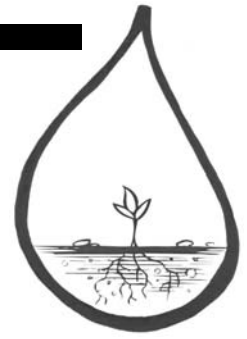


# Building Environmental Youth Leadership

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### TOPIC:

Background research

### OBJECTIVES:

- Students will compare their proposed project to problems identified and remedial action steps proposed in an environmental restoration plan.
- Students will practice basic research and presentation skills.

### LENGTH:

2 hours

### ENVIRONMENT:

Indoors or Outdoors.  
Need a place for students to pair-off for short discussions.

### MATERIALS:

- Copies of the *Threats to the Lower St. Louis River Ecosystem* or *St. Louis River Habitat Plan*.
- Copies of the Study Guide Worksheet for Students.

## Remedial Action

### Background:

Service-learning is not only concerned with satisfaction, team-work and lessons learned through student involvement and hard work. A truly successful service-learning project should benefit the environment and community in which it takes place. The objective of this activity is to compare proposed service projects with actions suggested in a scientific restoration plan. Students read and summarize parts of the plan. Then, the group works together to assess the value of proposed projects. As a result, the group develops a more focused understanding of the value of their service.

### Activity Outline:

#### *Beforehand:*

While this activity may be used to brainstorm possible service projects, it will be more effective as a means of assessing existing project ideas. Therefore, it is suggested that the group complete an activity like *Observation and Adventure Trip* to define one or more potential projects before starting this activity.

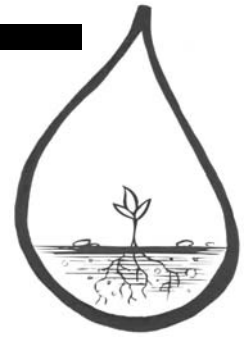
Copies of the *Threats to the Lower St. Louis River Ecosystem* can be printed. Or copies of the full *St. Louis River Habitat Plan* should be requested from the St Louis River Citizens Action Committee or downloaded from their website [www.stlouisriver.org](http://www.stlouisriver.org) prior to beginning the activity. This is a fairly large pdf document (1.4MB) so make sure to use a computer with an appropriate internet connection. Leaders may choose to copy all 100+pp of the plan, including history and geology of the river, assessment methods, threats and mitigation actions. This is good information for students to explore and summarize. However, the scope of this activity demands only that students work with the final two chapters: Threats to the Lower St. Louis River Ecosystem, and Strategies for Mitigating Threats.

Leaders may also choose to copy and assign students the accompanying *Study Guide* worksheet. This will help students summarize what they read. Leaders may not choose to assign the entire guide to all students. However, they should take time to split questions into manageable sections that small groups can complete. At the conclusion of the activity, the group should be able to answer all questions.

If the extent of this plan is inappropriate for the location of a proposed service project, group leaders should check with representatives of local planning departments, Soil and Water Conservation Departments, Natural Resource Conservation Services, University Extension Service, Department of Natural Resources, environmental advocacy groups, etc. for appropriate plans. However, these can be extremely technical in

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nature. Take time to assess the suitability of the plan for students involved.

### *Reading the Plan:*

Students gather for instructions. Briefly overview the objectives of the activity. Having selected one or more potential service projects, group members need to identify benefits to the environment and community before making a final decision. After all, a project with no benefits is little more than wasted time. Explain that students will work in small groups to read, understand and present sections of a scientific habitat plan, which notes environmental problems in the St Louis River and ways these may be mitigated. Armed with this information, the team can assess how proposed projects measure up, and decide whether to proceed.

Introduce the *St. Louis River Habitat Plan*. The introduction of the full document (pp1-4) provides requisite background information. Take a moment to answer student questions. Then, split them into small groups that will explore various parts of the plan, and report their findings back to the team. An easy way to divvy the reading is to assign each group a few questions from the study guide. However, groups may also be allotted a section or two from the guide (i.e., Loss of Habitat under Stresses or Commercial Shipping under Sources of Stress). In the latter instance, the team may choose to answer Study Guide questions during group presentations.

Students take time to split into small groups, read, and plan a presentation for their assigned portions of the plan.

### *Presentations:*

Students gather for presentations. Starting with the beginning of assigned sections, ask students to briefly (5min or less) summarize information they read. If they were assigned specific study guide questions, they should provide these answers. Otherwise, the entire team may take some time at the end of each presentation to assess which questions, if any, were answered by the group. Finally, each group should answer any follow-up questions asked by their peers.

