

Unit Title : Exploring Ecosystems

Essential Questions:

- a. What makes up an ecosystem?
- b. How do parts of an ecosystem interact?
- c. How can I protect ecosystems?

Connections:

Core Content

SC-EP-4.6.1 Students will describe basic relationships of plants and animals in an ecosystem (food chains).

Plants make their own food. All animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants. Basic relationships and connections between organisms in food chains can be used to discover patterns within ecosystems.

SC-E-3.1.2 Students will understand that organisms have basic needs (e.g. air, water, nutrients, light) and can only survive when these needs are met.

SC-E-3.3.3- Students will understand that all organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to the organism or to other organisms, other changes are beneficial.

Academic Expectations

- 2.3 Students identify and analyze systems and the ways their components work together or affect each other.
- 2.6 Students understand how living and nonliving things change over time and the factors that influence the changes.

Curriculum Web

This unit of study is dominantly related to science content. Other subject connections include math (graphing and data), practical living (protecting

ecosystems), and social studies (using maps to locate different ecosystems). Students will also respond to both formative and informative writing prompts.

Culminating Performance

At the completion of this unit, students will create an ecosystem on our school grounds as a class. Prior to the culminating performance, students will have produced a small ecosystem in which they observed daily, and mastered meeting the basic needs of a fish. Students will also have learned about how ecosystems can be protected based on human lifestyle choices.

The students will use the pond in the school's courtyard to create an ecosystem. The class will include aquatic plants and animals, and decide on the accommodations needed to meet their needs (PH level of water, soil condition, etc.)

Lesson 1

Name: What Makes Up an Ecosystem?

Grade: 4

Content: Science

Unit Title: Exploring Ecosystems

Objective (s):

- a. Students will describe the basic parts of an ecosystem.
- b. Students will create an ecosystem and record observations in a journal.

Connections:

SC-EP-3.4.1 Students will explain the basic needs of organisms.

Organisms have basic needs. For example, animals need air, water and food; plants need air, water, nutrients and light. Organisms can survive only in environments in which their needs can be met. Based on observations of plants and animals in controlled settings, simple investigable questions should be posed, simple investigations designed, resulting data collected and analyzed and consequences of similar situations predicted.

DOK 2

Context:

This is the first lesson in a three lesson sequence. Student's prior knowledge includes knowing the difference between living and non living things, as well as the basic needs of plants and animals. In this lesson, students will create a terrarium and an aquarium as models of an ecosystem. Throughout the creation of their models, students will record their observations. Time will be

allotted for students to manage and collect their data in duration of the Ecosystem unit. These observations will allow students to view changes and needs of an ecosystem.

Materials:

- *River Bank* handout (each student)
- Markers

Terrarium

- Clear 2 liter bottle (per pair) with the top of the bottle removed
- 1 c. of gravel (per pair)
- 2c. of soil (per pair)
- toothpicks
- pinch of alfalfa seeds, grass seeds and mustard seeds (per pair)
- combination of leaves twigs and rock-dead plant material (about 1 c. per pair)
- Sharpie Marker (per pair)
- Water droppers
- Small plastic cup
- *Setting up the Terrarium* (per pair)
- Plastic wrap
- Rubber bands
- Crickets

- Hand lens (per pair)

Aquarium

- Clear 2-liter bottle (per pair) with top removed
- 1 c. gravel (per pair)
- water (approximately 3-4 cm. from top of bottle)
- sharpie marker (per pair)
- 1-2 sprigs of elodea (per pair)
- 10-15 duckweed plants (per pair)
- 3 dropper full of alga (per pair)
- tap-water safe drops (per pair)
- *Setting Up the Aquarium* record sheet (per pair)
- 2 Mosquito fish (per pair)
- *Aquarium Observation* sheet

Procedures

Day 1:

Introduction: Ask students to think about living and non-living things; create a table on chart paper to record student responses for both categories. Explain the definition of ecosystem and give students examples. *Read about ecosystems- book from school library.*

Give students an overview of the upcoming unit. Tell students that they will be making a terrarium and an aquarium with a partner. Today, students will individually complete the *Riverbank Environment* handout and response sheet.

Students will choose two different color markers to represent living and non-living things in the picture.

