

# Life Giving Rivers

**Grade Level:** Third Grade

**Written by:** Kristen Murray, Leadership Preparatory Academy, Colorado Springs, CO

**Length of Unit:** Six lessons (13 days, one day=approximately 60 minutes) not including culminating activities

## I. ABSTRACT

This unit mingles science and social studies concepts to provide students with an understanding of the importance of the world's rivers. Rivers are identified as a powerful force in nature, creating land and water features by means of erosion. Students explore various rivers of the world and the role rivers have played throughout history in the development of civilizations. Using project based learning, students also examine the river as a fresh water habitat and ecosystem affected by environmental and man-made changes.

## II. OVERVIEW

### A. Concept Objectives

1. Students will understand the processes and interactions of the Earth's systems and the structure and dynamics of Earth and other objects in space. (*Colorado Model Content Standards for Science*, Standard 4, Third Grade)
2. Students will gain an understanding about the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment. (*Colorado Model Content Standards for Science*, Standard 3, Third Grade)
3. Students will recognize that maps, globes and other geographic tools help us locate and derive information about people, places and environments. (*Colorado Model Content Standards for Geography*, Standard 1, Third Grade)
4. Students will understand the effects of interactions between human and physical systems and the changes in meaning, use, distribution, and importance of resources. (*Colorado Model Content Standards for Geography*, Standard 5, First Through Fourth Grade)

### B. Content from the *Core Knowledge Sequence*

1. History and Geography: World History and Geography: World Geography: Important Rivers of the World (p. 69)
  - a. Terms: source, mouth, tributary, drainage basin
  - b. Asia: Ob, Yellow (Huang He), Yangtze (Chang Jiang), Ganges, and Indus
  - c. Africa: Nile, Niger, Congo
  - d. S. America: Amazon, Parana, Orinoco
  - e. N. America: Mississippi and major tributaries
  - f. Australia: Murray-Darling
  - g. Europe: Volga, Danube, Rhine
2. History and Geography: World History and Geography: World Geography: Geographical Terms and Features (p. 69)
  - a. channel, delta, reservoir
3. Science: Introduction to Classification of Animals (p. 81)
  - a. Scientists classify animals according to the characteristics they share
    - i. Cold-blooded or warm-blooded
    - ii. Vertebrates (have backbones and internal skeletons) or Invertebrates (do not have backbones or internal skeletons)

- b. Different classes of vertebrates
  - i. Fish: aquatic animals, breathe through gills, cold-blooded, most have scales, most develop from eggs that the female lays outside her body
  - ii. Amphibians: live part of their lives in water and part on land, have gills when young, later develop lungs, cold-blooded, usually have moist skin
  - iii. Reptiles: hatch from eggs, cold-blooded, have dry, thick, scaly skin
  - iv. Birds: warm-blooded, most can fly, have feathers or wings, most build nests, hatch from eggs, most baby birds must be fed by parents and cared for until they can survive on their own (though some, like baby chickens and quail, can search for food a few hours after hatching)
  - v. Mammals: warm-blooded, have hair on their bodies, parents care for the young, females produce milk for their babies, breathe through lungs, most are terrestrial (live on land) though some are aquatic
- 4. Science: Ecology (p. 83)
  - a. Habitats, interdependence of organisms on their environment
  - b. The concept of a “balance of nature”
  - c. The food chain: producers, consumers, and decomposers
  - d. Ecosystems: how they can be affected by changes in environment (for example, rainfall, food supply, etc.) and man-made changes
  - e. Man-made threats to the environment
    - i. Water pollution: industrial waste, run-off from farming
  - f. Measures we can take to protect the environment (for example conservation)

C. Skill Objectives

1. Students will identify land and water features. (*Colorado Model Content Standards for Science*, Grade Level Expectation 4.1c, Third Grade)
2. Students will describe the process of erosion and how it changes the Earth’s surface. (*Colorado Model Content Standards for Science*, Grade Level Expectation 4.1d, Third Grade)
3. Students will identify major sources of water. (*Colorado Model Content Standards for Science*, Grade Level Expectation 4.1e, Third Grade)
4. Students will explain the importance of water. (*Colorado Model Content Standards for Science*, Grade Level Expectation 4.3c, Third Grade)
5. Students will classify a variety of organisms according to selected characteristics. (*Colorado Model Content Standards for Science*, Grade Level Expectation 3.1b, Third Grade)
6. Students will identify the basic needs of an organism. (*Colorado Model Content Standards for Science*, Grade Level Expectation 3.1c, Third Grade)
7. Students will identify characteristics that are common to all individuals of a species. (*Colorado Model Content Standards for Science*, Grade Level Expectation 3.4a, Third Grade)
8. Students will identify differences in appearance among individuals of the same population or group. (*Colorado Model Content Standards for Science*, Grade Level Expectation 3.4b, Third Grade)
9. Students will identify ways in which human activity (such as deforestation, the building of dams, irrigation, etc.) can change the nature of regions and impact the

lives of animals and other people. (*Colorado Model Content Standards for Geography*, Grade Level Expectations 5.1.2 and 5.1.3, First Through Fourth Grade)

10. Students will identify a food chain found in a specified ecosystem.
11. Students will distinguish between renewable and non-renewable resources. (*Colorado Model Content Standards for Geography*, Grade Level Expectation 5.3.3, First Through Fourth Grade)
12. Students will locate important rivers of the world. (*Colorado Model Content Standards for Geography*, Grade Level Expectation 1.2.3, Third Grade)
13. Students will explain how the availability of water affects human lifestyles. (*Colorado Model Content Standards for Geography*, Grade Level Expectation 1.3.2, First Through Fourth Grade)
14. Students will identify measures that can be taken to protect the environment and manage resources. (*Colorado Model Content Standards for Geography*, Grade Level Expectation 5.3.5, First Through Fourth Grade)
15. Students will identify the climate, terrain, location, and plant and animal life of various ecosystems.

### III. BACKGROUND KNOWLEDGE

- A. For Teachers
  1. Baldwin, C. *Living by a River*
  2. Mercier, S. and Hoover, E. *Exploring Environments*
  3. Sauvain, P. *Rivers and Valleys*
- B. For Students
  1. Ability to locate the seven continents (CK Kindergarten-Grade 2)
  2. Understanding of what rivers and lakes are and how they are represented on maps and globes (CK Kindergarten)
  3. Understanding of the importance of the Tigris, Euphrates, and Nile Rivers in the development of civilization (CK Grade 1)
  4. Understanding of special classifications of animals-herbivores, carnivores, and omnivores (CK Grade 1)
  5. Understanding of extinction (CK Grade 1)
  6. Understanding of coast, valley, prairie, and desert as geographical terms and features (CK Grade 2)
  7. Knowledge of the Ganges, Indus, Yellow, and Yangtze Rivers (CK Grade 2)
  8. Understanding of the water cycle (CK Grade 2)
  9. Understanding of the importance the Mississippi and St. Lawrence Rivers played in transportation and irrigation as previously taught in a study of The Earliest Americans and Early Exploration of North America (CK Grade 3)

