3-5 Communities and Ecosystems Activity

South Carolina Aquarium

Overview

Focus Question
What is a community? What is an ecosystem?

Activity Synopsis
Students will be given clues on cards regarding biotic and abiotic factors from three ecosystems within three different regions of South Carolina; a blackwater swamp from the Coastal Plain region, a mountain stream from the Mountain region and a rocky reef from the Ocean region. They will use those clues to determine the regional ecosystem where they can be found.

Time Frame
30-45 minutes, depending on class size.

Objectives
The learner will be able to:
- Explain the difference between a community and an ecosystem.
- Compare and contrast the following South Carolina regions: mountains, coastal plain and ocean.
- Compare and contrast the following South Carolina communities: mountain stream, blackwater swamp and rocky reef.
- Compare and contrast the following South Carolina ecosystems: mountain stream, blackwater swamp and rocky reef.

Student Key Terms
- community
- ecosystem
- habitat

Teacher Key Terms
- abiotic
- biotic

Standards

2014 Academic Standards and Performance Indicators for Science

3rd Grade: 3.S.1A.1, 3.S.1A.4, 3.S.1A.6, **3.S.1A.8**, 3.E.4A.1, 3.E.4A.2, **3.L.5A.1**, 3.L.5A.2
4th Grade: 4.S.1A.1, 4.S.1A.4, 4.S.1A.6, **4.S.1A.8**, 4.E.2A.1, 4.E.2B.3, 4.L.5B.2, 4.L.5B.3
5th Grade: 5.S.1A.1, 5.S.1A.4, 5.S.1A.6, **5.S.1A.8, 5.L.4A.1, 5.L.4A.2**, 5.L.4B.1, 5.L.4B.3

* Bold standards are the main standards addressed in this activity

Third Grade Performance Indicators
3.S.1A.1 Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs.
3.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.
3.S.1A.6 Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.
3.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.
3.E.4A.1 Analyze and interpret data from observations and measurements to describe and compare different Earth materials (including rocks, minerals, and soil) and classify each type of material based on its distinct physical properties.
3.E.4A.2 Develop and use models to describe and classify the pattern distribution of land and water features on Earth.

3.L.5A.1 Analyze and interpret data about the characteristics of environments (including salt and fresh water, deserts, grasslands, forests, rain forests, and polar lands) to describe how the environment supports a variety of organisms.

3.L.5A.2 Develop and use a food chain model to classify organisms as producers, consumers, and decomposers and to describe how organisms obtain energy.

Fourth Grade Performance Indicators

4.S.1A.1 Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs.

4.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.

4.S.1A.6 Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.

4.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.

4.E.2A.1 Obtain and communicate information about some of the gases in the atmosphere (including oxygen, nitrogen, and water vapor) to develop models that exemplify the composition of Earth's atmosphere where weather takes place.

4.E.2B.3 Construct explanations about regional climate differences using data from the long term weather conditions of the region.

4.L.5B.2 Construct explanations for how structural adaptations (such as the types of roots, stems, or leaves; color of flowers; or seed dispersal) allow plants to survive and reproduce.

4.L.5B.3 Construct explanations for how structural adaptations (such as methods for defense, locomotion, obtaining resources, or camouflage) allow animals to survive in the environment.

Fifth Grade Performance Indicators

5.S.1A.1 Ask questions that can be (1) answered using scientific investigations or (2) used to refine models, explanations, or designs.

5.S.1A.4 Analyze and interpret data from observations, measurements, or investigations to understand patterns and meanings.

5.S.1A.6 Construct explanations of phenomena using (1) scientific evidence and models, (2) conclusions from scientific investigations, (3) predictions based on observations and measurements, or (4) data communicated in graphs, tables, or diagrams.

5.S.1A.8 Obtain and evaluate informational texts, observations, data collected, or discussions to (1) generate and answer questions, (2) understand phenomena, (3) develop models, or (4) support explanations, claims, or designs. Communicate observations and explanations using the conventions and expectations of oral and written language.

5.L.4A.1 Analyze and interpret data to summarize the abiotic factors (including quantity of light and water, range of temperature, salinity, and soil composition) of different terrestrial ecosystems and aquatic ecosystems.