Day 2:

Review living and non-living things from day one. Remind students that they will be creating a Terrarium; show students previously made example and explain each of the four divided sections on the 2-liter bottle.

Divide students into pairs. They will be working with their partner for both experiments. Give each pair a plastic cup. The students will collect dead material (ex: leaves, grass and rocks) from outside. (Once the pair has their collected materials, return inside to create the terrarium.)

Give each pair a 2-liter bottle and a set of student instructions for setting up the terrarium. Follow step-by-step instructions in whole group while referring to the previously made example. Students will also need to record data on the *Setting Up the Terrarium* handout as the class follows the instructions. Students will also complete the illustrated data for their records.

Once the terrariums are complete and labeled (with student names and plant names), place in window or well lit area.

Day3

(10 min.) Ask students to get with their partner and their terrarium. Today, students will be observing the growth of their plants and soil from the previous day set up. (Some growth may have occurred, however the majority of the plant growth will be seen in 3-6 days). Students will record observations in their journals. Ask students to return their terrariums to the window. Briefly discuss their observations.

Today students will be creating their aquariums. Provide each pair with student instructions for setting up the aquarium and requested materials. Again, follow step-by-step in whole group. Students will record data on their *Setting Up the Aquarium* handout as well as illustrated data. Once students have completed their aquarium, they will place them in the designated location in the classroom. (Fish will be added in following lessons).

Day 4

Students will make observations on their terrariums and add to their previously collected data over the soil and plants.

Today students will read an informative article *Duckweed, Elodea and Algae: Why Are They Important?* Students will answer questions over the article after reading.

Day 5

Students will make observations on their terrariums and add to their previously collected data over the soil and plants.

Today students will read an informative article *Mosquito Fish: Strong Little Fish* and answer questions once they complete the reading.

Ask students to get with their partner and aquarium. Give each pair two mosquito fish and the student instructions for adding animals to the aquarium. Students will also begin to make observations on their aquarium plants.

Further lessons

Students will observe both aquarium and terrarium daily for 2 weeks.

Students will see the growth of the 2 ecosystems and how life is maintained with the basic needs are met.

Assessment

Formative: Observation logs; completion of both projects and upkeep; responses to informative articles

Summative: Unit Test

Resources

All Wild About Kentucky's Environment Website

<http://www.kentuckyawake.org/curricula/ecosystems.cfm?category=31507> (obtained October, 2006)

Lesson 2

Name: How do parts of an ecosystem interact?

Grade: 4

Content: Science

Unit Title: Exploring Ecosystems

Objective(s):

- a. Students will demonstrate an understanding of producers, consumers, decomposers, carnivores, herbivores, and omnivores and how they connect within an ecosystem.

Connections :

SC-04-4.6.1 Students will analyze patterns and make generalizations about the basic relationships of plants and animals in an ecosystem (food chain).

Plants make their own food. All animals depend on plants. Some animals eat plants for food. Other animals eat animals that eat the plants. Basic relationships and connections between organisms in food chains can be used to discover patterns within ecosystems. DOK 2

Context:

This is the second lesson in a three lesson sequence within the Ecosystem unit. So far within the unit, students have created and observed two ecosystems (terrarium and aquarium). In this lesson, students will explore food chains and how their function helps maintain an ecosystem. Students will create a menu,

“Consumer Café”, that illustrates what a consumer, producer, decomposer, carnivore, omnivore and a herbivore entails.

Materials:

- Examples of local restaurant menus
- Science text pgs. B20-B25

Procedures:

Introduction: On the sentence strip paper, write the definition for the following terms: producer, consumer, decomposers, carnivore, herbivore, and omnivore. Ask students to match the term with the correct definition. Tell students that these vocabulary words will be explained further in their reading of Pages B20-B25 in their text.

Day 2:

After reviewing the assigned reading from Day 1, provide students with an example of their project. Explain the parts of the project while providing a letter home to parents, scoring guide and student examples.

Brain storm ideas in whole group for each category of the menu. (ex: what do carnivores need? What do Herbivores need? What do producers need? Etc.) Students should keep this as pre-writing to help them with their project.

