

## Chapter 9

# Developing Sustainability in the Lake Superior Basin

This document replaces LaMP 2000 Chapter 9.



Canoeing on Lake Superior  
Photography by USDA Forest Service, Superior National Forest

Lake Superior Lakewide Management Plan  
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## Chapter 9

# Developing Sustainability in the Lake Superior Basin

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### EXECUTIVE SUMMARY

The Binational Program is interested in more than protecting and restoring habitat or reducing toxic chemicals produced and released in the basin. In developing a management plan for Lake Superior, government agencies have pursued the goal of developing regional sustainability to restore and preserve a range of social, economic, and environmental values. This chapter discusses issues and actions relevant to identifying, monitoring, and affecting conditions that affect basin-wide sustainability. In conjunction with the work of other committees in the Lake Superior Binational Program, it provides a basis for assessing where we are as a society in the watershed, projecting how close we are to achieving our “Vision for Lake Superior,” and suggesting how to sustain an ecosystem in the Lake Superior watershed that supports thriving communities in the future.

Various groups interpret the concept of sustainability differently and this lack of agreement on the meaning creates a significant challenge. The definition of sustainability also changes as environmental conditions, scientific understanding, and social priorities change. At the very least, sustainability requires that we conserve existing resources in the basin so that future residents are not left without access to vital elements of daily life.

Any plan for developing sustainability must be flexible and responsive to changes in the social, economic, and environmental conditions of the region. Many argue, as well, that planning for sustainability requires ongoing education and persuasion much more than the implementation of specific laws and regulations. Determining progress toward sustainability requires using several indicators measured over time, interpreting the meaning of those indicators within a social and political context, and demonstrating measurable results. We believe that this chapter outlines a prudent and practical blueprint for beginning the process.

To guide our efforts, we have focused on indicators for five general aspects of regional sustainability: the natural capital of the basin, the quality of life in the area, resource consumption patterns, citizens’ awareness of their capacity to contribute to sustainability, and economic vitality. As an initial attempt to measure these indicators, and following another study endorsed by the Binational Program dealing with the attitudes and values of decision makers in the basin, a “Baseline Sustainability Indicators” project was completed in 2000 to determine the status of basin-wide sustainability. This project examined a wide range of existing databases to also determine the extent to which sustainability trends could be observed without creating new indexes or gathering additional information.

Based on a preliminary review of the database, it seems apparent that a variety of social and economic conditions may threaten the long-term sustainability of the watershed. In particular, a relatively depressed regional economy may be fostering conditions that work against the incorporation of sustainability principles into daily life and that further encourage ill-advised use

of basin resources. However, the data also suggest that various demographic forces may influence the adoption of more benign technology and land use planning on a watershed scale. Overall, research to-date reinforces the fact that humans must be seen as a part of, rather than apart from the Lake Superior ecosystem and that a LaMP should consider ways in which we balance our activities with the rest of the regional ecosystem.

## **Actions**

In addition to collecting data regarding socioeconomic and attitudinal data in the basin, the Developing Sustainability Committee (DSC) of the Lake Superior Binational Program has proposed, initiated, or completed a series of projects. A number of these projects are oriented primarily toward further assessing the status of sustainability in the basin. They include:

- A Sustainable Forestry Criteria & Indicator initiative that identifies monitoring indicators for forestry practices in the basin (including harvesting and resource modification) and establishes a system by which the processes can be periodically assessed in light of the basin-wide sustainability of forest resources.
- A “Community Awareness and Development Review” that seeks to formally survey residents of the basin as well as initiate person-to-person dialogue regarding sustainability issues.
- A review of the status of “Sustainability Education” in the region in order to gain a better picture of the extent to which sustainability principles are currently being incorporated into environmental education programs.
- An examination of the causes of urban and rural sprawl in the watershed.

A number of other projects focus primarily on ways of informing the public’s choices relating to social and personal behavior, such as:

- A “Communicating Economic Values” project aimed at improving the visibility and demonstrating the economic importance of natural resource systems in the basin.
- A project that evaluates the value of various economic instruments (e.g., user fees, pollution charges, permit trading programs, performance bonds) applicable to the Lake Superior basin.
- A project promoting water conservation that builds upon Canadian efforts.
- “Marketing Waste Reduction and Energy Efficiency” programs that provide information and assistance campaign tailored to alerting small businesses, health care organizations, and educational systems in the basin to various energy and waste assistance programs.
- A program designed to further facilitate mercury reduction by expanding current emphases on thermostat, button battery, and fluorescent lamp recycling.

These and additional action items, some of which already have sponsors and funding as well as some that represent our “next steps,” are listed in Table 9-1.

**Table 9-1: Next Steps**

<b>Project</b>	<b>Lead Agency/ Funding Source</b>	<b>Funded</b>	<b>Needs Funding</b>
Community Awareness Review & Development Project (Phase I)	Environment Canada, EcoSuperior, Michigan Technological University, and Central Lake Superior Land Conservancy (WDNR, MPCA, & GLNPO funding)	X	
Lake Superior Stewardship/Leadership School Project	U of Wisconsin, WI Coastal Management, Lake Superior Binational Program	X	
Sustainable Forestry Indicator Development	USDA Forest Service	X	
Reviewing the Status of Sustainability Education	Not determined		X
Communicating Economic Values and Teaching the Value of Economic Instruments	Not Determined (unknown funding)		X
Promoting Water Conservation	EcoSuperior	X	
Marketing Waste Reduction & Energy Efficiency	Michigan Department of Environmental Quality	X	
Understanding Sprawl	Northern Michigan University (USDA Forest Service)	X	
Watershed Management Promotion	Not Determined (unknown funding)		X
Environmental Industrial Design Demonstration	Not Determined (unknown funding)		X
Mercury Reduction	U.S. EPA, Environment Canada, Province of Ontario, EcoSuperior, other local, tribal and state projects (see LaMP Ch. 4 for more information)	X	
Promoting Riparian Buffers	Central Lake Superior Land Conservancy (GLNPO funding)	X	
Comparing Sustainability Indicators	Not Determined (unknown funding)		X

## 9.0 ABOUT THIS CHAPTER

In developing a management plan for Lake Superior, government agencies are pursuing the goal of developing sustainability in the Lake Superior watershed to restore and preserve a range of social, economic, and environmental values. The LaMP 2002 Progress Report (available online at [www.epa.gov/glnpo/lakesuperior](http://www.epa.gov/glnpo/lakesuperior) and [www.on.ec.gc.ca/glimr/lakes/superior](http://www.on.ec.gc.ca/glimr/lakes/superior)) now places the subject of sustainability front and center in describing the Binational Program. This updated chapter of the original LaMP 2000 technical document discusses a variety of issues and actions relevant to identifying, monitoring, and affecting conditions relevant to ensuring basin-wide sustainability. In conjunction with the work of other committees in the Lake Superior Binational Program, it provides a basis for assessing where we are as a society in the watershed, projecting how close we are to achieving the Lake Superior LaMP's "Vision for Lake Superior" (see p. 1-3), and suggesting how to sustain thriving communities in the future. Section 9.1 describes the problem. Sections 9.2 and 9.3 lay out the Lake Superior sustainability objective and the current status and trends in sustainability in the Lake Superior basin. Finally, Sections 9.4 and 9.5 outline strategies for future initiatives and next steps toward implementing those initiatives.

## 9.1 PROBLEM IDENTIFICATION

Typically, when we consider the risks associated with environmental problems in the Lake Superior basin, we rarely look beyond the remediation of existing problems. Watersheds can be rehabilitated; municipalities, industries, and citizens can be held accountable; or the air can be purified and the threat seems to "go away." However, in order to ensure that these problems do not recur, a more fundamental puzzle must be solved: How should citizens around Lake Superior sustain their society so that the Lake Superior of tomorrow is healthy as well? How should they act as a society to realize the "Vision for Lake Superior" which begins this planning document?

People are part of and dependent on the environment. Nonetheless, attempts to encourage people to alter their lifestyles on behalf of the natural environment (and, therefore, themselves) are often met with resistance: "It will cost too much. Jobs will be lost. The science isn't conclusive. It's better than it used to be so there's no need to do anything else. The problem will fix itself." In some cases, these arguments may have merit. However, these arguments often fail to appreciate the risks and impacts on current and future generations. By the time society recognizes the cost to future generations of depleted resources and missed opportunities for sustainable lifestyles, the quality of life for future generations may already be diminished.

The Lake Superior Binational Program represents a rare instance in history when citizens, agencies, and nations band together to address problems and to bring to life a collective vision of a responsible society that plans for the future as it deals with the present.

### 9.1.1 General Introduction

The Lakewide Management Plan (LaMP) for Lake Superior exists because, under the Great Lakes Water Quality Agreement, society has concluded that our actions in the past and present

potentially harm our use of the lake in the future. Assuming that humans and nature can coexist in harmony and that it is possible to have a sound economy and a healthy environment, those living in the Lake Superior basin must begin to develop a sustainable society throughout the region. That is, we need to find a way to use resources in the watershed to provide the sort of living conditions we seek to maintain or improve upon, without causing harm. In order to create a sustainable society, it is not enough to guarantee we may benefit from the natural and social environment at the present time. What we do today will surely influence the lifestyles of future generations. Thus, a viable LaMP must take into account the extent to which citizens in the region can prosper and sustain themselves in the years to come.