### IV. RESOURCES

- A. Baldwin, C. *Living by a River* (Lessons One, Three, Four, and Six)
- B. Baldwin, C. *Living by a Desert* (Lessons Four-Seven)
- C. Baldwin, C. *Living by a Prairie* (Lessons Four-Seven)
- D. Baldwin, C. *Living by a Temperate Deciduous Forest* (Lessons Four-Seven)
- E. Baker, L. *Life in the Oceans* (Lessons Four-Seven)
- F. Biome Group of the Fall 1996 Biology 1B class, section 115, at UC Berkeley. "The World's Biomes," *Museum of Paleontology* [On-line]. Available URL: <http://www.ucmp.berkeley.edu/glossary/gloss5/biome/> (Lessons Four-Seven)
- G. Byles, M. *Life in the Polar Lands* (Lessons Four-Seven)
- H. Chinery, M. *Desert Animals* (Lessons Four-Seven)

- I. Chinery, M. *Forest Animals* (Lessons Four-Seven)
- J. Chinery, M. *Grassland Animals* (Lessons Four-Seven)
- K. Chinery, M. *Questions and Answers About Polar Animals* (Lesson Four-Seven)
- L. Chinery, M. *Rainforest Animals* (Lessons Four-Seven)
- M. Donovan, S. *Ocean Animals* (Lessons Four-Seven)
- N. Galko, F. *Wetland Animals*
- O. Ganeri, A. *Habitats: Forests* (Lessons Four-Seven)
- P. Gibbons, G. *Marshes and Swamps* (Lessons Four-Seven)
- Q. Owens, C. *Deforestation* (Lesson Seven)
- R. Patent, D. H. *Prairies* (Lessons Four-Seven)
- S. Steele, C. *Desert Animals* (Lessons Four-Seven)
- T. Stille, D. *Water Pollution* (Lesson Three)
- U. Stradling, J. *Rain Forest Life* (Lessons Four-Seven)
- V. Wheeling Jesuit University/NASA Classroom of the Future. "Biomes," *Exploring the Environment* [On-line]. Available URL:  
<http://www.cotf.edu/ete/modules/msese/earthsysflr/biomes.html> (Lessons Four-Seven)
- W. *Endangered Animals* (Lesson Seven)
- X. "Biomes-Habitats," *Enchanted Learning* [On-line]. Available URL:  
<http://www.enchantedlearning.com/biomes/>
- Y. "Desert Animals and Wildlife," *Desert USA* [On-line]. Available URL:  
<http://www.desertusa.com/animal.html> (Lessons Four-Seven)
- Z. "Your Key to the Biomes," *The Cyberzoo* [On-line]. Available URL:  
<http://lsb.syr.edu/projects/cyberzoo/biome.html> (Lessons Four-Seven)

## V. LESSONS

### Lesson One: What Makes Water a River? (two 60 minute sessions)

- A. *Daily Objectives*
  - 1. Concept Objective(s)
    - a. Students will understand the processes and interactions of the Earth's systems and the structure and dynamics of Earth and other objects in space.
  - 2. Lesson Content
    - a. Important Rivers of the World (p. 69)
      - i. Terms: source, mouth, tributary, drainage basin
      - ii. Asia: Yellow and Ganges
      - iii. Africa: Nile and Congo
      - iv. S. America: Amazon, Parana, and Orinoco
      - v. N. America: Mississippi and major tributaries
    - b. Geographical Terms
      - i. delta, channel
  - 3. Skill Objective(s)
    - a. Students will identify land and water features.
    - b. Students will describe the process of erosion and how it changes the Earth's surface.
    - c. Students will identify major sources of water.
    - d. Students will locate important rivers of the world.
- B. *Materials*
  - 1. *Living by a River* pp. 4-6, by Carol Baldwin
  - 2. Landscape of a river with the following parts labeled: source, waterfall, tributary, floodplain, meander, lake, channel, delta, distributaries, and mouth (the valley scene on p. 75 and/or the river scene on p. 34 of *Exploring Environments*, listed

in the Resource section of this document, can be enlarged, using an overhead projector; page 4 of *Rivers and Valleys* also has a landscape that can be enlarged; elements that are not included in a particular landscape can be added by hand)

3. A handful of each of the following colors of salt dough for each student: blue, brown, and green (an easy recipe can be found at <http://www.kidsdomain.com/craft/saltdough.html>; adjust the recipe in order that you will have enough of each color for each child in your class; have parent volunteers make this and bring it in a day or two before in a sealed Ziploc bag)
4. A Styrofoam meat tray (approximately 5x8 inches) for each student
5. Ten toothpicks for each student
6. Paper, pencils, scissors, and glue stick for each student
7. U.S. and world maps for reference
8. A copy of the rubric in Appendix C for each student
9. A copy of the rubric in Appendix A for each student

C. *Key Vocabulary*

1. Source – place where a river begins
2. Drainage basin – the area of land drained by a river and its tributaries
3. Glaciers – a large body of ice moving slowly down a slope or valley or spreading outward on a land surface
4. Runoff – water that does not soak into the ground, but runs into a river, lake, or ocean
5. Waterfall – a very steep drop in the water of a stream
6. Springs – place where underground water comes to the surface
7. Tributaries – streams or rivers that flow into a larger river
8. Channel – low area through which a river flows
9. Bank – high ground that borders a river, also called a riverbank
10. Floodplain – flat area on either side of a river covered by a flooding river
11. Sediment – tiny bits of rock, sand, and soil
12. Erosion – movement of soil and rocks by water, wind, or ice
13. Meander – follow a winding course
14. Mouth – part of a river where water empties into a lake or ocean
15. Delta – land that is formed where a river empties sediment into a lake or ocean
16. Distributaries – one of the streams a river separates into when it reaches its delta

D. *Procedures/Activities*

**Day One**

1. Begin by asking students to tell you what they know about rivers. Students might name rivers, describe a rafting or camping trip on a river, or tell you about the plant or animal life near a river. This will allow you to assess their background knowledge.
2. Inform students that they are going to be learning all about rivers. Tell them that they will learn about the various parts and importance of rivers. Say, “You will be learning about the river as a habitat for plants and animals. You will also be learning about many rivers of the world and the roles they play in different countries’ economic activities and cultures.”
3. Read pp. 4-6 of *Living by a River*.
4. Tell students to pay careful attention as you review the parts of a river because they are going to be making river models and labeling the land and water features discussed in the next session.
5. Refer to the landscape and locate the source of the river. Ask students to recall from the reading where the water in rivers comes from. (springs, melting snow, or rain)