5.L.4A.2 Obtain and communicate information to describe and compare the biotic factors (including individual organisms, populations, and communities) of different terrestrial and aquatic ecosystems.

5.L.4B.1 Analyze and interpret data to explain how organisms obtain their energy and classify an organisms as producers, consumers (including herbivore, carnivore, and omnivore), or decomposers (such as fungi and bacteria).

5.L.4B.3 Construct explanations for how organisms interact with each other in an ecosystem (including predators and prey, and parasites and hosts).

Cross Curricular Standards

South Carolina Social Studies Standards
3-1.3, 5-6.6

South Carolina College and Career Standards for ELA
Inquiry (I) – 3-1.1, 3-2.1, 3-3.1, 3-3.2, 3-4.1, 3-4.2, 3-4.3, 3-5.1, 3-5.2, 3-5.3, 4-1.1, 4-2.1, 4-3.1, 4-3.2, 4-4.1, 4-4.2, 4-4.3, 4-5.1, 4-5.2, 4-5.3, 5-1.1, 5-2.1, 5-3.1, 5-3.2, 5-4.1, 5-4.2, 5-4.3, 5-5.1, 5-5.2, 5-5.3
Communication (C) – 3-1.2, 3-1.3, 4-1.2, 4-1.3, 5-1.2, 5-1.3

Common Core ELA Standards
Reading Informational – 3.3, 5.1
Speaking/Listening – 3.4
Writing – 3.9

3-5 Communities and Ecosystems Activity

Background

Key Points

Key Points will give you the main information you should know to teach the activity.

- Populations are a group of living things in a particular area that all belong to the same species.
- A **community** consists of all of the living things that inhabit a particular area.
- A community is an assemblage of populations; it consists of all of the populations that share the same environment.
- An **ecosystem** includes all of the **abiotic** factors as well as the communities that exist in a certain area. Abiotic factors are those factors that are not living. Important examples of abiotic factors include water, temperature, light, soil and wind. In many ways, the abiotic factors of a particular area define the communities that live there.

Detailed Information

Detailed Information gives more in-depth background to increase your own knowledge, in case you want to expand upon the activity or you are asked detailed questions by students.

Despite being 40th in size among the states, South Carolina has one of the highest biodiversity levels of any state in the country. Regions ranging from Mountains to the Ocean, South Carolina supports a variety of populations, communities and **ecosystems**. Populations are a group of living things in a particular area that all belong to the same species. Humans, porkfish, river otters, mountain laurel trees and pitcher plants are all examples of different populations.

A **community** consists of all of the living things that inhabit a particular area. A community is an assemblage of populations that share an environment. The environment can be as small as a rotted log or as large as a continent. In the Mountain region, a community could consist of river otters, trout, mayflies, mountain laurel, cardinals and flowering dogwood.

An ecosystem includes all of the **abiotic** factors as well as the communities that exist in a certain area. Abiotic factors are those factors in an environment that are not living. Important examples of abiotic factors include water, temperature, light, soil and wind. In many ways, the abiotic factors of a particular area define the communities that live there.

South Carolina is divided into five major land regions: the Mountains, Piedmont, the Sandhills, the Coastal Plain and the Coast. The vast Atlantic Ocean is located off of the coast of South Carolina, the sixth region. Each of these regions is characterized by a unique set of physical factors, which in turn affects the animals and plants that are able to form communities there.

Mountain Region

The smallest in area of the six regions, the Mountain region is located in the northwest corner of the state and found in only three counties. It is part of the Blue Ridge chain of the Appalachian Mountains. It is an area characterized by mountains and valleys, rocky outcrops, waterfalls and fast moving streams. Mountains in this region can be above 3,000 ft in elevation. The climate in this region tends to be cooler and less humid than the rest of the state but with a higher rainfall amount, ranging from 60 to 76 inches a year.

Mountain Stream Ecosystem

Mountain streams are a unique **habitat** in South Carolina. Found only in the mountains of the northwest corner of South Carolina, this habitat makes up only two percent of the state's freshwater habitats. The water in these streams is provided by abundant rainfall and groundwater springs. These streams erode away the soil in their beds leaving a rocky bottom. The water of mountain streams tends to be cool in temperature, clean and highly oxygenated. Streams tend to be shallow with areas of rapid moving water and slower- moving pools. Many plants and animals can be found along the banks of mountain streams.

