

Watery Webs!

Lesson Focus: the interdependence of organisms within watershed communities, changes in watershed ecosystems as a result of natural and human activities, differences among watershed communities

Lesson Objectives:

- Students will be able to describe the diversity and interdependence of organisms within various habitats of a watershed.
- Students will be able to identify the roles of producers, consumers and decomposers in aquatic and semi aquatic communities.
- Students will be able to predict how changes in the environment affect wetland ecosystems.

Enduring Understandings:

- All living things need energy to live and grow.
- All living things in a community are interconnected and interdependent.
- Ecosystems include producers, consumers and decomposers, as well as nonliving factors.
- Natural events and human activities can disrupt the flow of energy through a food web.

Georgia Performance Standards Addressed:

S4L1 Students will describe the roles of organisms and the flow of energy within an ecosystem.

- a. Identify the roles of producers, consumers, and decomposers in a community.
- b. Demonstrate the flow of energy through a food web/chain beginning with sunlight and including producers, consumers and decomposers.
- c. Predict how changes in the environment would affect a community (ecosystem) of organisms.
- d. Predict the effects on a population if some of the plants or animals in the community are scarce or if there are too many.

S4CS4 Students will use ideas of system, model, change, and scale in exploring scientific and technological matters.

- a. Observe and describe how parts influence one another in things with many parts.

Grade Level: Fourth Grade

Materials:

- 5" x 8" index cards
- Large open area or field
- Safety pins, tape, or yarn as card attachments
- Ball of yarn or string
- Basket or other type of container for the cards
- Map of your state that can be used to identify your local watershed
- Large (3' by 4') piece of paper

Time Needed: Two or three 45-minute class periods

Background Information:

Where there is water, there is life. Every brook, stream, or river drains an area of land called its watershed, or drainage basin. The diversity of living things sustained within a watershed maybe found in its flowing headwaters, along its river and stream banks, and throughout its soggy freshwater swamps and tidal marshes. However these communities need more than just water to survive, they also need each other. Energy from the sun is passed from producer, to consumer, to decomposer in an on-going cycle of interdependence. Non-living factors such as the climate, amount and movement of water, and land and the minerals influence the type of organisms within each ecosystem.

Learning Procedure:

Before the lesson:

Prepare 5" x 8" river food web cards. Each card should have the name of a living factor (organism/plant) or a nonliving factor written on the front. (See "A River Community" Chart). If you laminate the cards you can use them more than once (punch holes and tie yarn on the cards so students can easily wear them).

A. Watery Web Model

- 1.) Review the concept of living and nonliving factors, producers, consumers, and decomposers.
- 2.) Place the cards in "the river" (any type of container) and allow each student to randomly draw one card, pin it to the front of their shirt, and return to their seat.
- 3.) Once everyone has drawn a card, ask the nonliving factors to stand. Allow them to identify themselves: "I am flowing water..."
- 4.) Now call upon the producers to stand, identify themselves and sit. Call upon the consumers and decomposers to do the same.

- 5.) Take a ball of yarn and toss it to “the water,” who should hold tightly on to the end and toss it to “the soil,” then to “the nutrients,” “the dissolved oxygen,” and then to “the sunlight.” Remind the students that these are the nonliving factors of the ecosystem.
- 6.) Ask the students: “Who uses energy from the sun, nutrients in the ground, air and water to make their own food?” (Answer: the producers) Direct “the sun” to toss the ball to a producer.
- 7.) Who eats this producer for energy? The students must answer the question correctly for the ball of yarn to be tossed.
- 8.) Ask: “Who eats this organism?” Proceed this way from organism to organism.
- 9.) Be sure each organism has been connected at least once, and some may be connected more than once. Multiple connections can signify that certain organisms are very important in a community.
- 10) Point out that all the nonliving and living parts of a community are interconnected and interdependent. The health of the “Watery Web” that has been created is shown by all the connections that have been made.