6. Review the water cycle. Tell students that some of the water in the Amazon River in South America originates as melting snow in the Andes Mountains. Say, "Most of the water in the Amazon River is a result of rainfall in the Amazon rainforest." Locate the Amazon River on the world map.
7. Explain to students that water can also originate from glaciers located high in the mountains. Define glacier.
8. Define drainage basin.
9. Locate the waterfall. Tell students that as rainwater, melting snow, or water from a spring collects it forms a stream that often cascades down a waterfall. Define waterfall.
10. Tell students that Angel Falls, located on the Orinoco River in South America, is the world's highest waterfall. Say, "It is 3,212 ft. high. " Locate the Orinoco River on the map.
11. Mention that Iguacu Falls, also located in South America on the Parana River, is the world's widest falls, spanning more than two miles. Find the Parana River on the world map.
12. Say, "The Congo or Zaire River in Africa contains so many waterfalls, rapids and islands that it is difficult to navigate." Locate the Congo River using the world map.
13. Explain that a waterfall is created when water goes from one hard rock that resists the water's erosion to a softer rock that is easily eroded.
14. Define erosion as the wearing away of land. Explain that the force of fast rushing currents along with the stones and pebbles they carry wear away not only the banks of a river, but also the river bottom resulting in the formation of waterfalls and deep gorges. Say, "dirt and rocks are picked up and carried by the river as sediment. The sediment, or silt, is referred to as the river's load."
15. Explain that the Yellow River in Asia gets its name because of its color. Say, "The color of the water is due to the abundance of sediment that the river carries. Each year the river carries approximately 1.5 billion tons of silt or sediment to the Bohai Sea." Locate the Yellow River.
16. Point to the tributary and ask students to identify the feature. Define tributary.
17. Refer to the U.S. map and identify the Mississippi River and its major tributaries, the Ohio, Missouri, and Tennessee.
18. Locate the river's floodplain and explain that when a river overflows its banks, it often deposits some of the sediment it has carried in its floodplain. This sediment, or silt, makes the soil very rich or fertile for farming. Ask students to think back to first grade and recall a civilization that was built on the floodplain of the Nile River. (Egypt)
19. Mention that the Yellow River in Asia is often referred to as the "China's Sorrow" because its flooding has caused much suffering to those living along its banks. Say, "Millions of people have drowned, towns have been destroyed, and crops have been ruined."
20. Define channel.
21. Point to the meander and ask students to identify the feature. Define meander.
22. Ask students to recall the name of the point at which a river meets the sea or ocean. (mouth) Locate the mouth on the landscape.
23. Once again, point out that the sediment, or silt, being carried by a river is often deposited at the mouth of the river to form new land, called a delta. Say, "When a river reaches the sea, it suddenly stops its currents as it crashes against the sea. A delta is formed if the amount of sediment is greater than what the sea can disperse."

24. Refer to the maps and explain that New Orleans, Louisiana is a city built on the Mississippi delta. Say, "The Mississippi River delta gets 300 feet longer each year due to the huge amounts of sediment deposited by the Mississippi River."
25. Mention that the Ganges River in Bangladesh has the world's biggest delta. Point out that the mud deposits also force the river to distribute and form various small channels, or distributaries. State that the Ganges River delta is made up of over 50 muddy islands that are separated by a maze of channels. Locate the Ganges River on the map.
26. Ask students to write a paragraph explaining how water changes the Earth's surface. Encourage students to give examples of land and water features created by erosion.

### **Day Two**

1. Review the parts of a river using the river landscape.
  2. Pass out the rubric in Appendix A and discuss expectations.
  3. Distribute a handful of each of the colors of clay dough to each student along with a Styrofoam meat tray.
  4. Students should work to create a model of a river.
  5. Write the following elements on the board and have students label each using the toothpicks: source, waterfall, tributary, floodplain, meander, lake, channel, delta, distributaries, and mouth.
  6. Students should cut out a small strip of paper, write the name of the feature being labeled, and glue it to the top of a toothpick.
- E. *Assessment/Evaluation*
1. Teacher observation of student participation in class discussion
  2. Student paragraphs assessed using the rubric in Appendix C
  3. Assessment of student-created river models using the rubric in Appendix A

### **Lesson Two: Importance of Rivers (two 60 minute sessions)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will understand the effects of interactions between human and physical systems and the changes in meaning, use, distribution, and importance of resources.
    - b. Students will recognize that maps, globes and other geographic tools help us locate and derive information about people, places and environments.
  2. Lesson Content
    - a. Important Rivers of the World (p. 69)
      - i. Asia: Yangtze, Indus, Ob, and Ganges
      - ii. Australia: Murray-Darling
      - iii. Europe: Volga, Danube, and Rhine
      - iv. Africa: Niger
    - b. Geography Terms
      - i. reservoir
    - c. Ecology
      - i. Habitats, interdependence of organisms on their environment
      - ii. Ecosystems: how they can be affected by changes in environment (for example, rainfall, food supply etc.), and by man-made changes
      - iii. Man-made threats to the environment
        - a) Water pollution: industrial waste, run-off from farming

- iv. Measures we can take to protect the environment (for example, conservation)
3. Skill Objective(s)
- a. Students will explain the importance of water.
  - b. Students will explain how the availability of water affects human lifestyles.
  - c. Students will distinguish between renewable and non-renewable resources.
  - d. Students will identify measures that can be taken to protect the environment and manage resources.
  - e. Students will locate important rivers of the world.
  - f. Students will identify the basic needs of an organism.
- B. *Materials*
- 1. *Living by a River* pp. 7-8, 22, and 27, by Carol Baldwin
  - 2. Pages 5-11, 16-32, and 43-45 of *Water Pollution*, by Darlene Stille
  - 3. World map for locating world rivers
  - 4. Paper and pencil
  - 5. Materials necessary for the demonstration in Appendix B
  - 6. A copy of the rubric in Appendix C for each student
- C. *Key Vocabulary*
- 1. Recreation – refreshment of strength after work; fun
  - 2. Natural resource – supply provided by nature
  - 3. Renewable resource – a supply that can be replenished
  - 4. Conservation – the careful preservation and protection of something
  - 5. Reservoir – an artificial lake in which people store water for later use
- D. *Procedures/Activities*
- Day One**
- 1. Ask students, “Why are rivers important?” Answers might include, “Rivers provide fish, drinking water, and homes for animals.”
  - 2. Say, “Reflect on what you learned about Native Americans and the early explorers of North America. What did they use rivers for? How did they use the Mississippi River specifically?” (farming, transportation, drinking water, and food)
  - 3. Ask, “What else do we use rivers for today?” (electricity and recreation) If students have trouble with this, ask them what they did last time they visited a river. (camping, fishing, etc.) Define recreation and give examples (rafting, fishing, canoeing, swimming, etc.)
  - 4. Read pp. 7-8, 22, and 27 of *Living by a River*.
  - 5. Discuss how the water of the Ganges River in India is considered sacred and how the Hindu people of India bathe in the waters daily. Once again, locate the Ganges River on the map.
  - 6. Inform students that even thousands of years ago, the people of Mohenjo-Daro, India bathed in a building called a Public Bath that was supplied by the waters of the Indus River. Locate the Indus River in Asia on the world map.
  - 7. State that the Niger River delta in Africa is home to many plants and animals as one of the world’s largest wetlands. Locate the Niger River delta in Nigeria on the world map.
  - 8. Explain that the Volga River in Russia, also referred to as *Beloved Mother*, provides good things to many people as food, coal, lumber, and manufactured goods are transported up and down the river. Locate the Volga. Say, “Without