The drive toward sustainability does not suggest that agencies such as the U.S. EPA should attempt to “manage” society in a way that exceeds their legislative mandates and authority. Rather, it is expected that governments, citizens, and industry will cooperate to limit damage to the natural foundation for society. We face these issues globally as well as in Lake Superior, as we struggle to find ways to improve living standards for a rising world population, while limiting damage to the ecosystem and preserving resources for the future. In order to accomplish these goals, we will need to find ways to support high living standards with less waste of resources and less environmental damage. A resource rich area such as the Lake Superior watershed cannot be insulated from the problems facing others on the planet and, specifically, those living down stream in the Great Lakes catchments.

### **9.1.2 Defining Sustainability**

Various definitions of “sustainability” have been advanced. Some, such as the United Nations definition, have focused on how society can develop in order to meet “the needs of the present without compromising the ability of future generations to meet their own needs.” Others have stressed ways to ensure economic growth, as in “the intensive use of, and high yields from, natural systems without damage to their continued productivity.” And still others have concluded that the term entails a significant shift in how humans think about their relationship to nature, and have argued that our only hope lies in a substantial retreat from the quality of life enjoyed by those in the industrialized world.

Despite differences of opinion, definitions of “sustainability” generally share a variety of attributes. Planning for sustainability always involves making decisions about where we want to be in comparison with existing conditions. At the very least, sustainability requires conserving existing resources so that our descendants can enjoy the same or better quality of life as the present generation. Additionally, in order to predict how we may best ensure regional sustainability, we need to bear in mind a variety of issues:

- What is or is not sustainable at a given point in time may not be the same in the future. An understanding of what constitutes sustainability will always be a moving target because we cannot control all of the social and environmental factors that are associated with the process of sustaining valued lifestyles. Thus, any plan for developing sustainability must be flexible and responsive to changes that follow social and natural cycles such as migration trends, climate change, or technological development.

- Social and economic considerations are important, but they do not take precedence over a healthy, natural environment that is protected from significant human-induced impairments such as pollution, habitat loss, and chaotic land-use patterns. There is evidence in the basin both of impairments caused by historical resource extraction operations, and of the beginnings of urban sprawl. Both threaten to stress the natural ecosystem and possibly reduce its ability to repair itself or sustain the people that depend upon its bounty. Although social and economic needs must not be neglected, we must recognize that our physical environment is the foundation for all other social or economic benefits. Consequently, sustainability requires that our use of natural resources does not cause substantial long-term damage to the rest of the ecosystem.
- As a dynamic process, developing and measuring sustainability requires attention to how society and the environment change over the span of many years; the true measure of a sustainable society is on the scale of generations rather than years. Planning and assessment is a much more complex process than, for example, rehabilitating a single stream or eliminating a specific chemical in the environment. At times, what we are doing today to maintain a quality of life may diminish the ability of the environment to support society in the future.
- Since processes directed at achieving and maintaining sustainability must be enduring, we need to encourage and respect a diversity of perspectives regarding the manner in which society makes progress toward sustainability. Effective policy truly depends on a political consensus that favors long-term advances over short-term benefits. Planning for sustainability requires ongoing education and persuasion rather than merely attempting to enforce laws and regulations that may not be wholly supported by citizens.

The LaMP process embraces a number of sustainability principles. These principles have evolved over time, are similar to those adopted by other organizations and regional ecosystem initiatives, and are relatively easy to understand.

1. Adaptability. Economic growth and social development in the basin should continually be adapted to the natural cycles of our environment. Value-laden decisions regarding land use should be based on our best scientific understanding of how technology, economics, and society can affect the sustainability of the natural ecosystem.
2. Equity. No group in the basin should bear an inequitable burden in adapting to the natural cycles of our environment. Too often, decisions based on ostensibly sound science do not consider the social ramifications for choosing one action over another and are, in of themselves, politically unsustainable. Furthermore, by design or happenstance, such decisions can place at a disadvantage some segments of society simply because of economic status, geographic location, age, race, sex, or the like.
3. Knowledge. Education, more than regulation, is a cornerstone in the process of brining into balance human activities and the natural cycles of our environment. In particular, the



success of the Lake Superior LaMP depends on basin citizens understanding that a diversity of life and quality habitat is part and parcel of our quality of life.

4. **Unity.** The basin is a system of interconnected environmental, economic, and social systems. Planning should be done in accordance with the cycles of the natural environment by looking at the “big picture” of how individual decisions affect other areas of the basin and its environment, economy, and society as a whole.
5. **Limits.** The environment has a finite capacity to replenish natural capital or absorb waste. Science cannot give us an exact measure of the environment’s capacity to perform these services. Consequently, the LaMP calls for monitoring a variety of ecosystem indicators, including those focusing on social and economic elements.

### **9.1.3 Challenges**

Even though the idea of sustainability has long provided a foundation for the Lake Superior Binational Program, it is difficult to decide how we should go about facilitating sustainable practices on the ground. To promote practices that provide for sustainable outcomes requires consideration of a variety of issues that go beyond the prevention of pollution; to produce a truly sustainable society means that we must grapple with issues that are more general in scope than those associated with other aspects of the LaMP. Though progress has been made, we are still a long way from promoting a full range of social and economic initiatives that will make for a sustainable future.

In order to effectively support the process of developing sustainability in the Lake Superior basin, the LaMP must deal with three fundamental issues. For each of these issues, there are challenges that must be overcome.

#### **9.1.3.1 Dealing with Complexity**

As there is no single best indicator of sustainability, we must turn to a suite of measures taken over time. Some of these indicators are tangible and can be measured in much the same way as the ground water pollution or wildlife populations. Most measures are much less concrete and attempt to assess the distinctly social fabric of the watershed. To integrate physical and social assessments of sustainability requires a substantial investment in time, effort, and finances especially for the creation of new indexes to measure complex social interactions. It also requires the development of reports that are easily understood by citizens and policymakers alike. Additionally, we need to focus on the basin as a whole, rather than become fixated on one or two components of the larger system. There may also be some merit in considering the extent to which actions enhancing regional sustainability could either enhance or adversely affect global conditions (e.g., placing a moratorium on logging, mining or other extractive actions in the watershed might result in the use of developing countries’ resources beyond sustainable levels). It is particularly difficult to comprehend this “big picture” since indicators of sustainability are not adequately monitored.

Sustainability does not involve quick-fix, “end-of-pipe” solutions to environmental threats, rather it deals with the identification, monitoring, and remediation of more serious shortcomings located “up stream” in society itself. For example, the Lake Superior Binational Forum has argued that present levels of economic production and consumption are unsustainable, unless we can find ways to produce and consume with less waste and less environmental damage. Ecological deficits must be corrected, globally and in the Lake Superior basin. The Forum argues that globally, and in Lake Superior, ecosystem carrying capacity is being exceeded.

### **9.1.3.2 Dealing with the Political Context**

Observing and modifying social practices is often a more time consuming process than installing the best technology for pollution prevention or remediating a degraded stream. We exist within a political context that can hinder changing the way we live and work, or may as easily provide additional opportunities for sustainability. Our society is one of competing agendas, alliances, and philosophies, and much depends upon what sector of society is driving the political process. Efforts to promote sustainability must cope with competing jurisdictions, lack of coordination, overlapping mandates, and unclear lines of accountability. For instance, an important challenge in promoting sustainable development will be to encourage local governments to consider principles of sustainability, including consideration of impacts on other communities, when making local decisions about management of land and water resources.

### **9.1.3.3 Demonstrating Measurable Results**

It is difficult to determine whether progress is being made towards sustainability. While commitment to sustainability may promote actions that will gradually improve the ability of the Lake Superior ecosystem to support the social and economic lives of its inhabitants, these results may not be immediate. As a consequence, people may focus on more observable short-term targets when committing money or effort to a LaMP-related project. Therefore, it is crucial that we specify reasonably tangible measures and outcomes that permit us to actually observe movement toward sustainability.

## **9.2 SUSTAINABILITY OBJECTIVES AND INDICATORS**

In the process of building the Lake Superior LaMP, the Developing Sustainability Committee (DSC) of the Binational Program has relied on a consistent set of ecosystem targets established in the mid-1990s (see: <http://www.cciw.ca/glimr/lakes/superior/pdf/lupind5.pdf>). Both the general- and sub-objectives for sustainability were created out of public input and in consideration of environmental and social science. Subsequent efforts by the DSC refined those objectives to highlight the social and economic conditions influencing environmental sustainability. In comparison with most outcomes identified in other portions of the LaMP, these objectives are cast in terms of assessing human behavior that affects the land, water, air, and life forms in the watershed.

### **9.2.1 General Objective**

In keeping with the Vision, the following objective underscores a distinctly social aim for our efforts in the basin, focusing primarily upon how we should go about the business of using resources at our disposal:

Human use of the Lake Superior ecosystem by all people in the watershed should be consistent with the highest social and scientific standards for sustainable use. Land, water and air use should not degrade the Lake Superior ecosystem, nor any adjacent ecosystems. Use of the basin's natural resources should not impair the natural capability of the basin ecosystem to sustain its natural identity and ecological functions, nor should such use place at significant risk the socioeconomic and cultural foundations for any group of citizens in the watershed, nor should we deny current and future generations the benefits of a healthy, natural Lake Superior ecosystem. Policies directed at the wise management of natural and social resources in the basin should not usurp the right of local communities to determine their future within the guidelines established by existing statutes and regulations. Technologies and development plans that preserve natural ecosystems and their biodiversity should be encouraged.

