Teachers' Guide to the Urban Wilderness Canoe Adventures (UWCA) "Investigation on Mississippi River"

This guide for teachers provides information on pre-trip and post-trip lessons that complete the UWCA field trip.

Learning Objectives for the UWCA Investigation of the Mississippi River Experience: Students will investigate the health of the Mississippi River Ecosystem. In doing so they will generate scientific questions based on research (pre-trip lesson), collect evidence to answer their question (during field trip), and reach a conclusion about the health of the Mississippi River ecosystem by analyzing and discussing this evidence (during field trip and post trip). Students will also learn about the basic components of an ecosystem, a watershed, and the role humans play in the ecosystem. A full list of the academic standards addressed is provided at the end of this document.

Pre-Trip Lesson

Preview:

"Investigating the Mississippi River" article and guided scientific question writing.

Time:

One or two 50 min class periods

Grade Level:

Written for 5th-8th grade students

Instructions to teachers:

Before reading:

Introduce students to their upcoming field trip on the Mississippi River: please show the UWCA day trip preparation video: https://www.youtube.com/watch?v=beb3evkU5II (if not seen at field trip prep assembly)

Introduce students to concepts of a scientific investigation, a watershed, and an ecosystem. Find out what students already know and would want to do know about these topics. Explain how in a scientific investigation you first research to find out what to ask questions about. Tell students that by reading this article they are starting their research.

Read the article.

Ask students to look for the different parts of an ecosystem described in the article and underline or write about ways these parts interact, include living and non-living parts of an ecosystem. Also consider ways humans are impacting the ecosystem.

Prepare students for writing scientific questions after reading by asking them to underline ideas in the text they have questions about or information they could use as evidence to write a scientific question on.

Write Scientific Questions:

Ask students to pose some questions about the health of the Mississippi River based on the article that could be investigated on the Mississippi River Field Trip. The second half of the article includes specific examples and information students can use to write testable hypothesis. Please see the examples given at the end of the article for ideas. Students could work in groups to create their questions.

Interactive Pre-Trip Activity- "A Shower in the Watershed"

Preview

Introduce students to the concept of a watershed in a really fun way. These activities are a great way to start learning about the Mississippi River and how the health of the river is tied to what happens in the entire watershed.

Time/Grade

20 min./5th-8th grades

Materials

1 watering can or other water container, 1 opaque shower curtain or tarp.

Instructions to Teachers:

Bring students outside. Introduce students to the concept of a watershed. A watershed is an area of land where all of the water that drains off it goes to the same place. Ask to students to think about what watershed they are in? We are all in the Mississippi River watershed.

Then ask for one student volunteer who will become a landform. The volunteer lies down in the fetal position, completely still on the ground, and is then covered by the shower curtain. Point out how the students body shape can be imagined as a rugged landscape. Ask students to imagine where the water will go when it rains. Where will the small streams be located? How about the large streams?

Now, pour water onto the student covered by the tarp to simulate a rain storm. Watch how the water drains off the 'landscape' in small streams. Notice where the streams drain too and discuss if you are looking at one watershed or multiple watersheds.
After this activity, students could explore the school grounds looking for how the water drains from the school building, lawns, and parking lots. Look for drain spouts, and storm drains. All of this water, and anything it brings with it will drain into the Mississippi River.

On the Field Trip

Students will conduct field investigations to answer the questions they wrote during their pre-trip lesson and to discover how clean the Mississippi River is. Field investigations will include netting for macro-invertebrates, identifying what they catch and recording this information. Students will also record water temperature and clarity. And students will test the amount of the phosphorus found in the water. Students will record the results of their tests or investigations. UWCA staff will guide students through these investigations and data recording. UWCA staff and student pre-trip reading will help to explain what the results mean for river health. UWCA staff will give student data sheets to teachers at the end of the trip.

Following the Field Trip

Time:

50 minutes or 1 class period

Instructions to Teachers:

Review the evidence (field trip record sheets)
Field Trip Record Sheets: During the field trip students' results will be recorded on a group record sheet. Student names will be at the top of the sheet. Each investigation station; biological (netting), physical (temp. and clarity), chemical (phosphorus) will get its own record sheet. This will be facilitated by UWCA staff. At the end of the field trip UWCA staff will hand all the record sheets for each station to the corresponding science teacher.

Ask students to spend a few minutes remembering what they did and how they did it. What questions were they trying to answer? What evidence did they collect?

Pass out field trip record sheets to students, split students back into field trip groups, or as close as possible. Record sheets should be found in the manila envelope given to you at the end of the field trip. Use the student names on the top of sheet to remind yourself who was in which group.

Discuss any differences in the data between groups:
Ask students to think of explanations for why differences may exist. Did groups use different methods for data collection, were some groups working harder than others on the field trip? Take the average if there is not a good explanation for why some data points are different.

Write an educated explanation about the health of the Mississippi River ecosystem:
Use the data collected as evidence to support your explanation or claim about health of the ecosystem. Include information on the role you think humans play in the Mississippi River's health. Students could do this by themselves or within their same groups. Encourage students to think about the role society at large plays in the Mississippi River ecosystem's health and the role individual students' play in the river's health.

****Extra Idea:*** Ask students to write or draw about actions people could take to improve the health of the Mississippi River or about some of the animals they saw on their trip. Enter the Big River Art Contest, if students are in grade 6 or lower. (http://www.nps.gov/miss/forteachers/brjartcon.htm)

Alligned MN Academic Standards in Science

5th grade:	5.1.1.2.1 Generate a scientific question and plan an appropriate scientific investigation, such as systematic observations, field studies, open-ended exploration or controlled experiments to answer the question. 5.1.1.2.2 Identify and collect relevant evidence, make systematic observations and accurate measurements, and identify variables in a scientific investigation. 5.3.4.1.3 Compare the impact of individual decisions on natural systems. For example: Choosing paper or plastic bags impacts landfills as well as ocean life cycles. 5.4.2.1.1 Describe a natural system in Minnesota, such as a wetland, prairie, or garden, in terms of the relationships among its living and nonliving parts, as well as inputs and outputs. For example: Design and construct a habitat for a living organism that meets its need for food, air and water. 5.4.2.1.2 Explain what would happen to a system such as a wetland, prairie or garden if one of its parts were changed. For example: Investigate how road salt runoff affects plants, insects and other parts of an ecosystem. Another example: Investigate how an invasive species changes an ecosystem. 5.4.4.1.1 Give examples of beneficial and harmful human interaction with natural systems. For example: Recreation, pollution, wildlife management.
6th grade:	6.1.3.4.1 Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context. 6.1.3.1.1 Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.
7th grade:	7.1.1.1.2 Understand that when similar investigations give different results, the challenge is to judge whether the differences are significant, and if further studies are required. For example: Use mean and range to analyze the reliability of experimental results 7.1.1.2.1 Generate and refine a variety of scientific questions and match them with appropriate methods of investigation, such as field studies, controlled experiments, review of existing work, and development of models. 7.1.1.2.3 Generate a scientific conclusion from an investigation, clearly distinguishing between results (evidence) and conclusions (explanation). 7.1.1.2.4 Evaluate explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, and suggesting alternative explanations. 7.4.2.1.1 Identify a variety of populations and communities in an ecosystem and describe the relationships among the populations and communities in a stable ecosystem. 7.4.2.1.3 Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition.
8th Grade:	8.1.1.2.1 Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.