- rivers some of the goods that could not be transported into remote areas by car, truck, or train would not be as readily available.”
9. Mention that Irtysh River in Asia, a major tributary of the Ob, has long been considered a major transportation route in Siberia because of the lack of good roads. Locate the Ob River on the world map.
  10. State that the Danube River in Europe has been used for the transportation of soldiers for over 2,000 years. Say, “Throughout history the Romans, Goths, Crusaders, and Ottoman Turks have used the river for such purposes.” Locate the Danube River on the map.
  11. Point out that in addition to fishing, washing, cooking, drinking, irrigating, transporting, and providing homes for plants and animals, rivers are also a source of electricity.
  12. Explain that we often build dams, which have gates that can be opened. Say, “As the water rushes through the gates, it turns the blades of a turbine, or wheel. The spinning turbine creates electricity.” Mention that upon completion, the Three Gorges Dam in Asia will use the waters of the Yangtze River to generate as much electricity as 15 nuclear power plants. Locate the Yangtze.
  13. Inform students that rivers are also dammed to create lakes or reservoirs. Define reservoir. Explain that lakes and reservoirs make excellent recreation spots. Mention that the Murray River in Australia is a popular one for vacations. Say, “One can regularly see houseboats, sailboats, and canoes in the lakes and reservoirs along the river’s path.” Locate the Murray.
  14. Tell students that water is a valuable natural resource. Explain that water is considered a renewable resource. Using structural analysis, ask students to explain what is meant by renewable. (*re* means again; to make new again) Define renewable and give examples of renewable resources. (timber, corn, etc.) Give examples of non-renewable resources. (oil and coal)
  15. Ask students to tell you where we get our water when we have depleted a supply. (water cycle) Review the water cycle (evaporation, condensation, and precipitation).
  16. State that although water is renewable, we can be faced with a crisis when we experience drought conditions and it doesn’t rain, or the water supply is not renewed for a period of time. Say, “We can use water at a faster rate than it is replenished.”
  17. Ask, “What can be done to prevent this?” (conserve water) Define conservation and give examples of ways to conserve water. (Don’t let the water run when brushing teeth; limit length of showers and amount of water we use to take a bath; limit watering of lawns)

### **Day Two**

1. Ask students to tell you what every organism needs for survival. (food, water, shelter, and air) Ask, “What happens if we don’t have water to drink? (We die.)
2. Ask, “Is it necessary to be concerned about our water supply if it is a renewable resource?” (yes) “Why?”(water pollution)
3. Read pp. 5-11, 16-32, and 43-45 of *Water Pollution*.
4. Discuss the effects of water pollution (limits fresh water supplies and harms plant and animal life, eventually leading to the contamination of food supplies) Explain that water can be treated; however, it can be costly.
5. Explore ways in which our water supply becomes contaminated. (oil spills, waste dumping by factories, toxins leaking into the ground water supply, trash, run-off from farming, etc.)
6. Begin the water pollution demonstration in Appendix B.

7. Discuss what measures should be taken to prevent contamination of our water supply. (limit water and air pollution, regulate industrial dumping, etc.)
  8. Review the importance of rivers by saying, "Let's summarize. Why are rivers important?" (source of food and drinking water, used for transportation, bathing, electricity, farming, and recreation)
  9. Pass out the rubric in Appendix C and discuss the expectations for the writing assignment.
  10. Have students write a paragraph explaining why it is important that we take care of our rivers.
- E. *Assessment/Evaluation*
1. Teacher observation of student participation in class discussion
  2. Evaluation of student paragraphs using the rubric in Appendix C

**Lesson Three: The River as a Fresh Water Ecosystem (three 60 minute sessions)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will gain an understanding about the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.
  2. Lesson Content
    - a. Ecology
      - i. Habitats, interdependence of organisms on their environment
  3. Skill Objective(s)
    - a. Students will identify the basic needs of an organism.
    - b. Students will identify the climate, terrain, location, and plant and animal life of various ecosystems.
- B. *Materials*
1. Materials necessary to continue the water pollution demonstration in Appendix B
  2. *Living by a River* pp. 9-15 by Carol Baldwin
  3. Pictures of plants and animals common to a river ecosystem (these can be found in *Exploring Environments*, published by the AIMS Education Foundation)
  4. Various resources as listed in the Resource section of this document for student research
  5. Computer with Internet access to be used for student research
  6. Large piece of white butcher paper for each group
  7. Crayons, colored pencils, and/or markers
  8. A copy of the self-evaluation in Appendix D for each student
  9. A copy of the rubric in Appendix E for each student
- C. *Key Vocabulary*
1. Habitat – a place where a plant or animal lives and can get everything it needs
  2. Ecosystem (biome) – a major ecological community type
- D. *Procedures/Activities*
- Day One**
1. Complete day two of the water pollution demonstration in Appendix B.
  2. Review what the basic needs of every organism are. (air, water, shelter, and food)
  3. State, "In previous lessons, we explored the river as a home to many plants and animals. We call this home a habitat." Define habitat.
  4. Explain that habitats can be quite small like a damp area under a rock, in the trunk of a tree, or a backyard. Say, "Habitats can also be huge, such as deserts, grasslands, and forests."

5. Say, "Large habitats have distinct terrain, climates, plant and animal life and are often made up of many smaller habitats; therefore, we refer to larger habitats as ecosystems or biomes." Define ecosystem.
6. Point out that all rivers all over the world have distinct features as studied in previous lessons and contain similar wildlife. Say, "They are all made up of freshwater."
7. Ask students to identify examples of plant and animal life that would inhabit a river ecosystem. (various species of fish, birds, insects, etc.)
8. Read pp. 9-15 of *Living by a River*.
10. Using the river landscape and various plant and animal pictures to identify more examples of plant and animal species that live in and around the river. (gallinule, fish spider, cottonmouth, mud puppy, largemouth bass, snails, yellow flag iris, sycamore, water lily, etc.)
11. Have students identify smaller habitats within the river ecosystem. (underneath a rock, shade of a tree, branches of a tree, riverbank, under the water, etc.)
12. Explain to students that there are several ecosystems, or ecological communities found throughout the world. Identify these: grasslands or prairies, temperate deciduous forests, temperate tropical rainforests, taiga or coniferous forests, oceans, wetlands, deserts, and polar lands.
13. Tell students that they will be placed in groups of three-four. Each group will be assigned a biome to research.
14. Inform students that they will be creating a landscape of their assigned biome that pictures the plants and animals that live there. Explain that at the end of the unit students will hold a World Ecology Summit, where they will educate their classmates and other students about their ecosystem.
15. Define groups and assign ecosystems.
16. Pass out the rubric in Appendix D and discuss how students will assess their own participation in the group activity.
17. Pass out the checklist in Appendix E and discuss how you will be assessing student landscapes. Explain that students should work to include many different types of plants and animals. Mention that information regarding animal classifications (vertebrates, invertebrates, and endangered animals) will be provided in the next lesson.

