

Case Studies: River Rewilding Curriculum in Action

Summary

These case studies describe how two secondary public schools in Grand Rapids, Michigan implemented the “River Rewilding” curriculum developed and piloted by Ms. Brenda Perry, Ninth Grade Biology and Algebra Facilitator at Kent Innovation High (KIH) in Grand Rapids. The River Rewilding units explore the rationale for, and the possible effects of, the Grand River Restoration and Revitalization project in downtown Grand Rapids.



Wenk Associates

The Grand River Restoration and Revitalization project is a restoration initiative that will remove dams, recreate natural habitat, and improve public access to the main stem of the Grand River that runs through the heart of the City. Construction on the project is expected to begin in 2020.

In the first case study, the ninth-grade biology teacher who developed these units spent two months with her students immersed in all three units: Advanced Water Quality, Social and Economic Impacts of the Grand River, and the Grand River Restoration and Revitalization Project. Students sampled macroinvertebrates and studied their connection to water quality, stood in the shoes of stakeholders who use the River, and completed independent research projects based on an identified community need. Students presented their research to each other at the end of the unit. One student team presented their research to environmental professionals at the 2018 Lower Grand River Organization of Watersheds (LGROW) Spring Forum.

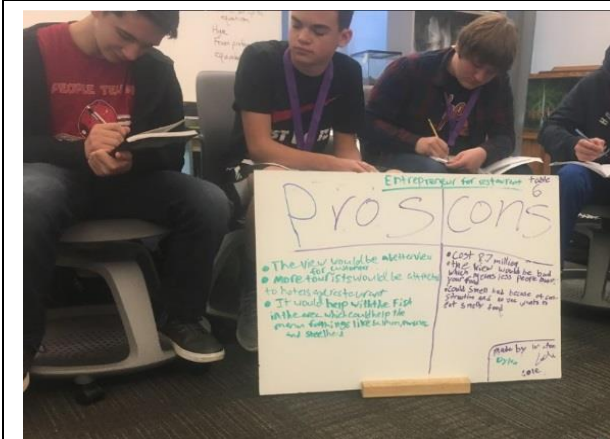
In the second case study, sixth-graders at the Grand Rapids Public Museum School studied the Advanced Water Quality unit. Students worked in teams to become experts on one of three indicators of stream health: chemical, biological, and physical.

Over the course of the fall semester, students visited four streams within the watershed to collect data, compare it to historical data, and assess overall stream health. Each team presented their findings to other students, parents, and community partners. In the spring, students learned about the Grand River Revitalization and Restoration Project as part of their study of city infrastructure and planning.

Both schools partnered with LGROW, an agency of the Grand Valley Metro Council, to enhance the in-class lessons with hands-on, outdoor learning experiences.

Installing Hester Dendy samplers in the main stem of the Grand River in downtown Grand Rapids.





Students develop pros and cons of the river restoration from stakeholder perspectives.

Case Study One: Kent Innovation High School

Ms. Brenda Perry immersed her biology students in the full River Rewilding curriculum over the course of two months. Kent Innovation High is a project-based school, but this project was completed with freshmen during the fall semester, so students were somewhat new to community-based projects.

The “Take a Stand” activity from the Grand River Revitalization and River Restoration Project unit was the entry event to the lessons. Community partners from Grand Rapids Whitewater, the nonprofit organization

spearheading the river restoration project, and from LGROW visited the classroom to give a 15-minute overview of the project. Students were then assigned a stakeholder group to discuss pros and cons of the project based on what they knew so far. This activity allowed the students to generate a list of “Knows and Need to Knows” that helped guide their research throughout the rest of the unit.

From here, students moved into learning about stream habitat health and biological indicators through the Advanced Water Quality unit. Students completed the Stream Physical Characterization and Habitat Assessment worksheet on an on-campus stream, along with community partners from LGROW. They also installed Hester Dendy samplers in

Students identify macroinvertebrates found in Hester Dendy samplers.



both the on-campus stream and the main stem of the Grand River in Grand Rapids in order to characterize the biological health of both streams and to learn strategies for comparing ecosystems of differing sizes.

Hester Dendy samplers need to remain in the stream for 4-6 weeks, during which time groups of students researched the topics identified in their “Need to Know” chart. Students chose a topic from the list that most interested them and identified a potential audience and end product that could help educate the community on what they learned. Areas of interest and project products from this activity were used to help develop the Economics, Access, Sea Lamprey, Sturgeon, and Mussel activities in the

Grand River Revitalization and River Restoration Project unit, as well as lessons from the Social and Economic Impacts unit. While this allowed student interest and voice to drive the project in Ms. Perry’s class, other teachers could assign these activities to specific groups as a way to more clearly define expected outputs of student research.

