Work Together with a Common Goal

After completing *Sum of the Parts*, students will foster a sense of place as they explore the diversity of a local river and work together to create a new vision for the watershed. Can each property be renovated to support the diverse needs of the community and manage growth responsibly while protecting water quality, wildlife and recreational opportunities?

Objectives

Students will:

- recognize that individual actions impact everyone.
- define and summarize the importance and effectiveness of Riparian Corridors as zones of protection.
- chart watershed users in their community and demonstrate that water pollution problems *and solutions* are primarily human generated activities.
- consider Best Management Practices and community participation as solutions.
- generalize the complexities involved in the protection and maintenance of a diverse ecosystem.
- identify land use and historical urban growth as important considerations for water quality management.
- discover that community growth and protecting the resource is possible through collaboration.

Background

The Mukwonago river watershed is the most diverse aquatic ecosystem in southeastern Wisconsin. Within its 74 square miles the watershed connects 14 lakes and preserves 28 state natural areas. Groundwater recharge sustains the entire river system, supporting 50 species of fish, 16 species of freshwater mussel and protecting 80 rare, threatened and endangered plants and animals. Although the area is rich in biodiversity and recreation, human activities create numerous problems such as non point source pollution, increased pressures on species at risk, recreational use conflicts, increased development and threats to water quality.

Teacher Resources

Visit www.lakeledgenaturalist.com to download *Managing the Water's Edge and the Mukwonago River Watershed Protection Plan*.

Lesson Extensions

A. Riparian Corridors Download *Managing the Water's Edge*. Introduce students to the concept of riparian buffers and their importance to the watershed. Ask how they could modify the property they created for *Sum of the Parts* to support buffers and wildlife corridors. How will the presence or absence of riparian corridors affect wildlife? What happens if only a few land owners participate?

B. Making Connections

Part 1: After completing *Sum of the Parts* use the poster illustration to spark a discussion about the plants and animals found in the watershed. Read aloud the background information about the Mukwonago River. Assign the 12 species listed on the poster for deeper exploration or use the species list from table 8 (pages 58-59) of the *Watershed Protection Plan*. Ask the students to discuss why their species is at risk and how species interact with and depend on one another (ex. mussels need fish to complete their life cycle). Why is it critical to protect the diversity of the watershed? What is the community's responsibility to the watershed?

Part 2: Students research and list components of the Mukwonago watershed. Who are the users? List species, recent news, recreational activities, conflicts, issues, and outreach. Ask students how they use the watershed. Is there a way to develop the watershed for all interested parties? What would it look like? Who would maintain it? Who maintains the watershed now? Have students recreate developments and properties along a new river that support all parties and resources. Assign community roles from the students list of users and insert invasive species, endangered species and pollution scenarios for a balanced analysis.

C. A Birds Eye View Using the land use aerial photos (Figs 7-9) and urban growth charts (Fig 4 and Table 2) from the *Mukwonago River Watershed Protection Plan*, have students compare land use practices and development from 1941 and 2005. What are the differences? Have those differences affected the watershed? How? Can point and non-point source pollution sources be identified from the aerial photos? What Best Management Practices could minimize the impact of growth and changing land use patterns?

D. Culmination: *Who is Responsible?* Invite a citizen organization, nonprofit group or government personnel to visit your classroom to discuss their role in informing the public and protecting the watershed. Involve them in the river lesson to discuss remediation and our responsibilities as citizens. The DNR, Land and Water Conservation Departments and the Nature Conservancy are good places to start.

E. Situation Cards Use these cards in conjunction with *Sum of the Parts* or with lesson options A-B. Mix them up, create your own, or hand out the same card to several students and start a debate.

ALERT

Invasive plants threaten the quality and abundance of native plants and wildlife on your land and shoreline. While walking the area you identify **common buckthorn,** and **reed canary grass** as the culprits. You notice that the plants don't stop at the property boundary but continue to grow along the adjacent lot. Eradication will take time and communication with your neighbors. Where should you begin? What will happen if your neighbors don't participate?

***Real World*:** Learn about these invasive plants and how to control them.

DILEMMA

The stretch of river that boarders your property is rich with game fish and other wildlife. As you sit along the shore with your fishing pole, a man in a canoe informs you that just upstream **a new development is going in.** He says it will surely affect the quality of life along the river as new roads; fertilizers and run off could change the water temperature and add pollutants. You realize that you need information. What can you do about it?

***Real World*:** Are there development pressures along a river or lake where you live? Check the news.

PERSPECTIVE

You are a fish. Did you know that freshwater mussels depend on you as a host during part of their life cycle? You have some attached to your gills right now. Don't worry, it doesn't hurt. In three weeks they will fall off and begin their independent life at the bottom of the river. Now, swim the length of the river. **Will you survive** and make it to the end? Which land owners along the river support wildlife and water quality? Are there adequate *buffer zones* (a transition zone between the water and the land) along the way to protect your habitat from pollution? What Best Management Practices could be used to improve your chances?

***Real World*:** Learn about native fish and mussels of the river. How many are there? What habitats do they require?

AWARENESS

You just attended a workshop on the importance of natural areas along streams and lakes (these areas are called "buffers" which means to help protect against adverse effects). **Share what you learned** with a neighbor along the river. Don't forget to mention: Did you know that buffers are a transition zone between the water and the land? These zones, when left as natural areas, provide core habitat and travel corridors for wildlife and are rich in biodiversity. These areas even protect the quality of our water supply!" Take a closer look at how you and your neighbor have developed your properties. Do your land use practices protect these areas?

***Real World*:** Research the benefits of buffers and natural riparian habitats. Are there areas in your community that could be improved?

ACTION

Congratulations! You just joined the Citizen River Cleaner Uppers. **You have volunteered** to plan a clean-up day this Saturday. You need lots of help. How should you spread the word? Make a plan of action. You will need supplies for clean up and food to feed the hungry work crew. What will you do with the garbage? What will you do if you find electronics and tires? Partner with a neighbor to make a poster advertising the event.

***Real World*:** Who are the groups in your community that participate in stream protection activities? Do citizens monitor water quality and hold clean up events? Do area businesses support them?

INVASIVE

You are **Purple loosestrife,** an invasive aquatic plant species. Spread yourself to another property of your choice. Advise the property owner and his neighbors that if they don't take control and get rid of you, your flowers will produce hundreds of thousands of seeds this season and you will displace native plants and clog the waterway. Suggest that they research the best ways to rid their shoreline of you before it's too late.

***Real World*:** Research this invasive species and the mechanical; chemical and biological ways of controlling it.

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