Piedmont Region

The Piedmont region is in the northwest of the state and extends from the mountains to the fall line that crosses the state through Columbia. It is a generally flat area with gently sloping hills and wide river valleys. As most of the soil in the piedmont is composed of clay, a substance difficult for water to flow through, very little rainwater can soak into the soil. Much of the rainwater runs off to join the many streams and rivers that crisscross the landscape. The Piedmont is a warm, humid area. Because of its distance from the

ocean, it does not receive the temperature regulating effects the ocean provides and thus has wider temperature extremes than the coast has. It has a rainfall range of 45 to 60 inches a year.

Sandhills Region

The Sandhills constitute a unique region formed by the remains of an ancient coastline. The Sandhills also mark an approximate boundary between the Piedmont and Coastal Plain. The topography consists of rolling hills with gentle slopes. The soil texture is mostly sandy and internal drainage is rapid and even excessive. Sandhills soils are generally low in plant nutrients, moisture and organic material because the soil texture allows rapid leaching. The area receives an average annual rainfall of about 45 inches.

Coastal Plain Region

The Coastal Plain is an area of flat land that comprises more than half of the state's area. Though hilly in certain places, most of the plain is flat and slowly lowers in elevation from the Sandhills to the coast. This flatness results in many wetlands as the slope is often too gradual to cause water to continuously flow. The climate of the region is warm and humid with an average yearly rainfall of 46 inches.

Blackwater Swamp Ecosystem

Blackwater swamps occur in the Coastal Plain. Because of the flatness of the plain, the blackwater rivers are slow-moving and follow a winding, meandering path. When rainfall amounts are high, the water in these rivers floods over the banks into the woods and creates the swamp habitat. Depending on rainfall amounts this swamp habitat can last a few days or a few months. The still, warm water of blackwater swamps is filled with organic material and provides habitat for a number of plants and animals such as cypress trees and alligators.

Coast Region

The Coast is an area of land at the edge of the ocean that extends from the North Carolina to the Georgia border that is about ten miles wide. Of all the regions of South Carolina, the Coast is the most dynamic. The salinity of the rivers and wetlands in this region change throughout the day as tides rise and fall. Barrier islands, beaches and salt marshes will change in size and shape as waves and ocean currents erode and deposit sand. Because of sea breezes and proximity to the ocean, the Coast tends to be cooler than areas even just a few miles more inland from the coast. The Coast tends to be warm and humid with abundant rainfall.

Ocean Region

The ocean is a body of water that has high salinity and generally stable conditions. Though hurricanes and other major storms can stir up the shallow waters above the continental shelf, ocean waters are generally not affected by the weather. The average temperature of the ocean remains fairly stable from year to year. Off the coast of South Carolina, the ocean seafloor is generally covered by a sandy or muddy bottom. In certain areas, however, rocky reefs jut upwards from the bottom of the ocean floor.

Rocky Reef Ecosystem

Rocky reefs occur in the waters off of South Carolina's coast. These rocky reefs, in large part, are formed from the remains of organisms, like corals and tube-building worms, which lived many, many years ago. These rocky reefs provide a hard substrate to which other organisms can attach. If sunlight can penetrate to the depths of a rocky reef location, seaweeds attach to the reef and thrive. Other small animals like barnacles, sponges, tunicates and soft corals also attach and grow upon the reef. The seaweeds and small animals that make their home on the reef attract larger predators, like sheepshead and porkfish. Rocky reefs are like an oasis of life surrounded by more desolate areas of sandy seafloor. Where rocky reefs occur, an abundance of life abounds.

Because these regions are so different in their abiotic characteristics, they support very different communities. By knowing the abiotic characteristics of an area, one can guess what kinds of animals might live in its community. In turn, knowing the habitat needs and adaptations of an organism can be used to determine what environment it might inhabit. This relationship between organisms and environments defines communities, and also shows how interconnected the natural world is.

Procedure

Materials

- Tape
- Ecosystem clue cards (You will need all of these cards for this activity. It might be best to print them all out and laminate them so you can use them over and over easily):
  - Mountain cards
  - Coastal Plain cards
  - Ocean cards
- Region posters for activity (optional)

Procedure

1. Before you get started with the students, make sure you have the region, ecosystem and abiotic cards separated from the plant and animal cards. If you have a poster maker at your school, you can make the region posters to use instead of the region cards, which adds a nice dimension to the activity.