After four weeks, Hester Dendy samplers were removed from both streams, and community partners from local environmental nonprofits and state agencies assisted students with identifying the species found. This was an opportunity for students to learn how structure and function apply to biological indicator species and to generate water quality index scores for both locations. Data was submitted to LGROW for addition to their watershed monitoring database.

Students presented completed research projects to each other in class at the conclusion of the unit, and a small group of selected students presented the water quality data collected as a class to a group of community stakeholders at LGROW's annual stakeholder event at the end of the year.

After completing the unit, Ms. Perry reflected that the macroinvertebrate sampling generated a large number of very interesting observations and questions by students. This might make the macroinvertebrate sampling a useful entry event to the unit, which could help students more clearly identify the problem they would like to study throughout the rest of the unit.

Case Study 2: Grand Rapids Public Museum School

The Grand Rapids Public Museum School chose to pilot a single unit from the full curriculum in the 2018-2019 school year. Sixth grade science teacher Tom Gibson chose the Advanced Water Quality unit, which aligned closely with his students' learning objectives. Ideally all units would be taught as an integrated learning experience, but this case study demonstrates how single unit can be taught if a teacher is unable to collaborate with other content areas to include activities relating to social and economic issues.

Mr. Gibson's class began their fall semester with an introductory unit on watersheds and water quality in class. Students were broken into teams focusing on Chemical, Biological, and Physical aspects of stream health, and each team was tasked with becoming the expert in those areas of monitoring. The Physical Scientist team studied the "Stream Physical Characterization and Habitat Assessment Handbook" as part of their work and learned how to

Preserved macroinvertebrates from Grand River Hester Dendy sample



Students collect measurements as part of their Stream Physical Characterization and Habitat Assessment in Mill Creek



A Biological Scientist Team collects and identifies macroinvertebrates.



complete the assessment worksheet in the field. The Biological Scientist team used the Macroinvertebrate ID Cards and Card Sort activities as part of their research to learn about the desired biodiversity in a stream as well as structure and function. They also recorded data collected in the field using the Macroinvertebrate Stream Quality Assessment. The Chemical Scientist team followed procedures outlined in their chemical water quality monitoring kits to understand what a healthy stream chemistry looks like. They also compared data collected with their monitoring kits to data collected with sensors in order to better understand issues related to data precision and accuracy.

Once each team became an expert on their testing methodologies, students visited four streams within the watershed (Lamberton Creek, Plaster Creek, Mill Creek, and Indian Mill Creek) to collect data and assess overall stream health. Community partners from area environmental groups and agencies assisted the students with data collection in the field. Back in the classroom, that data was analyzed by students to compare and contrast each stream.

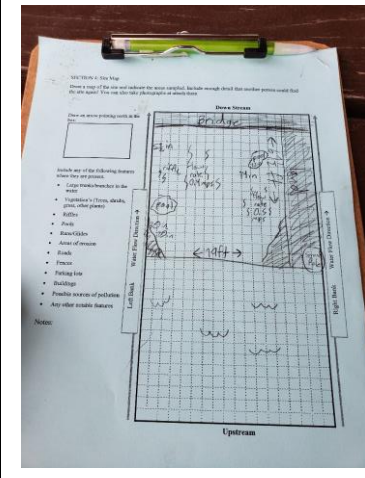
Before going into the field, students had made predictions of stream health based on historical water quality data at those sites; back in the classroom, students

compared the new stream data to historical data. At the end of the fall unit, each team presented their findings to the class, family members, and community partners.

A Chemical Expert Team discusses the differences they found between sensor data and test kit data in Mill Creek.



A site map created by a Physical Expert team.



In the spring semester, students learned about the Grand River Revitalization and Restoration Project as part of their study of city infrastructure and planning. Historical materials and project documents from the Grand River Revitalization and Restoration Project supplemented their existing curriculum on this topic. In addition, a smaller group of students who performed strongly in the fall semester built on what they learned to complete the Hester Dendy sampling and macroinvertebrate procedure in the main stem of the Grand River in downtown Grand Rapids. This connected students to what they learned the previous semester and furthered their understanding of how the river restoration might impact biodiversity.

Photo credits: Eileen Boekestein, Environmental Education Coordinator, Lower Grand River Organization of Watersheds, Grand Valley Metro Council, Grand Rapids, Michigan.