### **Days Two and Three**

1. Students will work in groups to complete the task assigned on day one.
2. Teacher will circulate, monitoring group behavior and individual student participation and providing assistance as needed.

#### **E. *Assessment/Evaluation***

1. Teacher observation of student participation in class discussion
2. Student evaluation of their participation in the group activity using the rubric in Appendix D
3. Teacher evaluation of student landscapes using the checklist in Appendix E

### **Lesson Four: Animal Classification (two 60 minute sessions)**

#### **A. *Daily Objectives***

1. Concept Objective(s)
  - a. Students will gain an understanding about the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.
2. Lesson Content
  - a. Introduction to Classification of Animals (p. 81)

- i. Scientists classify animals according to the characteristics they share
    - a) Cold-blooded or warm-blooded
    - b) Vertebrates (have backbones and internal skeletons) or Invertebrates (do not have backbones or internal skeletons)
  - ii. Different classes of vertebrates
    - a) Fish: aquatic animals, breathe through gills, cold blooded, most have scales, most develop from eggs that the female lays outside her body
    - b) Amphibians: live part of their lives in water and part on land, have gills when young, later develop lungs, cold--blooded, usually have moist skin
    - c) Reptiles: hatch from eggs, cold-blooded, have dry, thick, scaly skin
    - d) Birds: warm-blooded, most can fly, have feathers or wings, most build nests, hatch from eggs, most baby birds must be fed by parents and cared for until they can survive on their own (though some, like baby chickens and quail, can search for food a few hours after hatching)
    - e) Mammals: warm-blooded, have hair on their bodies, parents care for the young, females produce milk for their babies, breathe through lungs, most are terrestrial (live on land) though some are aquatic
3. Skill Objective(s)
- a. Students will classify a variety of organisms according to selected characteristics.
  - b. Students will identify characteristics that are common to all individuals of a species.
  - c. Students will identify differences in appearance among individuals of the same population or group.

B. *Materials*

1. Materials necessary to continue the water demonstration in Appendix B
2. Pictures of various animals that inhabit a river ecosystem (make sure that there are several examples from each vertebrate class and some examples of invertebrates; the invertebrates may include snails, clams, and insects)
3. Posters or a bulletin board display picturing the various classes of animals and their characteristics for student reference
4. Paper and pencil
5. Computer with Internet access to be used for student research
6. Various resources as listed in the Resource section of this document for student research
7. Student copies of the self-evaluation
8. Student copies of Appendix E

C. *Key Vocabulary*

1. Vertebrate – an animal with a backbone and an internal skeleton
2. Invertebrate – an animal without a backbone; has an exoskeleton
3. Mammal – any of a class of warm-blooded vertebrates that nourish their young with milk secreted by glands and have skin more or less covered with hair
4. Fish – an aquatic, cold-blooded vertebrate that breathes through gills, has scales, and develops from eggs laid outside the female’s body

5. Reptile – a cold-blooded vertebrate that has dry, thick, scaly skin and hatches from eggs
6. Amphibian – a cold-blooded vertebrate that lives part of its life on land and the other in water; has moist skin and breathes with gills before developing lungs as an adult
7. Bird – a warm-blooded invertebrate that has wings and feathers, flies, builds nests, and hatches from eggs
8. Cold-blooded – body temperature is regulated by outside temperature
9. Warm-blooded – maintains steady body temperature

D. *Procedures/Activities*

**Day One**

1. Perform the task for day three of the water pollution demonstration in Appendix B.
2. Say, “Let’s look back at the animals that inhabit a river ecosystem.” Refer to the river landscape.
3. Ask, “What do a cottonmouth and a kingfisher have in common?” (They live in a river ecosystem, eat fish, and are vertebrates.)
4. Point out that both animals are what scientist call vertebrates. Define vertebrates.
5. Ask students to infer what a fish spider and a snail might have in common. (They both inhabit a river and are invertebrates.) Point out that they are invertebrates. Define invertebrates.
6. Call on students to orally classify the animals in the river landscape as vertebrates or invertebrates.
7. Explain that there are so many different types of animals that in order to study them, scientists must group them.
8. Inform students that animals are first grouped according to whether or not they have a backbone. Say that scientists then break these groups into smaller groups based on similar characteristics.
9. State that scientists classify animals using a number of characteristics. Say, “One distinguishing characteristic is an animal’s body temperature. Some animals are warm-blooded, and others are cold-blooded.” Define warm-blooded and cold-blooded.
10. Say, “Other characteristics such as how an animal looks (Do they have hair, scales, or feathers?) or cares for its young are used for classification.”
11. Tell students that the five classes of invertebrates are fish, reptiles, amphibians, birds, and mammals.
12. Ask students what they know about each of these groups of animals.
13. Discuss each class and its distinguishable characteristics as listed in the *Core Knowledge Sequence*.
14. Refer to the posters or bulletin board display.
15. Mention that all animals in a particular classification may not share all of the characteristics common to the group. State that there are always exceptions. Discuss a few. (penguins don’t fly, whales and dolphins are aquatic mammals that do not have hair, duck-billed platypuses are not birds although they lay eggs and have a bill, guppies give live birth to their young, etc.)
16. As a class, orally classify the vertebrates in the river landscape.

**Day Two**

1. Complete day four of the water pollution demonstration in Appendix B.
2. Review the definition of vertebrate and invertebrate.
3. Review the five classes of vertebrates and their characteristics.

4. Tell students that are to classify each of the animals pictured in their landscape. Explain that they should classify each animal as a vertebrate or invertebrate. Say that if the animal is a vertebrate, they should also include the vertebrate class to which it belongs.
  5. Instruct them to write this information neatly, next to the picture of each animal. (For example vertebrate, mammal)
  6. Students should work on this for the rest of the session.
  7. Remind students that they will be evaluating their participation in the activity using the self-evaluation in Appendix D.
  8. Tell students to refer to their landscape rubrics. Remind them to make sure that they have included vertebrates and invertebrates as well as examples from each vertebrate class.
  9. The teacher should circulate monitoring student behavior and participation and assisting as needed.
- E. *Assessment/Evaluation*
1. Teacher observation of student participation in class discussion
  2. Student evaluation of their individual participation in group activity using the rubric in Appendix D
  3. Evaluation of students' classification of animals pictured on landscapes using the rubric in Appendix E

**Lesson Five: Interdependence (two 60 minute sessions)**

- A. *Daily Objectives*
1. Concept Objective(s)
    - a. Students will gain an understanding about the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.
  2. Lesson Content
    - a. Ecology
      - i. The food chain: producers, consumers, and decomposers
  3. Skill Objective(s)
    - a. Students will classify a variety of organisms according to selected characteristics.
    - b. Students will identify a food chain found in a specified ecosystem.
- B. *Materials*
1. Materials necessary for continuing the water pollution demonstration in Appendix B
  2. *Living by a River* pp. 16-19, by Carol Baldwin
  3. 3x12 strips of white construction paper
  4. Glue
  5. Crayons, colored pencils, and/or markers
  6. Various resources as listed in the Resource section of this document for student research
  7. River landscape with plant and animal pictures
  8. A copy of the rubric in Appendix F for each student
- C. *Key Vocabulary*
1. Producers – living thing that can use sunlight to make its own food
  2. Consumers – living thing that needs plants for food
  3. Decomposers – consumer that puts nutrients from dead plants and animals back into the soil, air, and water
  4. Herbivore – animal that eats only plants

