

Whose River Is It – An Investigation

Essential Question: How can data collected from Nature’s Classroom activities be used to design follow up investigations?

Objective: Students will design an investigation testing the degree of impact of contamination on the watershed.

Next Generation Sunshine State Standard(s):

SC.6.N.1.1

Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.6.N.1.5

Recognize that science involves creativity, not just in designing experiments, but also in creating explanations that fit evidence.

Next Generation Science Standard(s):

MS-ESS3-3

Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

MS-ETS1-1

Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3

Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

Materials: (one for each student)

- copies of student page: “**Whose River Is It?**” scenario

Set up / prep: Make copies of prompt/data sheet

Time needed: 50 minutes/one class period

Procedure:

This project can be done individually by the student, in pairs, or groups (recommended). Project plan will be represented on a poster, PowerPoint or presentation with visuals.

1. Remind student of their Nature’s Classroom Experience. Ask students:
 - a. Recalling the different activities, what is the relationship between the water cycle and watershed?
 - b. What are the effects of the water cycle on the watershed and end users?
 - c. Explain the cause and effect relationships between biotic and abiotic factors within the watershed.
2. Instruct students they will be using the Hillsborough River Watershed and their experience at Nature's Classroom to design a controlled experiment.
3. Class will read the selected "**Whose River is It?**" scenario. (If students have already worked a

“**Whose River Is It?**” scenario in Language Arts class, then they may use the results of that discussion.)

- a. Brainstorm different stakeholders and their point of view (or dilemma) related to the scenario. Share information with the whole group.
4. Based on data collected by the individual school along with data gathered from the NC icon in Ideas, students (individually, pairs, or groups) should use the information to formulate a hypothesis related to a dilemma.
5. Based on their hypotheses of potential changes in the ecosystem caused by the dilemma chosen, students must then design a controlled experiment that could test if the hypothesized changes will actually occur and to what degree.
6. Controlled lab experiment must include a posed question, hypothesis, listed constants, a control, listed independent and dependent variables, data collection methods, description of how the data will be analyzed, and appropriate graphic representation for data.
7. Groups will post their design on poster boards or white boards. Allow students the opportunity to visit other stations to critique designs of other groups. Suggestion: Have one group member remain at the group’s poster and other group members rotate.
8. Based on the feedback group members receive, allow for edits and preparation of a final product from students.

Assessment:

Completed project plan.

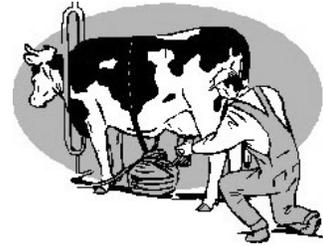
WHOSE RIVER IS IT?

Dilemmas- The Magnolia River

1. Positions

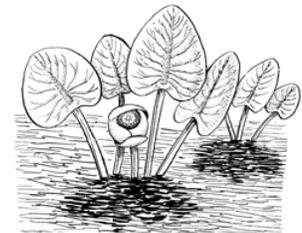
Pro-Dairy Farmers

Pro-River Citizen's Environmental Group



Scenario

2. River County is known as the "Milk Capital" of Florida. Fifty dairy farms are located on or near the Magnolia River. These farms provide 25 percent of Florida's milk and 80 to 90 percent of the milk consumed in southwest Florida. Each farm supports 1,000 cows, and each cow produces 85 pounds of manure a day - an amount equal to the fecal waste of 17 humans. Every time it rains, large amounts of nutrient-rich waste washes into the Magnolia River. The Magnolia River feeds into Clear Lake, a popular recreational site for swimming, canoeing and fishing. The lake has been closed to swimming and fishing several times because of very high coliform bacteria counts.
3. Government agencies have known of this contamination to the river for twenty years, but it wasn't until recently that the River County Environmental Protection Commission instituted specific policies regarding the handling of animal wastes. River County's dairy farmers have been ordered to prevent animal excrements from entering the river. The necessary improvements are so expensive and the accompanying required reductions in herd sizes are so drastic, that at least six farmers say they are going to move their farms to another county.
4. River County's economy depends upon its dairy farms. They generate \$250 million in revenues for the county annually. Additionally they employ over 1,500 people. Without its dairy farms, River County would have to ship in milk from north Florida or other states, and consumers all over southwest Florida would end up having to pay a higher price for milk.
5. Clear Lake, on the other hand, also generates a large proportion of the county's revenues as a tourist attraction. Business owners in the area say they can't afford any more closures of the lake. Local residents insist that the contamination and related health hazards are unacceptable. Environmentalists claim contamination to the Magnolia River and Clear Lake is destroying valuable habitats.



Source: Waterways- Southwest Florida Water Management District