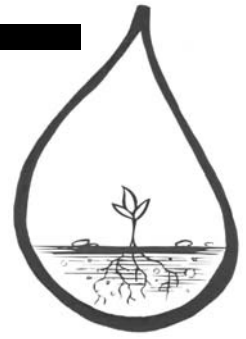
### *Project Assessment:*

Once all groups have presented their information and answered study guide questions, the entire team should assess environmental and community benefits of potential service projects. For each project, identify a threat which it addresses. Where does it fit within the stresses and sources of stress identified in the plan? Then, evaluate whether each project fits within remedial actions proposed in the plan. Brainstorm any additional benefits associated with the projects that are not proposed in the *Habitat Plan*.

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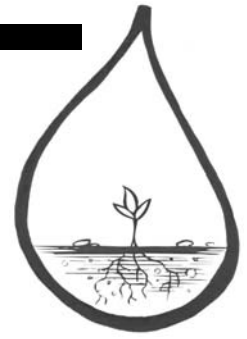
Finally, students can rank each potential project according to their benefits assessment.

**References:**

St. Louis River Citizens Action Committee. (2002). *Lower St. Louis River Habitat Plan*. St. Louis River Citizens Action Committee, Duluth, MN. Downloaded from [www.stlouisriver.org](http://www.stlouisriver.org) on 7/12/06.

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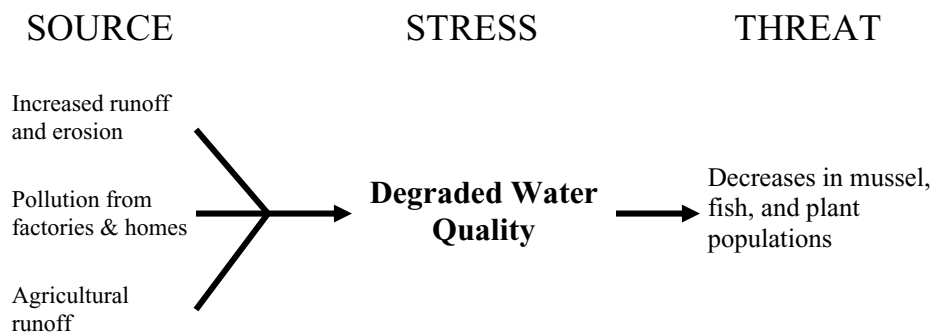
### THREATS TO THE LOWER ST. LOUIS RIVER ECOSYSTEM

Adapted from Lower St. Louis River Habitat Plan  
Compiled by St. Louis River Citizens Action Committee

Definitions for **bold face words** appear in the Glossary at the end of the report

To identify ways of managing and enhancing the health of the Lower St. Louis River **ecosystem**, it is necessary to understand the requirements of a healthy ecosystem and what factors may be causing harm.

Threats can be described in two parts: a **stress** and a **source of stress**. Stresses are the processes or events that have direct impacts on the **watershed**. The sources of stress are the people, plants, animals, actions or conditions that cause the stress. Stresses are what need to be eliminated or minimized to protect the watershed, but this can only be done by acting on the sources of the stress. For example, poor water quality may be a stress to fish, mussels, or other plants and animals. However, this stress may be caused by any number of factors like increased **runoff** and **erosion** from large development projects, pollution from factories or farms. To eliminate the stress, the cause of degraded water must be clearly identified.



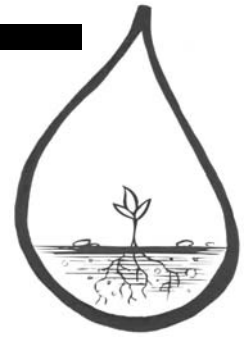
**Figure 1: An example of the relationship between source, stress, and threat to water quality on the Lower St. Louis River ecosystem.**

Often, a single activity causes multiple stresses, thereby contributing to multiple threats. For example, commercial and residential development (building new homes and businesses) contributes to four of the major stresses to the Lower St. Louis River ecosystem. Sometimes multiple activities contribute to a single stress, and some threats occur at scales far greater than that of the Lower St. Louis River project area (such as global climate change and airborne pollution). It is beyond the scope of this report to develop strategies to mitigate such effects.

It is important to recognize that the intent of this report is to catalog and explain the human activities that have or are expected to have a negative impact on the health of the Lower St. Louis River ecosystem—the birds, fish, mussels, wetlands, forest, and other entities. However, it is not intended to suggest or imply that all human activities are “bad,” or should be eliminated. Instead, this report highlights the need for careful

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planning of future developments and other endeavors, as well as the need to decrease the effects of current human activities.