Day 3:

Review definitions and examples of consumers, producers, decomposers, carnivores, herbivores and omnivores. Ask students to get out their pre-writing from the previous day. Students will use this to create an outline for their menu. A rough draft will be due the next day. Students will have 1 ½ weeks to complete the project. It will be due the following week after the rough draft is completed.

Assessment:

Formative: Rough draft, vocabulary match

Summative: Project and unit test

Lesson 3

Name: How can I protect ecosystems?

Grade: 4

Date:

Content/subject: Science & Practical Living

Unit Title: Exploring Ecosystems

Objectives:

Students will create a poster that represents 3 ways to protect our environment.

Connections:

SC-E-3.1.2 Students will understand that organisms have basic needs (e.g. air, water, nutrients, light) and can only survive when these needs are met.

SC-E-3.3.3- Students will understand that all organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to the organism or to other organisms, other changes are beneficial.

Context:

This is the third lesson in a three lesson sequence. Prior lessons include introduction to what makes up an ecosystem and how these parts interact. In this lesson, students will gain an understanding of why it is important to protect the environment, and how bad choices may affect an ecosystem.

Resource/Materials:

- “A Fishy Tale”
- Fishbowl

- Sponge in the shape of a fish
- Colored drink mix
- Punched out paper dots
- Yellow and red food coloring
- Grass clippings or decaying plants
- 7 small paper cups
- string
- pencil
- liquid detergent
- weight or fishing sinker
- soil
- water
- salt
- cooking oil

Procedures:

1. Bring students together on carpet to discuss and review the definition of an ecosystem and the elements that it is made up of.
2. Ask students to think about how their actions affect the ecosystems (record student responses on chart paper).
3. Tell students that today they will see how bad choices such as throwing trash on the ground, not recycling, oil spills, etc. affects our ecosystems.

4. Have “pollutants” for the activity set up in the paper cups, along with the fish bowl with “Buddy” the fish. Show students the cups and what they contain. (colored drink mix, grass, cooking oil, salt, paper dots, and warm water with detergent). Explain that students are going to be watching for changes that may occur in the water. Presently, the water is fresh and clean. Ask the students how they think “Buddy” feels.
5. Give each student a copy of “A Fishy Tale” script to read and follow along.
6. Read through script together, carrying out actions as they are mentioned. In whole group setting, discuss how “Buddy” is feeling now that the water is polluted. Ask students what they think should be done with the container of polluted water.
7. At the end of the script discuss with students the importance of keeping our environment clean.
8. Ask student to create a poster board advertising the importance of keeping our environment clean. Tell students these posters will be placed around the school to encourage our school community to make positive choices.

Adaptations:

*Special Education teacher is collaborative during science time. Adaptations for special needs students will be individually addressed according to their IEP.

Student Assessment:

Formative: Student Poster with scoring guide

Summative: Unit Test

Related Activities:

- *Enviroscape* tabletop models
- Filtering systems

Resources:

All Wild About Kentucky's Environment Website

<http://www.kentuckyawake.org/curricula/ecosystems.cfm?category=31507> (obtained October, 2006)

Scoring Guide

Protect Our Ecosystem Poster

Poster Illustrates:

- 3 ways to protect our ecosystem _____/30

Student gives information about all 3 ways (how and what it protects in the ecosystem)

- Illustrations are neat and colorful _____/10

All pictures are relative to the content and purpose of poster as explained in task prompt.

- Writing is legible _____/10

Name _____

Consumer Café Scoring Guide

_____ 50 pts. Create a menu for each organism

5 Menus Total

1. Producers

2. Consumers

3. Decomposers

Herbivore

Carnivore

Omnivore

_____/50pts. Each menu includes the following features
(minimum numbers of items are listed)

2 Appetizers

3 Entrees

2 Beverages

3 Desserts

3 Kids Menu Entrees

_____/20pts. Menu Design: Creatively colored (or designed) and
includes pictures

_____/ 30pts. Project is neatly prepared and organized

Total Score _____/150 Pts.

Student Signature _____ Date _____

Parent Signature _____ Date _____

Dear Parents/Guardians,

Throughout our Ecosystems unit, we will be learning about the shared relationships of plants and animals. As we begin our study of food chains and food webs, your child will begin designing menus tailored for each group of organisms. The textbook is an excellent vocabulary resource, and creating these menus will allow the students to creatively apply all they have learned and will continue to learn.