5. Omnivore – animal that eats plants and animals
6. Carnivore – animal that eats only other animals
7. Food chain – a relationship in which plants and animals depend on one another for food and energy

D. *Procedures/Activities*

**Day One**

1. Perform the tasks for day five of the water pollution demonstration in Appendix B.
2. Ask, “Where does your food come from?” (grocery stores, restaurants, farms, animals, etc.)
3. Ask, “Where do plants and animals get their food?” Students should be able to respond by saying that animals hunt or eat other animals. They may not remember that plants produce their own food since it was covered last in kindergarten.
4. Read pp. 16-19 of *Living by a River*.
5. Define producers, consumers, and decomposers.
6. Say, “As we learned previously, scientists group animals according to similar characteristics. The role a living thing plays in an ecological community is yet another characteristic used to classify animals.”
7. Refer to the river landscape and orally classify the plants and animals pictured as producers, consumers, or decomposers. Make sure that you have examples of decomposers pictured. Decomposers pictured might include earthworms, flies, millipedes, and mites.
8. Say, “Animals are also classified by what they eat.”
9. Review herbivore, omnivore, and carnivore as it was covered in first grade.
10. Call on students to orally classify animals pictured in the river landscape as herbivores, omnivores, or carnivores.
11. Explain that all plants and animals, living or dead, are potential food for somebody else.
12. Refer to the river landscape and say, “Algae makes a good snack for insects; a water shrew might feed on insects and their larvae; a large fish might eat the water shrew; the large fish is a great meal for the cottonmouth. The algae, insect, fish, water shrew, and cottonmouth are all links in a type of food relationship called a food chain.” Tell students that all living things are a part of a food chain.
13. State that the main source of energy in a habitat is sunlight. Say, “Plants use sunlight to produce food, thus storing some of the sun’s energy. When an animal eats a plant, it too gets energy from the sun by means of the plant. In this way energy is transmitted to animals along the food chain each time something is eaten.”
14. Tell students that in each ecosystem there are many different food chains.
15. Inform students that during the next session they will be creating a model food chain consisting of plants and animals in their assigned ecosystem.
16. Demonstrate how students will use the paper strips to make an actual chain.
17. Pass out the rubric in Appendix F and discuss expectations.

**Day Two**

1. Students will each individually make a model food chain consisting of plants and animals found in their assigned ecosystem.
2. The teacher should circulate monitoring student behavior and providing assistance as needed.

E. *Assessment/Evaluation*

1. Teacher observation of student participation during class discussion

2. Student-made food chain as assessed using the rubric in Appendix F

**Lesson Six: Threats to the River Ecosystem (two 60 minute lessons)**

A. *Daily Objectives*

1. Concept Objective(s)
  - a. Students will understand the processes and interactions of the Earth's systems and the structure and dynamics of Earth and other objects in space.
  - b. Students will gain an understanding about the characteristics and structure of living things, the processes of life, and how living things interact with each other and their environment.
  - c. Students will understand the effects of interactions between human and physical systems and the changes in meaning, use, distribution, and importance of resources.
2. Lesson Content
  - a. Ecology
    - i. Habitats, interdependence of organisms on their environment
    - ii. The concept of a "balance of nature"
    - iii. Ecosystems: how they can be affected by changes in environment (for example, rainfall, food supply etc.), and by man-made changes
      - a) Man-made threats to the environment
    - iv. Water pollution: industrial waste, run-off from farming
    - v. Measures we can take to protect the environment (for example, conservation)
3. Skill Objective(s)
  - a. Students will identify ways in which human activity (such as deforestation, the building of dams, irrigation, etc.) can change the nature of regions and impact the lives of animals and other people.
  - b. Students will identify measures that can be taken to protect the environment and manage resources.

B. *Materials*

1. *Endangered Animals* video
2. Paper and pencil for each student
3. Chalk/white board or overhead for displaying questions about endangered animals
4. Various resources as listed in the Resource section of this document for researching man-made and environmental threats to the world's ecosystems
5. Computer with Internet access to be used for student research
6. A copy of Appendix G for each student

C. *Key Vocabulary*

1. Endangered – threatened
2. Adaptation – the ability to adjust to environmental conditions

D. *Procedures/Activities*

**Day One**

1. Review from Lesson Two, man-made threats to the river ecosystem. (waste dumping, littering, run-off of oil and pesticides, etc.)
2. Review the results of the water pollution demonstration in Appendix B.
3. Say, "In a previous lesson, we discussed how dams are used to create electricity. Dams can also threaten a river. We can use too much water for drinking and irrigation and cause a river to dry up."

4. Explain that there are also environmental threats to a river ecosystem. State that as previously mentioned, dust and ash from volcanoes along with certain types of algae can pollute rivers and lakes.
5. Inform students that extreme climate changes can also be an environmental threat. State that drought is caused by a prolonged period of high temperatures and little if any rain. Ask, “What happens to a river when the climate is increasingly hot and dry?” (dries up) “How does this affect plant and animal life?” (kills plant and animal life as habitat is destroyed; causes some animals to relocate; food may become scarce)
6. Ask, “What happens when there is a drought or a river dries up due to exploitation?” (overpopulation of some animals, decrease in population of others; food supplies can be affected) Give examples of this. This can be done using the plant and animals displayed on the river landscape. (a decrease in the population of birds such as the kingfisher and the gallinule affects weasels and snakes that depend on the birds as a food source; the decrease occurs since the kingfisher lives on fish and the gallinule feeds on mosquitoes, tadpoles, and insect larvae, animals that also decreased in population and threatened bird populations when the river dried up)
7. Remind students that plants and animals depend on one another for food and energy creating a “balance in nature.” Explain that nature’s balance is always changing to man-made and environmental changes.
8. Define adaptation. Give examples of how plants and animals adapt to the changes in the environment. (animals eat a variety of plants and animals, salamanders move into the mud during a drought sometimes living there for two months without drying out, alligators dig holes with their tails that hold water during times of drought, animals visit other ecosystems, etc.)
9. Explain that man can often throw off nature’s delicate balance and affect an ecosystem by hunting or pursuing animals to the point of extinction. Review the meaning of extinction.
10. Define endangered. Say, “The Amazonian Manatee is a large swimming mammal that lives in rivers, canals, oceans, and other places full of water plants. In South America, the manatee is hunted for food. Hunting has threatened manatee populations. Manatees are endangered animals on their way to becoming extinct.”
11. Ask, “Do you know of any other animals that are endangered and why they are considered threatened?” (whales, condors, red and gray wolves, mountain gorillas, black rhinos, monk seals, etc.)
12. Tell students that they are going to learn more about endangered animals by watching a video.
13. Explain that they are to listen and respond to the video by completing the following.
  - a. Give several reasons why animals are endangered.
  - b. List some endangered animals discussed in the video.
14. Write the response guidelines on the board.
15. View the video, *Endangered Animals*.