### Overview of Stresses and Sources of Stress

The most critical stresses and sources of stress to the watershed are summarized below. These are stresses and sources of stress for which various strategies have been developed in this report.

#### Critical Stresses to the Lower St. Louis River Watershed

- **Loss of *habitat*** directly eliminates animals and plants in the watershed
- **Increased *sedimentation* (filling in of bays and waterways)** threatens the survival of many habitats, especially the sheltered bays
- **Competition for food and habitat from undesirable exotic species** threatens the survival of animals and plants that naturally live in the watershed
- **Exposure to river bottom *pollution*** threaten the health of animals and plants in the watershed
- **Poor water quality** impairs the health and diversity of habitats, as well as plants and animals that live in the watershed

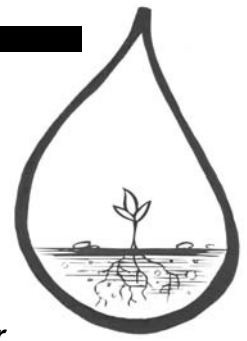
#### Critical Sources of Stress to the Lower St. Louis River Watershed

- **Home, shopping and factory developments** within the watershed and harbor result in the loss of natural habitat, increased erosion and sedimentation, lowered water quality, and the introduction and spread of exotic species
- **Commercial Shipping** results in the need for ***dredging*** (digging out) and filling waterways, resulting in loss of habitat, increased erosion, and the introduction and spread of exotic species
- **Polluted sediments** from a variety of historical factory and commercial sources expose plants and animals to pollution that might harm or kill them
- **Forest management practices** contribute to increased water flow after rainstorms, which result in erosion and sedimentation

The following table summarizes the five major stresses and sources of stress in the Lower St. Louis River Watershed.

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**Table 5 Primary stresses and sources of stress in the Lower St. Louis River Watershed.**

<b>Stress</b>	<b>Source of Stress</b>
Loss of habitat	Development Commercial Shipping (dredging and filling) Other sources
Increased Sedimentation	Development Forest management practices Other sources
Competition from Exotic species	Commercial Shipping Development Other sources
Contact with polluted river bottom	Pollution from historic commercial and industrial sites, sewage Other sources
Lower water quality	Development Commercial Shipping Polluted river bottom Forest management practices Other sources

### Stresses

#### Loss of Habitat

Loss of habitat directly eliminates plants and animals we are trying to conserve. It is generally caused by the conversion of forests, wetlands and other natural landscapes to another use, such as providing homes for people, shopping developments, factories, and growing crops.

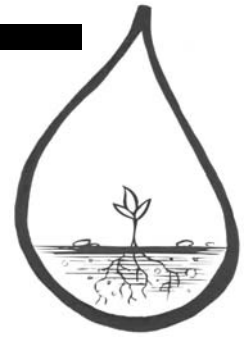
Historical habitat losses in the Lower St. Louis River include the elimination of much of the Great Lakes coastal wetlands and shoreline aquatic habitats, which were filled to create land for various developments or dredged for shipping.

#### Increased Sedimentation

Sedimentation from soils eroded into the river is a serious and ongoing threat, particularly to the sheltered bay habitats and their accompanying wetlands. Sedimentation is also a problem for some bays and river mouths. The bays provide important habitat for fish spawning, bird nesting, and feeding for a wide range of plants

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and animals. Sediments slowly fill these bays, causing the decline and loss of wetland vegetation. In addition, particles of clay floating in the water reduce penetration of sunlight in the already dark waters of the rivers. This makes it harder for underwater plants to grow. Fewer plants result in loss of food and habitat for fish and birds.

### Competition from Undesirable Exotic Species

Undesirable **exotic species** of plants and animals are one of the biggest threats to the Lower St. Louis River Ecosystem. By competing for habitat, food, and breeding areas, undesirable exotic species can eradicate other animals and plants that usually live in the river, reduce fishing, spread disease, and reduce the overall diversity of animals and plants in the ecosystem.

Some exotic animals found in the watershed are: Zebra mussels (*Dreissena polymorpha*), Eurasian ruffe (*Gymnocephalus cernuus*), Round goby (*Neogobius melanostomus*), Rainbow smelt (*Osmerus morax*), Sea lamprey (*Petromyzon marinus*), Threespine stickleback (*Gasterosteus aculeatus*), Rusty crayfish (*Orconectes rusticus*).

