

# Riparian Round Up

**Adapted from:** An original Creek Connections activity.  
Creek Connections, Box 10, Allegheny College, Meadville, Pennsylvania, 16335

**Grade Level:** Basic to Advanced

**Duration:** 45 minutes

**Setting:** riparian area field site

**Summary:** Students visit a riparian area and apply knowledge they've acquired through other Riparian Buffers Module activities to observe, answer questions, and draw conclusions about the riparian area.

**Objectives:** Students will apply their knowledge of the functions of riparian buffers, the concept of ecotones, riparian assessment, nutrient cycling, riparian tree identification, and riparian debates to a riparian field site.

**Vocabulary:** simple, compound, alternate, and opposite leaves, decomposer, producer, consumer, microhabitat, nutrient cycling, ecotone, biodiversity, microorganisms, microbes

**Related Module Resources:**

- "Riparian Buffer Basics" Fact Sheet
- "Introduction to Riparian Buffers" Fact Sheet
- Tree ID, Wrangling Over Riparian Zones, RipCycles, Eco-Tones, and RCE Activities
- Riparian Videos

**Materials (Included in Module):**

- Riparian Round Up Worksheet
- Riparian Round Up Example Responses
- *Tree Finders, Peterson's Field Guides, Tree Identification Books*

**Additional Materials (NOT Included in Module):**

- Clipboards

## ACADEMIC STANDARDS: (ECOLOGY & ENVIRONMENT)

### 7<sup>th</sup> Grade

- 4.1.7.D. Explain and describe characteristics of a wetland.
  - Recognize the common types of plants and animals.
- \*NOTE: Riparian areas frequently contain wetlands or are considered to be wetlands.
- 4.3.7.B. Describe how human actions affect the health of the environment.
  - Identify land use practices and their relation to environmental health.
- 4.6.7.A. Explain the flows of energy and matter from organism to organism within an ecosystem.
  - Identify niches for producers, consumers and decomposers within an ecosystem.
- 4.6.7.B. Explain the concepts of cycles.
  - Identify and explain cycles within an ecosystem. Analyze the role of different cycles within an ecosystem.
- 4.6.7.C. Explain how ecosystems change over time.
  - Explain a change in an ecosystem that relates to humans.
- 4.7.7.A. Describe diversity of plants and animals in ecosystems.
  - Select an ecosystem and describe different plants and animals that live there.
- 4.8.7.C. Explain how human activities may affect local, regional and national environments.
  - Explain how a particular human activity has changed the local area over the years.
- 4.8.7.D. Explain the importance of maintaining the natural resources at the local, state and national levels.
  - Explain how human activities and natural events have affected ecosystems.

### 10<sup>th</sup> Grade

- 4.1.10.B. Explain the relationship among landforms, vegetation and the amount and speed of water.
  - Explain how vegetation affects storm water runoff.
- 4.1.10.C. Describe the physical characteristics of a stream and determine the types of organisms found in aquatic environments.
  - Identify terrestrial and aquatic organisms that live in a watershed.
- 4.1.10.D. Describe the multiple functions of wetlands.
  - Explain how a wetland influences water quality, wildlife and water retention.
- 4.1.10.E. Identify and describe natural and human events on watersheds and wetlands.
  - Identify the effects of humans and human events on watersheds.
- 4.3.10.B. Explain how multiple variables determine the effects of pollution on environmental health, natural processes and human practices.
  - Explain how human practices affect the quality of the water and soil.
- 4.6.10.B. Explain how cycles affect the balance in an ecosystem.
  - Explain the consequences of interrupting natural cycles.
- 4.6.10.C. Analyze how ecosystems change over time.
  - Analyze consequences of interrupting natural cycles.
  - Identify and explain the succession stages in an ecosystem.
  - Identify causes of succession.
  - Analyze consequences of interrupting natural cycles.
- 4.8.10.C. Analyze how human activities may cause changes in an ecosystem.
  - Analyze and evaluate changes in the environment that are the result of human activities.

