The River Mile
Water Quality

Lesson # 12

Water Quality:

The River Mile Site Visit

Developed by the Lake Roosevelt Forum to support "The River Mile" National Park Service Program

Suggested duration: 1 Day Field Trip	**LESSON 12** **Water Quality: The River Mile Site Visit**

INTRODUCTION:
Students have been introduced to water and crisis of inadequate clean water for populations around the globe. Students have investigated water quality indicators, conducted classroom experiments and learned to use measurement protocols. They have audited their personal family water consumption and identified ways to personally reduce water consumption. Students have chosen an aspect of water to research and proposed a community project to positively impact an area of water quality or quantity. Successful completion of the required study has earned the students an academic excursion to study water quality conditions in the field at The River Mile-Adopt a Mile study site.

STUDENT WORK AND ASSESSMENT
Students apply their learning about water quality, quantity, scientific observation and WQ indicator testing protocols at a local Lake Roosevelt watershed site. Data collected is contributed to the National Park Service - The River Mile project and shared with other groups in the network.

QUESTIONS TO EXPLORE/INSTRUCTIONS/PROCEDURE
1. Prior to the site visit trip review all WQ testing protocols practiced in Lessons 3-8. Discuss any changes in procedure needed to accommodate for field location.
2. Establish team for each test: Turbidity, conductivity, temperature, ph, dissolved oxygen, nitrogen, phosphorus and the multi-test probe.
3. Review GPS and latitude and longitude coordinates.
4. Establish 4-6 data collection locations at TRM and the GPS coordinates
5. Review the importance of making specific, detailed written observations and sketches
6. Schedule two quiet observation times (sit spots) into the day's schedule
7. Focus observations, test and discussion on the inquiry questions
8. What do turbidity, pH, dissolved oxygen etc. tell you about the condition of this site?
   a. How do you think these values would change if you tested them 2 hours from now? 2 Days? 2 Months? Years?
   b. Do your water chemistry results differ between location X and location Y?

Inquiry Questions:
What is the relationship between the land & water at TRM field site?

What do the water quality indicators at TRM field site tell us about the health of the CR & LR?

Inquiry Process:
Real world Application of learning to TRM

Standards:
PS2, PS3, ES2, LS2,

Assessment:
Application of WQ testing protocols
Observational data collection
Journal reflections

Materials:
Transportation to TRM field site
Science journals
GPS
WQ testing equipment
Field guides to LR plants & animals

Handouts:
TRM Core parameters
TRM Water Sample Record Sheet

c. Use what you learned in the other lessons to explain why. Where did they find more macro-invertebrates? In sand, gravel, mud, vegetation?

9. Subsequent to the site visit, analyze the data collected and ask students to provide evidence on the health of the LR watershed. Develop new questions that could be researched.

10. Collect macro-invertebrates and identify them to order using a visual key. Determine if these are tolerant or intolerant species.
   a. What does it tell you about the water quality? Does that fit with the water chemistry results? Where did they find more macro-invertebrates? In sand, gravel, mud, vegetation?
   b. Macro-invertebrates are much less costly to sample than water chemistry yet can tell students a lot about conditions in the lake/stream. Looking at bugs is more exciting to most students than dealing with water chemistry.

11. Students could map the site, describe local impacts on water quality (erosion, streams entering the lake, campsites, plant/algae growth, etc.).
   a. What things did they see on the trip from the school to the site that have an impact on water quality?
   b. What things are beyond the immediate region that influences water quality? Did their data suggest that the issues they mapped and listed are affecting water quality?

12. Samples for the coliform and E coli PetriFilm tests could be collected from multiple locations (beach, off a point, in a cove, etc.) Each group could make predictions about which sample will have the highest levels. All samples could be compared to the control (a sample of distilled water).

13. Younger students might benefit from identifying animals (visually or from sign [scat, tracks, nests]) and determining how each might be impacted by a polluted lake.

RESOURCES

See The River Mile's website at: http://www.nps.gov/laro/forteachers/laro-river-mile.htm