Some exotic plants found in the watershed are: Purple loosestrife (*Lythrum salicaria*), Common reed (*Phragmites australis*), Reed canarygrass (*Phalarus arundinacea*), Hybrid cattail (*Typha x glauca*), Beachgrass (*Ammophila breviligulata*).

### River Bottom Pollutants

Elevated levels of pollution in the river bottom, including metals, pesticides and other chemicals are causing a number of concerns on the Lower St. Louis River. These include threats to fish, plants and microorganisms living in the river. In addition, river bottom pollutants lead to restrictions on eating fish, and increased costs to industry.

### Degraded Water Quality

Water quality in the Lower St. Louis River watershed has improved greatly since 1978, when the water treatment plant (Western Lake Superior Sanitary District) began operating. However, improvements are still needed. Pollutants previously released into the river remain suspended in the water. Moreover, several sources of pollution (from road and grass runoff like fertilizers and oil) still contribute to lower water quality in the watershed. These threaten fish, birds and other animal and plant populations.

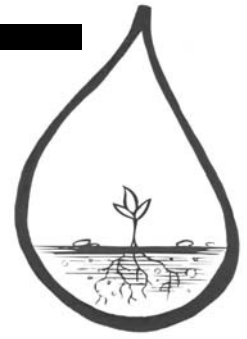
### Sources of Stress

#### Home, shopping and factory developments

Home, shopping and factory development projects result in many changes to the land and water. The most obvious effect of these projects is the loss and degradation of habitats and the resulting negative effects on animals and plants that utilize those

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habitats. Development is the primary cause of habitat loss and sedimentation, contributing to lower water quality. It is also a factor in the spread of exotic plants.

Natural forest land and other vegetation cover absorbs water and slows the movement of runoff. Wetlands and forest soils act as natural sponges to hold water and release it gradually. But when land is developed, the loss of forests, wetlands and other vegetation cover, in combination with increases in roads, parking lots and other surfaces that don't absorb water causes runoff to move more quickly. This leads to greater erosion of stream banks and channels, and sedimentation in the Lower St. Louis River.

In addition to increasing sedimentation, runoff may also carry pollutants into the river.

Seeds from exotic plants (like purple loosestrife) planted in gardens can also be carried into local wetlands and stream banks. However, it is now illegal for nurseries to sell known exotics in Minnesota and Wisconsin.

### Commercial Shipping

Dredging and deliberate filling of river areas have been two causes of habitat loss in the Lower St. Louis River, and they remain a continual threat. Development projects are often the cause of deliberate filling, but filling is also a result of maintenance dredging of the main shipping channel and some of the industrial slips and navigation channels. Whenever materials are dredged from the river bottom, they must be deposited somewhere. Erie Pier is the facility that currently processes and stores dredge materials. Previous ideas for dredge materials have been using it to fill some bays, shipping slips and deep holes found on undredged portions of the river. Such filling would result in a loss of habitat, and threats to fish and plants.

Commercial shipping is also the primary cause of the introduction of exotic species into the Lower St. Louis River. **Ballast water** from ships that is released into the river may carry exotic animals and plants. Other ways of spreading exotics include intentional and unintentional fish stocking, construction of canals and water diversions, transport in bait buckets and on fishing boats, planting for road construction, dispersal from gardens, and release from aquariums.

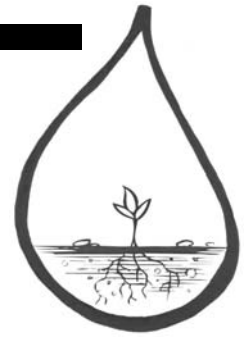
The spinning propellers on ships can also stir up river bottom pollutants.

### River Bottom Pollution

Pollution on the river bottom is a concern on portions of the Lower St. Louis River. Pollutants result from many sources, including factory operations, city wastewater, stormwater, and runoff from homes and businesses.

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### Forest Management

Some current and historical forest management practices (cutting and planting trees) have contributed to increased sedimentation of the Lower St. Louis River. For example, many of the remaining forests within the area are fairly young, and contain a lot of aspen and birch. Studies suggest that snowmelt occurs 2 to 3 times faster in these forests than those that are over fifteen years of age. This causes an increase in runoff and erosion.

In addition, logging roads built to harvest trees lead to loss of habitat and increased runoff and erosion. They also provide pathways for introduction of exotic plants and animals.

