Leading With Science: The Thirst for Knowledge & Leverage

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Introduction & Problem Statement

The Nature Conservancy's 2015 Goal, to work with others to conserve 10% of every major habitat type on Earth, is unprecedented in its scale and ambition. This bold goal is not achievable without a strong science foundation to guide our actions.

The Conservancy prides itself on being a science-based organization. Indeed, members have identified TNC's science-based approach as the most appealing attribute of the organization. So what does it mean to be science based? Science guides the Conservancy's work in three important ways:

1. First, science helps the Conservancy decide where we work and what we are trying to accomplish.
2. Second, science guides our strategies and management actions by identifying critical threatening processes and developing management and restoration tools.
3. Finally, science can help us answer the questions of: "Are we being successful?" and, "How can we be more effective at achieving our conservation goals?"

The Conservancy needs an integrated approach to science issues that currently influence our core business. Within the Great Lakes Basin, the Conservancy's science expertise is extensive, however, across the Great Lakes Basin, the Conservancy has yet to establish a comprehensive set of conservation science research priorities.

In this paper, and subsequent presentation, we identify the core strategic science issues that are impeding effective conservation action in the Great Lakes basin. Sound science should inform and instigate conservation practices, but too often the lack of science is used to delay management interventions especially where uncertainty exists.

We identify the science issues that are common to a range of portfolio sites and geographies, and where a lack of knowledge, tools or effectiveness measures is preventing the Conservancy from implementing effective biodiversity conservation and obtaining its goal of protecting 10% of all major habitats.

These are issues that require the Conservancy to assume an active role in ensuring that appropriate investigations are undertaken to inform management interventions. The job of Conservancy science is to inform our conservation actions with the best possible scientific information.

Conservation: *Current Situation*

Within the Great Lakes basin, the Conservancy's science work has been highly diverse, with effective examples in local areas as well as basin-wide research efforts. These efforts must continue.

However, with the realization that truly effective conservation for the Great Lakes Basin must be approached at ever increasing spatial scales, we must further augment and strengthen this work collectively across the region. Initial efforts, including a multi-operating unit alignment around aquatic issues (2006) and the formation of individual Lake Basin Teams (2007), have led to the development of joint research and planning efforts. Such efforts, combined with ongoing work, suggest we are well on our way to a comprehensive science strategy that addresses the myriad information gaps at appropriate spatial and temporal scales.

Conservation: *Vision*

The Conservancy's science leadership within the Great Lakes basin envisions a suite of core strategies supporting a broader science-based approach to conservation. These strategies are focused on conservation at spatial and temporal scales meaningful for impact across the basin.

Each of these strategies will utilize the expertise of existing staff as well as leading university and other science and conservation partners. Each strategy will require new skills and approaches that push the limits of current knowledge. However, every one of these strategies is within our grasp – and if we can succeed in these core areas, we can transform conservation from a minor issue that is rarely on the minds of Great Lakes basin leaders to a core platform about the natural world for ourselves and future generations.

Key Science Strategies

1. Identifying and Investing in a Coordinated Great Lakes Research Agenda.

The key to effective conservation within the Great Lakes basin requires an understanding of the important species, systems, and processes that contribute to the biological diversity of the basin, as well as the major stressors that threaten these features. While the Conservancy has effectively addressed many of these factors over the past several decades, our interest in the full range of biological diversity necessitates that we further expand our work to include systems and processes from our forests and grasslands to the open lake basins.

As such, the Conservancy's science leadership within the Great Lakes basin is currently engaged in the process of establishing the core conservation science strategies that will be pursued over the coming decade. Chief among these are the following:

Climate Change: *Critical Needs/Questions*

- Develop Great Lakes basin wide future climate scenarios at a scale and resolution applicable to inform adaptation strategies.
- Evaluate how current conservation strategies (conservation planning, habitat restoration, etc.) may be adapted in light of future climate change scenarios.
- Identify best management practices in forest and agricultural settings that allow these and associated systems to remain viable in light of the potential impacts of climate change.

Climate Change: *Current Status*

- A climate change working group is focused on issues pertinent to the states and province that intersects the Great Lakes region.
- Development and submission of proposals (Donnelley Foundation, TNC RJKose) to implement the strategy addressed above.
- Investigation of impacts of projected climate scenarios on forest composition and structure, and development of forest management abatement strategies for forested systems in Minnesota.

