer, as it goes up?
7. Where would squirrels fit in a food chain?

Log onto the following site:

<http://www.s-hamilton.k12.ia.us/BiologyHomepage/angiemonthei/afood.htm>

Use this page as self-assessment of what you have learned today.

Knifley Grade Center
Food Web Poster Project



Name: _____

Teacher: Denise Grant

Date : _____

Title of Work: _____

| | Criteria | | | | Points |
|--|--|---|---|--|---------------|
| | 1 | 2 | 3 | 4 | |
| Title of Poster | Title not given 0 points | Inappropriate title 1 point | Title listed but not complete 3 points | Creative appropriate title 5 points | _____ |
| Correct organism selection | Organisms are not listed for specific feeding level 0 points | Organisms shown, but not appropriate 10 points | Organisms shown but not identified at the feeding level 20 points | Organisms represented and placed in proper feeding level 30 points | _____ |
| Correct placement of arrows indicating feeding relationship | No arrow drawn 0 points | Arrows drawn but incorrect 5 points | Arrows drawn but not complete 15 points | Arrows placed appropriately 30 points | _____ |
| Name of organism given | No names listed 0 points | Names given, but incorrect for organism pictured 5 points | Names given but inaccurate 7 points | Correct names given for organism pictured 10 points | _____ |
| Spelling | 5-10 misspelled words 1 point | 2-4 misspelled words 2 points | 1-2 misspelled words 3 points | No spelling errors 5 points | _____ |
| | | | | Total----> | _____ |

Teacher Comments: 80 points possible for project

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Major Content _____ Unit Title _____

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Context:

Resources:

Procedures:

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