### 12<sup>th</sup> Grade

- 4.1.12.B. Explain the relationships that exist within watersheds in the United States.
  - Understand that various ecosystems may be contained in a watershed. Examine and describe the ecosystems contained within a specific watershed.
- 4.1.12.E. Evaluate the trade-offs, costs and benefits of conserving watersheds and wetlands.
  - Evaluate the effects of human activities on watersheds and wetlands.
- 4.6.12.A. Analyze the interdependence of an ecosystem.
  - Analyze the positive or negative impacts of outside influences on an ecosystem.
- 4.6.12.B. Analyze the impact of cycles on the ecosystem.
  - Explain the processes involved in the natural cycles.
- 4.6.12.C. Analyze how human action and natural changes affect the balance within an ecosystem.
  - Analyze effects of human action on an ecosystem.

## **BACKGROUND:**

By participating in the activities included in the Creek Connections Riparian Buffers Module, students cover myriads of topics related to riparian buffers: what riparian buffers are, the functions of riparian buffers, how riparian buffers enhance water quality, riparian buffers as ecotones, riparian assessment, nutrient cycling in riparian ecosystems, identification of common riparian trees, and riparian debates. Yet, riparian buffers are such a rich topic that information remains to be covered and that which has already been presented could certainly be reinforced. Therefore, this activity serves as a “catch-all” of riparian concepts, introducing students to new ideas while also forcing them to apply previously acquired knowledge in the field.

For extensive background information on riparian buffers, see the “Riparian Buffers Basics” Fact Sheet.

## **OVERVIEW:**

Students visit a riparian buffer and use knowledge gleaned from other Riparian Buffers Module activities and their powers of observation to complete questions. The questions cover the following riparian buffer topics: what riparian buffers are, the functions of riparian buffers, how riparian buffers enhance water quality, riparian buffers as ecotones, riparian assessment, nutrient cycling in riparian ecosystems, identification of common riparian trees, and riparian debates.

## **PROCEDURE:**

### **Teacher Preparation:**

1. Make copies of Riparian Round Up Worksheets for your students.
2. Identify a riparian area to visit for the activity.

### **Student Experiment or Activity:**

1. Go to the riparian area and distribute the Riparian Round Up Worksheets to students.
2. Have students use their powers of observation and knowledge from other riparian buffer activities to complete the 23 questions on the Riparian Round Up Worksheet.
3. The first person to complete all 23 questions wins!
4. After students have completed the Worksheets, go over the questions with them and have them share examples of their responses to each question. Their responses should be diverse.

## **DISCUSSION:**

*Note: The questions on the Riparian Round Up Worksheet will spark lots of great discussions. Here are additional discussion questions:*

What are the most common trees found near the waterway? *Let students respond.*

What characteristics did you use to correctly identify your mystery tree? *For example, leaf shape, size, pattern, edges, bark, flowers, etc.*

Many of you identified different tree species. What does this tell us about the biodiversity in the riparian area? *There is high biodiversity in the riparian area.*

How is the richness and abundance of microhabitats related to biodiversity? *The greater the number and different kinds of microhabitats, the higher the biodiversity of the area.*

Are there other decomposers in the soil that are difficult to see? *Yes. Thousands! Decomposers can be fungus, bacteria, insects, etc.*

What is another name for organisms that one can't see with the naked eye? *Microorganisms or microbes.*

Do you think there is more biodiversity in the riparian ecotone or in the upland? Why? *There is probably more biodiversity in the riparian ecotone than in the upland because ecotones generally have higher biodiversity than adjacent habitats.*

How does the land use adjacent to the waterway affect stream health? *Depends on the land use at the site, but could add nutrients, increase runoff and/or soil erosion, etc.*

How does a riparian buffer help reduce the negative effects of adjacent land use? *See "Riparian Buffer Basics" Fact Sheet.*

### **EVALUATION:**

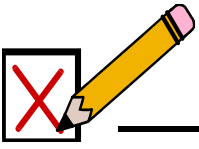
- Accurately completed Worksheets.
- Correctly define riparian area and riparian buffer.
- Discussion questions above.

### **EXTENSIONS AND MODIFICATIONS:**

- Have students work in pairs or larger groups to complete the questions.
- If you have less time, the first person or group to complete 10 (or other pre-determined number of questions) wins.
- If you don't have the opportunity to take your class to visit a riparian area, take pictures or video footage of a riparian area and have students use their imagination and creativity or footage from the riparian zone videos included in the module to complete the Riparian Round Up questions.
- After visiting the area, have students pick one riparian topic, do further research, and present their findings to the rest of the class in poem, essay, or drawing form.
- Do the activity at several sites and compare answers.

### **NOTES (PLEASE WRITE ANY SUGGESTIONS YOU HAVE FOR TEACHERS USING THIS ACTIVITY IN THE FUTURE):**





## WORKSHEET : RIPARIAN ROUND UP

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Name \_\_\_\_\_ Date \_\_\_\_\_

*Use your powers of observation and knowledge from other riparian buffer activities to complete the following questions.*

1. What watershed is this riparian zone in? \_\_\_\_\_  
\_\_\_\_\_

2. Find a tree near the waterway and determine...  
a. its common name. \_\_\_\_\_  
b. if its leaves are compound or simple. \_\_\_\_\_  
c. if its leaves are alternate or opposite. \_\_\_\_\_

3. Select an unknown tree in the riparian area, sketch a picture of one of its leaves below, and use a dichotomous key and/or field guide to correctly identify it.

Common Name: \_\_\_\_\_

Scientific Name: \_\_\_\_\_

Leaf Drawing:

4. **Succession** is the replacement of populations in a habitat by better-adapted populations over time, progressing toward a stable population composition. If three large trees next to each other were to fall down naturally because of age or wind, describe how you think the area where the trees were would look...

a. before the trees fell. \_\_\_\_\_  
\_\_\_\_\_

b. immediately after the trees fell. \_\_\_\_\_  
\_\_\_\_\_

c. one year after the trees fell. \_\_\_\_\_  
\_\_\_\_\_

d. ten years after the trees fell. \_\_\_\_\_  
\_\_\_\_\_

e. 35 years after the trees fell. \_\_\_\_\_  
\_\_\_\_\_

*HINT: Think about what is on the forest floor, the amount of sunlight, the types of vegetation that prefer lots of sunlight versus those that prefer shade, etc.*

5. Why doesn't leaf litter continuously pile up in riparian forests?

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6. Examine the leaf litter in the riparian forest for a decomposer. Sketch it below and try to identify it.

Decomposer Name: \_\_\_\_\_

Decomposer Drawing:

7. Define microhabitat and identify a microhabitat in the riparian area and an organism typically found there.

Microhabitat = \_\_\_\_\_

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Microhabitat A: \_\_\_\_\_

Two organisms typically found in Microhabitat A: \_\_\_\_\_

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Microhabitat B: \_\_\_\_\_

Two organisms typically found in Microhabitat B: \_\_\_\_\_

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8. Identify three objects in the riparian area that slow the flow of runoff passing through that area.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

9. Identify and describe evidence of how humans have had an impact on the riparian area.

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10. a. Draw and label a picture of something natural in the riparian area that is helping to stabilize the streambanks (keep them from falling in or being eroded).

- b. Draw and label a picture of something artificial (placed by humans) that may be present in this riparian area or has been used near other waterways to stabilize stream banks.

11. Describe examples of pathways of the three nutrient cycle pathways below.

Carbon - \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Nitrogen - \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phosphorous - \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

12. Identify and describe evidence of how one of these nutrient cycles has been disrupted in the riparian area and what the consequences of that disruption are.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

13. Identify an organism that prefers to live in the ecotone edge...

- a. between the waterway and the riparian area. \_\_\_\_\_
- b. between the riparian area and the uplands. \_\_\_\_\_

14. Identify a link between the riparian area and the base of the aquatic food web.

\_\_\_\_\_  
\_\_\_\_\_

15. Identify and describe a terrestrial producer in the riparian area.

\_\_\_\_\_  
\_\_\_\_\_

16. Identify and describe an aquatic producer in the waterway.

\_\_\_\_\_  
\_\_\_\_\_

17. Identify and describe a riparian area terrestrial...

a. primary consumer. \_\_\_\_\_

b. secondary consumer. \_\_\_\_\_

18. Identify and describe an aquatic...

a. primary consumer. \_\_\_\_\_

b. secondary consumer. \_\_\_\_\_

19. Describe how the land use beyond the riparian area would affect the waterway if all the riparian area trees and vegetation were cleared.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

20. Identify three characteristics of the riparian site that make it a healthy, effective riparian area.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

21. Name three things that you could do to make the riparian area even healthier/more effective.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

22. Based on the land use beyond the riparian area, how might the landowner and local conservation officers have different views on how the riparian area would be best managed? What compromise might they reach so that both the landowner's interests and the health of the stream are maintained?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

23. Name three recreational activities you and your friends could do in this riparian area.

a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_



## ANSWER KEY : RIPARIAN ROUND UP

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*Note to Teachers: There are not single “right” answers to the questions below. Rather, they encourage students to use their observation skills and previously acquired knowledge of riparian buffers to complete them. Below are examples of responses you might expect from your students.*

1. What watershed is this riparian zone in? *Answers will vary.*
2. Find a tree near the waterway and determine...
  - a. its common name. *Silver maple*
  - b. if its leaves are compound or simple. *simple*
  - c. if its leaves are alternate or opposite. *opposite*
3. Select an unknown tree in the riparian area, sketch a picture of one of its leaves below, and use a dichotomous key and/or field guide to correctly identify it.

Common Name: *Sycamore*

Scientific Name: *Platanus occidentalis*

Leaf Drawing:



Source: [www.clip-art.com](http://www.clip-art.com)

4. **Succession** is the replacement of populations in a habitat by better-adapted populations over time, progressing toward a stable population composition. If three large trees next to each other were to fall down naturally because of age or wind, describe how you think the area where the trees were would look...
  - a. before the trees fell. *Shaded, few understory trees, etc.*
  - b. immediately after the trees fell. *Flooded with sunlight, downed trees.*
  - c. one year after the trees fell. *Lots of sapling; trees have started to decompose.*
  - d. ten years after the trees fell. *Medium to large trees, old logs fully decomposed*
  - e. 35 years after the trees fell. *Large trees, dark understory, few saplings.*

*HINT: Think about what is on the forest floor, the amount of sunlight, the types of vegetation that prefer lots of sunlight versus those that prefer shade, etc.*

5. Why doesn't leaf litter continuously pile up in riparian forests?

*Decomposers break down the leaf litter and return the nutrients contained therein to the soil, atmosphere, or food web; as a result, the leaves do not pile up.*

6. Examine the leaf litter in the riparian forest for a decomposer. Sketch it below and try to identify it.

Decomposer Name: *Wild Mushroom*

Decomposer Drawing:



Source: [www.clip-art.com](http://www.clip-art.com)

7. Define microhabitat and identify a microhabitat in the riparian area and an organism typically found there.

Microhabitat = *A local habitat of an organism within a larger habitat.*

Microhabitat A: *Microhabitat in the riparian area: under rocks along the stream edge*

Two organisms typically found in Microhabitat A: *mountain dusky salamander and northern two-lined salamander*

Microhabitat B: *on a rotting log*

Two organisms typically found in Microhabitat B: *mushrooms, beetles*

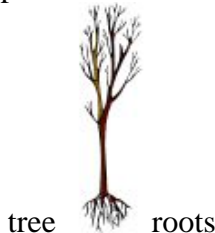
8. Identify three objects in the riparian area that slow the flow of runoff passing through that area.

- a. *Trees*
- b. *Rocks*
- c. *Leaf litter*

9. Identify and describe evidence of how humans have had an impact on the riparian area.

*There is trash in the stream and riparian area. This has polluted the stream and degraded the beauty of the area. If humans spend a lot of time here, they might also disturb vegetation and increase soil erosion in the area.*

10. a. Draw and label a picture of something natural in the riparian area that is helping to stabilize the streambanks (keep them from falling in or being eroded).



tree roots

Source: <http://www.clip-art.com>

- b. Draw and label a picture of something artificial (placed by humans) that may be present in this riparian area or has been used near other waterways to stabilize stream banks.



Stone piles/rip rap

Source: [http://www.pioneersand.com/products/boulders\\_riprap.htm](http://www.pioneersand.com/products/boulders_riprap.htm)

11. Describe examples of pathways of the three nutrient cycle pathways below.
- Carbon – *Carbon-containing leaves in the canopy fall to the forest floor, are consumed by decomposers, and returned to the atmosphere as carbon dioxide via decomposition.*
- Nitrogen – *Frankia bacteria in the riparian forest fix nitrogen, which is then taken up by alder trees in the forest.*
- Phosphorous – *The rocks along the stream edge contain phosphorous (phosphates) and are weathered. Some of the phosphates dissolve in the water and are taken up by aquatic producers like the algae in the stream.*
12. Identify and describe evidence of how one of these nutrient cycles has been disrupted in the riparian area and what the consequences of that disruption are.
- There is a lot of algal growth that might indicate that the farms nearby are using too much fertilizer. That fertilizer is eventually washing into the stream where it stimulates explosive algal growth. Aquatic life isn't being too negatively affected yet but soon the algae will die and the decomposers that break it down will deplete the water of oxygen, harming aquatic life. This is evidence that humans are disrupting the nitrogen and/or phosphorous cycles.*
13. Identify an organism that prefers to live in the ecotone edge...
- between the waterway and the riparian area. *Two-lined salamander*
  - between the riparian area and the uplands. *Deer*
14. Identify a link between the riparian area and the base of the aquatic food web.
- Leaf litter that falls from riparian canopies into waterways forms the base of the aquatic food web. This leaf litter enters the food chain when it is colonized by bacteria and converted to CPOM. Shredders consume CPOM. Leaf litter is also a natural nutrient that can be used by algae in creeks. Algae is consumed by some aquatic insects.*
15. Identify and describe a terrestrial producer in the riparian area.
- Black locust—This is a leguminous tree that can fix its own nitrogen.*
16. Identify and describe an aquatic producer in the waterway.
- Cyanobacteria—This blue-green algae can fix its own nitrogen.*

17. Identify and describe a riparian area terrestrial...
- primary consumer. *Rabbit—an herbivore that eats plants.*
  - secondary consumer. *Hawk—a predator that eats rabbits and other primary consumers.*
18. Identify and describe an aquatic...
- primary consumer. *Water penny beetle larva—a grazer that eats phytoplankton*
  - secondary consumer. *Hellgrammite—an aquatic predator that consumes grazers such as water penny beetle larvae.*
19. Describe how the land use beyond the riparian area would affect the waterway if all the riparian area trees and vegetation were cleared.  
*There is a school parking lot beyond the riparian area. If the riparian area were cleared of trees and vegetation, more storm water runoff from the parking lot would enter the stream because there would be no vegetation or obstacles to soak up or slow down runoff. The extra storm water runoff would increase turbidity levels in the stream. If the storm event occurred during the winter and salt had been used to melt snow in the parking lot, the salt would wash into the waterway and increase TDS (total dissolved solids) levels.*
20. Identify three characteristics of the riparian site that make it a healthy, effective riparian area.
- Mature trees along the waterway.*
  - The riparian buffer is 100 feet wide.*
  - There are a lot of shrubs and vegetation in the riparian area.*
21. Name three things that you could do to make the riparian area even healthier/more effective.
- Plant more native, moisture tolerant trees.*
  - Install fascines (bundles of native twigs buried in stream banks).*
  - Plant live willow and dogwood stakes.*
22. Based on the land use beyond the riparian area, how might the landowner and local conservation officers have different views on how the riparian area would be best managed? What compromise might they reach so that both the landowner's interests and the health of the stream are maintained?  
*The riparian area is on the edge of school property. School officials don't want the kids to have a wooded area on school grounds where they might hang out and cause trouble. However, the conservation district officer insists that the riparian buffer is beneficial to the health of the stream. They might decide to work with students to build interpretive trails in the riparian area and educate students about the importance of the buffer. If the students help maintain the area and understand its benefits, delinquency in the riparian area will be less likely.*
23. Name three recreational activities you and your friends could do in this riparian area.
- Camping*
  - Mountain biking*
  - Fly fishing*