

What's In Our Water Lesson Plan

NGSS Standard:

MS-LS2-4- Students can construct and argument supported by empirical evidence that changes to physical or biological components of an ecosystem affects populations.

Objectives:

1. Students will be able to describe how water entered the Ohio River through the water cycle and water sheds.
2. Students will be able to collect quantitative data through different chemical tests performed on the river.
3. Students will be able to analyze data in order to assess the cleanness and health of the river.

ENGAGE:

Students are asked: "Where does water come from and why is it important?"

Follow up questions should serve as a transition to the water cycle and where water comes from in which the students will be asked to label the different stages of the water cycle both on their work sheet and on a poster at the front of the class. As each stage is labeled on the poster, students should share what they know occurs at that stage. The last stage to be discussed should be runoff. The question will be asked, "Where does the run off come from and where does it go?" This question will lead to a discussion of the water shed.

Additional follow up questions, such as "Would you drink the water from the River?" should refocus student attention around the importance and uses of water. The question is then asked, "If we drink the water in the river, how clean is the water in the River?"

EXPLORE:

The first step in this activity is to have the students make a prediction about whether the river is clean and healthy or dirty and unhealthy.

After being given directions on **how** to perform the tests, students will execute the following biochemical tests on the River: Air Temperature, Water Temperature, Dissolved oxygen, pH, Conductivity, Turbidity, and Secchi Depth. Students can be asked to predict what the tests are measuring, but information on the purpose of the tests should not be explained until **after** the students test the waters. Students will record their results on their data sheet.

EXPLAIN:

In the explain stage of the lesson the students will analyze the data that they have collected and explain what each data value means with respect to the river's health.

The health of the river will be evaluated by comparing the values that were determined for each biochemical tests to the values that are given as the expected values for a healthy river. At this point, more details about the purpose of each test can be explained with input from the students' experiences with collecting data from the tests. The comparisons will show whether the results that the students found fall into the range that was expected. If the value does fall within the expected range, it is determined as a healthy value, and if the determined value falls outside the range, it is considered an unhealthy value. At the end, the students will evaluate their results to assess whether their prediction on the health of the River was correct or not. At this p

ELABORATE:

Students will now compare the health of the natural habitat of fish, the river, with the health of a fish's unnatural habitat, an aquarium.

In this part of the lesson, the students will be given data that is representative of the values of the same biochemical tests; however, this time the tests will be performed on one of the field station aquariums. In this activity, the students will compare the river results with the fish tank results in order to determine which is a healthier habitat for fish.

In the final part of this activity, the students will be asked to determine whether they believe that the river or the aquarium is a safer, healthier environment for the fish to live in and explain their reasoning for this decision. Students will then be asked to design a new artificial habitat that is healthiest for the fish.

EVALUATE:

Student groups will present their findings, their decision on which habitat they believe is healthier along with evidence to support their findings, and share their newly designed habitat.

Water Quality Survey

Name: _____ Date: _____

Location: _____ Time: _____

Weather: _____

Prediction of Health of the River:

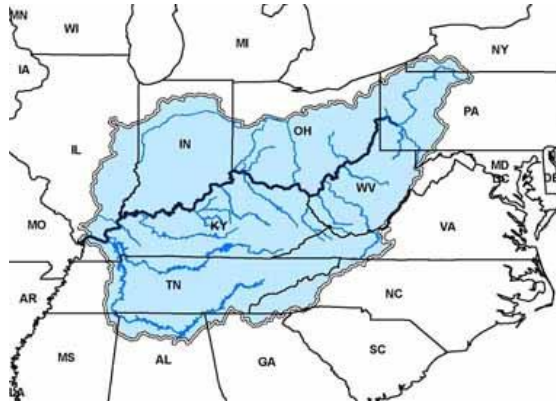
Parameter	Sample #1	Sample #2	Expected
Air Temperature (°C)			0-30 °C
Water Temperature (°C)			0-30°C
Dissolved Oxygen (mg/L or ppm)			5-12 ppm
pH (SU)			6-9
Conductivity (uS)			Below 600 uS
Turbidity (Opposite of Clarity)			No Turbidity
Secchi Depth (m)			0-1 meters

Based on the chemical data collected above, what can you say about the health of the river?

Prediction of Aquarium vs. River Health:

Based on comparisons between collected data and given data, which environment is a safer healthier place for fish to live? Why?

Where Does The Water Come From?



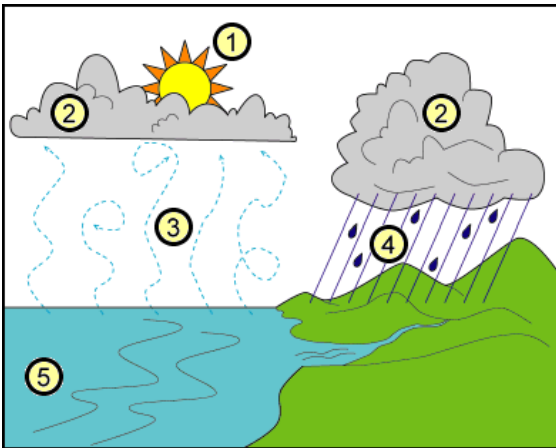
Ohio River Facts

Start: _____

End: _____

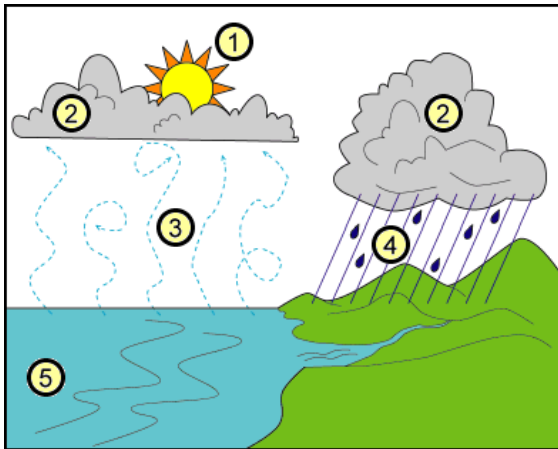
Length: _____

Source States: _____



1. _____
2. _____
3. _____
4. _____
5. _____
6. What is runoff?

What's In Our Water? Pre-Assessment



Label The Water Cycle

1. _____
2. _____
3. _____
4. _____
5. _____

2. What is a watershed?

3. Why is the Ohio River important to the people who live near it?

4. In your opinion, do you believe that the Ohio River is clean and healthy, or dirty and unhealthy? Explain why you feel this way.

What's In Our Water? Post-Assessment

1. After examining the water of the river, what did you learn about the health of the River?

2. Name the parameters that are used to measure the health of the river.

3. Explain which is a better environment for a fish to live in, the Ohio River or an aquarium. Explain why the environment that you chose is a safer place for the fish to live.

4. What are ways you can help keep the river clean and safe to be used by fish, people, and other plants and animals?