### STRATEGIES FOR DECREASING THREATS

Having identified the threats to the health of the Lower St. Louis River watershed the next step in the process was to develop strategies to eliminate or abate these threats. The following are some strategies for decreasing threats:

#### Protect Critical Remaining Natural Areas

- Increase public understanding and awareness of the importance of the beach and dune communities (Minnesota and Wisconsin Points) to migratory birds and the need to minimize harm to this habitat.
- Encourage people to stay on designated trails on Wisconsin Point and Minnesota Point
- Survey plants and birds within the Magney-Snively Forest to provide data for monitoring the health of the forest
- Inventory and document erosion areas in all area forests and stream banks
- Ensure that land surrounding sheltered bays is maintained with natural vegetation

#### Clean Polluted Sediments and Restore Natural Functions

- Encourage action to clean contaminated sediments and restore natural functions

#### Reduce High Stream Flows that Result from Land Development

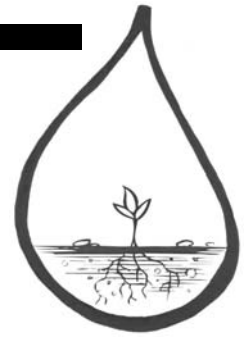
- Protect wetlands and forests in the watershed
- Re-plant evergreen forests in appropriate areas of the watershed

#### Control Pollution from Roads and Parking Lots

- Educate the Public on the impacts of sand and salt in water environments
- Work to reduce the use of road salt on roads in winter
- Install traps to capture sand in storm sewers and ditches before it reaches streams and wetlands
- Keep and enhance natural plant buffers on roadsides and in parking lots to capture sediment and salt before it enters storm drains and ditches.

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### GLOSSARY

**ballast water:** water carried by ships to provide stability and adjust a vessel's trim for optimal steering and propulsion. It is collected and released at sea, along coastlines, and in port. As a result, a diverse mix of plants and animals from different ports are transported and released around the world with the ballast water of ships.

**clay:** very fine inorganic sediments under 2  $\mu\text{m}$  in diameter; not gritty, feels slippery between fingers.

**dredging:** Removal of mud from the bottom of water bodies. This can disturb the ecosystem and causes silting that kills aquatic life. Dredging of contaminated muds can expose biota to heavy metals and other toxics.

**ecosystem:** All of the interacting organisms in a defined space in association with their interrelated physical and chemical environment.

**erosion:** The wearing away of land surface by wind or water, intensified by land-clearing practices related to farming, residential or industrial development, road building, or logging.

**exotic species:** A species that is not indigenous to a region.

**habitat:** The place where a population (e.g. human, animal, plant, microorganism) lives and its surroundings, both living and non-living.

**polluted runoff:** Rainwater or snowmelt that picks up pollutants and sediments as it runs off roads, highways, parking lots, lawns, agricultural lands, logging areas, mining sites, septic systems, and other land-use activities that can generate pollutants.

**pollution:** Generally, the presence of a substance in the environment that because of its chemical composition or quantity prevents the functioning of natural processes and produces undesirable environmental and health effects.

**runoff:** Water from rainfall, snowmelt, or otherwise discharged that flows across the ground surface instead of infiltrating the ground.

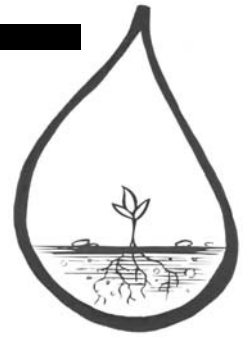
**sedimentation:** The removal, transport, and deposition of detached soil particles by flowing water or wind. Accumulated organic and inorganic matter on the lake bottom. Sediment includes decaying algae and weeds, precipitated calcium carbonate (marl), and soil and organic matter eroded from the lake's watershed.

**source of stress:** the people, plants, animals, actions or conditions that stress the watershed.

**stress:** the processes or events that have direct impacts on the watershed.

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**watershed:** All land and water areas that drain toward a river or lake; also called Drainage Basin or Water Basin.

**Definitions from:** [www.duluthstreams.org](http://www.duluthstreams.org), [www.epa.gov/OCEPaterms/hterms.html](http://www.epa.gov/OCEPaterms/hterms.html)

### ACKNOWLEDGEMENTS

This report is edited verbatim from the *Lower St. Louis River Habitat Plan* with minor verbiage revision for non-technical readers and omission of content for reading time. It is intended only for educational use to provide a brief and general overview of the threats identified on the Lower St. Louis River.

*Lower St. Louis River Habitat Plan* was compiled by the St. Louis River Citizens Action Committee. Go to [www.stlouisriver.org](http://www.stlouisriver.org) to download a full copy of the plan.