There are a number of noteworthy features embedded within this general objective:

- Promoting sustainability requires involvement by government, industry, and private citizens alike.
- Decisions should be based on our best scientific understanding of how technology, economics, and society can affect the sustainability of the ecosystem.
- No particular sector of current and future society should bear an inequitable burden in implementing sustainable practices.
- Communities within the basin should be empowered to lead the way toward sustainability.
- Education, more than regulation, is the cornerstone to achieving sustainability.

Ideally, the general objective can provide guidance in identifying specific, action-oriented principles that can shape social behavior.

### **9.2.2 Sub-Objectives**

To evaluate our progress, the general objective has been broken down into four sub-objectives. These guide us in the selection of monitoring and projects toward achieving sustainability in the Lake Superior basin.

### **9.2.2.1 Ensuring Environmental Integrity**

The first sub-objective, that “public and private decisions should be based on understandings, rooted in formal and informal educational settings, which contribute to the integrity and stability of social and biotic communities,” reaffirms the role of education in creating a sustainable regional society. We should be promoting a range of educational opportunities that help people to appreciate the need for living in harmony with the natural ecosystem in the basin.

### **9.2.2.2 Resources and Services as Environmental Capital**

The second sub-objective clarifies the relationship between resource use and resource value: “The Lake Superior ecosystem provides resources and services to humans. These include air, water, fiber, minerals, energy, waste transport and treatment, food, recreation, and spiritual sustenance. These resources should be valued as environmental capital, in the same way that other capital is assigned value.”

Much of the work required to meet the second sub-objective can be accomplished by having ordinary people invest themselves in the LaMP, or in other efforts that seek to enhance the quality of life locally or regionally through more sustainable resource management. When citizens become involved in the Binational Program and similar efforts, they increase the “social capital” of their communities. Social capital includes the knowledge and experience that people bring to any production capacity and refers to the organizations, structures and social relations that people build, independent of any state or large corporation. In turn, enhancing social capital can help reserve environmental capital. For example, research is demonstrating that with the presence of strong social capital, consumption patterns can be decreased without any decrease in quality of life.

### **9.2.2.3 Sustainable Technology and Design**

“Institutional capacity to integrate affordable technology and sustainable design should be developed within the Lake Superior ecosystem.” Here, the focus is upon encouraging the adoption of practical technology that is within financial reach of citizens who work and play in the region.

### **9.2.2.4 Basin-Wide Planning**

The final sub-objective for developing sustainability within the LaMP framework suggests projects that optimize regional land-use planning: “The basis for guiding sustainable development at the scale of the Lake Superior ecosystem (especially in reference to community land use or comprehensive planning) should be the pattern of land, water, and air use, as these affect ecological, social, and economic processes.” In particular, we should be careful to monitor where we are in process of striving for sustainability, so as to better identify the specific actions needed in the future. Furthermore, we should recognize that while state/provincial and federal policy can be influential, it is the local units of government that generally have jurisdiction over

the use of the land. And, sometimes, regulations from beyond a locality may undermine the ability of local units of government to direct resources in more appropriate ways.

A useful idea regarding sustainability considers the “ecological footprint” a community leaves on the planet as it develops and consumes natural resources. Our ecological footprint is the total area of productive land and water required continuously to produce all the resources consumed, and to assimilate all the wastes produced, by a specified human population, wherever on Earth that land is located. Through the use of sophisticated computer algorithms, decision makers can estimate the true costs and benefits flowing from any land use decision. Coupled with Geographic Information Systems technology, ecological foot printing analysis can be used as a compass directing us toward sustainable lifestyles. Though ecological foot printing analysis is still in its infancy and still requires a significant investment in research and development, this analytical tool holds great promise for the Lake Superior basin and beyond.

#### **9.2.2.5 Sustainability Indicators**

In 1995, the Lake Superior Binational Program published a discussion draft document entitled Ecosystem Principles and Objectives for Lake Superior (EPO), which was developed on the basis of input from experts and citizens living in the basin rather than simply incorporating measures originating elsewhere. The EPO report included a detailed summary of the rationale and specific monitoring indicators for basin-wide sustainability; a complete version of the “developing sustainability” portion of that document can be accessed via the World Wide Web at <http://www.cciw.ca/glimr/lakes/superior/pdf/lstupind5.pdf>. In 1998, so as to better monitor the status of regional sustainability, the Superior Work Group narrowed the wide range of sustainability indicators in the EPO to a suite of five “best bet” measures. The following categories of sustainability indicators provide a framework for assessing the status of and progress toward achieving sustainability in the Lake Superior watershed:

- Reinvestment in the Natural Capital of the Basin. One way to think about managing human activities as a part of the Lake Superior ecosystem is to consider the concept of “natural capital.” Just as people often measure their wealth in terms of currencies and possessions, so too does the natural environment represent an enormous bank of goods and services. To the extent it is unwise to use all of our money for short-term gains or to consume all of our material resources with little care for the future, it is also foolish to deplete an ecosystem of all the benefits we rely upon. Certainly, some of these natural riches are more-or-less renewable, as is the case of sustainable forestry. On the other hand, other types of natural resources (e.g., a diversity of species, or the ozone layer) are non-renewable. Natural systems have a finite capacity to produce renewable resources or to absorb human-induced emissions and pollutants without heavy impact on future generations. Hence, we must ensure that annual consumption of natural resources is not depleting basic natural capital “stocks” and that there is enough natural “wealth” to meet our needs and those of future generations.

Given the substance of natural capital, we want to monitor the balance between what is extracted from the natural basis for life in the basin with what is returned to the land, and to promote projects that facilitate an equitable balance in the future. Thus, this suite of

indicators includes: the amount of sustainable forestry occurring on the land; the extent of watershed management or restoration programs; native fisheries and wildlife stocking; exotic species control and native plant repatriation; reclamation of mining operations and industrial sites; and replacement of wetlands and biotic diversity.

- “Quality of Human Life” Indexes. Several existing EPO indicators focus on the extent to which natural and social forces in the watershed impact upon citizens’ lifestyles (e.g., migration patterns, social service demands). This omnibus measure of life, incorporating a range of social indicators, serves as a basis for projects intended to benefit the quality of life in the basin in accordance with other ecological or economic values. For example, with baseline measures in hand, we can compare the quality of life in different communities, institute remedial programs, and track changes over time. This suite of indicators includes: incidence of crime; demographics of migration (especially the loss of extended families in the basin); demands for social services; transportation infrastructure status; extent of recreational and cultural opportunities; citizen involvement in decision making; public access to lakeshores; and population density.
- Resource Consumption Patterns. We should consider the types and quantities of resources that are consumed in the basin, especially as these demands influence various natural and social structures. In particular, we want to focus on energy production and consumption, water availability and use trends, and waste stream loadings (e.g., landfill capacity versus recycling trends). This suite of indicators includes: availability of recycling programs; amount of forest and mining resources that remain in the basin; types and quantities of electric power generation; quality and volume of aquifers; amount of and stressors related to tourism; depletion of wildlife and fisheries; landfill capacity and incineration volume; degree of urban sprawl; and loss of native flora.
- Awareness of Capacity for Sustainability. Clearly, education in formal and informal settings is a necessary component in any drive toward regional and global sustainability. And education is especially important if we are committed to fostering sustainability through processes of voluntary compliance rather than by way of regulation and enforcement. We need to understand the content and extent of current educational and media messages about issues related to sustainability, and measure the impact of improved educational programs on people’s awareness of sustainability and on their behavior. The indicators needed include: depth of environmental and sustainability education curricula in schools; promotion of resource conservation programs; incorporation of ecological design into building codes; extent of zoning regimes; popular support for environmental regulations; community outreach programs by natural resource agencies; and media coverage of sustainability-related issues. It should be noted, however, that monitoring trends in this suite of indicators will be difficult given the inherent subjectivity of what actually constitutes “awareness.” For example, the Clean Michigan Initiative overwhelmingly supported by voters in 1998 was derided by some environmental organizations as favoring urban economic interests at the expense of larger environmental needs. Nonetheless, funding from that initiative is now supporting a number of remediation projects that contribute to sustainability. In this case, it

is difficult to determine which group (i.e., voters, policy makers, non-governmental organizations) actually demonstrated a greater awareness of the issues at hand.

- Economic Vitality Measures.** Any broad-scale program to ensure a sustainable world must give due consideration to economics along with issues of ecology and society. Without a healthy economy, social and environmental policies in a democratic system are not in themselves sustainable. The broader Binational Program can be well served by our understanding the threats and opportunities to the economic health of the watershed, drawing upon extant econometric models of vitality, and communicating such patterns and trends to the public. For example, while it is arguable that those living in poverty have a lesser impact on the ecosystem due to their relatively meager capacity to participate in a consumer society, the opposite could be just as true insofar as poverty may hasten the depletion of wood lots, require the diversion of community resources that could be directed at environmental protection, and so on. Furthermore, with a baseline overview of the economy, projects can be implemented to demonstrate sustainable alliances between environmental and economic sectors in the basin. This suite of indicators includes: per capita income; cost of living; extent of poverty; local employment trends; regional trade balance; diversity of community economies; facilitation of transitional economics; value-added industry; and regional or local tax bases.