Invasive Species: *Critical Needs/Questions*

- Develop adequate pre-import screening tools to evaluate potential invasive species before they enter the region.
- Identify critical invasion pathways from global to local scales, and high risk sites for new introductions to inform Early Detection-Rapid Response.
- Develop and evaluate control, eradication and restoration techniques.
- Develop surveillance, tracking, and mapping technologies to detect, and document, the spread and impact of invasive species.

Invasive Species: *Current Status*

- The Conservancy is supporting regional and national efforts to develop robust risk assessment protocols for pre-import screening of live organisms in trade, which can be used at federal and state levels.
- Pathway analyses are focused on identifying high risk sources of aquatic invasive species to identify high risk vessels and critical sites for quarantine of recreational vectors.
- Current projects underway on key invasive species (e.g. baby's breath on dune systems, aquatic invasive species, hydrilla, phragmites).
- Invasive species assessments have been completed in Indiana, Illinois, and Michigan to guide conservation strategies.

Conservation Planning & Ecoregional Measures: *Critical Needs/Questions*

- When appropriate, implement planning approaches that integrate across terrestrial and aquatic realms, with the goal of protecting the full range of biodiversity in an economically feasible way, notably through sustainable harvest and valuing ecosystem services.
- Environmental maps or classification tools for open waters and coastal zones of the Great Lakes.
- Develop and collect measures of effective conservation at ecoregional and individual project scale so that we are tracking our progress towards goals, i.e., creating an ecoregional scorecard as well as measuring strategy effectiveness at specific projects.

Conservation Planning & Ecoregional Measures: *Current Status*

- Movement towards integrated conservation action planning across state and international boundaries at scales meaningful for effective conservation of

Great Lakes resources. This includes lake basin planning efforts for Lakes Ontario and Huron as well as whole watershed efforts (e.g., Green Bay in Wisconsin and Michigan).

- Currently establishing baseline measures for 10 projects as initial effort to establish integrated measures program for all Great Lakes work.

Great Lakes Open Water and Coastal Ecology: ***Critical Needs/Questions***

- How do we identify and craft strategies for a target (open waters) that we have little experience in protecting?
- What would be the expected end point for open water strategies or what do we call "success"?
- How can we better link conservation actions on the land with the conservation of open waters, including nearshore habitats? And, how do we relate our work on watershed and coastal system conservation to the health of the Great Lakes themselves?
- Developing conservation strategies that sustain coastal processes and connectivity of coastal, open water, and upland habitats at a meaningful scale.

Great Lakes Open Water and Coastal Ecology: ***Current Status***

- The Nature Conservancy will be sponsoring a symposium at the 2008 Annual Meeting of the Society for Conservation Biology to highlight conservation of the world's great lakes in an era of increasing water demands.
- Movement towards planning that is integrated across state and international boundaries at scales meaningful for effective conservation of Great Lakes resources. This includes lake basin planning efforts for Lakes Ontario and Huron as well as whole watershed efforts (e.g., Green Bay in Wisconsin and Michigan).
- The Nature Conservancy is hosting a coastal/ nearshore workshop at the 2008 International Association of Great Lakes Research, to gather expert input on key research needs and conservation actions.
- The Conservancy is engaging leading academic and agency research institutions in beginning to fill some of the most important science gaps, and coordinating disparate research efforts.

Land Use Issues (including working landscapes, urbanization, and energy development): ***Critical Needs/Questions***

- Assessments of best management practices on aquatic systems (large lakes to rivers/streams including flow, nutrients, and sediments), including analyses of river and stream connectivity, impacts of agricultural and forest best management practices.
- Effect of growing energy development demands on agricultural areas (ethanol), forests (woody biomass), tributaries (hydro and micro-hydro), and areas (wind, liquefied natural gas).
- Evaluations of the effectiveness of sustainable forestry and agricultural programs, including the effectiveness of working forest easements.
- Development of scenarios that predict threats from future land use conversion.

Land Use Issues: ***Current Status***

- Multiple sustainable forest management efforts across the basin, including Indiana, Michigan, Minnesota, and Wisconsin.
- Michigan, Minnesota, and Wisconsin are current part of a Conservancy-wide study to determine how forest ownership and management influence the conservation outcomes.
- Biofuels working group established Conservancy wide to address Conservancy biofuels policy.
- Partnering with Michigan State University to investigate impacts.

Integration of Economic and Social Issues: ***Critical Needs/Questions***

- Development of a framework to shape our ecological agenda and strategies in terms of ecosystem services, including assessments of ecological and economic benefits from conservation actions.
- Quantification of the ecosystem services delivered by the Great Lakes and their shoreline communities.