As a class, we have reviewed the project scoring guides and have seen several student examples. The students will be given some class time to work on their menus ; however, your child should be working on their menus at home as well.

The scoring guide included shows you and your student exactly what the Consumer Café project requires. While I always encourage students to get constructive feedback from peers and adults, this is an individual project. This scoring guide is a tool for your child to complete his/her very best work and earn an excellent grade.

All information needed to complete this project is found on pages _____ in the science text book. Please feel free to contact me with any questions or concerns.

Thank you,

Students,

Please read the Consumer Café scoring guide with a parent/guardian and return the signed copy in your Monday folder. I am so excited to see your menus! Have fun creating your cuisines, and please come to me with any questions and ideas you have about your menus.

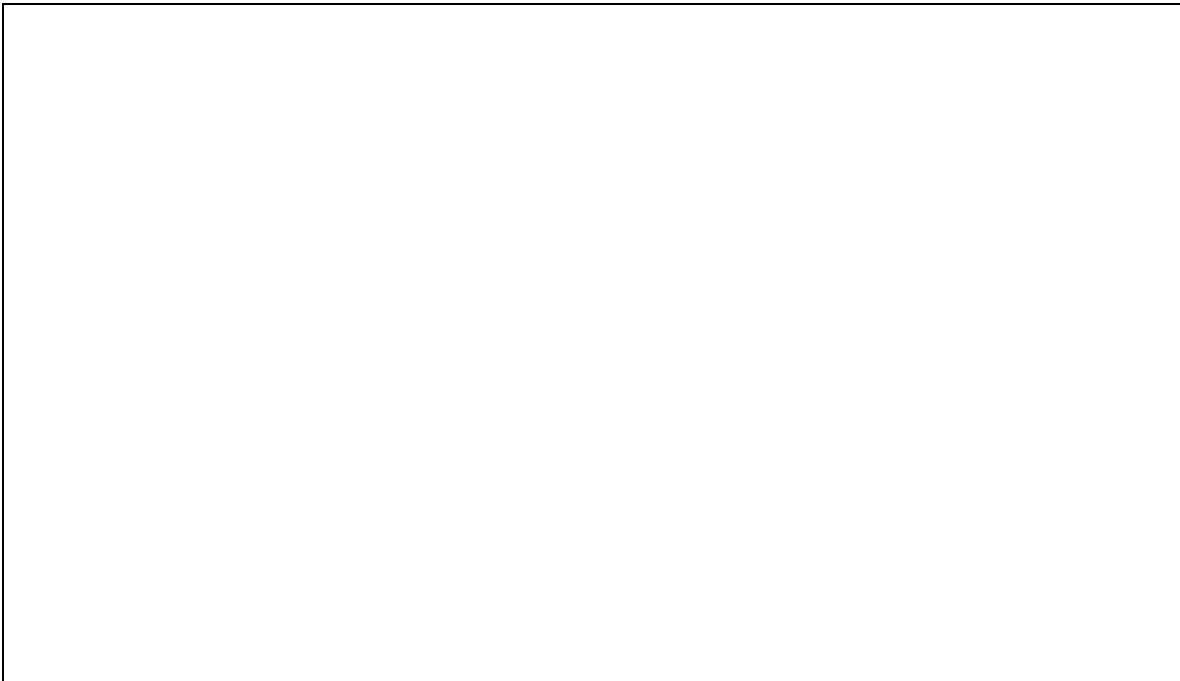
Bon Appetit!

Name _____

Directions: Choose one color for living things and another color for non-living things. Color all the living things one color. Color all the non-living things another color.

In all ecosystems, living things rely on nonliving things.

Describe in words, and draw a picture, of how living part of this fresh water ecosystem relies on a nonliving part.



Terrarium Observations

	<u>Amount and Size</u>	<u>Color/ Description</u>	<u>Other Observations</u>
Soil			
Alfalfa			
Grass			
Mustard			
Dead Material			

Setting Up the Aquarium

	<u>Amount and Size</u>	<u>Color/ Description</u>	<u>Other Observations</u>
Gravel			
Water			
Elodea			
Duckweed			
Algae			



Exploring Ecosystems

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