In 2000, the Binational Program hosted a workshop designed to bring together experts in the field of ecological and social assessment (report available at <http://www.epa.gov/glnpo/lakesuperior/binatmonwkshp.pdf>). Building upon the work that went into developing the EPO seven years earlier, independent analysis by members of the Lake Superior Binational Forum has added to the list of indicators a number of alternative measures while, at the same time, suggesting that some may be more valuable than others. Table 9.2 displays the decade-long evolution of the sustainability indicators now in use by the Binational Program.

**Table 9-2: Comparison of the LaMP 2000 and Forum Sustainability Indicators**

Forum Sustainability Indicators Bold indicates the most direct DSC-Forum match	LaMP 2000 “Best Bet” Indicators - Measures for Sustainability
<i>Reinvestment in the Natural Capital of the Basin</i>	
<ul style="list-style-type: none"> <li><b>Sustaining basin diversity.</b></li> <li><b>Landscape patterns.</b></li> <li><b>Reinvestment in natural capital.</b></li> <li>Political pressure to protect and remediate the environment.</li> <li>General participation in environmental programs</li> </ul>	Amount of sustainable forestry occurring on the land.
<ul style="list-style-type: none"> <li><b>Sustaining basin diversity.</b></li> <li><b>Landscape patterns.</b></li> <li><b>Reinvestment in natural capital.</b></li> <li>Improvement in water quality.</li> <li>Political pressure to protect and remediate the environment.</li> <li>General participation in environmental programs</li> </ul>	Extent of watershed management or restoration programs.

<ul style="list-style-type: none"> <li>• <b>Sustaining basin diversity.</b></li> <li>• <b>Reinvestment in natural capital.</b></li> <li>• General participation in environmental programs</li> </ul>	Native fisheries and wildlife stocking.
<ul style="list-style-type: none"> <li>• <b>Sustaining basin diversity.</b></li> <li>• Reinvestment in natural capital.</li> <li>• General participation in environmental programs</li> </ul>	Exotic species control and native plant repatriation.
<ul style="list-style-type: none"> <li>• <b>Reinvestment in natural capital.</b></li> <li>• <b>Political pressure to protect and remediate the environment.</b></li> <li>• Landscape patterns.</li> <li>• Diversity of community economies.</li> <li>• General participation in environmental programs</li> </ul>	Reclamation of mining operations and industrial sites.
<ul style="list-style-type: none"> <li>• <b>Sustaining basin diversity.</b></li> <li>• <b>Reinvestment in natural capital.</b></li> <li>• <b>Improvement in water quality.</b></li> <li>• Landscape patterns.</li> <li>• Reduced waste stream loadings.</li> <li>• Political pressure to protect and remediate the environment</li> <li>• General participation in environmental programs</li> </ul>	Replacement of wetlands and biotic diversity.

<i>“Quality of Human Life” Indexes</i>	
	Incidence of crime.
<ul style="list-style-type: none"> <li>• <b>Robustness, human flexibility, and adaptability</b></li> </ul>	Demographics of migration.
	Demands for social services.
<ul style="list-style-type: none"> <li>• <b>Energy consumption.</b></li> </ul>	Transportation infrastructure status.
<ul style="list-style-type: none"> <li>• <b>General participation in environmental programs</b></li> </ul>	Extent of recreational and cultural opportunities.
<ul style="list-style-type: none"> <li>• <b>Political pressure to protect and remediate the environment.</b></li> <li>• <b>General participation in environmental programs</b></li> </ul>	Citizen involvement in decision-making.
<ul style="list-style-type: none"> <li>• Landscape patterns.</li> </ul>	Public access to lake-shores.
<ul style="list-style-type: none"> <li>• <b>Landscape patterns.</b></li> <li>• Energy consumption.</li> </ul>	Population density.



*Resource Consumption Patterns*

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• <b>Reduced waste stream loadings.</b></li> <li>• <b>Political pressure to protect and remediate the environment.</b></li> <li>• Reinvestment in natural capital.</li> </ul>                     | Availability of recycling programs.                             |
| <ul style="list-style-type: none"> <li>• <b>Sustaining basin diversity.</b></li> <li>• <b>Regional trade balance.</b></li> <li>• <b>Diversity of community economies.</b></li> <li>• Reinvestment in natural capital.</li> </ul>         | Amount of forest and mining resources that remain in the basin. |
| <ul style="list-style-type: none"> <li>• <b>Energy consumption.</b></li> <li>• <b>Reduced waste stream loadings.</b></li> <li>• Regional trade balance.</li> </ul>   | Types and quantities of electric power generation.              |
| <ul style="list-style-type: none"> <li>• <b>Improvement in water quality.</b></li> <li>• Reinvestment in natural capital.</li> </ul>   | Quality and volume of aquifers.                                 |
| <ul style="list-style-type: none"> <li>• <b>Regional trade balance.</b></li> <li>• <b>Diversity of community economies.</b></li> </ul>   | Density of and stressors related to tourism.                    |
| <ul style="list-style-type: none"> <li>• <b>Sustaining basin diversity.</b></li> <li>• <b>Reinvestment in natural capital.</b></li> </ul>  | Depletion of wildlife and fisheries.                            |
| <ul style="list-style-type: none"> <li>• <b>Reduced waste stream loadings.</b></li> <li>• Reinvestment in natural capital.</li> </ul>  | Landfill capacity and incineration volume.                      |
| <ul style="list-style-type: none"> <li>• <b>Landscape patterns.</b></li> <li>• <b>Political pressure to protect and remediate the environment.</b></li> <li>• Reinvestment in natural capital.</li> <li>• Energy consumption.</li> </ul> | Degree of urban sprawl.   |
| <ul style="list-style-type: none"> <li>• <b>Sustaining basin diversity.</b></li> <li>• Reinvestment in natural capital.</li> </ul>   | Loss of native flora.   |

*Awareness of Capacity for Sustainability*

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• <b>Political pressure to protect and remediate the environment.</b></li> </ul>   | Depth of environmental and sustainability education curricula in schools. |
| <ul style="list-style-type: none"> <li>• <b>Political pressure to protect and remediate the environment.</b></li> <li>• Improvement in water quality.</li> <li>• Reinvestment in natural capital.</li> <li>• Energy consumption.</li> <li>• Reduced waste stream loadings.</li> </ul> | Promotion of resource conservation programs.                              |
| <ul style="list-style-type: none"> <li>• <b>Political pressure to protect and remediate the environment.</b></li> <li>• Reinvestment in natural capital.</li> </ul>   | Incorporation of ecological design into building codes.                   |

<ul style="list-style-type: none"> <li>• Energy consumption.</li> <li>• Reduced waste stream loadings.</li> <li>•</li> </ul>	
<ul style="list-style-type: none"> <li>• <b>Landscape patterns.</b></li> <li>• <b>Political pressure to protect and remediate the environment.</b></li> </ul>	Extent of zoning regimes.
<ul style="list-style-type: none"> <li>• <b>Political pressure to protect and remediate the environment.</b></li> <li>• Reinvestment in natural capital.</li> </ul>	Popular support for environmental regulations.
<ul style="list-style-type: none"> <li>• Political pressure to protect and remediate the environment.</li> </ul>	Community outreach programs by natural resource agencies.
<ul style="list-style-type: none"> <li>• <b>Political pressure to protect and remediate the environment.</b></li> </ul>	Media coverage of sustainability related issues.

<i>Economic Vitality Measures</i>	
	Per capita income.
<ul style="list-style-type: none"> <li>• Energy consumption.</li> </ul>	Cost of living.
	Extent of poverty.
<ul style="list-style-type: none"> <li>• Diversity of community economies.</li> </ul>	Diversity of community economies.
<ul style="list-style-type: none"> <li>• <b>Regional trade balance.</b></li> <li>• <b>Diversity of community economies.</b></li> </ul>	Local employment trends.
<ul style="list-style-type: none"> <li>• <b>Regional trade balance.</b></li> </ul>	Regional trade balance.
<ul style="list-style-type: none"> <li>• Regional trade balance.</li> </ul>	Facilitation of transitional economies.
<ul style="list-style-type: none"> <li>• <b>Regional trade balance.</b></li> <li>• <b>Diversity of community economies.</b></li> </ul>	Value-added industry.
<ul style="list-style-type: none"> <li>• Diversity of community economies.</li> </ul>	Regional or local tax-bases.

<i>Forum Indicators I</i>	<i>Indirect “Best Bet” Indicators</i>
<ul style="list-style-type: none"> <li>• Robustness, human flexibility, and adaptability.</li> </ul>	All of the “Reinvestment in the Natural Capital of the Basin” suite; citizen involvement in decision-making; all of the “Resource Consumption Patterns” suite; all of the “Awareness of Capacity for Sustainability” suite; extent of poverty; diversity of community economies; facilitation of transitional economies.

<ul style="list-style-type: none"> <li>• Ecological literacy.</li> </ul>	<p>All of the “Reinvestment in the Natural Capital of the Basin” suite; citizen involvement in decision-making; all of the “Resource Consumption Patterns” suite; all of the “Awareness of Capacity for Sustainability” suite; facilitation of transitional economies.</p>
<ul style="list-style-type: none"> <li>• Basin-wide sense of identity.</li> </ul>	<p>Extent of watershed management or restoration programs; extent of zoning regimes; media coverage of sustainability-related issues.</p>

<sup>1</sup> These 3 indicators, though potentially rich in information regarding the development of sustainability in the Lake Superior basin, will likely require both many different sub-measures and the expenditure of extensive resources, in order to gather reliable and valid data.