Integration of Economic and Social Issues: ***Current Status***

- Effort underway to quantify the effectiveness of corporate programs (in-store education and plant labeling) designed to lessen the impacts of invasive species.

2. Promoting adaptive learning, and demonstrating and refining innovations and effective conservation across a range of scales.

The Conservancy is engaged in hundreds of conservation projects around the world. These are often non-traditional experiments that balance the needs of people and local economies with those of nature. From sustainable forestry to payments for ecosystem services, this unprecedented collection of activities highlights different conservation approaches–but, taken together, will they be effective?

The Conservancy is moving beyond the reporting of outcomes on a project-by-project basis to a systematic ability to synthesize outcomes from many different projects and identify best practices and failure points. Using new filters that include economic and social measures, the resulting information will be used to improve The Nature Conservancy's major investments, so that they can return ever increasing conservation progress.

In the Great Lakes basin, this entails highlighting and communicating several of the projects where we have developed true expertise. These include migratory bird stopover ecology, invasive species issues, effectiveness of working forest easements, fen and grassland restoration, hydrologic restoration of work farm lands, sustainable forest management, and prediction of climate change in northern forests. Each of these efforts is currently underway as a demonstration designed to influence conservation action throughout the Conservancy.

3. Increasing accountability and transparency by measuring and reporting performance and increasing public access to information.

Credible scientific research, accessible data and reliable monitoring are the keys to engaging communities in effective conservation across the world. Scientific tools offer a common platform to begin problem solving. They illuminate challenges and influence solutions at appropriate spatial and temporal scales.

The Conservancy has lagged behind academic and governmental institutions in data sharing and transparency. We need drastic improvement in making our conservation plans, biodiversity inventories and management practices widely accessible to the Great Lakes, as well as the global community.

In the Great Lakes Basin, this means not only fully participating in Conservancy-led efforts, but also bridging the gap between our efforts and those of other Great Lakes organizations. For example, this means full integration with efforts such as: the State of the Lakes Ecosystem Conference and assessments of indicators, the Great Lakes Geographic Information System , and the Great Lakes Regional Research Information Network . Such integration will ultimately lead to increased conservation leverage and effectiveness across organizations and agencies.

Relationships

A fundamental premise of "Leading with Science" is that we are facilitators of cutting edge science. Rather than dramatically increasing internal Conservancy science staffing, we will partner with leading universities and agencies to address the most pressing science questions of the day. When those science questions shift, we will have the nimbleness to forge new partnerships and rapidly deploy resources to emerging science issues.

In the Great Lakes Basin, we already have strong partnerships with Nature Conservancy Canada as well as with a number of colleges and universities including Michigan State University, Ohio State University, Purdue University, University of Michigan, University of Minnesota, University of Notre Dame, and University of Wisconsin, as well as numerous smaller colleges and universities. Furthermore, we anticipate strengthening and adding to these relationships over the next three years via an analysis of how our core research agenda integrates with the strengths of the various academic institutions working in the basin.

People

We have formed a Great Lakes Basin Science Leadership Team to further science-based conservation within the Great Lakes Basin. The team is comprised of key Conservancy science leaders (e.g., state-level Directors of Science and other senior scientists) in the basin. An initial meeting was held May 12-14th, 2008 at Michigan State University's Kellogg Biological Station where the Science Leadership Team addressed the issue of a regional science agenda.

Future efforts will focus on regular updates of progress on major strategies, with a commitment to great collaboration, sharing of results and lessons learned from individual projects being use to complete the overarching strategies.

Knowledge & Learning

Promoting learning is critical to the success of Leading with Science within the Great Lakes basin. Around the basin there are hundreds of on-the-ground projects at large and small scales which are experiments in different approaches to conservation. A collective understanding of these approaches and, where appropriate, a roll-up of these approaches as well as a sharing of the lessons learned, will be a part

of the new science approach. In the basin we will move beyond reporting outcomes project-by-project, to a systematic ability to synthesize outcomes from many different projects and identify best practices and lessons learned from failure points.

Accordingly, learning has been identified as one of our primary strategies, and we have already begun steps to ensure that science knowledge and expertise gained will be shared broadly with partners throughout the basin, as well as within The Nature Conservancy.

Conclusion

Biodiversity and functioning ecosystems are important dimensions of a sustainable world, but they are not the only dimensions. When conservation broadens its approach, its workforce, its support base, and the information it manages and shares, conservation will be about humanity's sustainable future.

The Conservancy cannot choose that future—but, we can illuminate that future and help the public make well-informed and intentional decisions about it.