

### Introduction

We present two case studies from the north shore of Lake Superior and discuss how capacity building has helped in the development and implementation of stream naturalization projects. The purpose is to show how knowledge transfer can occur between organizations and promote more integrative and adaptive forms of managing stormwater. Organizations tend to suffer from knowledge isolation, caused by functioning within vertical silos (i.e. the transfer of knowledge and resources within the institution). Causes include: 1) hierarchical and bureaucratic organizations that make sharing of knowledge difficult (Liebowitz and Chen 2003), lack of a specific knowledge management strategy (Syed-Ikhsan and Rowland 2004) and the fact that knowledge sharing is laborious, time consuming, and difficult (Szulanski 2002).

The creation of horizontal bridges between the silos, using a knowledge management strategy, creates more efficient institutions and results in greater benefits and increased viability (Wigg 2002). We focus on developing horizontal bridges as they relate to creating capacity to develop and implement stream naturalization projects.

### Background

Government organizations have recognized that the Thunder Bay harbour and the 5 watercourses that flow through the city are contaminated. This contamination issue is compounded due to a lack of formal stormwater management plans. A 2000 study found that a number of stormwater discharges were acting as conduits for transport of contaminants to the waterfront (Jaagumagi 2001). Barriers to the development of a stormwater management plan in this region consist of a lack of capacity (i.e. resources), communication, knowledge, and commitment between multiple jurisdictions. All of this results in no individual organization having the responsibility or capacity to manage this cumulative problem. We find that large-scale problems identified by government organizations engender equally large-scale plans that fail to provide clear achievable objectives at a local level.

### Methodology

Adaptive management strategies were used to assess and define problems related to non-point source pollution which led to discussions, collaboration and capacity building with regard to the concerns raised.

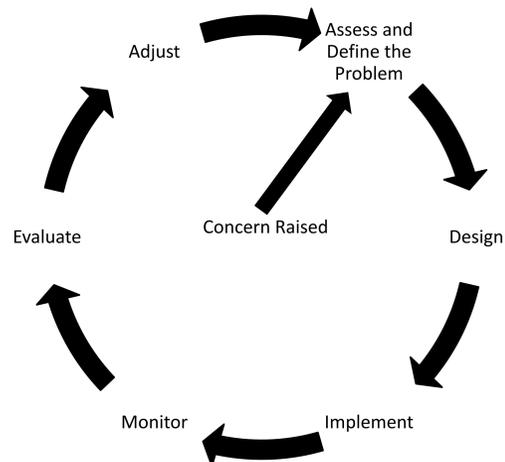


Figure 1: Representation of adaptive management stemming from a concern raised which can lead to building capacity to address the problem. Modified from Owens, P. 2009.

### Case Study 1: Stormwater Impact Assessment

The main objective of this project is to characterize the impacts from stormwater discharges and provide recommendations (i.e. stream naturalization) for the remediation of water quality and ecosystem habitat. It represents a city-wide collaborative effort towards assessing the impacts of stormwater discharge within the Thunder Bay.

Stormwater discharge and non-point source pollution is a concern that has been raised by multiple organizations within Thunder Bay. Informal communication and knowledge transfer is used to build capacity and bridge the organizations that want to assess and define this problem, namely: the North Shore Remedial Action Plan (RAP) composed of Environment Canada, the Ministry of the Environment, the Ministry of Natural Resources and Lakehead University, Lakehead Region Conservation Authority (LRCA) and EcoSuperior.

Collaboration between the organizations allow for an in-depth and comparable stormwater impacts assessment on three different sites (the Lyons Channel, Neebing River and McVicar Creek) despite limited resources. The goal of the project meets the needs of the RAP, LRCA and EcoSuperior while supporting the City of Thunder Bay's Community Environmental Action Plan.

### Partners

- ▶ EarthWise Thunder Bay Water Working Group (Municipality)
- ▶ EcoSuperior Environmental Programs (NGO)
- ▶ Lakehead Region Conservation Authority (Provincial Government)
- ▶ North Shore Remedial Action Plan (Provincial / Federal Governments)



### Case Study 2: McVicar Creek Naturalization

The objective of this project is to build on existing efforts and available resources to naturalize and stabilize two areas along McVicar Creek, reduce non-point source pollution by preventing erosion, and limit the inputs associated with stormwater runoff.