2. Introduce the concept of community. Teachers can engage students by showing them a picture of a jungle or a desert. Ask students to name all of the plants and animals that might use each environment as a habitat. Explain that because these plants and animals live together in the same environment they are known as a community (like people living in the same town belong to a community). Explain that a community is made up of all of the living things (plants and animals) in an environment. Explain that the things that are not living in an environment (water, air, rock) affect which plants and animals live there.

3. Introduce the concept of ecosystems. Ask students to list some of the abiotic or nonliving things in a jungle or desert. Explain that an ecosystem is made up of all of the members of a community (all of the plants and animals) plus all of the nonliving things (or physical factors) in their environment. Ensure that students know the difference between a community and an ecosystem.

4. Advise students that they are going to play a matching game. Tell the students that to get started they need to set up the classroom by organizing some cards.

5. Hand each student a card (region, ecosystem, abiotic factor cards only, not the plant and animal cards yet).

6. Tell them that their job will be to use the clues on their cards to figure out:

- Who has a region card (3) – Or use posters for this.
- Who has an ecosystem card (3)
- Who has an abiotic factor card (3 water, 3 rock, 3 air, 3 sun)

7. Tell students that three of received a South Carolina region card, three of them received a South Carolina ecosystem card and 12 of them received an abiotic factor card (water, sun, rock or air).

8. Once all of the cards are handed out, ask who has a region card and have them tape the card to the wall in order, one at a time, reading the bullets on the card out loud to the class (Mountains, Coastal Plain, Ocean).

9. Next, ask who has an ecosystem card and have them determine which region the ecosystem belongs and have them explain why as they tape it under the region card in which it belongs (Mountain Stream, Blackwater Swamp, Rocky Reef).

10. Lastly, one at a time, have the students determine where the abiotic factor cards should be. Make sure to have them explain as they tape it to the wall under the other cards.

11. Now it is time to hand out the plant and animal cards (18 total).

12. Have each student stand under the region and ecosystem they think their plant or animal card belongs.

13. Go from student to student asking them to explain why they picked the region and ecosystem they picked. Have them move if they picked wrong. Here's a cheat sheet in case you need a quick refresher:

Mountain Stream
Yellow spotted salamander
Brook trout
Canadian hemlock
Wood frog
Mountain laurel
Wood chuck

Blackwater Swamp
Cypress tree
Brown water snake
Great blue heron
American alligator
Bluespotted sunfish
Yellow-bellied slider

Rocky Reef
Phytoplankton
Queen angelfish
Loggerhead sea turtle
Cannonball jelly
Spider crab
Black sea bass

14. Once you know that they are placed correctly in their ecosystem, ask students to raise their cards in the air if they hold a card that pictures a member of a:

- Mountain stream community
- Blackwater swamp community
- Rocky reef community

Discuss the difference between community and ecosystem each time.

15. Optional: Ask students in each group to work together to determine which community members are producers and which community members are consumers.

Assessment

Assessment #1:

Use the following datasheet to assess whether students comprehended the differences between communities and ecosystems

- [Assessment Datasheet](#)
- [Assessment Datasheet Answer Key](#)

Scoring rubric out of 100 points

10 points for the correct answers for each of the living or nonliving things.

There are 10 living or nonliving things in the list.

Assessment #2:

Have students complete the Abiotic and Biotic Assessment Sheet.
Check students' work with the Abiotic and Biotic Assessment Worksheet Answer Key.

Scoring rubric out of 100 points

Correctly lists abiotic features of the mountain region habitat: 25 points
Correctly lists biotic features of the mountain region habitat: 25 points
Correctly lists abiotic features of the coastal region habitat: 25 points
Correctly lists biotic features of the coastal region habitat: 25 points

Assessment #3:

Have students complete the Communities and Ecosystems Vocabulary Quiz.
Check students' work with the Communities and Ecosystems Vocabulary Quiz Answer Key.

Scoring rubric out of 100 points

For each perfectly answered vocab term: 20 points
For each almost perfectly answered vocab term: 10 points
For each incorrectly answered vocab term: 0 points

Cross Curricular Extensions

STEM Extension
Have students pick a spot in your school yard to observe for 10 minutes. Have them list abiotic and biotic things that they see. Students should then use the list to create a bar graph on the computer of abiotic and biotic things.

