

"Sites of Engagement" Lesson Plan

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Essential Question: How do humans impact the water quality of the Lamoille River?

Standard: **LS2.A: Interdependent Relationships in Ecosystems**

- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1}
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1}
- Growth of organisms and population increases are limited by access to resources. (MS-LS2-1}

The first step we take in determining the water quality of the Lamoille is to count and identify benthic macro invertebrates. Please see the hand out students receive. There are four classifications of the benthos. Students are introduced to the words tolerant and intolerant. We work to understand what it means if we find more intolerant to pollution benthos or more tolerant to pollution benthos.

Students practice identifying common benthic macro invertebrates and are assigned to groups of about four. Each group has a recorder, collector and identifier. Jobs are discussed and norms for the river trip are discussed. The question we need to answer at the site is:

"What is the quality of the water of the Lamoille River based on the number of tolerant or intolerant benthos collected and identified?"

We will do the testing at our test site on the Lamoille River. It is about 1 mile from school and we walk there. The walk is along the river on the new rail trail. This site has been used as the 7th grade river test site for about fifteen years. It is located

between routes 15 and 15A . Tenney bridge, the rail trail and water buildings and farm fields are in sight of our site. We walk across a field to enter the river. This is a quiet place on the river there is a bend and it is easy place to gather benthos. It is my favorite day of the year.

Pre-visit: Study and live with pertinent vocabulary words. Practice identifying benthos in groups that will be used at the river. Draw a site map so everyone knows their territory. Review often how to i.d. and count and where to store data and where to put it when we are done. Go over behavior expectations. Review complete and incomplete metamorphosis. Choose a couple of benthics to study a little in-depth to understand their life cycle and how they over winter. Answer the questions: Why do we count and identify benthic macro invertebrates? What does this information tell us about the overall health of the Lamoille River?

On-site: We will walk down to the river site with about 80 students. We will immediately go to our territory and collect and i.d. benthics. We are very careful to place them back in the water when we are finished counting. Within the group there are 3-4 students and they each have a job. Someone keeps track of the data, usually two students collect and one student is back up for all jobs. This work takes about an hour. Then the humanities teachers have the students do a nature write while we are at the river. Then we have lunch there. We pack up check for trash and any left behind socks and walk back to school.

Post-visit: Students will centralize collected data. We will discuss this information. We will use the scientists meeting format to make sense of all the data we collect. In the meantime we make a histogram of the data, this is a great visual aid and will show us which group we collect the most benthic from.

What is the OUTCOME of this experience?

Students will all have the histogram that we will produce together. This will be in their laboratory notebooks (that they use all year). Please see the attach handout called "Benthic Histogram Analysis". This will be used as a formative assessment and to inform our scientists meeting. Be aware that often I will have students tell me the answers if they are unable to write their thoughts. Question 4 is the

difficult question. There is no right or wrong answer. It will depend on how the student used the data. It will be my job to read (or listen) to the answers and determine how valid it is. This will determine the level of understanding a student has about the role benthic macro invertebrates play in the overall health/water quality of the river and how we use that information to determine the quality of the water.

What resources and preparation are needed to be ready for this experience?

I need the entire teaching team to be engaged in this activity. We all go to the river together. My hope is that the watershed team (Holly K) can help with this part and the chemical tests, (as you know the schedule was full so they were not able to assist). Some resources that we need are water shoes for students. Other than that we have what we need.

In what ways does this plan incorporate other district/ grade-level expectations?

Our school uses the motto, "Construct, Act, Express". Construction will be our pre-site work, acting will be our site visit and expressing will be the end product of all our data and what we think the water quality of the Lamoille is and how humans impact it.