### **Day Two**

1. Tell students that they are to spend the class time researching man-made and environmental threats to their assigned ecosystem.
2. Point out that if they have not already, students need to include examples of endangered animals in their landscapes.

3. Encourage students to take notes, as they will be orally presenting the information at the World Ecology Summit.
- E. *Assessment/Evaluation*
1. Teacher observation of student participation during class discussion
  2. Student notes on endangered animals
  3. Evaluation of oral presentation of man-made and environmental threats to the assigned ecosystem and suggested conservation measures using the rubric in Appendix G

## VI. CULMINATING ACTIVITIES

- A. Students will hold a World Ecology Summit in which they will educate their classmates and other students in the school about the various ecosystems of the world. Students will identify various habitats present in their ecosystem and the plants and animals that inhabit them using the landscapes they created during the unit. Plant and animal facts and information on adaptations should be included. The student-made food chains should be used to explain interdependence and the need for a “balance of nature.” Man-made and environmental threats to the biome and suggested conservation measures should be presented along with information about the climate and location of each biome. A rubric for assessment is included in Appendix G.
- B. After holding the World Ecology Summit, evaluate student’s understanding of the world’s ecosystems by playing “Test Your Knowledge,” a game in which two teams compete for the title of most knowledgeable. Given a clue, teams will race to identify the mystery ecosystem and earn a point. The team with the most points is awarded a trophy (teacher-made) and crowned the “Most Knowledgeable.” Clues can be found in Appendix H.

## VII. HANDOUTS/WORKSHEETS

- A. Appendix A: River Model Rubric
- B. Appendix B: Water Pollution Demonstration
- C. Appendix C: Paragraph Rubric
- D. Appendix D: Self-Evaluation Rubric for Group Activity
- E. Appendix E: Landscape Checklist
- F. Appendix F: Food Chain Rubric
- G. Appendix G: Oral Presentation Rubric
- H. Appendix H: Test Your Knowledge Clues

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**Appendix A**  
**River Model Rubric**

Name \_\_\_\_\_

<b>CATEGORY</b>	<b>Advanced</b>	<b>Proficient</b>	<b>Developing</b>	<b>Beginning</b>
<b>Accuracy</b>	At least 90% of the items are correctly labeled.	80-89% of the items are labeled correctly.	79-70% of the items are labeled correctly.	Less than 70% of the items are labeled correctly.
<b>Neatness</b>	90-100% of the labels can be read easily.	89-80% of the labels can be read easily.	79-70% of the labels can be read easily.	Less than 70% of the labels can be read easily.

## Appendix B<sup>1</sup>, page 1

### Water Pollution Demonstration

#### Materials:

- Large plastic jar with a wide mouth
- Pencil
- Sponge
- Small magnet
- 8 inches of string
- Water
- Punched paper dots
- Food coloring
- Dirt
- Molasses

#### Directions:

##### Preparation

1. Cut the sponge into the shape of a fish.
2. Lay the pencil horizontally across the mouth of the jar.
3. Suspend the sponge fish from the pencil using about 5 inches of the string. You can choose to make a hole or staple the string to the sponge.
4. Using the remaining string, suspend the magnet from the bottom of the sponge. This will keep the sponge from floating to the top of the water.
5. Gather the remaining ingredients and add them to the water as instructed each day.

##### Demonstration

###### *Day One*

1. Begin by telling students the following story. “There once was a perch named Fiona. Fiona lived in Lake Geneva in Europe. She was a happy fish. She loved to frolic in the fresh water where food was plentiful. One day, Fiona decided to explore her surroundings. She traveled up a river known as the Rhine. She immediately noticed something different while swimming along the riverbank at Basel. Little did Fiona know, but a fire broke out at a warehouse. Water from the fire hoses washed tons of agricultural chemicals into the river.”
2. Add a few drops of red food coloring to the water to give it a light pink tint.
3. Ask students, “How do you think Fiona felt?”

###### *Day Two*

1. Mention that the Rhine River is the busiest river in Europe and Rotterdam, located at the mouth of the Rhine, is the world’s busiest port.
2. Begin, “As Fiona continued her explorations, she began to notice that the water was once again changing. As barges transported goods up and down the Rhine, they leaked engine oil.”
3. Add some molasses to the water.
4. Ask, “How do you think the oil and chemicals are affected Fiona and the other fish living in the Rhine River?”

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<sup>1</sup> Adapted from “Fred the Fish: An Interdisciplinary Water Pollution Activity,” *Water, Stones, and Fossil Bones* by Chilton-Stingham, P. and Wolanin, J.

## Appendix B<sup>2</sup>, page 2

### *Day Three*

1. Say, “ All of the exploring made Fiona very hungry. She searched for food, but quickly became discouraged. Pollution of the Rhine had upset the balance of the river. Microscopic plants were dying, leaving water insects and eventually fish without anything to eat. Hungry, Fiona took a bite out of what she thought was a smaller fish, but soon discovered it was a piece of garbage instead.”
2. Add a handful of punched paper dots to the water.
3. Say, “Overhead, a large white craft passed. A vessel full of tourists cruising the Rhine Gorge had dumped their trash into the river.”
4. Ask, “What was Fiona thinking?”

### *Day Four*

1. Say, “Fiona longed for Lake Geneva where the water was fresh and food was plentiful so she decided it was time to go home. The rivers current was much stronger traveling upstream. Because the currents are so much stronger, a barge traveling upstream takes twice as long to get to its destination. Suddenly, the water became cloudy.”
2. Add a handful of dirt to the water.
3. Say, “As Fiona struggled, fertilizers and pesticides from nearby vineyards were washed into the river by the rain.”
4. Ask, “What do you think will happen to Fiona if she doesn’t find her way home soon?”

### *Day Five*

1. Begin, “After struggling for some time, Fiona found it more difficult to breathe. The water around her was murky, which also make navigating difficult. “
2. Add a few drops of green food coloring.
3. Say, “Sewage and nitrates from household detergents also find their way into the Rhine River. The Rhine is known to some as “the sewer of Europe” because it is so heavily polluted.”
4. Ask, “What do you think happened to Fiona?”

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<sup>2</sup> Adapted from “Fred the Fish: An Interdisciplinary Water Pollution Activity,” *Water, Stones, and Fossil Bones* by Chilton-Stingham, P. and Wolanin, J.