The foregoing set of “best bet” indicators for developing sustainability served as the basis for initiating two projects, each of which address the sub-objectives of education, economic relationships, incorporation of practical technology, and land-use planning.

### 9.3 CURRENT STATUS AND TRENDS IN THE BASIN

#### 9.3.1 Baseline Sustainability Indicators Project

In 2000, the Developing Sustainability Committee (DSC) reported on its baseline data for a suite of socioeconomic sustainability indicators. Although the project researchers had to rely on data generated by various agencies at sporadic intervals, this “snapshot” of human dimensions relevant to regional ecosystem management in the Lake Superior basin is instructive. Table 9.3 identifies some of the important trends found in this extensive report (available at <http://emmap.mtu.edu/gem/community/planning/lb.html>).

**Table 9-3: Representative Trends in Basin-wide Sustainability**

<p><b>Forestry</b> Michigan, Minnesota, Wisconsin, and Ontario have a number of programs to encourage sustainable forestry, and voluntary compliance with those standards seems to be working. For example, the Great Lakes Forestry Alliance reported in 1995 that timber growth in Michigan, Minnesota, and Wisconsin exceeded harvest by 90 percent and timber volume increased from about 25 billion cubic feet in 1952 to more than 50 billion cubic feet in 1992. In the United States, there are 51.5 million acres of forestland in the basin, of which 3.2 million acres are either reserved as parks and wilderness or classified as unproductive. Of the productive land, 26 million acres are nonindustrial private forests, 18 million acres are publicly owned, and forest-products companies own 4 million acres.</p> <p><b>Population &amp; Migration</b> One measure of sustainability considers the number of people the basin can contain without jeopardizing environmental infrastructure. Here the situation is more complex than it may at first appear. Although population in the U.S. portion of the basin has declined roughly 4 percent in</p>
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the past half-century, and 80 percent of the residents tend to remain in the same geographic area for lengthy periods of time.

### **Transportation**

Given the rural nature of the Lake Superior basin, transportation could have a substantial impact on sustainability. In this area, trends are in a negative direction. For example, between 1980 and 1990, the percentage of basin workers driving alone to work rose from 58 to 73 percent, while fewer carpooled or walked to work and a limited survey of traffic volumes in the Michigan part of the Basin from 1987 to 1998 shows an average 34 percent increase in traffic in regional population.

### **Recycling**

Participation in recycling programs is much higher and materials recovery greater in Minnesota and Wisconsin, where statewide programs are well-developed and certain materials are banned from landfill disposal. Large areas of the Michigan part of the Lake Superior Basin have no recycling programs at all, and very little information is available on Ontario programs. Consequently, the total post-consumer waste disposed by landfill or incinerator appears to exceed 2 million cubic yards per year.

### **Energy Production**

About 87 percent of the electric power generated in the Basin comes from generators using coal, natural gas, fuel oil, or wood waste. Total power generated in the U.S. part of the Basin increased 47 percent between 1985 and 1995. More than half of basin-wide water usage supports energy production. The amount of power purchased from outside the basin has also increased. From this we can conclude that basin residents are consuming nonrenewable resources at an increased rate. Prudent conservation practices could likely reduce this consumption rate.

### **Economy**

“Economic Vitality” is one of the best-represented indicators in the Developing Sustainability Committee (DSC) report, and represents a central element in assessing forces that compel people to live in an unsustainable manner. Median family and household incomes within the U.S. Lake Superior Basin were below the national and Michigan, Minnesota, and Wisconsin medians in 1979 and 1989 but were improving somewhat by 1993. The poverty rate for all persons, families, and children increased faster in the U.S. portion of the basin between 1979 and 1989 than in the U.S. overall during that period. Seven industries (non-durable goods manufacturing, durable goods manufacturing, retail trade, mining, transportation and public utilities, federal civilian government, and construction) were among the top three industries in six or fewer counties each, suggesting an increase in economic diversity leading to more sustainable communities.

More recently, the DSC has partnered with Michigan Technological University to expand the baseline indicators project so as to develop land-use indicators. In light of the political ramifications of developing sustainability, and in conjunction with the State of the Lakes Ecosystem Conference (SOLEC) process, this research (funded by a grant from the Great Lakes National Programs Office) investigated the extent of local land-use planning structures and existing links between citizen groups and governments, both of which were shown to be

fragmented and sporadic (see <http://emmap.mtu.edu/gem/community/planning/solec.html>).

### 9.3.2 Survey of Community Decision Makers

In 1997, at the request of those who manage “protected areas” (i.e., public parks and preserves) in the Lake Superior basin, the Binational Program co-sponsored an extensive survey of community decision makers in the region (for the full, peer-reviewed report, see *Natural Resources Journal*, volume 40 – number 1, pages 19 – 46). Based on the assumption that “core” protected areas in the region serve as a primary focus for ecosystem management practices, and that their existence contributes significantly to the social and economic well-being of basin residents, business and industrial leaders, educators, media managers and governmental representatives reported their perceptions regarding the relationship between protected areas in the basin and sustainable development. Research objectives included the production of a representative profile of basin decision makers’ knowledge of and attitudes regarding the role of protected areas in the respondents’ social and economic spheres.

The results of this study indicate that, in general, respondents from Canadian communities showed more positive attitudes toward the role of protected areas, as well as a more unified perception of issues, than respondents from the United States. Most community leaders seemed to have a good general knowledge of the natural areas near where they live and held a favorable opinion of government management of protected areas, while rejecting the idea that private enterprise could accomplish the task as well. Also, it is evident from the results of the survey that the majority of community leaders believed that the inherent ecological values of protected areas may be compromised by private enterprise and that it would be difficult for entrepreneurs not to be biased by profit margins at the expense of protected areas’ values. However, although respondents demonstrated a positive perception of protected areas and their relationship to sustainability across the basin, a large portion of the community leaders believed that existing parks and refuges should allow for more development and resource extraction and either rejected or were unsure about the desirability of creating more protected areas in the region. Despite the fact that most respondents believed that protected areas should include portions of Lake Superior itself, they seemed to be less sure of the role of aquatic protections in their own backyard. It is probable that most basin residents are unfamiliar with what aquatic protections involve, what restrictions may be implemented, and the environmental, social, and economic benefits that may evolve from such a designation.

Community leaders generally perceived protected areas as contributing to their communities in relation to the tangible benefits that accompany fostering sustainable development. Yet they exhibited less favorable attitudes towards preservation of protected areas in their own vicinity than in general. For instance, respondents were less opposed to resource extraction in local protected areas; were less accepting of restrictions being placed on local protected areas; had a slightly less favorable view of the economic burdens posed by nearby protected areas; and were less agreeable to preserving aquatic regions near their communities. This response pattern suggests that community leaders are perhaps less accepting of environmental policies when they perceive local economic growth and job opportunities to be at risk. Hence, this study provides

evidence in support of the idea that citizen' attitudes toward natural resource policies and protected areas are grounded in local, rather than regional, national or global concerns over economic viability and lifestyle choice.

This study suggests that basin residents are generally ambivalent toward the prospect of protected areas or sustainable development in the region. People understand that protected areas are important but lack sufficient information about the general range of benefits afforded by parks and preserves. Hence, information campaigns about the benefits of preserving natural lands are needed to better inform debates about natural resource policy

### **9.3.3 Summary of Status and Trends**

Given the relative paucity of baseline data we have accumulated thus far (especially that of Canadian origin), it is somewhat premature to draw general conclusions regarding the status and prospect for basin-wide sustainability in the Lake Superior region. Such will require the generation and analysis of data over time, as well as a careful cross-referencing of information. Furthermore, since much of our data deals with mostly economic concerns, we should be wary of unduly emphasizing economic sustainability over social and environmental components in the sustainability triad. And it may be significant that much of the data does not account for economic and social changes that have accompanied the general economic upswing of the late 1990s. Nonetheless, even at this early date we can make a number of observations regarding opportunities for education, general understandings of economic relationships, incorporation of practical technology, and wise land-use planning that may be tested as information comes to augment the research reported above. For example:

- Although the high educational background of basin residents and environmental education efforts seems to be cultivating pro-sustainability understandings and values, the relative impoverishment of the region may further encourage continued inefficient consumption of watershed resources (e.g., previously undisturbed countryside). To compensate for such consumptive drives, we must find ways to enhance the regional economy in ways that balance social and environmental needs.
- The relatively lower cost of living in the region (e.g., housing costs), combined with a seemingly higher quality of life (e.g., low commuting times and crime rates), may attract more immigrants to the region, thereby placing greater stress upon natural and social systems to the detriment of sustainability. Consequently, land use patterns are impacted by newcomers' inclinations to develop home sites and services beyond the existing suburban fringe, thereby reducing the amount of agricultural, forestry and recreational lands.
- As urban populations decline, and more people move into undeveloped countryside, greater pressure will be placed on transportation and service infrastructures; with rising levels of poverty and lowered tax-bases, less effort may be directed at conservation-oriented measures such as mass transit and the use of environmentally benign energy sources. Thus, it is imperative that innovative technologies be adopted to offset citizens' tendencies to live for the present and forget about the future.

- As with elsewhere in Canada and the United States, the general population of the Lake Superior basin is aging. It will be important to further enfranchise (e.g., through continuing education and media outreach) this aging population in the collective process of promoting sustainability.