The benefits of stream naturalization and the need for naturalization of impacted buffers along McVicar Creek have been recognized by several organizations in Thunder Bay. Two areas were identified by the North Shore RAP as impacted buffers that should be actively re-forested, while the Stewardship Council of Thunder Bay received funds to purchase various trees to plant along shorelines in Thunder Bay. Informal knowledge transfer allowed for collaboration and generated the capacity to use the resources of the Stewardship Council to plant trees in the sites identified by the North Shore RAP. Other organizations provided additional resources (i.e. manpower) to complete the project.

Currently, the North Shore RAP is using available capacity to benefit the McVicar Creek Naturalization project by cultivating native shrubs to be planted alongside the initial trees planted in 2011.



### Partners

- ▶ EarthWise Thunder Bay Water Working Group (Municipality)
- ▶ Lakehead University (Academic)
- ▶ Ministry of Natural Resources (Provincial Government)
- ▶ North Shore Remedial Action Plan (Provincial / Federal Governments)
- ▶ Stewardship Council (Provincial Government)
- ▶ Tree Stewardship Thunder Bay (NGO)

### Highlights

- ▶ A shared concern brought organizations of various backgrounds together and created capacity for stream naturalization.
- ▶ Collaboration and increased resource effectiveness made these projects possible since resources and funds were not available for individual projects.
- ▶ Through collaborative work, organizations developed projects to meet separate mandates with the same overarching goals based on a shared concern.
- ▶ An informal knowledge management program was developed.
- ▶ Informal communication created horizontal bridges between organizations and generated the capacity for stream naturalization.

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### Discussion

Although government organizations have identified problems related to non-point source contamination, such as the Thunder Bay Area of Concern (AOC) and the need for a Source Water Protection Plan, stakeholders have not yet fostered the capacity to address these wicked problems (Ludwig, 2001). Stream naturalization has been identified as an important water quality control used in stormwater management that can address problems related to non-point-source contamination (Smith *et al.*, 1993). However, government generated plans do not mention the use of stream naturalization as an objective to address non-point source pollution. Collaboration between organizations helps create horizontal bridges, which allows stream naturalization to be integrated into stormwater management, and contributes to the broader objectives identified by government remediation plans.

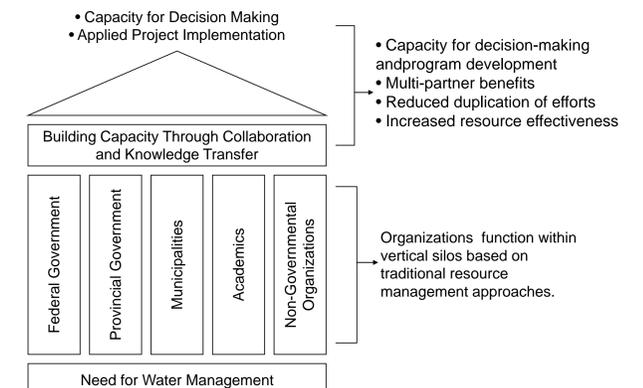


Figure 2: Graphical representation of inter-organizational capacity, collaboration and knowledge transfer as a horizontal bridge that links vertical silos and results in capacity for decision making and applied project implementation.

### Conclusion

Informal knowledge management, particularly the development of horizontal bridges, from these two case studies show that inter-organizational capacity builds a dynamic network. This brings upon positive changes to the otherwise static network of government organizations, and results in multi-partner benefits. These are similar to results from Wiig (2002) who found that people and institutions work smarter and more effectively when knowledge transfer occurs.

Additionally, the development of horizontal bridges reduces the duplication of efforts, increases resource effectiveness, and allows the completion of otherwise impossible projects. This is in accordance with the cost effectiveness principle described for environmental management by Gilbert (1997). Overall, building capacity has helped stream naturalization and the development of stormwater management plans through: A) capacity for decision-making and program development and B) implementation of mitigation projects.

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