**Appendix C  
Paragraph Rubric**

Student Name \_\_\_\_\_

<b>CATEGORY</b>	<b>4 Points</b>	<b>3 Points</b>	<b>2 Points</b>	<b>1 Point</b>
<b>Focus on Topic</b>		Main idea is clear.	Main idea is somewhat clear.	The main idea is not clear. There is a seemingly random collection of information.
<b>Support for Topic</b>	Relevant, telling, quality details give the reader important information that goes beyond the obvious.	Supporting details and information are relevant, but one key issue is unsupported.	Supporting details and information are relevant, but several key issues are unsupported.	Supporting details and information are typically unclear or not related to the topic.
<b>Transitions</b>	A variety of thoughtful transitions are used. They clearly show how ideas are connected.	Transitions clearly show how ideas are connected, but there is little variety.	Some transitions work well; but connections between other ideas are fuzzy.	The transitions between ideas are unclear or nonexistent.
<b>Conventions</b>	Writer makes no errors in capitalization, punctuation, and spelling so the paper is exceptionally easy to read.	Writer makes few errors in capitalization, punctuation, and spelling so the paper is still easy to read.	Writer makes several errors in capitalization, punctuation, and spelling that catch the reader's attention and interrupt the flow.	Writer makes many errors in capitalization, punctuation, and spelling that catch the reader's attention and greatly interrupt the flow.

**Beginning 0-4 points    Developing 5-8 points    Proficient 9-12 points    Advanced 13-15 points**

**Appendix D<sup>3</sup>**  
**Self-Evaluation Rubric for Group Activity**

Name \_\_\_\_\_

Use the following rating scale to give yourself a score in each area. Be honest!

1=Excellent                  2=Good                  3=Fair                  4=Poor

- \_\_\_\_\_ I used my time wisely.
- \_\_\_\_\_ I stayed focused on the task at hand.
- \_\_\_\_\_ I shared good ideas.
- \_\_\_\_\_ I actively participated in group discussions.
- \_\_\_\_\_ I listened carefully to others when they were speaking.
- \_\_\_\_\_ I worked cooperatively with others in my group.
- \_\_\_\_\_ I was a problem solver.
- \_\_\_\_\_ I did my best work.
- \_\_\_\_\_ I did my part to contribute to the group's work.
- \_\_\_\_\_ I learned something.
- \_\_\_\_\_ I had a good time.

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<sup>3</sup> Adapted from *Appendix C, Self-Evaluation Checklist*, Challenger Center for Space Education, 1992

**Appendix E**  
**Landscape Checklist**

Student Name \_\_\_\_\_

**CATEGORY**

**RESPONSIBILITIES**

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Features

- Distinct physical characteristics of the biome are included
- Examples of invertebrates and all five classes of vertebrates are represented
- Endangered animals are pictured
- Various forms of plant life are included
- Animals are correctly classified
- Attention is given to scale

---

Presentation

- Work is original
- Space is well used
- Illustrations are colorful and appeal to the eye
- Product is neat

**Appendix F**  
**Food Chain Rubric**

Student Name \_\_\_\_\_

<b>Proficient</b>	<ul style="list-style-type: none"> <li>• Depicts plants and animals particular to the assigned ecosystem</li> <li>• Illustrates plant and animal life</li> <li>• Uses original illustrations</li> <li>• Correctly sequences plant and animal life</li> <li>• Successfully labels producers, consumers, and decomposers</li> <li>• Includes at least four links in the food chain</li> <li>• Correctly classifies animals as herbivores, carnivores, or omnivores</li> </ul>
<b>Developing</b>	<ul style="list-style-type: none"> <li>• Depicts plants and animals particular to the assigned ecosystem</li> <li>• Illustrates plant and animal life</li> <li>• Uses some original illustrations</li> <li>• Correctly sequences plant and animal life</li> <li>• Successfully labels producers, consumers, and decomposers</li> <li>• Includes less than four links in the food chain</li> <li>• Incorrectly classifies animals as herbivores, carnivores, or omnivores</li> </ul>
<b>Beginning</b>	<ul style="list-style-type: none"> <li>• Depicts plants and animals that are not particular to the assigned ecosystem</li> <li>• Includes no illustrations</li> <li>• Sequences plant and animal life incorrectly</li> <li>• Incorrectly labels producers, consumers, and decomposers</li> <li>• Includes less than four links in the food chain</li> <li>• Incorrectly classifies animals as herbivores, carnivores, or omnivores</li> </ul>

**Appendix G**  
**Oral Presentation Rubric**

**Group Members:**

<b>CATEGORY</b>	<b>4 Points</b>	<b>3 Points</b>	<b>2 Points</b>	<b>1 Point</b>
<b>Content</b>	Showed a full understanding of the topic.	Showed a good understanding of the topic.	Showed a good understanding of parts of the topic.	Does not seem to understand the topic very well.
<b>Comprehension</b>	Students were able to accurately answer almost all questions posed by classmates about the topic.	Students were able to accurately answer most questions posed by classmates about the topic.	Students were able to accurately answer a few questions posed by classmates about the topic.	Students were unable to accurately answer questions posed by classmates about the topic.
<b>Preparedness</b>	Students were completely prepared and have obviously rehearsed.	Students seemed pretty prepared but could have used more rehearsal time.	Students were somewhat prepared, but it is clear that more rehearsal is needed.	Students did not seem at all prepared to present.
<b>Posture and Eye Contact</b>	Stood up straight, look relaxed and confident. Established eye contact with everyone in the room during the presentation.	Stood up straight and established eye contact with everyone in the room during the presentation.	Sometimes stood up straight and established eye contact.	Slouched and/or did not look at people during the presentation.
<b>Volume</b>	Volume was loud enough to be heard by all audience members throughout the presentation.	Volume was loud enough to be heard by all audience members at least 90% of the time.	Volume was loud enough to be heard by all audience members at least 80% of the time.	Volume was often too soft to be heard by all audience members.

**Beginning 0-5 points    Developing 6-10 points    Proficient 11-15 points    Advanced 16-20 points**

## Appendix H<sup>4</sup>

### Test Your Knowledge Clues

1. I am a large area of land covered with tall grasses. (prairies or grasslands)
2. I am freezing cold and covered with ice all year. (tundra or polar lands)
3. I can be flooded with salty or fresh water. (wetlands)
4. Most of my land in the U.S. is being used for farming and ranching. (prairies or grasslands)
5. I receive very little rain each year. (deserts)
6. I am the only biome in which insects do not live. (oceans)
7. Because of humid conditions, I have the greatest amount of plant growth. (rainforests)
8. The most common type of tree found in my environment has cones. (taiga or coniferous forests)
9. I am named for the barren plains of the Arctic Circle. (tundra)
10. I am characterized by many trees that do not make food during the winter; therefore, their leaves change colors and fall to the ground. (temperate deciduous forests)
11. Although I cover less than one-fifth of the earth's land, I support over a million-and-a-half different kinds of plants and animals. (rainforests)
12. Plants must have little surface area, good water storage, or adapted strong root systems to survive my hostile environment. (deserts)
13. I have long, dark winters. (tundra or polar lands)
14. I cover over 70% of the Earth's surface. (oceans)
15. Although I am often thought of as very hot place, I can be very cold. (deserts)
16. I provide oxygen and prevent erosion. (rainforests)
17. I am made up of standing water in marshes, swamps, and bogs. (wetlands)
18. I commonly have very high daytime temperatures and low nighttime temperatures that make survival difficult. (deserts)
19. I am characterized by well-defined seasons. (temperate deciduous forests)

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<sup>4</sup> Adapted from "Picture This," *Lifesaver Lessons* published by The Education Center, Inc., 1998