B. Watery Web Disruptive Scenarios

- 1.) Present the following four scenarios to your students. Describe each scenario and have the students predict and discuss what the consequences to the food web would be.
 - Fertilizers and sewage have made their way to the river and have caused an algae bloom that is using most of the dissolved oxygen in the water. (There would not be enough oxygen for the fish. They would die or migrate elsewhere.)
 - Land development has caused erosion problems along the banks of the river. (Sediment and mud cover fish gills killing them or cover the eggs laid under rocks preventing them from growing.)
 - Pesticides have been sprayed in the area. The insect population has been greatly reduced. (Loss of a food source)
 - Pollutants from non-point sources have been ingested by the mollusks. (Mollusk are no longer safe to eat)

C. Biodiversity in a Watershed

- 1) Discuss with the students what a watershed is and ask them to identify and locate their watershed.
- 2) Ask the students to close their eyes and visualize a natural community that can be found locally. If they are having a hard time, consider showing them a picture.
- 3) Allow some of the children to share their images. After listening, point out that although a watershed’s communities are connected by the water itself, they will not be all the same.

- 4) Use a map to identify the watershed in which you and your students reside.
- 5) Explain that the nonliving factors (climate, land forms, soil types, minerals, water and its flow rate) determine the types of living communities that exist within a watershed.
- 6) Divide the class into five groups. Assign each group to be one of the following: riverbank ecosystem, deep water swamp ecosystem, fresh water marsh, salt marsh ecosystem, river ecosystem.
- 7) Direct the groups to research the producers, consumers, and decomposers that make up each of the ecosystems.
- 8) Each group should complete a Watershed Community Graphic Organizer (see attached).
- 9) Provide each group with a large (3' by 4') piece of paper to illustrate and label the nonliving factors, consumers, producers and decomposers that are part of their ecosystem.
- 10) Allow each group to present their "Watery Web" to the class. They should share details of the particular nonliving factors and food web in the specific ecosystem.

Evaluation:

1. Use the attached rubric to score Parts A, B, and C

Extensions:

1. Have each student write a letter to the human population from the point of view of the part of the ecosystem they portrayed. The letters should describe the consequences of disruptions to the watery web and include suggestions and alternatives to what otherwise spells disaster for watershed life.
2. Use the Virtual Pond Field Trip site (listed in the Resources section) to learn more about the animals that might live in a freshwater community.
3. Have the students visit the websites of Gray's Reef <http://graysreef.noaa.gov/> and the Georgia Aquarium www.georgiaaquarium.org for more information and images of marine organisms.

Resources

[The U.S. Geological Survey Kid's Page](#) - This site allows students to explore ecosystems of the Coastal Plain.

[The New Georgia Encyclopedia](#) - This site provides detailed information on Georgia's wetlands and rivers.

[Explore the Okefenokee Swamp](#) - This wonderful and informative site was created by Lori Miller, a technology instructor in Waycross, Georgia.

[Virtual Pond Field Trip](#) - This site allows students to examine and learn about tiny fresh water organisms.

[Kids Do Ecology](#) - This site allows students to learn more about ecology and explore diverse biomes.

[The Savannah River Ecology Lab](#) - This site provides animal fact sheets and an abundance of additional resources.