Language Arts Extension
Have students write a story about an animal's day. In the story they should describe the community and ecosystem mentioning both abiotic and biotic things found in the habitat.

Social Studies Extension
Have students research what their community (and ecosystem) was like 100 years ago. How was it similar? How was it different?

Resources

Teacher Reference Books

Ballantine, Todd. Tideland Treasures. University of South Carolina Press, Columbia, 1991.
A wonderfully simple introduction to the plants and animals of the salt marsh, sandy beach and ocean habitats of the eastern United States.

Barry, John M. Natural Vegetation of South Carolina, University of South Carolina Press, Columbia, 1980.
A look at the vegetation communities in each region of South Carolina and the abiotic factors that influence them.

Kovacik, Charles F. and John J.Winberry. South Carolina: The Making Of a Landscape, University of South Carolina Press, Columbia, 1987.
Information on the geology, ecology and cultural history of the different landforms and regions of South Carolina.

Martof, Bernard S. et. al. Amphibians and Reptiles of the Carolinas and Virginia. University of North Carolina Press, Chapel Hill, 1980.
A content-rich field guide to the reptiles and amphibians of South and North Carolina and Virginia.

Meyer, Peter. Nature Guide to the Carolina Coast, Avian-Cetacean Press, Wilmington, NC, 1998.
An informative look at the characteristics and wildlife of the Coast and Ocean regions of South and North Carolina.

Rhodes, Fred C et. al. Freshwater Water Fishes of the Carolinas, Virginia, Maryland and Delaware. University of North Carolina Press, Chapel Hill, 1994.
A content-rich field guide to the fresh water fishes of South Carolina, North Carolina, Virginia, Maryland and Delaware.

Ruppert, Edward E. and Richard S. Fox. Seashore Animals of the Southeast. University of South Carolina Press, Columbia, 1988.
A content-rich field guide for the identification of shallow-water invertebrate animals of the Atlantic coast of the southeastern United States.

Teacher Reference Websites

Eisenhower National Clearinghouse
http://www.enc.org/
This website is sponsored by the United States Department of Education. An entire section is dedicated to lesson plans and activities for teachers.

Frank Potter's Science Gems
http://www.sciencegems.com
A plethora of science resources can be accessed at this terrific site. Under the Life Science 2 heading, teachers can access the "Ecology", "Biology of Plants" and the "Biology of Animals" sections. All sections contain a wide variety of information, resources, and lesson plans related to ecology, plants and animals.

South Carolina Department of Natural Resources (SCDNR)
http://www.dnr.sc.gov/
Information on the wildlife and geology of all of South Carolina.

Student Reference Books

Eyewitness Books: Ocean, Alfred A. Knopf, Inc, New York, 1995.
This book uses photographs, illustrations and text to teach the reader about the plants and animals that make ocean habitats their home.

Eyewitness Books: Ecology, Steve Pollock. Dorling Kindersley, Inc. New York, 2000.
This book uses photographs, illustrations and text to teach the reader about ecology.

Look Closer: Swamp Life, Dorling Kindersley, New York, 1993.
Using photographs, illustrations and text, this book teaches the reader about the plants and animals that live in swamps.

One Small Square: Swamp, Donald Silver. Learning Triangle Press, 1997. ISBN 0070579261
Great text and great illustrations combine to provide students with an abundance of background information about the swamp ecosystem.

Student Fiction Books

Pass the Energy Please! Barbara Shaw McKinney. Dawn Publications, 1951. ISBN 1584690011
This well-illustrated book focuses on food chains and the interdependencies of plants and animals.

Curricula

Aquatic Project WILD
Aquatic Project WILD is an interdisciplinary curriculum for K-12 teachers on aquatic wildlife and **ecosystem**s. The activities cover a broad range of environmental and conservation topics.
For more information click on http://www.projectwild.org/ProjectWILDK-12AquaticcurriculumandActivityGuide.htm

Project WILD
Project WILD is an interdisciplinary curriculum for K-12 teachers on a broad range of environmental and conservation topics.
For more information click on: http://www.projectwild.org/