

Table of Contents

1.0	BACKGROUND	1
1.1	Definition of Ecosystem-based Management	1
1.2	EBM in New York State	2
1.3	Why the Eastern Lake Ontario Region?	3
1.4	Purpose of this Document	5
2.0	ELEMENTS OF THE EBM PROCESS	7
2.1	EBM Strategy Foundation	7
2.2	Consideration of Scale	8
2.3	Scientific Foundation (Datasets)	9
2.4	Monitoring and Adaptive Management	9
2.5	Stakeholder Involvement and Public Outreach	10
2.6	Governance	12
3.0	PROPOSED EBM PLANNING PROCESS	15
3.1	Step 1: Define the Project	19
3.2	Step 2: Assess Focus Areas	27
3.3	Step 3: Identify Threats to Focus Areas	31
3.4	Step 4: Situation Analyses	32
3.5	Step 5: Develop and Implement Actions	35
3.6	Step 6: Adapt and Improve	35
4.0	RECOMMENDATIONS	37
4.1	Stakeholder Involvement and Public Outreach	37
4.2	Institutional Design	38
4.3	Data Management	39
4.4	Data Needs	39
4.5	Research and Monitoring	41
4.6	Funding	42
4.7	Near Term Actions	42
5.0	REFERENCES	45

List of Tables

Table 1. Varied Spatial Scales	8
Table 2. Stakeholder and Focus Group Meeting Attendance, 2007	12
Table 3. Proposed Planning Process	17
Table 4. Technical Advisory Group	20
Table 5. Stakeholder Groups	20
Table 6. Focus Areas	23
Table 7. Example Summary of Initial Assessment of Focus Areas	26
Table 8. Viability Assessment for Barrier Dune/Wetland Complex (Adapted from LaMP-based Biodiversity Conservation Strategy for Lake Ontario)	30
Table 9. Summary: Threats and Associated Threat Level per Focus Area	32

List of Boxes

Box 1 Stakeholder Involvement to Date	21
Box 2 Stakeholder Interests and Concerns	24

List of Figures

Figure 1. EBM Organizational Structure	22
Figure 2. Example Situation Analysis of Barrier Dune/Coastal Wetland Complex	34

1.0 BACKGROUND

The U.S. and Pew Ocean Commissions documented that our nation's oceans are in trouble, and recommended ecosystem-based management (EBM) to improve the protection and restoration of coastal ecosystems. Following the recommendations of these two national commissions, over 200 scientists signed a statement stating that, "Solutions based on an integrated ecosystem approach hold the greatest promise for delivering desired results." With this consensus on the need for EBM, many states and regions have begun considering how to integrate existing management into an ecosystem approach.

1.1 Definition of Ecosystem-based Management

EBM strives to take the current regulatory system and governance structure which is largely sector-based, (e.g. air, water, transportation, agriculture) and sometimes conflicted (independent regulatory and economic growth goals), toward a system which will: lead to decisions based on a holistic understanding of ecosystems; be adaptive and responsive to change; promote coordination and cooperation among sectors; balance competing uses; and inspire compromise.

EBM is different from current management approaches that focus on a particular issue or on a single ecological component such as a single endangered species or isolated water quality parameters. By focusing on interacting systems, EBM requires participation of many state agencies and requires the integration of knowledge from individuals with local experience as well as experts in biological, social and economic fields. EBM is a tool that can cut across programmatic and geographic jurisdictions with the components of EBM providing a language that allows for improved communication between citizens, scientists, the private sector and government officials.

The 2005 Scientific Consensus Statement on Ecosystem-based Management provided the following definitions of EBM and ecosystems:

Ecosystem-based management is an integrated approach to management that considers the entire ecosystem, including humans.

An ecosystem is a dynamic complex of plants, animals (including humans), microbes and physical environmental features that interact with one another.

The six essential elements of Ecosystem-based management are:

- 1) place based, reflecting local needs,
- 2) recognition of interconnections among components of the ecosystem,
- 3) a scientific foundation for decision-making,
- 4) measurable objectives to direct and evaluate performance,
- 5) adaptive management to respond to new knowledge, and
- 6) stakeholder involvement to advance objectives.

1.2 EBM in New York State

New York State took a leadership position on EBM with the New York Ocean and Great Lakes Ecosystem Conservation Act (OGLECA). This statute requires ecosystem-based management of New York's coastal ecosystems, and establishes the New York Ocean and Great Lakes Ecosystem Conservation Council (The Council) to coordinate coastal management in New York to achieve the following policy:

The policy of the state of New York shall be to conserve, maintain and restore coastal ecosystems so that they are healthy, productive and resilient and able to deliver the resources people want and need.

The Council is chaired by the Commissioner of Environmental Conservation, and consists of the following eight additional members: the Commissioners of Agriculture and Markets; Economic Development; General Services; Parks, Recreation and Historic Preservation; Transportation; the Secretary of State; the President of the New York State Energy Research and Development Authority; and the Acting Chancellor of the State University of New York. The Deputy Secretary of State for Coastal Resources serves as Executive Director of the Council.

Council Responsibilities

The Council is expected to perform the following:

- *Promote understanding, protection, restoration and enhancement of New York's ocean and Great Lakes ecosystems while promoting sustainable and competitive economic development and job creation;*
- *Ensure community needs and aspirations are accommodated, recognizing the interdependent goals of community well-being, environmental quality and economic viability;*
- *Define and implement an adaptive approach building upon existing laws and programs to advance activities that affect coastal ecosystems in order to ensure the coexistence of healthy ecosystems with human activities;*
- *Integrate and coordinate ecosystem-based management with existing laws and programs;*
- *Develop guidelines for agency programs and activities that affect coastal ecosystems to advance the policy and principles of the Act;*
- *Encourage scientific research and information sharing that will inform ecosystem-based management decisions and enhance ecosystem management capabilities;*
- *Use New York's private and public academic, research and non-profit institutions more effectively in developing and advancing coastal ecosystem-based management; and*
- *Facilitate regional coordination and cooperation to address complex coastal resource issues which cross political and jurisdictional boundaries.*

Reporting Expectations

The Council is required by OGLECA to deliver a report to the Governor and Legislature by November 1, 2008 with the following components:

- *Demonstrate improvements that can be accomplished in eastern Lake Ontario and Long Island Great South Bay through ecosystem-based management in cooperation with resource managers, local*

- governments, industry, conservation and community-based organizations, and academic and research institutions;*
- *Define executive and legislative actions necessary to integrate ecosystem-based management with existing programs needed to advance the coastal ecosystem principles;*
 - *Include a plan, schedule, and funding opportunities for implementation of executive actions necessary to advance the policy and principles;*
 - *Create an ocean and coastal resources atlas to make information available to the public and decision makers;*
 - *Establish a research agenda that identifies priority issues in need of further research to enhance ecosystem-based management;*
 - *Recommend actions to preserve, restore and protect submerged aquatic vegetation populations and meadows; and*
 - *Identify opportunities for regional ecosystem-based management with neighboring states and the federal government.*

This Ecosystem-based Management Strategy document fulfills part of the first requirement and will be used to guide the development of the future EBM Plan. The Council is committed to providing guidance, leadership, and support to the Core Team and partners to facilitate a successful EBM implementation in the Sandy Creeks Watershed.

New York EBM Guiding Principles

The following principles are founded in the New York Ocean and Great Lakes Ecosystem Conservation Act (OGLECA). The Council is to uphold the principles and use them to guide the implementation of local EBM.

- *Activities in and uses of coastal ecosystems are sustainable;*
- *Ecological health and integrity is maintained;*
- *Ecosystems' interconnections among land, air and water are recognized;*
- *Understanding of coastal ecosystems is enhanced;*
- *Decisions are informed by good science;*
- *When risks are uncertain, caution is applied; and*
- *Broad public participation occurs in planning and decision making.*

1.3 Why the Eastern Lake Ontario Region?

The EBM legislation identified two demonstration areas where EBM principles are being applied as models for the rest of the state. Per the New York Ocean and Great Lakes Ecosystem Conservation Act, the two demonstration areas, the Great South Bay on Long Island and Sandy Creeks Watershed on Lake Ontario, were selected because they include coastal ecosystems. The Sandy Creeks Watershed sits between the southeastern shore of Lake Ontario and the Adirondack Mountains. The watershed includes freshwater coastal, lowland and upland forest resources. The coastal area includes a barrier dune and wetland complex that is one of the

largest inland dune systems in the eastern Great Lakes, contains some of the highest quality freshwater marshes in New York State and has been identified as a “Significant Coastal Fish and Wildlife Habitat” area by the Department of State (DEC, Natural Heritage, 2007). The lowlands support agricultural uses which in turn create a rural landscape. The upland slopes include large unfragmented tracts of working forests in both public and private ownership. The area is one of the most intact landscapes in the state with over thousands of miles of rivers and streams and complex drainage patterns (Comprehensive Wildlife Conservation Strategy for New York).

The region has low human population densities, on the average of 50 people per square mile. Local sentiment reflects a concern that the rural way of life is slipping away due to increased development. Current socio-economic systems (agriculture, forestry, outdoor recreation and tourism) rely heavily on local natural resources. While recent changes in the Sandy Creeks Watershed has led to some frustration among residents, there is a general understanding of the processes driving the change and an eagerness to support steps toward a more desirable future. Good water quality conditions, large areas of connected woodland, shrubland, riparian, and wetland habitats, and low amounts of impervious area throughout the Sandy Creeks watersheds suggest that the region is ecologically-vital, and remains relatively unimpacted by human disturbances. EBM provides process for developing strategic actions to maintain healthy and vibrant ecological and socio-economic systems subjected to changing cultural patterns.

Sandy Creeks Watershed Steering Committee

A Steering Committee was formed to provide administrative support and guidance to local and state efforts towards the development of a Sandy Creeks Watershed EBM Plan. Members include representatives from state agencies and local non profit organizations. The New York Department of State (DOS), Division of Coastal Resources has staff dedicated to the implementation of the EBM process in the Sandy Creeks Watershed and has partnered with the Department of Environmental Conservation (DEC), the Tug Hill Commission (THC) and The Nature Conservancy (TNC) to facilitate the integration of EBM into state and local programs.

The mission of the DEC is to “conserve, improve, and protect New York State’s natural resources and environment and control water, land and air pollution, in order to enhance the health, safety and welfare of the people of the state and their overall economic and social well being”. The DEC also is the regulatory agency that handles environmental permits. The Tug Hill Commission provides technical assistance to local governments, economic development organizations and other organizations associated with land use planning, commercial economic development and natural resource management. The Commission also ensures that local concerns are understood and considered during decision making processes. The Nature Conservancy is a major land holder and steward that coordinates many local projects and plays an important role in bringing stakeholders together, creating partnerships, and securing funding for implementation (Tug Hill Commission, 2007).

The Steering Committee is responsible for providing leadership and organization, soliciting stakeholders, setting up and conducting workshops, documenting the outcomes and results of workshops, hiring and paying consultants, etc. To date the Steering Committee has facilitated

the development of the Sandy Creeks Watershed Baseline Study, this EBM Strategy document and a series of stakeholder workshops held during the summer of 2007. A proposed EBM planning structure that includes local groups consisting of a Core Working Group, Technical Advisory Group and Stakeholder Groups are described in more detail in Section 3. The local representation will be actively responsible for making recommendations and crafting the EBM Plan. The Steering Committee is responsible for packaging the final work products and making them available to the state EBM Council.

1.4 Purpose of this Document

The purpose of this document is to identify key components and requirements of ecosystem-based management (EBM) and outline a strategic approach for developing an EBM Plan for the Sandy Creeks Watershed. This document describes the basic elements of EBM Planning, highlights work done to date, presents a step-by-step process for developing strategic actions, presents the governing structure and provides recommendations for advancing the process. Essentially it provides a starting point for integrating EBM into the existing social, economic and political structure of Sandy Creeks Watershed. Furthermore, project partners and watershed communities may use this strategy document to articulate specific needs as they pursue funding to develop an EBM Plan.

Once the EBM Plan is in place, state and local governments can use it to make informed land use and socio-economic decisions; state government can use it to make management, financial and regulatory decisions; and nongovernmental organizations (NGOs) and local organizations can use it to identify target conservation areas/efforts, etc.

2.0 ELEMENTS OF THE EBM PROCESS

2.1 EBM Strategy Foundation

As stated in Section 1, the focus of EBM planning is to work at understanding the ecosystems associated with coastal environments and the connections between them and local socio-economic systems. Sound science and local knowledge are essential as well as active participation from state agencies, local governments and organizations and, individual residents to articulate local ecological and socio-economic needs. The strategic action development process outlined in this document is based on the The Nature Conservancy's Conservation Action Planning (CAP) process. The CAP process, one component of The Nature Conservancy's comprehensive Conservation by Design program, provides an excellent structure for assessing ecological systems. Conservation Action Planning is a framework that helps practitioners clearly define conservation elements and articulate threats to those elements in a way that allows them to learn over time and adapt. A conservation group is guided through a series of diagnostic steps that culminate in a set of clearly defined objectives and strategic actions (TNC, 2007).

The Sandy Creeks Watershed EBM Strategy builds upon the CAP process to include an accounting of, in a quantifiable and scientifically based manner, the socio-economic piece of the puzzle. Weaving the two systems (ecological and socio-economic) into the same process offers opportunities for whole system management that considers a balance and necessary integration of human and natural systems that promotes sustainability and regenerative conditions. The Great South Bay EBM draft document (based on TNC Conservation by Design) was also used as a reference. Overall, the EBM Strategy is designed to be supported by a scientific foundation and adaptive management and, upheld by local residents.

The proposed process for developing strategic actions is based on identifying **focus areas** that represent and encompass the full array of biodiversity, including natural resources that support the local economy, in the Sandy Creeks Watershed. They form the basis for setting goals, carrying out conservation actions and measuring conservation effectiveness. Recognizing the biodiversity and ecological connections within the Watershed, focus areas should be selected to protect species, communities and ecological systems associated with the shoreline of Lake Ontario (dune/bay complex and marshes), adjacent lowlands and forested headwaters. **Attributes** are identified for each focus area, which if missing or altered, would lead to the loss of the focus area over time. Attributes are matched with **indicators** that provide the foundation for developing **quantitative** (measurable) **goals** that will in turn support adaptive management through monitoring the effectiveness of strategic actions and the ongoing viability of the focus area. Current conditions are recorded for each focus area and its attributes. Each focus area is processed through a **situation analysis** to identify the greatest threats as well as connections with socio-economic systems. Results from the situation analysis will guide the development of **strategic actions** designed to achieve the stated objectives and goals.

An iterative approach is used throughout the process to re-evaluate focus areas and threats, integrate new information, revise indicators and identify information gaps or incongruence.

2.2 Consideration of Scale

One of the biggest challenges in EBM planning is determining the appropriate scale at which to collect data, conduct assessments and implement actions. Table 1 includes some examples of scale. As noted in the Sandy Creeks Watershed Baseline Conditions Report, most of the available data was collected either on the basis of political boundaries or was site specific. Not only is a universal and consistent data collection method needed, consideration of scale is directly linked to focus areas, attributes and indicators.

Table 1. Varied Spatial Scales

Conservation	Socio-economic
Ecoregion	Global
Territory	National
Ecosystem	Regional
Watershed Basin	State
Subwatershed	Trade Area
Communities	County
Species	City
	Market Sector

Focus areas are the ecological systems, communities or species that define the specific outcomes that will be managed or influenced by strategic actions (TNC, 2000). Ideally the focus areas that are chosen will represent and encompass the biodiversity and economic connections within the project area. In some cases, a small scale focus area may be subsumed in one or more other larger scale focus areas. Additionally, focus areas may be selected based on coarse filter/fine filter approach. Coarse filter focus areas are those that, when conserved, also conserve a larger suite of species (nested focus areas). Fine filter focus areas are those that may not be easily captured by coarse filter focus areas and require individual attention. These focus areas may be rare, face unique threats or require unique strategies (TNC, 2007). Examples of different scale considerations are provided below.

Ecological Systems

- Assemblages of communities that occur together on the landscape; linked by environmental processes.
- Terrestrial, freshwater, marine.
- Foundation of several local economies; defines cultural systems.

Ecological Communities

- Globally imperiled vegetation associations or aquatic alliances.
- Support local markets.

Species

- Imperiled, endangered, special concern.
- Groupings of species with similar conservation requirements
- Globally significant aggregations
- Directly connected to a local business.

Separate data collection methods may need to be identified in order to support 1) comprehensive regional analyses across all watersheds and 2) detailed analyses to track more specific local, subwatershed conditions and changes over time. Furthermore, when the time comes to implement actions, decisions will need to be made as to whether the action is best **coordinated** at the state, county or municipal scale; broad-brush versus site specific. The scale of

implementation should be tied to the identified data tracking scale to enhance adaptive management efforts (using data collection methods to compare the effects of any given action to the established desired conditions and making adjustments as needed). Stakeholder participation will be an important component during the development of action and implementation strategies.

2.3 Scientific Foundation (Datasets)

The foundation of an effective EBM strategy is built with sound ecological and economic datasets, which are used to 1) characterize current conditions, 2) identify conservation, restoration, and economic development opportunities, and 3) perform trend analyses to measure the response of natural and human communities. [The Sandy Creeks Watershed Baseline Report \(2008\)](#) summarizes both ecological and socio-economic information from literature reviews, market and socio-economic data sources, GIS datasets, United States Geological Survey stream gauge data, and anecdotal information obtained from a subset of interviews and limited field reconnaissance. Due to limitations associated with GIS, ecological and socio-economic datasets, a comprehensive determination of the baseline conditions was not made. Thus building scientific datasets is a high priority and the Baseline Report should be viewed as a first step in the long-term process of assessing local ecological and socio-economic systems.

The biggest challenge in collecting and analyzing ecological and socio-economic data for the Sandy Creeks Watershed is that most data typically used is collected on the basis of political boundaries. Furthermore, because ecological and economic systems are complex, there is the potential for collecting a large body of information to inform the Ecosystem-based Management process. To this end, future data collection efforts should be directed by a limited set of focus areas and attributes to provide a focused and coordinated allocation of limited resources, and refinement of prioritization of data gaps. [The Baseline Report outlines current datasets and data gaps and provides recommendations for creating a comprehensive system for managing and collecting data.](#) Those recommendations are outlined at the end of this document ([Biohabitats, 2008](#)). Specific Recommendations are provided in Section 4: Recommendations.

2.4 Monitoring and Adaptive Management

As focus areas are assessed to determine their viability, attributes and indicators will begin to form and collectively may exceed the capacity for regular and thorough assessment. Thus, it is important to identify the attributes and indicators that are most important to measure regularly. Measuring methods do not need to be complex or sophisticated and indicators can be quantitative or qualitative. Often it is more effective to get information using a simple method as long as it is sufficient for the types of decisions that need to be made. Methods can range from:

- Detailed mapping using a global positioning system and management of the data within a Geographic Information System.
- Collecting census data
- Quantitative assessments using randomly positioned quadrats to track changes over time

- Qualitative estimates of relative abundance based on wandering transect survey.
- Quick site visits to determine the presence or absence.

Monitoring refers to applying a systematic approach to collecting data overtime and some methods are included above. Monitoring efforts throughout the Sandy Creeks Watershed were reviewed to perform a trend analysis to gain an overall understanding of how ecosystems are changing over time. Currently, the only formal monitoring effort in operation with the Sandy Creeks Watersheds is the ongoing NYSDEC Rotating Integrated Basin Studies (RIBS) portion of the Statewide Waters Monitoring Program, which includes screening (a verbal habitat assessment and a macro invertebrate community assessment), and intensive monitoring (a macro invertebrate community assessment, toxicity testing, sediment contamination, bacteriological results, and field, nutrient, mineral, and metal parameters) in discrete locations within the subwatersheds. The RIBS program allows comparative water quality of Lake Ontario tributaries.

An expanded and more comprehensive monitoring effort in the Sandy Creeks Watersheds would allow additional data to be collected which could help to determine overall watershed integrity, and allow for an assessment of ecological trends. An effective Ecosystem-based Management Strategy is dependent upon continuous, verifiable data input of selected ecological and socio-economic indicators that have robust literature support for their use as effective indicators of watershed health. This type of monitoring framework does not currently exist in the Sandy Creeks Watersheds. Effective EBM planning and implementation will require a minimum level of commitment to collecting and analyzing these types of datasets spatially and temporally across all subwatersheds.

Adaptive management is based on developing actions designed to test key hypotheses about how an ecosystem functions and is very different from trial and error or best-guess strategies. Throughout the iterative process of selecting focus areas, attributes and indicators and identifying threats, discussions should include ideas about what is needed to provide the most effective adaptive management methodology. Furthermore, adaptive management may require the development of new institutions and institutional strategies that are flexible enough to adapt in response to new information.

2.5 Stakeholder Involvement and Public Outreach

Stakeholder participation throughout the EBM Planning process is paramount for successful implementation of the strategic actions. This strategy document outlines how and when stakeholders will be involved in the process. Overall, a structure, based on representatives, capitalizes on the existing social structure of interest groups throughout the Watershed. All workshops, while designed to assist the Core Working Group with EBM planning work, will be open to the public. Public forums will be held to inform local communities of planning progress. A diverse public outreach program will include tools such as newspaper articles, newsletters, webpages, a list serve, bulletin boards, and outreach meetings (skill building and information gathering) to ensure broad participation throughout the planning process.

EcoLogic, Inc., a New York-based environmental consulting firm, facilitated a series of stakeholder focus group meetings between June and October 2007 (Table 2). The purpose of the meetings was to introduce the concept of Ecosystem-based Management and to solicit local ideas and concerns about local natural resources and socioeconomic sectors. Outreach techniques included a series of meetings (two open-invitation forums and seven focus group gatherings) and individual interviews. Results from the meetings are included in The solicitation of comments was guided by a series of questions. During the initial open-invitation meeting the following questions were posed:

- What aspects of the ecosystem are most important—of greatest value—to you, with an emphasis on natural resources and social, economic sustainability?
- What are the issues and challenges facing the Sandy Creeks ecosystem over the next five to ten years?
- What are some tools (educational, scientific, regulatory, etc.) that might help stakeholders face these challenges and protect this area for future generations?

Focus groups consisted of representatives from the following sectors; agriculture, business, conservation, foresters and large landowners, municipalities and recreation. All of the focus groups were asked to respond to following questions:

1. What is your background and interest in the Sandy Creeks watershed? (What brought you to this meeting tonight?)
2. Think back about fifteen years. How would you compare the state of this region at that time to what it is now? Consider this in natural resource terms, recreational terms, social terms, however you'd like.
3. Think ahead about fifteen years. Given the current trends in population, land use, economic development; will this be an area where your family wants to settle?
4. Why or why not? What factors will change the Sandy Creeks region?
5. Which of these can be controlled?
6. Identify one or two priority projects that you believe can effectively improve the future of the Sandy Creeks ecosystem.

The open-invitation wrap-up meeting was designed to ensure that what was heard by EcoLogic staff adequately captured local interests and concerns. Furthermore, participants had the opportunity to consider comments collected from all of the meetings.

Table 2. Stakeholder and Focus Group Meeting Attendance, 2007

Focus Group	Date	Location	Invited	Present	% (pres/inv)
Initial Meeting	6/27	Sandy Island Beach State Park	140	18	13%
Conservation	7/25 8/15*	Sandy Island Beach State Park	30	11	37%
Municipalities	7/30	Adams Center Municipal Building	30	5	17%
Agriculture	8/6	Sandy Island Beach State Park	18	5	28%
Recreation/ Anglers	8/8	Sandy Island Beach State Park	23	7	30%
Business	8/29	Sandy Island Beach State Park	20	1	5%
Foresters/Large Landowners	8/30	Sandy Island Beach State Park	19	5	26%
Wrap-up Meeting	9/20	Sandy Island Beach State Park	140	20	14%
TOTAL			140	72	51%

* Represents a second open-invitation meeting for people with scheduling conflicts. The majority of attendees were associated with the conservation focus group.

As the EBM process begins to take shape, it will be important to recognize the input received in 2007 as well as include a wider range of participation and collect additional feedback, especially when determining the refined list of focus areas. Results from the 2007 stakeholder meetings are included throughout subsequent sections and specific recommendations for building an effective and comprehensive Stakeholder Involvement and Public Outreach Program are included the Recommendations Section. Furthermore, Step 1 of the proposed process addresses public involvement in greater detail.

2.6 Governance

Governance is the set of authorities, processes, and procedures that guide and monitor the values and goals of an organization. State and local government jurisdictions tend to be determined based on political boundaries that typically are not congruent with ecosystems. EBM planning is based on ecosystems and requires coordination among existing government agencies to provide processes and procedures that will serve the goals of the Sandy Creeks EBM Plan. As mentioned in Section 1.2 New York EBM planning is to build upon existing laws and programs and facilitate regional coordination and cooperation across political and jurisdictional boundaries to address complex coastal resource issues. A thorough review of existing the existing governance structure (international, federal, state and local) including but not limited to gaps/overlaps in programs and policies, overlapping authority, staffing, public funding, assistance and incentive programs and communication systems.

During the 2007 stakeholder meetings, the participants were looking for reassurance that state agencies would be able to align themselves with the EBM principles and be responsive to local recommendations generated by the EBM planning process.

Located in Jefferson, Lewis and Oswego Counties, the project area includes all or portions of the following towns: Henderson, Hounsfield, Adams, Watertown, Champion, Rodman, Rutland, Denmark, Pinckney, Montague, Worth, Lorraine, Boylston, Redfield, Richland, Sandy Creek, and Ellisburg. It also includes all or portions of the villages of Adams, Ellisburg, Mannsville, Sandy Creek, Lacona, and Pulaski.

3.0 PROPOSED EBM PLANNING PROCESS

The development of an EBM Plan is a highly iterative process designed to integrate new information as it becomes available. The process is broken down into steps (Table 3) for ease in discussing the progression; however the steps are not distinct units and are not intended to suggest a strictly linear process. To the contrary, the process is more like a series of circles, varying with size, whereby past steps are revisited more than once and usually, several times. Thus feedback loops are called out in Table 3. While steps are intended to outline specific actions to guide future planning work, some work has already occurred. As a result, work done to date is included at the appropriate step to be included and added upon when the planning process is fully underway.

Stakeholder participation is an integral part of the process and relies on local representation with direct participation in planning workshops (Core Working Group) and indirect involvement through a parallel public outreach program. As a result, the public is involved, either directly or indirectly at every step. Broad-based public participation (public outreach) will take extra care and coordination to endure a structured and fair system for disseminating and receiving information. A series of kick-off meetings and newspaper articles may be used to prepare local constituents for their role in upcoming opportunities to comment on planning efforts. The Tug Hill Commission initiated a newsletter “Sandy Creeks Ecosystem-based Management Initiative” in 2007.

The planning process is designed to reach a solid understanding of who will participate how, where the boundaries of the project area are and what the vision is, or unifying motivation for, completing the process. Next, what is of interest? What needs to be protected or conserved? Discussion should include both ecological and socio-economic concerns. What is the current condition of these special things and how will they be measured? Research and monitoring will need to be completed to gain a better understanding of the selected resources. Actions would not be necessary if there were no need to be concerned with the health and vitality of the resources, thus threats must be clearly identified. The complexity of the process is compounded by the need to weigh ecological and socio-economic vitality. A situation analysis is the part of the process devoted to making connections between human beliefs, actions and practices and the health and vitality of ecological systems. Difficult decisions will have to be made to find ways to support both ecological and socio-economic systems. The decisions will produce strategic actions to implement.

After implementation, monitoring the effects will guide future adjustments and adaptations. Essentially EBM planning is ongoing, a lifelong commitment made by governments, local organizations and local people to ensure vitality across the landscape. Key terms that will be used frequently in subsequent sections are provided below and are based on terms used in The Nature Conservancy’s CAP Process.

Key Terms:

Focus Areas: a limited suite of species, ecological communities and/or ecological systems that are chosen to represent and encompass the biodiversity and/or socio-economic vitality of the Sandy Creeks Watershed. A species may not hold significant value in a particular ecosystem; however it may be very valuable in economic terms. They are the basis for setting goals, carrying out actions and measuring effectiveness of changing cultural practices. In theory, the conservation and careful management of focus areas will ensure functional landscapes, ecologically and socio-economically throughout the Watershed. A severely degraded focus area would result in dramatic changes to the current landscape and socio-economic systems.

Attribute: Aspects of a focus area's biology and/or ecology that if missing or altered, would lead to the loss of the focus area over time. More technically, they are the most critical components of biological composition, structure, interactions and processes, environmental regimes and landscape configuration that sustain a focus area's viability over time.

Indicator: Measurable entity related to a specific information need to track the status of an attribute. A good indicator is precise, and can be consistently measured over time.

Current Status: An assessment of the current "health" of a focus area based on a recent measurement of an indicator for an attribute of the focus area.

Qualitative Goal: A general statement that describes the future condition of a focus area. The Qualitative goal is useful in achieving consensus on how the focus area should or should not change over time.

Quantitative Goal: A specific measurement or rating associated with an indicator that describes the level of health or function that the strategic actions are designed to achieve.

Threats: Activities and processes that directly or indirectly degrade, destroy or impair systems represented by focus areas.



Table 3. Proposed Planning Process

Overview of EBM Planning Steps
<p>STEP 1: Define the Project</p> <ul style="list-style-type: none"> a. Identify and organize the people involved (public involvement structure). b. Create DRAFT summary of project scope, vision statement, and initial list of focus areas. ■ Public Outreach – Distribute draft documents and solicit comments project scope, vision and focus areas. c. Revise documents as needed and provide formal recognition of project scope, vision and working list of focus areas. <p>STEP 2: Assess Each Focus Area</p> <ul style="list-style-type: none"> ✦ Ad-hoc Technical Group - Establish technical working groups to develop assessments & data collection initiatives for one or more of the focus areas. a. Describe the Ecologic or Socio-economic Importance/Benefits. b. Explain why it was chosen. c. Determine a qualitative goal. d. Summarize the current status. (Data Check – is existing data available/adequate?) e. Identify key attributes and associated indicators, current condition, stress & quantitative goal. (Data Check – are indicators currently measured?) f. Outline monitoring and adaptive management methods. g. Summarize stresses. ■ Public Outreach – Distribute provide summaries of focus area assessments and hold public meetings to solicit feedback. ∩ Feedback Loop – Revise focus areas. This step may be repeated several times as information gaps are pursued and closed. Over time this may result in new and/or removed focus areas. <p>STEP 3: Identify Threats</p> <ul style="list-style-type: none"> ✦ Ad-hoc Technical Group - Maintain technical working groups. a. List and summarize threats for each focus area. b. Refine monitoring and adaptive management methods. ■ Public Outreach – Distribute summaries of threats and hold public meetings to solicit feedback. ∩ Feedback Loop – Revise threats and revisit step 2 as needed. This step may be repeated several times as information gaps are pursued and closed. Over time this may result in new and/or removed focus areas.



Overview of EBM Planning Steps

Continued...


STEP 4: Conduct Situation Analyses


- a. Draw connections between stresses and threats.
- b. Identify strategies for relieving threats.
-  Public Outreach – Present results of situation analyses at public meetings, answer questions and solicit feedback.
-  Feedback Loop – Revisit threats based on information gathered from public comments.

STEP 5: Develop and Implement Actions

- a. Formulate draft strategic actions.
-  Public Outreach – Distribute draft strategic actions and solicit feedback. Ask participants to prioritize projects - to be considered by Core Working Group.
- b. Revise strategic actions and prioritize projects.
- c. Develop work plans.
-  Public Outreach – Distribute summary of strategic actions, and opportunities to assist with implementation.

STEP 6: Adapt and Improve

- a. Update Core Team roles and responsibilities, stakeholder list and process
- b. Reassess focus areas
- c. Identify changes in threats and opportunities
- d. Review situation analyses
- e. Update actions
- f. Revise monitoring and reporting methods
-  Public Outreach – Provide regular status reports through newsletter to communicate monitoring results associated with actions.

-  Note: This symbol occurs throughout this document to call attention to the public outreach component of the process. The Core Working Group includes stakeholders, thus stakeholder involvement is an inherent part of the process.

3.1 Step 1: Define the Project

The first step in the EBM planning process involves identifying and organizing the people who have a vested interest in the project area. A clear organizational structure helps constituents visualize how they might become involved in the process. A centralized organization is helpful to keep workshops productive by limiting attendance to about 20 people, however, individuals outside the formal structure will be given ample time to convey their interests and concerns regarding workshop topics. Additional lines of communication may also need to be developed to ensure equal representation across the watershed. The Steering Committee is already active and is facilitating the start-up steps to the EBM planning process and some stakeholder groups participated in outreach sessions conducted in 2007. A formal recognition of the organizational structure below will need to be formally presented and coordinated. Additionally, systematic structures should be put in place to assist with long term, organized involvement of all participants.

The other significant components to get under way is setting the project scope, or boundary, (somewhat defined), drafting a vision statement and selecting focus areas (initial lists are included in this strategy). The project scope and vision are important tools for keeping people focused and developing them is an important first step in bringing people together. While discussion about focus areas has begun and some constituents are knowledgeable about local ecosystems, a formal review of focus areas will provide a solid foundation for the planning process. Identifying focus areas will be an iterative process and will spill over into Step 2, Assess Focus Areas.

Stakeholder Involvement and Public Outreach Structure

A **Core Working Team**, consisting of approximately 20 representatives from local Stakeholder Groups, the Technical Advisory Group and the Steering Committee, resides at the hub of the planning process (Figure 1) and is responsible for developing the Sandy Creeks Watershed EBM Plan. This group will attend and participate in planning workshops facilitated by a consultant who will lead them through the planning process. Additionally, this same group will oversee and assist with the implementation and monitoring actions outlined in the plan. Furthermore the Core Working Team reports back to the state EBM Council on the progress made towards meeting the responsibilities outlined in the Ocean and Great Lakes Ecosystem Conservation Act.

A **Technical Advisory Group** will include scientists, researchers, natural resource managers, and economic development experts who will attend workshops as needed to provide facts and data and, guidance on how to interpret or use the information presented. Technical advisors are to provide up-to-date, scientific information to the Core Working Team, thus relationships with local expertise and research institutions (state and federal agencies, state universities, The Nature Conservancy, etc.) should be established and maintained in such a way to facilitate the flow of information in two directions, information needed and information produced. Technical people (see Table4) may be organized into permanent groups and/or on an ad hoc basis to review

research and information needs and present their findings to the Core Working Group. **Technical Advisors must be prepared to commit the time and resources necessary to help identify focus areas, attributes and indicators and design effective adaptive management methods.**

A network of **Stakeholder Groups**, most of which already exists throughout the watershed, will provide a broad public involvement base. Table 5 provides a starting point for developing a comprehensive list of Stakeholder Groups throughout the Sandy Creeks Watershed. The comprehensive list will guide decisions for selecting a manageable number of Stakeholder Group representatives to be included in the Core Working Group.

Stakeholder Group representatives are responsible for expressing the interests and opinions held by their group members to the Core Working Group and for conveying results of workshops back to the individuals they represent. Workshop results will also be made available to individuals through an established effective means of communication (news paper article, newsletter, webpage, public meeting, etc.). Stakeholder Groups should be encouraged to meet regularly to review and comment on outcomes and products from workshops to ensure that individuals have a voice in the planning process. As members of the Core Working Team, Stakeholder Representatives will play an active role in developing the EBM plan, assisting with implementation, evaluating actions and championing local education and outreach activities.

A successful EBM process depends on consistent participation from a wide range of stakeholders. Thus, providing a structure for stakeholder involvement will be critical in maintaining lines of communication and creating forums for discussions in addition to reinforcing the value of stakeholder input. Furthermore an organized stakeholder involvement structure will aid collaboration and coordination among local governments, organizations and residents. Local meetings have occurred (see Box 1) to foster dialogue about Ecosystem-based Management and while the attendees demonstrated an understanding of ecosystem processes, they were less comfortable with the processes associated with EBM planning.

Table 4. Technical Advisory Group

Possible Representation
<ul style="list-style-type: none"> • Agriculture Economist • Dune Complex Ecologist • Fisheries Economist • Forestry Economist • Forester/Silviculturist • Hydrologist • Wetland Scientist • Wildlife Biologist

Table 5. Stakeholder Groups

Starting point for a detailed and comprehensive list.
<ul style="list-style-type: none"> • Local Organizations • Local Government • Urban Development • Forestry • Higher Education • Residential Community • Industry • Political Office • Public Education • Recreation • Tourism • Business Community

Box 1 Stakeholder Involvement to Date

Local efforts to reach out to stakeholders concerning ecosystem-based management in the Sandy Creeks area were made during the 2007 summer months. EcoLogic, LLC. compiled a list of local stakeholders and facilitated an initial open invitation stakeholder meeting, focus group meetings (agriculture, business, conservation, foresters & large landowners, municipalities, recreation & anglers) and multiple interviews. The purpose of the meetings was to begin conversations about EBM and how it might work in the Sandy Creeks Watershed. The following is a summary of recommendations for working with stakeholders provided by EcoLogic, LLC:

- Include stakeholders in every step of the EBM process to build on local knowledge, address local concerns and sustain local commitment to the process.
- Stakeholders must remain convinced that their input is desired and valued and that they are being listened to by local officials and the Council. Their commitment is hinged on seeing early returns from their efforts and that they see cooperation from state and local agencies.
- Due to limited access to the internet, traditional print media should be used in addition to electronic distribution and project websites. Furthermore, the most effective means for receiving stakeholder input is through public meetings (regularly scheduled or, specific to project or participants). Secondary means include websites, e-mail, phone and mail contact.

The comments compiled by EcoLogic, LLC. provide a starting point for the Core Team and should be reflected back to the stakeholders during the beginning of the EBM process to acknowledge their input. Sign-in sheets need to be reviewed and to ensure comprehensive representation among local groups throughout Sandy Creeks Watershed.

The **Steering Committee** is an administrative body devoted to supporting the development of the EBM Plan. Members include representatives from state agencies and local non profit organizations; The New York Departments of State (DOS), and Environmental Conservation (DEC), other local representatives from EBM Council agencies, the Tug Hill Commission (THC) and The Nature Conservancy (TNC).

Steering Committee Members are responsible for providing leadership, shepherding the planning process, securing and allocating funds, setting up workshops and overseeing stakeholder involvement. They also hire consultants; provide staff to assist with workshops and logistics. Data acquisition, storage and distribution are coordinated by the Steering Committee. Furthermore, the Steering Committee is ultimately responsible for packaging the plan and providing continued support throughout the implementation of the plan.

Representatives from the Steering Committee will serve on the Core Working Group in an administrative capacity.

Figure 1. EBM Organizational Structure



Project Scope, Vision Statement, Preliminary List of Focus Areas

Articulating the project scope, vision and focus areas is a key aspect of the EBM planning process because it becomes the foundation of the EBM plan. During this step, the Core Team and representatives from the technical advisory groups discuss and agree on the geographical, ecological and economic extent (scope); a general summary of the desired state or ultimate condition of the project area (vision); and an initial list of ecological and economic components that will serve as the pulse points of the overall vitality of the project area (focus areas).

The **project scope** typically includes a map to define what areas are included within the project; however the situation may call for a geographical boundary with reference to “outside” areas that may influence the defined project area. For instance Fort Drum is located outside the Sandy Creeks Watershed but it impacts socio-economic activity within the watersheds. From an ecological perspective, Lake Ontario may only be at the edge of the project area yet may have a strong influence on the ecosystems within the project area.

The **vision** should broadly define and encompass all activities, articulate the desired change in the project area and be simple and succinct so that it can be used frequently.

Selecting **focus areas** is an iterative process that includes initial brainstorming for potential candidates, then assessing each one to determine its effectiveness as an indicator of the overall health of the local ecological and socio-economic systems throughout the Sandy Creeks Watershed. In very general terms, the Watershed can be divided into three zones; the coastal area along the shore of Lake Ontario, the “milk bucket” lowlands and the forested slopes. The expectation is that the overall ecological and socio-economic systems will remain functional and in-tact if the viability of each focus areas is either maintained or increased as a result of strategic management actions.

The list presented in Table 6 is an example of what the initial list of focus areas might look like. Each focus area should be assessed by the Core Working group to determine if it is truly the best ecosystem, community or species to use to monitor the vitality of the Watershed. The list is based on information from the 2007 Baseline Report and stakeholder meetings facilitated by EcoLogic, LLC.

Additionally, measuring or evaluation systems need to be put into place to follow through with the adaptive management component of EBM such that the implementation of actions (associated with specific focus areas) can be monitored, assessed and redirected if the desired results are not achieved.

- **Public Outreach:** The project scope, vision and focus areas can initially be formulated by the Core Working Team and then shared with a greater audience to solicit ideas and feedback.

Table 6. Focus Areas

Preliminary List
<ul style="list-style-type: none"> • Barrier Dune System • Marshes • Streams • Wetlands • Beech-Maple Mesic Forest • Mixed Deciduous Coniferous Forest • Headwater Streams • Fish Species • Sensitive Species • Rural Character

Comments can be compiled and considered by the Core Working Group to develop the summarized project scope, vision and initial list of focus areas that reflect the ideas and interests of the community. While some effort has made already (See Box 2) additional efforts to solicit ideas are needed to ensure complete representation.

Box 2 Stakeholder Interests and Concerns

EcoLogic reviewed the comments from the initial meeting and found three basic themes:

- a) native species and natural communities (dunes and beaches);
- b) economically successful natural resource-based industries (including forestry, agriculture, recreation, and fisheries); and
- c) intact forests and high quality streams.

When considering *native species and natural communities*, participants discussed changes in vegetation (increase in invasive plant species) throughout the watersheds and management of shoreline habitats (dunes and beaches). Participants perceived the increase in invasive plants to be a long-lasting threat to native species. The Dune Coalition was recognized for its positive contributions to protecting dune habitat yet participants noted that more resource management is needed within and beyond the dunes. Significant changes in beach access prompted a range of comments including a desire for more access to beaches, wishing private landowners would adopt a stewardship ethic when managing their stretch of beach and setting aside beach areas for wildlife.

Interest in *economically successful natural resource based industries* (i.e., agriculture, forestry and recreation) revealed an appreciation for the rural landscape and the industries that support it. While forestry practices vary throughout the watersheds participants voiced a collective concern about state lands being managed poorly and that funds from local forest products go to Albany rather than local natural resource management. Recreation was the third natural resource based economy to receive significant attention during the meetings. Maintaining a viable resource for outdoor, adventure recreation is extremely important to participants.

As just mentioned, the success of the recreation industry hinges on the quality of the local natural resources, thus *intact forests and high quality streams* are valued by the participants. Improvements in water quality were acknowledged and an interest in sustaining the improvement was conveyed. Participants understand that agricultural, forestry and recreation uses impact the resources they rely upon, thus they are interested in increasing conservation measures.

Top 5 Issues

As mentioned above, some ideas about focus areas have already surfaced, yet it is very important that all interested members of the community are given a chance to participate in deciding what the focus areas will be. To date, the Baseline Conditions Report and the Stakeholder Meetings of 2007 have provided some direction. The Baseline Conditions Report focuses on measuring the overall health of the Sandy Creeks Watershed. The result of that report is a list of detailed recommendations for assembling datasets in order to truly understand the existing conditions of the 14 subwatersheds. Stakeholders provided comments based on natural features that were organized according to general natural resource themes. The following list provides a general list of areas that received the most attention:

- Watershed-wide Ecological Indicators: Establish monitoring program to measure changes in effective imperviousness, stream road crossings, and road length.
- Socio-economic data: Adjust data collection to serve the interests of Sandy Creeks Watershed.
- Barrier Dune/Wetland Complex: Continue efforts to protect them while allowing for public access.
- Forests: Maintain large contiguous blocks and protect headwaters.
- Streams: Manage the landscape to support high water quality.
- Rural Landscape: Protect the natural resource based socio-economic structure.

The process of selecting focus areas may go through several iterations as attributes are discussed, indicators are identified or created and confidence in the science is built. The selection of focus areas should also consider scale, coarse and fine filters, and nested components. Over time, adaptive management will present opportunities to change or refine focus areas as they become more fully understood. This step, Step 1: Defining the Project, can conclude with a formal recognition of the organizational structure, project scope, vision and working list of focus areas. The term “working” is used because focus areas may change during the detailed assessment process outlined in Step 2.

Table 7 provides an example of how to summarize focus area assessments to determine which ones may be the most effective before performing a detailed assessment described in Step 2: Assess Focus Areas. A **qualitative goal** is assigned to articulate the overall direction of interest regarding each focus area. Next, **attributes** directly connected to the health of the focus area are identified. **Indicators** must be given for each attribute to measure changes throughout the implementation of actions. Once indicators are determined, the **current conditions** of each attribute are identified and ultimately paired with the desired conditions or **quantitative goal**.

Table 7. Example Summary of Initial Assessment of Focus Areas

Assessment Criteria Focus Area	Qualitative Goal	Attribute	Indicator	Current Condition	Quantitative Goal
Barrier Dune/Wetland Complex	Supports viable populations of target native species	Vegetation Wildlife	Population counts	Functioning with the support of significant active management	Specific % of dune grass cover
Rural Character					
Beech-Maple Mesic Forest					
Fish species					

3.2 Step 2: Assess Focus Areas

This section describes in detail, the process of assessing each focus area. The outline for organizing the information is very similar to the outline used for the Great South Bay EBM Plan. The difference here is that an ecological focus area is assessed based on its ecological and socio-economic value. For some focus areas, the socio-economic value may be more prominent than the ecological value. For example, a specific fish species may support several local fisheries businesses that provide jobs for residents thus the socio-economic value is high. Yet the same fish species is considered a non-native species that is not recognized as having high ecological value.

Ultimately the assessments will characterize the interrelationships between the local economic and natural systems; identify resource management issues and threats to ecological integrity and human well-being; and explain the links between ecosystems and socio-economics in the Sandy Creeks Watersheds.

An effective way to conduct the assessments would be to assign focus areas to an [ad-hoc group of technical advisors](#). The working groups would work through the assessment and report back to the Core Team with data needs, issues and results. Identifying threats at this time is also helpful although a more concentrated effort to identify threats is outlined in Step 3.

- **Public Outreach:** The general public should be kept abreast of the development of the list of focus areas. Summarize the assessments and allow people the opportunity to review and comment. Keeping the community involved and well-informed will support productive input during Steps 3 and 4; Identifying Threats and Conducting Situation Analyses.

A first sub-step in assessing focus areas is to perform a general assessment that tests each focus area to see if it is a vital component of the Watershed overall. The general assessment provides a structure for the Core Working Team to discuss each focus area in depth and hone the list down to the most vital focus areas. An example assessment is provided below. Most information is current, however it is not complete and only meant to provide a general indication of what might go in to a full assessment.

General Assessment: Barrier Dune/Wetland Complex (EXAMPLE)

Provide general description or definition of the focus area that may include such information as; a geographic area, state-wide, national or international biodiversity importance, local economic importance, etc.

The barrier dune/wetland complex is made up of multiple barrier beaches, embayments, dunes and wetlands along the southeastern shore of Lake Ontario. The area represents one of the largest inland dune systems in the eastern Great Lakes and contains some of the highest quality freshwater marshes in New York State (DEC, 2008). The area includes seven properties open to the public that draw local day visitors, regional visitors that support local tourism businesses.

Ecological Importance/Benefits: Describe more specifically the ecological benefits associated with the focus area. Include nested focus areas and connections with other focus areas.

*The barrier dune/wetland complex includes several ecological communities including dunes, medium fens, shallow emergent marshes, silver maple-ash swamps, red maple-hardwood swamps, red maple-tamarack peatlands, calcareous pavement barrens and calcareous shoreline outcrops. Rare species associated with the complex that are especially important include; pirate perch (*Aphredoderus sayanus*), least bittern (*Ixobrychus exilis*), black tern (*Chlidonias niger*), caspian tern (*Sterna caspia*), noctuid moth (*Abagrotis barnesi*), bogbean buckmoth (*Hemileuca sp.*), champlain beachgrass (*Ammophila*), rough avens (*Geum laciniatum*), and sand dune willow (*Salix cordata*). Several resident and migratory waterfowl and shorebirds use the dune complex for staging and foraging (DEC, 2008).*

Socio-economic Importance/Benefits: Describe more specifically the socio-economic benefits associated with the focus area. Include the businesses that specifically serve people who visit, recreate or use the focus area. Describe how the focus area defines the current cultural systems of the Sandy Creek Watershed.

The great lakes are known for their coastal dune systems and barrier dune systems in the Sandy Creeks Watershed are a popular destination for many New Yorkers and regional visitors. Include data on where visitors are from (state, national, international), estimation of number of businesses and jobs supported by people who visit the dunes and if available, revenue generated by dune tourism.

Why was it Chosen? Explain why it was selected to represent the overall vitality of the Sandy Creeks Watershed over other ecosystems, ecological communities or species. Make specific references to socio-economic connections and implications associated with the focus area.

The barrier dune/wetland complex is a coarse filter focus area that if managed well will support a wide range of ecological communities and several rare and endangered species (fish, birds, insects and plants). Even though the dunes have become degraded due to abuse and over-use, they are still viable and have responded to recent management strategies. Furthermore, some of the communities (the swamps) are in excellent condition (DEC, 2008). The dunes provide a destination for travelers who in turn support local businesses. Should the barrier dune/wetland complex become severely degraded, the southeast coastline of Lake Ontario would likely change dramatically and the local economy would shift.

Qualitative Goal: This is a general statement that communicates a vision for the focus area. People often know what they want to see, but may not speak about it in measurable terms.

Discussion about what the focus area should look like will flush out different perspectives and interests.

Barrier dunes remain stable and support existing biodiversity. Public access is maintained with controlled visitation and greater emphasis on environmental education.

Current Status: Describe the state of the system, community or species to determine it's viability. Focus areas should be healthy enough to persist for many generations with some intervention. If the proposed target requires major intervention or is on the brink of collapse, it may not be the best choice for measuring the overall health of the watershed. Defining the current status will also disclose data needs and potential research or monitoring needs.

Multi-faceted Extension efforts have been implemented in the barrier dune/wetland complex over the past two decades to reduce negative visitor impacts. An evaluation of the Extension efforts was completed in 2007 and results indicate that the efforts have been effective at reducing negative visitor impacts throughout most of the dune ecosystem (Kuehn, 2007).

Once focus areas are determined to be viable a more detailed assessment is made to:

- Identify ecological attributes
- Select indicators for each attribute
- Build a rating scale for each indicator
- Determine the current status and desired future status of each attribute
- Record issues, gaps in knowledge, or assumptions

Ecological attributes describe a characteristic of the focus area that is critical to the long-term viability of the focus area. For example, community architecture is an attribute associated with wetlands. A change in community architecture will have a direct impact on the function of the wetlands, with an extreme case where the wetlands areas are highly restricted in extent and frequency. Indicators are used to assess the attribute over time, thus they are measurable. In an effort to keep socio-economic considerations in the forefront, attributes may also have socio-economic indicators that represent the local economic interest that depends upon the attribute or focus area. See Table 8 for an example.

This part of the process should involve several iterations in order to come up with effective attributes and indicators. Some measures and goals may need to remain qualitative until data gaps are closed and or/collection protocols are defined. Thus the assessment does not necessarily have to be complete in order to move on to the next steps of the process.

**Table 8. Viability Assessment for Barrier Dune/Wetland Complex
(Adapted from LaMP-based Biodiversity Conservation Strategy for Lake Ontario)**

Key Attribute	Indicator	Indicator Ratings				Current Rating
		Poor	Fair	Good	Very Good	
Connectivity among communities & ecosystems	Adjacent land use/% natural cover (replaces # barriers)	<40% natural cover	40 - 60% natural cover	60 - 80% natural cover	80%+ natural cover	
	# of seasonal park visitors	< 25% of target level	25-50% of target level	50-75% of target level	>75% of target level	
Water Quality (nutrient concentrations, water turbidity, temperature, conductivity...)	Water Quality Index (WQI) for wetland quality	WQI of -3 to -1	WQI of -1 to 0	WQI of 0 to 1	WQI of 1 to 3	Fair
Community architecture	Area of wet meadow/meadow marsh	Wet meadows highly restricted in extent / frequency	Wet meadows extent and frequency restricted	Moderate amount of wet meadows	Extensive wet meadows in response to low lake levels in growing season	Poor
Fish habitat quality	Wetland Fish Index (WFI) of wetland quality	WFI of -3 to -1	WFI of -1 to 0	WFI of 0 to 1	WFI of 1 to 3	Fair
Size / extent of characteristic communities / ecosystems	Total area of all wetlands	Majority of wetlands are <20 ha	Majority of wetlands are 20-200 ha	Majority of wetlands are 200-1500 ha	Majority of wetlands are >1500 ha	Fair
Abundance and diversity of recreational fisheries	Fish IBI	IBI of 0-33	IBI of 33-67	IBI of 67-100		Fair
	# of fishing licenses sold in region	< 25% of sustainable level	25-50% of sustainable level	50-75% of sustainable level	>75% of sustainable level	

3.3 Step 3: Identify Threats to Focus Areas

Threats are activities and processes that directly or indirectly degrade, destroy or impair systems represented by focus areas. Stresses are impaired aspects of focus area attributes that usually result from human activities (threats). An assessment of threats provides an opportunity to prioritize management efforts and implement actions that will be most cost-effective. Perceived threats may need to be assessed to determine their validity in order to maintain a strong scientific basis for decision making and monitoring. Thus an explanation and description of each threat is included in the EBM plan. Threats must be well grounded and directly linked to stresses. The underlying causes (usually social, economic, political, institutional or cultural) that enable or otherwise contribute to the occurrence and/or persistence of threats or that represent opportunities to reduce direct threats will be considered in Step 4: Conduct Situation Analyses.

- **Public Involvement:** Once the focus areas are assessed and associated threats and stresses are identified, make a summary report available to the public. Allow time for them to comment. The Core Working Group will then review the comments and revise the assessment as needed.

Threats to the Sandy Creeks Watersheds Ecosystem

Based on comments from participants during the 2007 stakeholder initiative concerning what was important to them and what changes they had observed, potential threats were identified. The responses may be grouped into three overall categories (EcoLogic 2007):

- a) development pressure (loss of farmland, rural character and open space; rural/urban conflicts);
- b) lack of funds for infrastructure (camps with rustic septic “systems”, failing wastewater systems, and drinking water quality); and
- c) incompatible lake level management (water level to serve shipping industry or shoreline habitat health).

Impacts to native species by invasive species were also broadly reported as a threat.

During the situation analysis (Step 4), more threats may be identified and it may become apparent that some threats affect more than one focus area. Thus, it may be helpful to summarize the threats in a table like Table 9 to track the overall effects of threats on all of the focus areas. Once the table is populated, it can be used to prioritize actions associated with the threats that affect the greatest array of attributes. Table 9 is only partially populated, showing representation from the barrier dune/wetland complex example used earlier in this document.

Table 9. Summary: Threats and Associated Threat Level per Focus Area

Focus Areas Threats	Barrier Dune/Wetland Complex	Streams	Beech-Maple Mesic Forest	Rural Character
Riparian Buffer Encroachment	Low			
Untreated Surface and Wastewater	Medium			
Inc. Demand for Resid., Comm., & Ind. landuse	Medium			
Impervious Surface Development	Low			
Recreational Use	High			
Excessive Herbivory	Low			
Global Warming	Low			
Invasive Species	Medium			

3.4 Step 4: Situation Analyses

This is a complex step in the EBM process where each focus area and associated stresses and threats are scrutinized within a given geographical context in order to establish and understand linkages among biological issues and human activities and processes. The purpose of analyzing each focus area is to uncover the root causes of critical threats for each focus area and identify strategies that will change activities and processes in a way that abates the associated threat, relieves stresses and contributes to healthy systems (focus areas). Helpful questions for this step include:

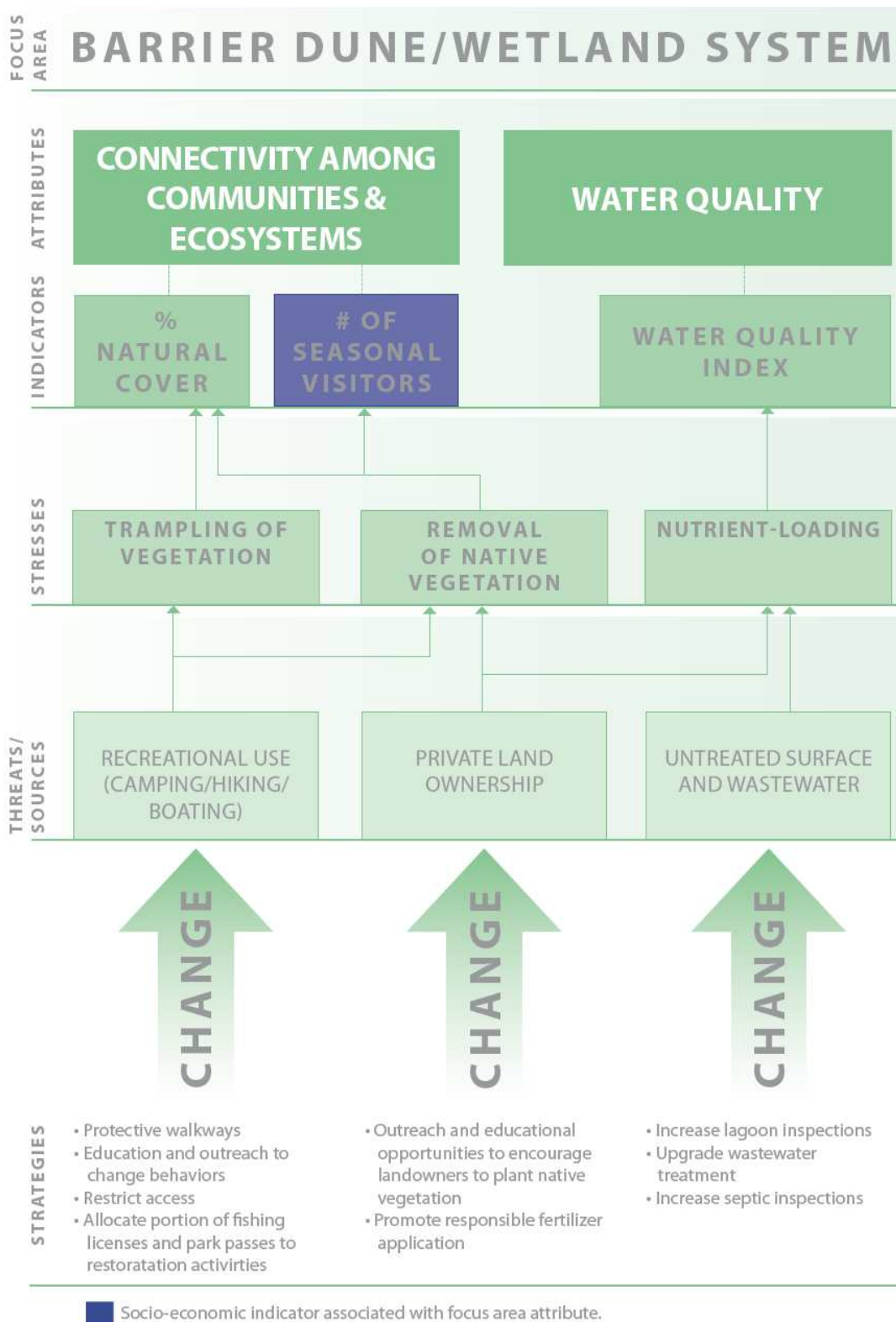
- “What is causing the threat to exist?”
- “Who are the key stakeholders linked to each of these factors?”

The challenge is to make the logic behind connections explicit without spending too much time trying to develop a perfect model of reality. In many ways, it is the process of discussing the

situation that is more important than the product, which is typically a systems diagram that captures the discussion. As analyses are conducted, threats and strategies can be compared among focus areas to identify correlations and synergies. A very basic Situation Analyses is illustrated in Figure 2. The CAP process offers a much more detailed approach and should be reviewed.

- **Public Outreach:** The Core Team will have conducted the situation analyses and public review will provide assurance that basic assumptions made during the analyses resonate with the larger community. Public meetings can be arranged depending on the appropriate geographical scale and location of focus areas. Additional strategies may surface and a greater understanding of connections among stakeholders and focus areas may be achieved.

Figure 2. Example Situation Analysis of Barrier Dune/Coastal Wetland Complex



3.5 Step 5: Develop and Implement Actions

The situation analysis is designed to produce a suite of strategies linked to measurable attributes which in turn are associated with qualitative and quantitative goals. The next step is to compare the strategies for each focus area and craft specific actions while avoiding direct negative impacts to any of the other focus areas or socio-economic systems. Examples can include practices to apply, guidance and tools to develop, incentives to implement, recognition of potential economic benefits and drawbacks of various implementation approaches and potential research. Again, sensitivity to scale will become apparent. For example, a regional level strategy can be to: protect water quality from land development activities. The ‘action’ may be to: require post-construction stormwater management for all new development. However, looking at a smaller scale, the post-construction requirements may vary depending on current conditions and proposed condition of various focus areas and attributes. Specifically, to promote redevelopment in urban cores, less stringent stormwater management requirements might be applied. Conversely, in areas with known rare, endangered or threatened species, criteria may be more stringent.

- **Public Involvement:** The Core Working Team will compile DRAFT actions associated with the strategies identified during the Situation Analyses. Public workshops should be held to provide stakeholders the opportunity comment on the actions before they are finalized.

3.6 Step 6: Adapt and Improve

Even though the initial planning process culminates in a list of actions designed to promote the health of the focus areas, management is inherently on-going. The indicators and monitoring protocols established during the planning process become the measuring sticks by which actions can be determined effective or ineffective. Again, scale becomes an issue, and will be important to consider when measuring the outcome of actions. Continuous looping through the EBM process steps will provide the framework for updating, learning and adapting the initial EBM Plan.

Monitoring is a critical piece in the EBM process in terms of collecting supporting data to facilitate continued analysis, providing supporting documentation to request funding, and to measure the effectiveness of plan implementation. Ultimately, an effective monitoring program includes both desktop tracking of key attributes and field based data collection. For specific recommendations see Section 7.2.2 Ecological Data Gaps and Future Monitoring and Section 7.2.3 Future Monitoring Efforts of the Sandy Creeks Watershed Baseline Conditions Report.

- **Public Involvement:** Continued communication with the public will be important to communicate the status of actions and monitoring. Regular reporting (1, 3 or 5 years) of status of attributes per watershed will keep people informed and included. Furthermore, stakeholder groups should remain in-tact to facilitate the implementation of actions, coordinate local education and outreach efforts, and review the reports that are an inherent part of adaptive management.

4.0 RECOMMENDATIONS

Ecosystem-based Management is a relatively new management strategy and will require people to adapt to the new planning principles and ultimately the goals of the Sandy Creeks EBM Plan. In order to adhere to the guidelines and meet the goals, individuals and organizations will need to build upon their abilities. The process of performing activities to improve an organization's ability to realize its goals is referred to as capacity building (Alliance). Basic capacity building activities that would assist the early stages of the EBM process include developing a stakeholder involvement and outreach program, adapting the institutional design, (including identifying opportunities for partnerships and collaboration), organizing information and outlining funding mechanisms. A significant amount of capacity building will be devoted to aligning data collection and management, program implementation and jurisdictional responsibilities within the bounds of the Watershed.

4.1 Stakeholder Involvement and Public Outreach

The stakeholder meetings of 2007 (facilitated by EcoLogic, Inc.) provided a beginning to the EBM public outreach program and the recommendations below stem largely from the feedback collected from them. As noted by EcoLogic, the group was unfamiliar with the term Ecosystem-based management, however, their visions and suggestions were congruent with the concept. Comments from the meetings ranged from eagerness for supporting efforts to preserve the natural resources and local way of life to doubt in the face of reaching consensus among a diverse collection of interests and getting agencies aligned to support local efforts in a cooperative manner. There was overall agreement that a grassroots, education based approach, similar to the one used by the Dune Coalition is preferred over a top-down, regulatory approach although some regulatory control may be needed for some management issues. The following recommendations are largely based on EcoLogic's Stakeholder Outreach Report.

- Future stakeholder involvement will need to build on the initial group of participants. Assessing invitation and attendee lists to determine strategies for increasing participation and representation is needed to ensure a balanced assessment of interests and concerns throughout the watersheds. Direct a concerted effort at the local level to produce a master list of organizations, contact information and general range of interest or mission. A spatial representation would be helpful to understand representation across the entire project area.
- Investigate low turn-out at the Business Focus Group meeting. Representation from the business sector is critical in fully including socio-economic elements into situation analyses.
- Continue to publish and distribute the *Sandy Creeks Ecosystem-based Management Initiative* newsletter (The Tug Hill Commission). Develop a webpage devoted to Sandy Creeks EBM Planning. Other communication tools to use throughout the planning process (identified as most effective by the stakeholders) include; articles in the newspaper, e-mail, snail mail, town meetings and briefings with local boards and councils.
- Empower local governments to be responsive to the stakeholders.

- Incorporate the specific concerns revealed during the 2007 meetings into the adopted measures and targets for success as developed during the EBM planning process.
- Integrate the stakeholder community into the natural resource inventory stage of the EBM planning process to incorporate site-specific data and knowledge.
- EBM management plan should explicitly include indicators and goals to address the impacts of development/human population on the rural character.
- Stakeholders must remain convinced that their input is desired and fully considered by decision makers.

Additional recommendations for managing a successful stakeholder involvement and public outreach program include:

- The process and discussions are as important, if not more, than the product. The dialogue opens up opportunities for understanding, and new ways of thinking and working together.
- Appoint a neutral person or group of people to facilitate meetings.
- Conduct an open process by taking the time to distribute information, draft reports and summaries of meeting products to the public in a timely manner. All meetings should be open to the public.
- Actively engage all sectors (full range of economic, social and environmental concerns and values) of the community such that time is taken to discover why a particular group is not participating followed by alternative outreach methods.
- Resolve conflicts with generosity, compassion and clear understanding.
- Exercise fairness.

4.2 Institutional Design

The institutions such as governance structure and, policies and programs will need to undergo a transition to support the principles and goals of EBM. Adjusting the institutional design is often the most challenging aspect of implementing EBM, furthermore, the multi-jurisdictional nature of watershed planning requires cooperation and coordination among numerous agencies and departments. In order to identify the potential for reform, a complete review of the current programs and laws that influence the management of natural resources and socio-economic systems of Sandy Creeks Watershed should be conducted. The review should also include recommendations for revising current programs and laws to support EBM planning. Local organizations should also be identified and their efforts cross-checked with government programs to highlight opportunities for coordination and collaboration.

In the short-term, interim working arrangements ranging from informal handshakes to formal protocols may be needed to support initial EBM efforts. A common formal mechanism is a protocol or memorandum of understanding that clarifies commitments among relevant parties (Coast Information Team).

4.3 Data Management

The Baseline Report provides a detailed review of existing data. The data was collected from a variety of sources, at a variety of scales and in varying degrees of usefulness. Determining a central repository for GIS data, reports and socio-economic data is a critical first step. A concerted effort is needed to establish protocols for recording metadata that includes information on: identification reference, data quality, data organization, spatial reference, entity attributes, and distribution. Data should be organized according to scale to assist with tracking watershed-wide, sub watershed and focus area strategic actions. Maintaining and organized collection of high quality data is one of the EBM principles and it is necessary for making sound decisions.

4.4 Data Needs

As noted at the end of Section 3.1, the results of the 2007 Stakeholder Meetings and the Baseline Report were organized to determine the top issues. While these issues seem to be the most prominent at this point, significant research and data collection needs to be conducted to provide the scientific foundation that would support raising any of the issues above others. Furthermore, the issues are presented in general terms due to the lack of specific data to support more detail. A summary of the top issues are listed below.

- Watershed-wide Ecological Indicators: Establish monitoring program to measure changes in effective imperviousness, stream road crossings, and road length.
- Barrier Dune and Coastal Wetland Complexes: Continue efforts to protect them while allowing for public access.
- Forests: Maintain large contiguous blocks and protect headwaters.
- Streams: Manage the landscape to support high water quality.
- Rural Landscape: Protect the natural resource based socio-economic structure.

The following recommendations for filling ecological data gaps will provide a more accurate understanding of overall conditions throughout the watershed and will ultimately set up the foundation for measuring change at the watershed and subwatershed level. Furthermore, the information will most likely inform more specific issues than the ones listed above.

- Comprehensive hydrologic information for each subwatershed, including in-channel flows, and surface and groundwater flows.
- Location and performance of existing stormwater management facilities (stormwater Best Management Practices [BMPs]).
- Location and documentation of industrial discharges into waterbodies.
- Primary sources of non-point source pollution into stream networks.

- An inventory and hydraulic / ecological performance rating of road crossings.
- Comprehensive physical and biological stream conditions data for all perennial stream networks in the study area. The current datasets include measurements at specific locations in the stream network, some areas are well-documented; others are completely unsurveyed.
- Condition of the riparian buffer along stream networks. This has been noted in some locations by Biohabitats field observations.
- Location and condition of floodplains.
- Distribution of invasive species across the subwatersheds.
- Specific inventories of avian, terrestrial, and aquatic communities supported by habitats in the Sandy Creeks Watersheds.
- Historical ecological data: what types of habitats and natural communities did these areas support pre-disturbance? Useful to identify reference conditions and conservation targets.

In addition to ecological data needs, there is also a need to pursue robust and useful socio-economic datasets. The various economic analyses conducted as part of the Baseline Conditions Report each have their own limitations. In general, however, they will provide a useful starting point to continue looking at trends into the future, as they are relatively simple to reproduce and the core data sets are readily available. Updating the analyses on a five-year interval should be sufficient to provide basic trend information for the various indicators. Specific opportunities to take advantage of include:

- *Demographic data* – As time goes by and new policies are instituted, local officials can track what happens to the demographic data points as a result. Key indicators of the economic effects of changes to the watershed could be observed in the age distribution and especially income distribution data tables.
- *Employment data* – It may be helpful to obtain from NYS Department of Labor a special run of aggregated Quarterly Census of Employment and Wages (QCEW) data at the 3-digit NAICS level for all the towns in the Watershed. That way, trends in employment and an associated LQ analysis at a more detailed level could be tracked over time. This would be useful in identifying key industries that should be targeted for retention efforts or potential growth industries that should be targeted for attraction to the area.
- *Tax parcel data* – Beginning a trend line measuring changes in land use and land values over time for the overall Sandy Creeks Watershed, as well as for each sub-watershed, would be useful to help understand the impact that environmental or other policies have on the economy.
- *Agricultural sector data* – Data on agricultural sector employment and annual production within the Sandy Creeks Watershed alone is not currently available, but would be beneficial in the context of the EBM Strategy. Potential data sources include Cornell Cooperative Extension Service, Northern NY Agriculture Development Program and

the NY State Department of Agriculture and Markets.

- *Forestry sector data* – Data on employment and annual production in the forestry sector within the Sandy Creeks Watershed alone is not currently available, but would also be useful in the context of the EBM Strategy. Potential data sources include the Empire State Forest Products Association and the NY State Department of Agriculture and Markets.
- *Tourism sector data* – Although there is a good deal of data available at the county and broader regional level to measure changes in the tourism industry over time, it is not possible to separate out data for the municipalities in the Sandy Creeks Watershed. It may be worthwhile to work with state and county entities that currently collect tourism-related data to explore the possibility of separating these data out for the Sandy Creeks Watershed. In addition, the number of hunting and fishing licenses, as well as snowmobile registrations, would be other data points that would illustrate changes in tourism and recreation over time. It could be helpful to request that people applying for these licenses and registration fill out a very short questionnaire regarding their typical spending habits and other types of activity they engage in while in the Watershed.

(excerpted from the 2007 Sandy Creeks Watersheds Baseline Conditions Report)

4.5 Research and Monitoring

Per the Baseline Report, the only formal monitoring effort in the Sandy Creeks Watershed is the NY Department of Environmental Conservation Rotating Integrated Basin Studies (RIBS) portion of the Statewide Waters Monitoring Program. The RIBS monitoring program includes a habitat and macro invertebrate assessment that allows comparative water quality of Lake Ontario tributaries. The Baseline Report includes recommendations for an expanded and more detailed monitoring effort to support a more comprehensive assessment of ecological and socio-economic trends. At the local level, a list of local monitoring efforts should be compiled and reviewed to; determine the feasibility of increasing them to a watershed-wide capacity and determine whether they provide information that can be used to assist with assessing the preliminary list of focus areas.

The determination of appropriate ecological data monitoring programs should be dictated by the types of data required to inform EBM strategy development - defined by agreed upon indicators of watershed condition. To a certain extent, the ecological and socio-economic indicators that are chosen to reflect watershed condition may be influenced by the datasets that are readily available, or the degree of effort that must occur to launch an effective monitoring program.

Future data collection efforts should:

- Establish a series of data collection protocols which can be replicated and practiced throughout the study area at spatially and temporally relevant intervals. This will allow comparable analyses of this data to be performed.
- Identify ecological and socio-economic indicators that have robust literature support for their use as effective indicators of watershed and market sector health.
- Establish regular monitoring intervals in which to collect data. This will allow trends to be established and responses to Ecosystem-based Management actions to be determined.

- Use GIS-based tools to manage, analyze, and retrieve the data. The database power and geospatial capabilities of GIS make it one of the most valuable tools available to the EBM planning efforts for the Sandy Creeks Watersheds.

4.6 Funding

Securing adequate funding for EBM efforts was included in the comments received from the 2007 stakeholder meetings. Funding sources typically include state earmarks, federal and state grants, corporate partnerships and user fees. One suggestion from the stakeholders included using revenue from state forests located in the Sandy Creeks Watershed to fund Watershed EBM efforts. Region 2 of the Environmental Protection Agency (EPA) includes New York and administers a whole host of grants designed to assist local communities with cleaning up their environment. The grants include, but are not limited to; Environmental Education and Youth Programs, Pollution Prevention and Wetlands. Watersheds that are part of the Great Lakes are eligible for Great Lakes Grants also administered by the EPA.

In addition to providing grants, the EPA created Environmental Finance Center Network. The Finance Center Network includes nine Environmental Finance Centers (EFCs), one of which is located at Syracuse University in the Center of Excellence in Environmental and Energy Systems. The EFCs provide state and local officials and small businesses with advisory services; education, publications, and training; technical assistance; and analyses on financing alternatives. The network of Finance Centers uses collaboration at the national level to assist with local implementation. Thus, the individual Centers offer national, regional and local tools and services to local environmental efforts (EPA). The Environmental Center at Syracuse is designed to assist environmental planning initiatives like the Sandy Creeks EBM process.

4.7 Near Term Actions

The recommendations above are primarily focused on setting the stage for effective EBM planning, however not everything has to be in place before actions can take place. It is important to keep the momentum moving to keep stakeholders engaged. When asked to identify specific projects that they would support, participants in the 2007 stakeholder initiative offered the following:

- Integrated trails and creek walks
- Low-interest revolving loan fund for farmers to implement best management practices
- Investment in wastewater collection and treatment infrastructure
- Permit system for hunting on private agricultural lands
- Alternative energy opportunities such as a willow biomass plant.
- New bridges over streams in areas used for recreation, perhaps in the context of a citizen conservation corps initiative

The list provides a starting point for investigating the potential for, and implications of, locally driven interests. By taking a few small steps on one or a few of the suggested actions will not only keep constituents engaged, but will also inform the EBM process.

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