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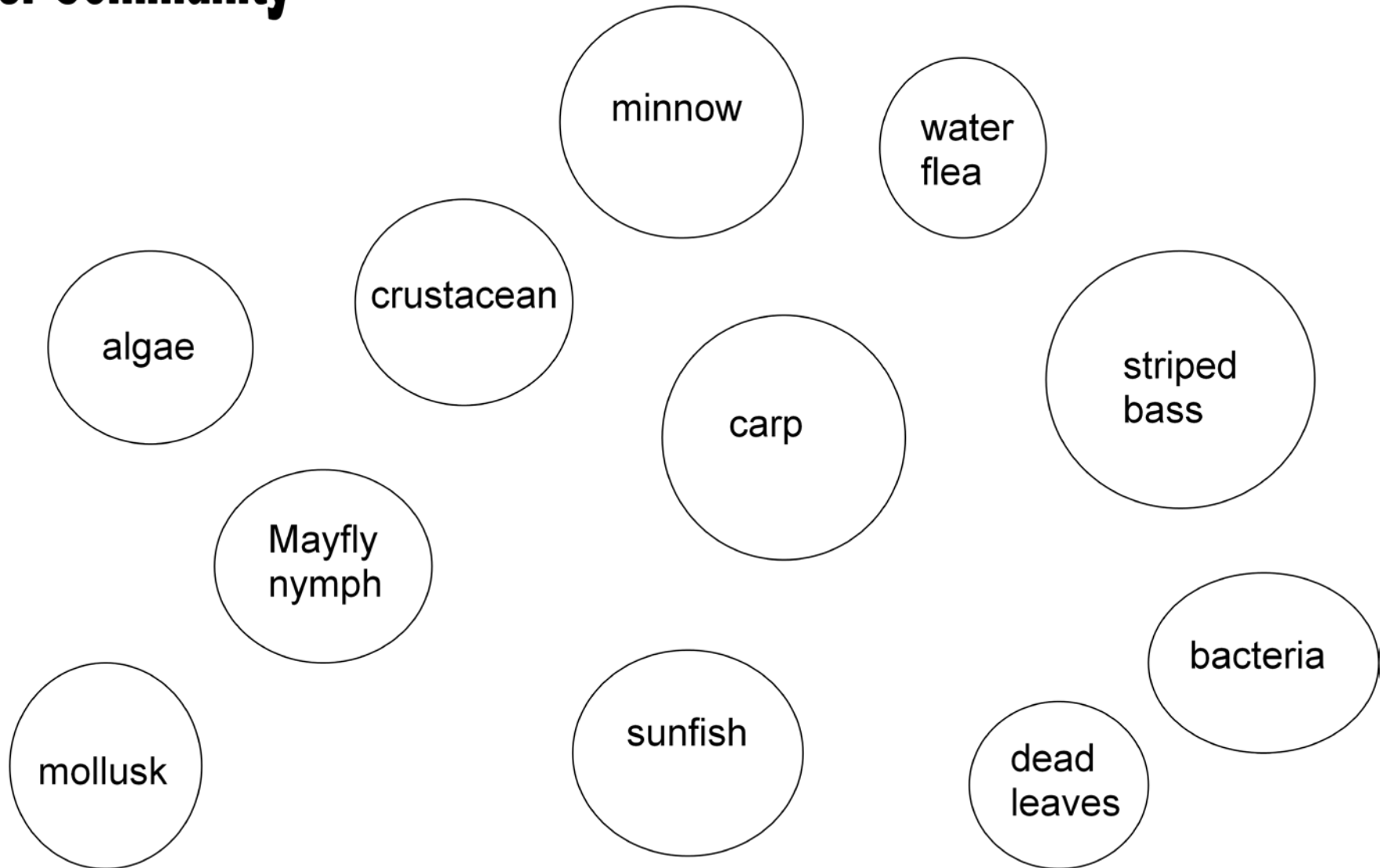
This activity is a product of the Rivers to Reef Teacher Workshop sponsored by the Georgia Aquarium and Gray's Reef National Marine Sanctuary in which the author was a participant . For more information about this workshop, Georgia Aquarium, or NOAA Gray's Reef National Marine Sanctuary, please visit our websites at www.georgiaaquarium.org or <http://graysreef.noaa.gov/>



Watery Web:

River Community

Dissolved Oxygen Sunlight Water Soil Minerals



Name _____

Water Web Rubric

	Observer 0 points	Beginning Naturalist 1 point	Progressing Naturalist 2 points	Advancing Naturalist 3 points
Able to identify role in the food chain during part A				
Active participation during part A				
Nonliving and living components correctly identified and labeled in Part C				
Display was creatively done in Part C				
Participation in the project in Part C				

Total Points

Teacher Comments:

