Essential Question: How do we come to know and appreciate the river environment and our place in it?

Content Questions: What plant and animal adaptations allow them to survive in the river environment?

What food chains and food webs can be found in a river ecosystem?
3rd Grade River Biodiversity Overview

**Content question 1:** What plant and animal adaptations allow them to survive in the river environment?

- Read aloud The Raft

LESSON 2: Schoolyard or Park Observation
- Outdoor exploration

LESSON 3: Plants and Animals of the River
- Assess prior knowledge
- Develop class mural

LESSON 4: What is an Adaptation?
- Animal charades

LESSON 5: Field Guides for the River
- Individual student research
- Creating field guide
- Writing poems

**Content question 2:** What food chains and food webs can be found in a river ecosystem?

LESSON 6: The Human Food Chain
- Food chain creation with bag lunch

LESSON 7: Foods Chains and Webs of the River
- Magic School Bus Gets Eaten video
- Food chain creation with river plant or animal
- Mural

LESSON 8: River Field Trip
- Plant and animals search and identification
- Macroinvertebrate exploration
- Solo time

**Culminating Writing Project**
Lesson 1: who depends on rivers? an introduction

Essential Question: How do we come to know and appreciate the river environment and our place in it?

Content Question: What plant and animal adaptations allow them to survive in the river environment?

Lesson Question: What plants and animals (biodiversity) depend on rivers?

Goals
- Students will be introduced to the wide variety of life that lives in and around rivers.
- Students will use their listening and speaking skills to learn about adaptations.

Vocabulary

- **Adaptation**: The modification, over time, of the physical, mental or behavioral characteristics of an organism which makes it better suited to its environment.
- **River**: A flowing body of water
- **Biodiversity**: The variety of life on earth including the different genes, species and ecosystems in a given area
- **Environment**: The air, land, water and living things in an area

Materials
- *The Raft*, by Jim LaMarche
- River journals
- Colored pencils or crayons
- Pencils

3rd Background Information

Students will be introduced to the wide variety of life that lives in and around rivers by reading the book *The Raft*, by Jim LaMarche. Through the class discussion, students will also be introduced to the idea of an adaptation.

Biodiversity is the name given to the wide variety of living things in the environment. Biodiversity also encompasses all the variety in the different species' genes and the wide variety of habitats (or ecosystems) that the organisms live in. For instance, in the river environment the richness of the biodiversity can be expressed as all the different plants and animals that depend on the river. This would include the fish that live in the water, the insects that burrow in the mud of the river bottom, the ducks who swim and feed in its waters, the deer that visit the river and the plants that grow in the river and along its banks. The rich biodiversity would also include the wide variety in these organisms' genes. The richness of a river's biodiversity can be further expressed as the wide variety of different habitats. The forest ecosystem through which the river runs, the running water of the river and the banks and bottom of the river.
Adaptations are characteristics that help a plant or animal survive in its environment. An organism's adaptations enable it to obtain and store food, water and air; to move about or be transported; to protect itself and to reproduce its own species.

**Procedure**

**Hook**

Have the students make predictions about the plot of the story, *The Raft*, using only the picture on the cover of the book.

**Activity**

1) Read *The Raft* aloud to the students. If there are many copies of this book in the classroom, allow the students to follow along or take turns reading.

2) As you read the story, have the students make a list of the different animals and plants that the boy comes across on his river journey. As you read the story, make sure to point out the illustrations and talk about the different animals in the pictures. When you are talking about the animals, introduce the students to the idea of adaptations. Adaptations will be covered in greater detail in following lessons, but this is a good place to introduce the concept while talking about specific animals in a specific environment. While looking at and reading about the different animals encountered on the boy's journey talk about things such as camouflage, beaks, claws, type of fur or feathers and the building of homes.

3) After reading the story, direct the students to fold a white sheet of paper into 4 rows (horizontally) and 3 columns (vertically).
   - In the 1st column, students will list the names of 4 animals chosen from the story: 1 animal per box.
   - In the 2nd column, students will draw the picture of the animal with as much detail as possible.
   - In the 3rd column, students will describe one way the animal adapts to its environment.

**Reflection & Assessment**

There is no formal assessment for this introductory lesson.

**Reinforcement & Enrichment**

Students will write a short paragraph about the animal in the book that they would most like to observe in nature. Students should include their reasons.
**State Standards**

**Illinois**

3.B.2a Generate and organize ideas using a variety of planning strategies.

4.A.2a Demonstrate understanding of the listening process by summarizing and paraphrasing spoken messages orally and in writing in formal and informal situations.

4.A.2c Restate and carry out a variety of oral instructions.

12.B.2a Describe relationships among various organisms and their environment.

12.B.2b Identify physical features of plants and animals that help them live in different environments.

**Indiana**

English 3.4.4 Use various reference materials.

English 3.4.1 Demonstrate that a great variety of living things can be sorted into groups in many ways using various features, such as how they look, where they live, and how they act, to decide which things belong to which group.
Essential Question: How do we come to know and appreciate the river environment and our place in it?

Content Question: What plant and animal adaptations allow them to survive in the river environment?

Lesson Question: What plants and animals (biodiversity) are in my schoolyard and how do they survive there?

Goals
- Students will use observation skills to identify and make assumptions and predictions about the plants and animals in their schoolyard or local park
- Students will write a narrative about one of their local plants or animals

Vocabulary
Observation: The act or process of watching something closely and carefully.

Materials
- Paper shopping bag
- Sun hat or visor
- Magnifying lens
- Large pictures of plants, birds, mammals and insects that could be found in the school yard
- Field guides for plants, insects, birds and mammals (see Resource section under River Plants and Animals for suggestions or check out your local or school library)
- Pencils
- Copies of Schoolyard Observation: Animal and Schoolyard Observation: Plant sheets (enough for each student)

Background Information
By going into their schoolyard and observing a single plant and or animal, students gain the field experience they will need when they visit their local river at the end of the unit. Skills to emphasize are those of observation, drawing inferences and asking questions, along with how to be safe and respectful of nature.

Though often overlooked, the schoolyard or local park can be an area rich in natural life. In fact, the IL Department of Natural Resources has a program (UrbanWatch) through which students monitor their schoolyard or local park and
then turn in their data. The data collected is used to assess the presence and
distribution of organisms in the urban environment, examine environmental
factors that influence biodiversity and to provide data to urban, city and park
planners. On the UrbanWatch web site (www.fmnh.org/urbanwatch/main.asp),
there is an online field guide and dichotomous key of the many species your
students might find just outside the school walls.

The types of animals you are likely to see are small. Common mammals include
squirrels and perhaps chipmunks. In wetland or pond areas you may see evidence
of muskrats (nests of cattails or holes). Common urban birds include crows,
robins, sparrows, pigeons, starlings and cardinals. Interestingly, about half of
these birds are not native to this area (house sparrow, starlings, and pigeon) but
have proliferated in the disturbed urban environment. Birds that may be found
in slightly less urban settings or in larger parks include: woodpeckers, flickers
and migrating warblers in wooded areas and goldfinches and redwing black-
birds in more prairie or open areas. In wetland or pond areas, mallards, seag-
ulls and herons (blue and green) are not uncommon. A wide variety of insects,
beetles and other invertebrates (animals without backbones) will no doubt be
inhabiting your schoolyard or park. Look for butterflies, flies and mosquitoes
flying in the air. Look for sowbugs (roly polies), worms, millipedes and centipedes
under rotting wood (including wood chips). Look for aphids and caterpillars on
leaves and stems and slug, snails and ants walking along the ground.

At the end of the lesson, students will be using field guides. Field guides are
books that are used to identify objects. Field guides are arranged in a way to
aid identification. Bird books often group birds by where they are found (wet
areas versus dry areas). Within these sections birds are arranged according to
how they look, with similar birds being placed next to each other. In wildflower
books, wildflowers are organized according to color of flower. Thus, the best
way to find a plant or animal in a field guide is to find the general section you
think your plant or animal is in and then to skim through the pages looking for
something similar to what you saw. Once you find something that looks similar,
check out the other plants and animals next to yours in the field guide to make
sure it couldn’t be one of them. It is also helpful to check the range where the
guide says the plant or animal is found to make sure it is found in your area.
Field guides differ from dichotomous keys wherein you are asked a question
and then, based on your response, are sent to different parts of the key to
answer still more questions.

In addition to helping you identify things in the environment, field guides give
you some additional information about your plant or animal, though this inform-
ation is often highly limited. A description, along with information on habitat,
range, voice and similar species is often included. More research will be neces-
sary if you want to know more about the plant or animal.
**Procedure**

**Hook**

Before class label the paper shopping bag "Mystery River Bag" and fill it with a sun hat or visor, magnifying lens and field guides. The Mystery River Bag will be used throughout the unit, so make sure to save it after each class.

At the beginning of class, display the Mystery River Bag prominently at the front of the room. Take the sun hat or visor out of the bag, put it on, and tell the students that they will be going on an outdoor adventure today. Then, take the magnifying lens out of the Mystery River Bag and use it to examine things around the room. Ask the students to guess what they will be doing today. Let them know that they will be finding a plant and/or an animal in the schoolyard or park and examining the world from its point of view and that, just like the boy from the book *The Raft*, they will be exploring nature and developing their observation skills.

Ask the students what kinds of things they think might be found in the schoolyard? As the kids answer, pull out pictures from the bag.

Next, have students come up and write their names on the Mystery River Bag.

**Activity**

1) Go over outdoor safety rules:
   - Stay in view of teacher at all times
   - Don't eat anything you find in the environment
   - Be respectful of all living things – no stomping on bugs, pulling up plants, scaring birds, etc.
   - Remind students that even though they are outside, this is not recess, but a time for careful scientific observations

2) Pass out the *Schoolyard Observation* Sheets to the students. Make sure every student has a pencil to write with. Go over the *Schoolyard Observation* Sheet and make sure students understand that they need to draw their plant or animal, describe it and make some inferences about their plant or animal based on their observations. They then need to write a story about their day from the point of view of their plant or animal. You can either have students choose a plant or animal, or require that they do both.

3) Once outdoors, have the students spread out to find a plant or animal that grabs their attention.

4) After 20-30 minutes, return to the classroom.

5) Back in the classroom, divide students into small working groups and have them use the field guides to try to identify their plant or animal. On their *Schoolyard Observation* Sheets, have students fill in the name of the plant or animal they observed as well as any new interesting fact they learned from the guide book.

*Assessment note:* Use *Assessing Schoolyard Observation* to assess the students' observation forms.
Reflection & Assessment

In their journal, students should answer the following question: "Do you think your animal could live in or around a river? Why or why not?"

Assessment note: Use the 3-point Journal Rubric found at the beginning of the curriculum to assess the students’ journal.

Reinforcement & Enrichment

Each student should choose one of the following options:
- Redraw their plant or animal, adding more detail and other items in its habitat using the field guides
- Rewrite their story, adding more detail
- Prepare a presentation on their plant or animal: either a story involving their plant or animal or a factual report on their plant or animal.

State Standards

Illinois

1.B.2a Establish purposes for reading; survey materials; ask questions; make predictions; connect, clarify and extend ideas.

3.B.2a Generate and organize ideas using a variety of planning strategies.

3.C.2a Write for a variety of purposes and for specified audiences in a variety of forms including narrative, expository, and persuasive writings.

4.A.2c Restate and carry out a variety of oral instructions.

5.A.2b Organize and integrate information from a variety of sources.

12.B.2a Describe relationships among various organisms and their environment.

12.B.2b Identify physical features of plants and animals that help them live in different environments.

Indiana

English 3.4.4 Use various reference materials.

English 3.5.2 Write descriptive pieces about people, places, things or experiences that: develop a unified main idea and use details to support the main idea.

Science 3.1.2 Participate in different types of guided scientific investigations, such as observing objects and events and collecting specimens for analysis.

Science 3.1.3 Keep and report records of investigations and observations using tools, such as journals, charts, graphs, and computers.
Draw your animal:

Describe your animal:
Where did you find your animal?

What does your animal look like?

How does your animal find food? What does it eat?
What is your animal scared of?

What is your animal better at than anyone else?

On the back of this sheet, write a story about your animal.
Pretend you are this animal. You just woke up. What happens?

Back inside, look through some nature books and fill out the following:
Name of animal:

Interesting fact about animal:
Draw your plant:

Describe your plant:
Where did you find your plant?

What does your plant look like?

How does your plant find food? What does it eat?
Who eats your plant?

What is your plant better at than anyone else?

On the back of this sheet, write a story about your plant. Pretend you are this plant. The day is beginning. What happens?

Back inside, look through some nature books and fill out the following:
Name of plant:

Interesting fact about plant:
### Schoolyard or Park Observation Assessment

<table>
<thead>
<tr>
<th>Score</th>
<th>Criteria</th>
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| 3 exemplary | - Drawing shows details and accuracy  
- Written description shows attention to detail and inferences are plausible  
- If the student did a presentation, the presentation was well organized, included relevant details and could be heard by all students |
| 2 proficient| - Drawing shows mostly accurate details  
- Written description shows some details and most inferences are plausible  
- If the student did a presentation, the presentation was fairly well organized, included some relevant details, and could usually be heard by all students |
| 1 progressing| - Drawing shows some details  
- Written description shows some a few details, few inferences are plausible  
- If the student did a presentation, the presentation was somewhat organized, included a few details, and could only occasionally be heard by all students |

**Comments:**
Lesson 3

Plants and Animals of the River

Essential Question: How do we come to know and appreciate the river environment and our place in it?

Content Question: What plant and animal adaptations allow them to survive in the river environment?

Lesson Question: What do we already know about plants and animals (biodiversity) that live in a river environment?

Goals
- Students will reflect on what they know about rivers
- Students will begin construction of a classroom river mural

Vocabulary
Student generated word list

Materials
- Mystery River Bag
- Index cards (1-2 per student)
- Student journals
- Materials for river mural design: construction paper, glitter, blue plastic wrap (for water), yarn, etc.
- Reference books on river plants and animals, basic field guides to local plants and animals (see Resource section under rivers and river plants and animals for suggestions or check out your local or school library)

Background Information
When we think about plants and animals that depend on rivers, we often just think of what lives in the river. But many plants and animals that do not live in the water, depend on the river as a source of water or food.

Animals, such as deer and raccoons, come to the river to drink. Raccoons and herons visit the river to find food such as frogs and fish. Trees, such as red maple, sycamore and green ash, can be abundant along rivers because they can withstand the occasional floods that can kill other types of trees.

Above the surface of the water, ducks paddle by feeding on algae and aquatic plants. Waterstriders also skim the surface of the water. In the water itself, fish such as carp, bluegills and sunfish swim about as do tiny microscopic animals like daphnia and copepods. Uni- and multi-cellular algae also float in the water. In the sediment, on the rocks at the bottom of the river and on submerged logs
live a wide variety of macroinvertebrates (animals without backbones that are visible to the naked eye) such as crayfish, caddisfly larvae, dragonfly nymphs and aquatic worms.

**Procedure**

**Hook**

Before class, build a basic outline of a river environment on the bulletin board or other large space. Make sure to include the river (include the banks and the water itself), some surrounding land and the sun. This bulletin board will be used throughout the unit, so make sure it is in a place where it can remain for the duration of the unit.

Before class, place materials to make a river mural in the Mystery River Bag introduced in Lesson Two. Place the bag in a prominent location in front of the class. Start the class by pulling out some materials that you will use to design the river mural from the Mystery River Bag. Let students know that together they will be building a model of a river environment.

**Activity**

1) In their journals, have students express what they know about rivers and their surrounding environment. Have them think about what rivers look like and what plants and animals live in and around the river. They should also include personal connections or memories they might have about river experiences. Have students think not only about rivers in foreign places, but to think about what they know about their local river.

2) After students are done working in their journals, have them share what they know about rivers.

3) As students share, have them add detail to your mural outline. You can be as creative as you like. At this point don’t censor the students too much. Later, they will be researching and learning more about rivers and their inhabitants. As the unit progresses things will be removed (if they are found not to belong in a river environment) and added to the mural. However, do advise students that this is a mural of a local river.

4) Talk about the river, in terms of what it is and its main characteristics. Assess students’ prior knowledge of concepts. If students are unfamiliar with their local river, tell your students a little bit about your local river. What is its name? How far from the school is it? What kinds of habitats are along its edge? How big is it? What kinds of plants and animals might you see on a visit to the river? What do people do when they visit the local river?

5) By the end, each student should have thought of one plant or animal that lives in the river environment. They will write the animal’s or plant’s name or an index card, illustrate it, and then write one fact about it on the card. (Students may refer back to their journal entries from Lesson 1 for plant and animal ideas.)
6) Students will then place their cards on the mural where they think that plant or animal might live. Later they can draw their plant or animal next to their name on the Mystery River Bag.

7) Have students do some quick research into their chosen plant or animal to find out if indeed it does live in or around rivers in this area. If a student’s plant or animal is found not to live around rivers here, have them move their card to the side of the mural and replace it with another plant or animal that they have learned lives in or around rivers in this area.

8) Have students record the plant or animal they posted on the mural in their journals. Then have them write one thing they would like to learn about their chosen plant or animal.

**Reflection & Assessment**

Students will write curiosity questions about the river, or plants and animals in their journal. This can be their WANT TO LEARN section. A similar section can be created on or near the river mural.

*Assessment note: there is no formal assessment as this lesson is mainly about assessing prior knowledge*

**State Standards**

**Illinois**

1.C.2a Use information to form and refine questions and predictions

4.A.2a Ask and respond to questions related to oral presentations and messages in small and large group settings

4.A.2c Restate and carry-out a variety of oral instructions

4.B.2b Use speaking skills and procedures to participate in group discussions

5.A.2b Organize and integrate information from a variety of sources.

12.B.2a Describe relationships among various organisms and their environment.

12.B.2b Identify physical features of plants and animals that help them live in different environments.

12.B.1a Describe and compare characteristics of living things in relationship to their environments.

**Indiana**

**English 3.4.4** Locate appropriate and significant information from the text, including problems and solutions

**English 3.4.4** Use various reference materials (such as a dictionary, thesaurus, atlas, encyclopedia, and online resources)

**English 3.7.3** Answer questions completely and appropriately