## 9.4 STRATEGIES FOR FUTURE INITIATIVES

### 9.4.1 “Gauges” and “Levers” to Promote Basin-wide Sustainability

With the release of LaMP 2000, the Lake Superior Binational Program began implementing a range of projects designed to further promote sustainability in the basin. As noted earlier, the actual implementation of projects will not be an easy task. Any project that monitors or improves the ability of citizens to manage their lifestyles in a sustainable manner must integrate complex data, work within the political context, and demonstrate measurable results.

Furthermore, insofar as the projects we envision should encompass a wider field of action than typically associated with specific habitat or pollution remediation or protection projects, the monetary cost of the initiative will be significant. And, without much doubt, we can anticipate that any strategy for change will require a sizable investment in effort from government agencies, regional industries, and citizens in the basin. Consequently, the “commitments” we continue to make must be considered in light of the resources that may or may not become available to support the program.

In the following sections of this chapter we outline a series of projects that we believe can be initiated in the near future. The strategy we have adopted proceeds along two tracks and has been adapted from a framework used by BioForest Technologies Inc. of Sault Ste. Marie, Ontario to develop forest management plans in Canada and the United States. On the one hand, some of the projects are directed at measuring indicators that should be considered gauges of sustainability in the region. Here, the primary focus is upon assessing the extent to which we are moving toward or away from sustainable lifestyles. On the other hand, other projects mostly deal with levers, or attempts to influence and change behavior so as to better promote sustainability. The intent here is to engage citizens in a proactive discussion of the issues at hand, and to encourage sustainable behavior while respecting the variety of viewpoints and values that citizens bring to the discussion. It should be noted that such gauges and levers are not wholly independent of one another; gauging where we are helps leverage projects that modify social conditions, which in turn must be continually monitored. For example, the previously discussed Baseline Sustainability Indicators project provides information that will help guide funding proposals for projects designed to improve conditions on the ground. The questions addressed by this project include:

- To what extent is economic planning compatible with forecasted market demand for products and services? For example, is a shift from an economy based on mining to one based on ecotourism economically feasible?

- To what extent does a change in demographic characteristics (e.g., the flight of younger generations in search of economic opportunities, the growth in a “second home” real estate market) affect the consumption of natural and social resources?
- To what extent do emerging sustainable forestry practices, in comparison with more intensively extractive approaches, maintain the natural capital of the Lake Superior basin?
- To what extent does the current configuration of community economies in the watershed allow for the long-term viability of resource policies?
- To what extent are current efforts to conserve energy and resources reducing the amount of “waste” being discharged into the basin ecosystem?

#### **9.4.2 Promoting Sustainability through Partnerships**

It is also important to recognize that the “developing sustainability” component of the LaMP is complemented by the work of other committees in the Binational Program. In a number of cases, the sorts of measures comprising our suite of “best bet” indicators are being monitored and acted upon by other groups. In reviewing the strategies being adopted by other Lake Superior Work Group committees at a monitoring workshop held in 1999, it became apparent that there is an appropriate degree of overlap between thematic emphases in the LaMP: the Habitat Committee is assessing the amount of watershed management and restoration occurring in the basin, wetland replacement rates, lakeshore access, and the growth of urban sprawl; the Aquatics Committee is reviewing the status of native fisheries, wetland fauna, and the quality and volume of aquifers in the region; the Terrestrial Wildlife Committee also focuses on riparian restoration, wildlife depletion and stocking, and the status of native flora and fauna. And, to a varying extent, each committee also includes an education component. We anticipate that substantial efficiencies in time, effort, and money for specific “gauge” or “lever”-oriented projects will be realized by meshing our sustainability initiatives with those of other committees.

#### **9.5 NEXT STEPS**

The Lake Superior Work Group continues to implement a range of ecosystem-based projects. As with the work of other committees, the Developing Sustainability Committee is also forging ahead with its sustainability initiative. The following section briefly outlines the areas of concentration.



### **9.5.1 “Gauges” to Promote Basin-wide Sustainability**

The following projects are primarily aimed at monitoring the extent to which principles of sustainability are understood and incorporated into the actions of a major industrial sector in the basin, the lives of common citizens in the watershed, and educational systems that surround Lake Superior. In addition, each gauge-oriented project points to the types of levers we may wish to pursue if we find a significant disparity between the ideals of sustainability and what is actually happening on the ground.

#### **9.5.1.1 Community Awareness Review and Development Project (CARD)**

The drive toward sustainability must be grounded in the actions of local communities but most citizens in the basin have limited understanding of long-term sustainability. There have been some notable attempts to cultivate sustainability awareness in the basin, such as the “sector” workshops hosted by the Lake Superior Forum dealing with issues such as mining, forestry, and sustainability in general. Additionally, collaborations such as the “Thunder Bay 2002” group generated interest in sustainability within specific communities. The CARD project is more comprehensive.

The project, initiated in 2003, will formally survey residents of the basin as well as initiate person-to-person dialogue regarding sustainability issues with the following objectives:

- i) to determine the state of knowledge and awareness of the residents of thirteen communities around Lake Superior of sustainability and environmental issues of interest to the LaMP, and identify areas for improvement;
- ii) to increase knowledge and awareness, especially as it relates to local issues, e.g., burn barrels, habitat protection; and
- iii) to foster improved decision-making that integrates social, economic, and environmental considerations.

The CARD has a three-phase, multi-year approach targeting thirteen basin communities: Thunder Bay, Marathon, Wawa, and Sault Ste. Marie (ON); Duluth, Two Harbors, and Grand Marais (MN); Newberry, Marquette, Houghton, and Ironwood (MI); Ashland and Superior (WI).

In Phase I, interviews and surveys will be conducted in these communities to assess residents’ knowledge of sustainability and the opportunities it provides, as well as other issues of concern, and how environmental considerations affect their behaviour and decision-making. In Phase II, this information will be used to direct outreach activities to various segments of these communities, such as business, county and municipal governments, and civic groups. In Phase III, the effectiveness of these outreach campaigns would be evaluated. The year-to-year activities of the project will be dependent upon the availability of funding.

The Developing Sustainability Committee is leading the Community Awareness Review and Development project with active involvement by the other committees. The results of this project will assist the four committees in accomplishing their objectives more effectively.

### **9.5.1.2 Lake Superior Stewardship/Leadership School Project**

The aim of the project is to develop local leadership skills among youth and adults in the context of Lake Superior basin issues using sustainability as the overarching theme. A pilot project began in 2003 with funding to University of Wisconsin – Extension by the Wisconsin Coastal Management Program. Pilot leadership school programs will be held during the summer of 2004 for youth and adults with an emphasis on experiential learning. The Sigurd Olson Environmental Institute at Northland College and University of Wisconsin Extension will sponsor the second year of the project. The second year will include an expansion of the youth program and a web-based curriculum supporting the needs of the Binational Program. The ultimate goal is to expand the program from the Wisconsin part of the basin to the rest of the Lake Superior basin.

The Lake Superior Stewardship Project is one of the joint projects between the Binational Program Superior Work Group and the Forum. Several agencies and organizations are participating with this project.

### **9.5.1.3 Sustainable Forestry Practices Inventory**

The overwhelming majority of the land-base in the Lake Superior basin consists of “working” forests administered by public agencies and private organizations. Currently, a range of sustainable forestry practices have been instituted on these lands: the Ontario Ministry of Natural Resources follows “adaptive management” practices on Crown Land, the Canadian Standards Association promotes forest-product guidelines, U.S. companies typically adopt Sustainable Forestry Initiative criteria or self-imposed targets through the International Standard of Operation process, State lands have begun to standardize their practices, and the USDA National Forest Service has its own regimes. However, we do not have a compendium of (among other issues) the scope, structure, administrative guidelines, yields, or efforts to coordinate with adjacent local and regional management practices. Such baseline data would be useful in projecting trends in the reinvestment in natural capital pertaining to basin flora, suggesting avenues for educational outreach, and assessing the projected economic vitality of the watershed. Thus, this project consists of comparing and contrasting sustainable forestry practices in the basin (including harvesting and resource modification) and establishing a system by which the processes can be periodically assessed in light of basin-wide sustainability of forest resources, including those beyond a historical emphasis on fiber production.

One outgrowth of developing an inventory of sustainable forestry practices may be an eventual partnering with government and industry to maximize sustainable yields while protecting the larger ecosystem and serving residents of the basin well into the future. For example, the Ottawa National Forest has already committed itself to developing and refining local forest unit criteria and indicators for sustainable forestry. The project goal is to identify and test the conditions that are necessary to sustain ecological, economic, and social systems, and the measures needed to assess how forest management is influencing sustainability at the local level. The ultimate utility of this effort will be to provide forest managers and partners with feedback that can be used to monitor and improve forest management planning. Such will include discussions with U.S.

Forest Service staff and local stakeholders associated with each forest unit. Five other National Forests are now developing similar indicators nation-wide.

Eventually, the USDA Forest Service hopes to implement the use of local unit criteria and indicators on forest land units over a three-year period to demonstrate the practicality and value of forest monitoring systems focused on sustainability. This effort will involve applying the criteria through on-the-ground monitoring and, thereby, evaluating sustainability to improve forest management. The effectiveness and efficiency (i.e., costs) associated with implementing this scheme could then be evaluated for broader application within the Lake Superior basin.

Alternatively, a number of local economic development organizations, such as Northern Initiatives in the central Upper Peninsula of Michigan, have previously sought public funding to examine and improve upon the “Best Management Practices” of small forest contractors who work in the woods for government agencies and private industry. It may be possible to partner with such organizations so as to improve their chances of obtaining grants aimed at securing the sustainability of timber industries while protecting the larger resources provided by the forests in the basin.

#### **9.5.1.4      Reviewing the Status of Sustainability Education**

The best opportunity to promote sustainability is to educate young people about the environment and our relationship to it. Unfortunately, previous nation-wide studies of environmental curricula suggest that, although today’s students know a lot more about the environment than their predecessors, such knowledge is often fragmented. Certainly, a lot of education occurs in the informal settings of family and community life but, if we want to optimize the use of our financial resources, we should focus on what gets taught in primary and secondary schools. Hence, the intent of this project is to gain a better picture of the extent to which sustainability principles are currently being incorporated into environmental education programs in the basin. This project will collect information from educational centers (e.g., the Lake Superior Center, Wolf Ridge Environmental Learning Center), Offices of Environmental Assistance, and as many schools and science teachers as possible within the region regarding what is being taught at present. Based on this information, programs can be compared and evaluated with an eye toward determining if existing programs are equipping citizens with the information and understanding that they need to make informed choices about lifestyle issues that affect sustainability. Appropriate reports will be drafted and disseminated across the study area.

To promote the goals of the Binational Program, we believe that an assessment of what is currently being taught about sustainability will allow us to provide teachers with an integrated package of educational resources tied to the sustainability theme. There are a variety of ways we will proceed to leverage enriched educational opportunities in our schools. The U.S. Department of Education, the President’s Council on Sustainability, and various State agencies have developed compendia of environmental education programs focusing on the sustainability issue that can be given a Lake Superior “spin” and shared with teachers in the basin through partnership agreements. Such will involve assembling a relatively digestible educational program dealing with sustainability issues (stratified for various educational levels), perhaps even

linked to annual events (e.g., Earth Day, Arbor Day), to be sent to educators in the watershed. Additionally, through a variety of means (e.g., a dedicated page on the Binational Program's web site), we will also alert teachers to more specific sources of information (e.g., elements of environmental design, regional land-use planning) housed at the Federal, Provincial, and/or State level.

In concert with more formal educational venues, the Lake Superior Binational Forum has successfully developed a number of initiatives to enhance awareness among citizens in the basin to the importance of the Lake Superior Binational Program. Additional areas of interest include regional consumption habits, the import/export and life-cycle of commodities, ways in which local industries are adopting innovative practices, and awareness about the connection between consumption and the exploitation of resources and humans in other parts of the world in order to satisfy local needs. These education programs also aim to enhance awareness about the connection between consumption and the exploitation of resources and humans in other parts of the world in order to satisfy local needs.

## **9.5.2 “Levers” to Promote Basin-wide Sustainability**

The following three projects are intended to act as levers for changing the status of sustainability in the Lake Superior basin. Specifically, they will focus on improving stakeholders' understandings of sustainable economics, the management of water resources, and the marketing of conservation programs. In a number of ways, each complements the wide range of community-based programs already underway throughout the watershed that have not been initiated by the Binational Program (e.g., the Sturgeon/Otter and Chocolay watershed projects in Michigan). In addition, each lever-oriented project includes a monitoring component, which allows us to gauge the effectiveness of our attempts to alter lifestyles and business practices.

### **9.5.2.1 Communicating Economic Values and Teaching the Value of Economic Instruments**

This project focuses on two separate dimensions. First, we will identify and assess the utility of specific “economic instruments” (e.g., user fees, pollution charges, permit trading programs, performance bonds) applicable to various business sectors located in the Lake Superior basin. Market-based mechanisms and other incentives for environmental management have been touted at all levels of government as offering opportunities to encourage resource protection and conservation. However, their utility may be different in a northern watershed like the Lake Superior basin than in other regions of Canada and the United States. Consequently, some effort is required to identify which specific tools might have applicability in the Lake Superior LaMP, and to share this information with basin residents. Second, we want to demonstrate and publicize the economic importance of natural resource systems in the basin for resource decision-making. Some effort has been expended over the last decade to “monetize” the value of Great Lakes basin resources (e.g., wetlands, fisheries, water supply, and biodiversity). This portion of the project will generate approximations of the economic value of resources in the Lake Superior ecosystem. Based on existing literature, we will compile current monetary estimates of Great Lakes ecosystem values, and then extrapolate those values to the Lake Superior basin. Along

with information regarding various economic instruments, these estimates will be disseminated to industry and civic decision-makers by way of sector-specific direct mailings. Emphasis will be placed upon demonstrating the relationship between values for Lake Superior basin resources, their management via market-based incentives for conservation and pollution protection, and the long-term sustainability of regional economies.

To evaluate the worth of this project, we will survey stakeholders in the basin after they have received information concerning economic values and instruments. We will probe whether businesses and local governments change the way they manage revenue streams and profit margins based on the information we provide. By collaborating with organizations such as the Upper Lakes Environmental Resource Network (ULERN) in Canada and the U.S. EPA Office of Policy and Innovation, we should be able to tailor subsequent approaches to encouraging changes in stakeholders' reinvestment in natural capital and the use of advanced technology to support an environmentally benign economy in the region.

### **9.5.2.2 Promoting Water Conservation**

Efficient water use is an important component of sustainability. This project builds on the work of Thunder Bay 2002 (now EcoSuperior) and the City of Thunder Bay by continuing to expand on a number of local initiatives. These include the toilet replacement rebate program, which provides \$125 towards the purchase of an ultra low flush toilet in residential, commercial and institutional buildings, and water audits that involve on-site assessments and recommendations for reducing water use (in addition to energy and solid waste use) in all sectors. These programs, in addition to the existing "downspout disconnection" program and the rain barrel promotion, which offers rain barrels to encourage the reuse of rainwater from rooftops, provides the elements of a comprehensive water conservation program. Newsletters, fact sheets and brochures will be disseminated to encourage local and adjacent communities to adopt water efficient practices.

Program effectiveness will be gauged by indicators such as the number of water audits completed, the number of replaced and/or retrofitted water-using fixtures, the adoption downspout disconnections and rain barrel installations, augmented where possible by actual water and energy bill savings. Ultimately, the main indicator of progress will be the reduction in municipal water pumpage and use, recognizing that many different factors affect total water pumpage. This project involves collaboration with a number of agencies, businesses, groups and funding organizations. Dissemination of the Thunder Bay experience to the remainder of the Lake Superior basin is a fundamental element of this project.

A related initiative focuses on the importance of developing and implementing pollution prevention planning and procedures in the pulp and paper sector. Water and energy are used in large quantities in this industry. The Cascade Fine Papers (formerly Provincial Papers) mill in Thunder Bay has expressed interest in partnering with EcoSuperior to develop efficiencies related to water and energy use at the mill. This project will examine core mill processes to identify operations where water and energy efficiencies could be most successfully implemented.

This would be followed by implementation of those measures determined to be practically and economically feasible. Successes would be disseminated to other mills.

### **9.5.2.3 Marketing Waste Reduction and Energy Efficiency**

A major component of advancing sustainability in the Lake Superior basin involves explaining pollution prevention measures to those located in the watershed. Currently, a wide array of state, federal, and provincial initiatives has been established to assist the private sector in reducing waste and conserving energy. Occasionally, agencies participating in the Binational Program and the Lake Superior Forum have hosted workshops dealing with waste reduction and energy efficiency. The programs sponsored by federal (e.g., U.S. EPA's ENERGY STAR program) and state agencies (e.g., Michigan's Business Pollution Prevention Partnership sponsored by the Department of Environmental Quality) most likely find their greatest marketability in areas of heavy industry and metropolitan populations that are quite unlike the Lake Superior catchment.

Large industries in the basin likely understand the range of assistance that is open to them, given their compliance with governmental regulations or the institutionalization of accrediting regimes (e.g., the ISO process).

The key to successful pollution prevention, especially among small businesses, is a community-based approach. WLSSD, EcoSuperior, Superior WI and many other communities have been successful in pollution prevention because local community staff work with businesses and public facilities.

### **9.5.2.4 Co-Host Sustainability Forums**

In addition to the community awareness review and development project described above, a number of other general or sector-specific sustainability workshops could be hosted in partnership with local organizations or Public Advisory Committees tied to Remedial Action Plans for formally designated "Areas of Concern" in the basin. In this case, the focus of the workshops would be adapted to each location. Some workshops would deal with fairly tangible issues such as managing urban encroachment, storm water permitting requirements, or (in cooperation with established U.S. EPA Superfund plans) to discuss the potential for including habitat restoration as part of site remediation efforts. Other forums might focus on more abstract concerns. For example, research suggests that forested areas in the Lake Superior basin do not represent significant or salient components in citizens' descriptions of where they live, what activities they engage in, and what their preferences are for valued lifestyles. If this is generally the case, it is important to alter perceptions so as to enfranchise the public in the process of demanding that forestry practices adopt the principles of sustainability. By drawing upon the community leaders and local expertise found in various basin communities, such forums will help to generate further ownership in the broader program of the LaMP. Finally, within the partnerships constituting the Lake Superior Binational Program, groups of citizens in the basin are also interested in evaluating actions taken by industries and communities to achieve sustainability. Essentially, this approach to measuring progress uses a "Report Card" format to identify achievements and areas in which progress is lacking.

### **9.5.2.5 Engage Media Campaigns for Public Outreach**

As most of us recognize, the general public remains unaware not only of the Binational Program, but also of the concept of “sustainability.” Thus, a primary objective is to increase public awareness of (a) what sustainability means in the context of basin life, (b) how individuals and communities can contribute to the overall goal of sustaining a valued quality of life in the watershed, and (c) ways the Developing Sustainability Committee can facilitate long-term sustainability. Of course, it is a marketing challenge to communicate a simple, unified message that embraces the ecological, social, and economic dimensions inherent in the concept of sustainability. In some respects, what is called for is akin to a “50 Things You Can Do To Sustain the Basin” communication campaign patterned after a brochure now being distributed by the Lake Superior Forum.

The public-at-large holds the key to sustainability, rather than the governments. The Binational Forum has argued that the general public has the responsibility to seek a standard of living that fully integrates conservation practices, to accept that the true cost of material consumption must include the replacement or loss of resources and the management of pollution, and to recognize that tax policies should take into account differences between resource conservers and consumers.

A variety of media can be employed to hasten changes such as those suggested above. Initially, we may produce a brochure featuring the Binational Program’s Vision Statement, a simple definition of sustainability, easily accomplished suggestions for behavior, and references for further information. This brochure would be made available to the public at a variety of venues around the basin (e.g., visitor centers, service-oriented businesses, government offices). Follow-up projects would include the use of alternative media focusing on the same basic themes, perhaps patterned after the public involvement strategies being adopted for publicizing LaMP 2000 after its release.

### **9.5.2.6 Building Community Capacity**

There is increasing evidence that grassroots initiatives are at the heart of successful gains in sustainable development. For example, consider the role of communities in the creation of “new wealth” through self-reliance. New wealth is created when an economy can produce more using the same or fewer amounts of energy and the same or a fewer number of resources - stretching existing resources further through conservation and recycling. In this way, economic growth is tied to ecological sustainability. Communities can also play a critical role in land-use planning, import replacement and maximizing the multiplier effect of economic and social initiatives.

In the coming years it will be imperative that we continue to enhance the ability of communities to live sustainably on a day-to-day basis. For example, we hope to work with U.S. EPA regarding current Superfund commitments to enhance local capacity for responding to emergencies, preventing further releases of toxic materials into the basin ecosystem, and providing outreach and education on “brownfields” redevelopment to local land use planners and

decision makers. Not only will such initiatives reduce the need to secure broad-scale funding through the Binational Program, but they will also cultivate local autonomy.

We believe that one of the most efficient mechanisms for building community capacity will come through the widespread accessing of the Binational Program's web page or e-mail list serves such as the "Sustainable Communities Network" (e-mail: [mnsn@mr.net](mailto:mnsn@mr.net)). Thus, we hope to highlight local success stories on the Binational Program's site that can be emulated by others around the basin, as well as orient the broader public to selected sources on the world-wide web that focus on rural sustainable development. As an illustration, the following two web sites may be of particular use:

- "Online National Library for the Environment" (<http://www.cnie.org>), managed by the Committee for the National Institute for the Environment.
- "Sustainable Development - ONLINE" (<http://susdev.eurofound.ie>), managed by the European Foundation for the Improvement of Living and Working Conditions (contains more than 300 sites, including excellent examples of initiatives from Finland).

In addition, a variety of other sites may provide citizens with the resources necessary to change lifestyles and promote sustainability in the Lake Superior basin:

- Corporations and Sustainable Development (<http://www.betterworld.com>)
- Center of Excellence for Sustainable Development (<http://www.sustainable.doe.gov>)
- The Citizens Network for Sustainable Development (<http://www.citnet.org>)
- Smart Growth Network (<http://www.sustainable.org>)
- Communities by Choice (<http://www.communities-by-choice.org>)
- Sustainable America (<http://www.sustainableamerica.org>)
- Sustainable Development Information System (<http://www.sdinfo.gc.ca/SDinfo/en/default.htm>)
- International Institute for Sustainable Development (<http://iisd.ca>)
- Canadian Sustainability Report (<http://www.sustreport.org>)
- State of the Lakes Ecosystem Conference (SOLEC) sustainability indicators (<http://www.epa.gov/gindicator> or <http://www.cciw.ca/solec/>)
- Minnesota's Interactive Directory of Environmental Education Resources (<http://www.seek.state.mn.us/>)
- New Road Map Foundation (<http://www.newroadmap.org>)
- Simple Living Network (<http://www.simpleliving.net>)
- Hennepin County (MN) Indicators of Community Sustainability (<http://www.co.hennepin.mn.us/opd/opd.htm>)
- Fostering Sustainable Behavior (<http://www.cbsm.com>)
- Minnesota Sustainable Development Initiative (<http://www.mnplan.state.mn.us/SDI/index.html>)
- World Resources Institute (<http://www.wri.org>)



### 9.5.3 Promoting Sustainability through Partnerships

Recognizing that partnerships with other programs could improve funding opportunities, there are a number of new sustainability projects on the horizon. For example:

- The Natural Resources Research Institute at the University of Minnesota - Duluth has determined that as much as 80 percent of the phosphorus loadings in basin watersheds can be attributed to road runoff, consisting mostly of fertilizer leaching from the maintenance of lawns. With the establishment of new zoning regulations and the installation of municipal sewer systems (driven by developers servicing in-basin migrants and the growth in vacation homes), more pressure will be exerted on the ecosystem by a reduction in buffers around riparian areas. To compensate for the potential threat of additional phosphorus loadings to the system, we want to promote the voluntary use of hardy native groundcovers that require little fertilization. To this end, The Central Lake Superior Land Conservancy has secured a Grant from the Great Lakes National Programs Office to establish demonstration sites for the use of conservation easements and native flora as riparian buffers.
- Across the Great Lakes basin, several existing or planned monitoring regimes address sustainability. For example, the SOLEC process has developed an indicator to assess land-use and stewardship based on an integrated collection of targets and indicators. The Great Lakes Protocol Workgroup of U.S. EPA has sought to establish consensus among the lake states for assessing the quality and quantity of drinking water sources in the region. Furthermore, the Terrestrial Wildlife Committee of the Lake Superior Work Group has suggested incorporating aspects of the Montreal Process and local land unit indicators for sustainable development. It will be useful to compare and standardize these indicators to optimize the use of agency resources directed at the sustainability initiative since, to date, we have attacked the problem only in a piecemeal fashion (e.g., as was attempted in 1998 when the SOLEC and EPO indicators were compared).
- Urban sprawl is one of the major contributors to the loss of biodiversity. Although urban sprawl is not as prevalent in the Lake Superior basin as elsewhere, cities such as Duluth, Marquette, and Thunder Bay have begun fragment in their hinterlands; as residents relocate in “fringe” areas, services follow, contributing to increases in energy consumption, erosion caused by run off from impervious surfaces, and habitat destruction. Currently, we know little about what prompts people to move out of cities or how to convince citizens that denser populations are in their long-term best interests. To complement existing efforts to control urban sprawl (e.g., the development of “Smart Growth” criteria for urban expansion being promulgated in Minnesota), we have partnered with the U.S.D.A. Forest Service’s North Central Experiment Forest Station to suggest avenues for persuading those living in the basin to remain closer to urban settings. Recently conducted studies suggest that residents’ desires to locate in the urban fringe or rural areas of the basin are born of economic conditions followed by a desire for the penetration of municipal services into previously unfragmented countryside.

- In recent years there has been a substantial growth in the number of watershed management projects in the basin. Most of the time, these programs focus on water quality, aquatic habitat restoration, and sedimentation reduction. Occasionally, a number of existing and emerging watershed projects have banded together and have secured funding to address broader issues associated with sustainability (e.g., the Central Lake Superior Watershed Partnership). The Developing Sustainability Committee may wish to craft a compendium of such watershed management programs, demonstrate how various programs can work within an evolving regulatory context (e.g., the National Pollution Discharge System will soon be requiring that best management practices be adopted to control storm water drainage), and encourage the systematic modification of existing programs in light of sustainability principles. For example, some have suggested that we investigate the possibility of providing municipalities with financial assistance (from either state or federal sources) so as to purchase, rehabilitate, and further protect degraded sections of urban watercourses. Additionally, there are several watersheds in the basin (most notably on the North Shore of Lake Superior) that, due to their remoteness and relative lack of adjacent development, do not currently have citizens cooperating to restore and preserve the resource. This project might also attempt to cultivate awareness among citizens in those watersheds of the benefits of watershed management plans.
- Some members of the Lake Superior Binational Forum have advocated an ambitious option for both safeguarding water quality and furthering economic productivity in the basin that embodies the practices of industrial ecology, full cost accounting and life cycle analysis, and a commitment to the virtual elimination of bioaccumulative toxins. The proposal is twofold: First, to create a project and investment fund to finance “green” industrial and business start-ups in the basin. Such could, over time, have a substantial impact on economic development in the basin while promoting the practical use of sustainable technology. Second, an attempt would be made in Canada and the United States to create two “Eco-Industrial Parks,” perhaps in a partnership with Cornell University’s “Work and the Environment” initiative. A number of attractive possibilities are presented by this emphasis including the use of existing brownfield locations and “renaissance zones,” establishing co-generation relationships with the relevant local utilities, extensive recycling and reuse of waste, reliance on local employees, and sustainable contributions to local economic infrastructures. In either case, the Developing Sustainability Committee could be drawn upon to help the Forum in slowly developing guidelines for assisting communities in search of “greener” economies.