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Assessing the Ecosystem Management Program of St. Lawrence Islands National Park, Ontario, Canada

In Ontario, Parks Canada has five national parks, one marine (freshwater) national park, and two multi-watershed recreational waterways at which ecosystem management programs have been initiated (Stephenson 1995). In each case the approach was to assess the in-place natural resources conservation program and optimize its use, while redesigning it to refect ecosystem management concepts. Generally, this meant re-orienting from an isolated, "special place," set-aside mind-set to one which included the surrounding natural systems and the human communities within them. This approach was supported by changes to Canada's National Parks Act (Government of Canada 1989) that included the need for ecosystem management and the requirement to maintain or enhance ecological integrity.

While the information available in textbooks (Meffe and Carroll 1994; Primack 1993; Agee and Johnson 1988), case studies (Yaffee 1996; McKenzie 1996), and papers (Christensen et al. 1996) related to the role of protected areas in creating a more sustainable society is growing, four basic ideas greatly influenced the development of Parks Canada's ecosystem management program at federal protected areas in the province of Ontario.

- Ecosystems can be manipulated to meet human needs or else human needs can be adapted to better correspond to ecosystem needs. The former is characteristically production-oriented, with activities under a single jurisdiction, and decision making is exclusively science-dominated with comparatively simple objectives. The latter tends to address human-biosphere relationships in an inclusive multi-partner fashion, where science is just one decision-making factor in a more complex set of objectives.

- In order to contribute as much as possible to changing current human behaviour, protected areas must play an active role towards creating a more sustainable future society. Figure 1 outlines the connection between the major goals (United Nations Conference on Environment and Development 1993; Government of Canada 1995) of a more sustainable society, which include biodiversity conservation and essential in-situ conservation by protected areas whose design (both individually and within a system) form a conservation-based land use mosaic that is a tangible step towards sustainability.

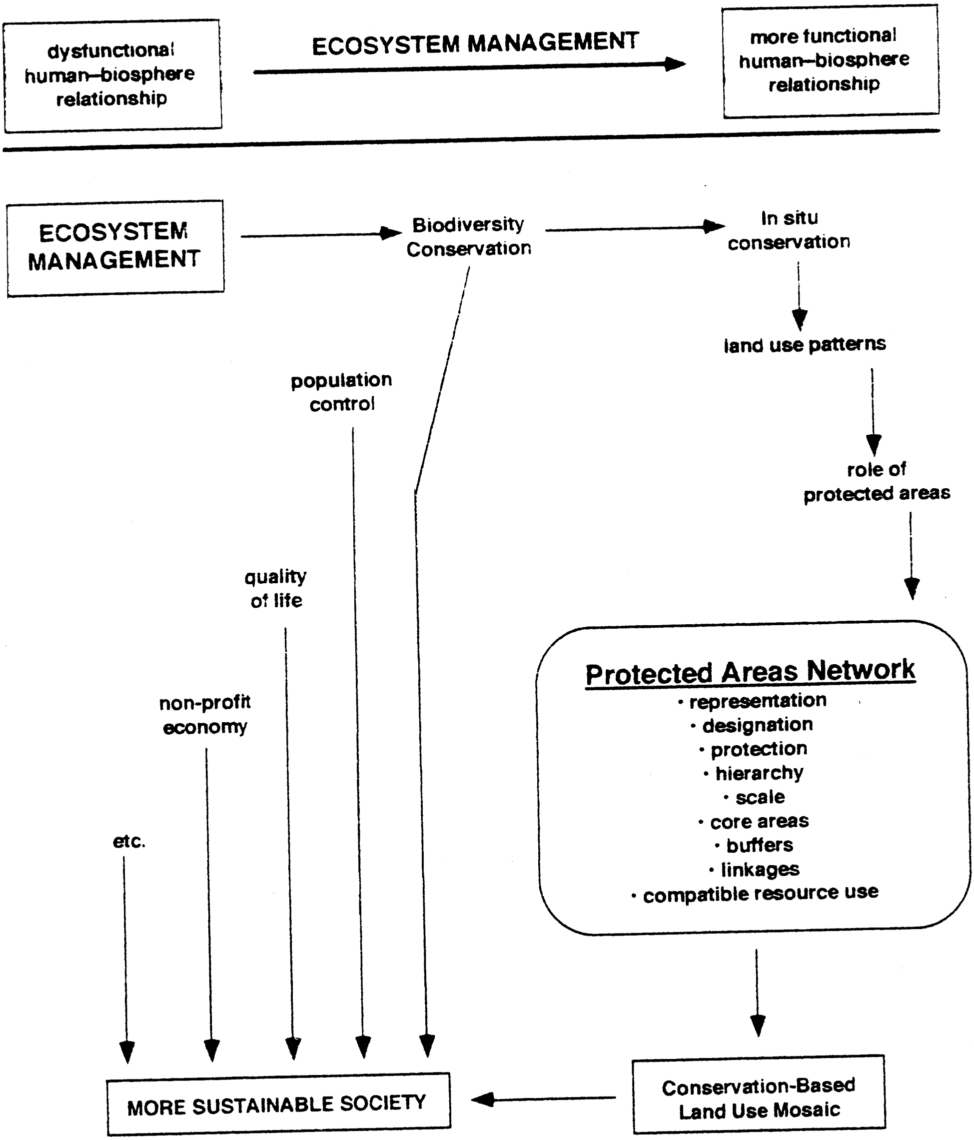

Figure 1. The connection between ecosystem management and a more sustainable society.

- Protected areas of all varieties must form a linked, buffered, spatial hierarchy and network from local to macro-landscape lands.
- Ecological integrity is not an obsolute condition and is related to ecological health through scale. The core protected areas in the hierarchical network should be managed for the highest possible ecological integrity and other land-use categories less so, with the broad goal being that the overall mosaic sustains ecological health.

These basic ideas, substantiated by many others (Noss and Cooperrider 1994), lead to the modern protected area paradigm. In summary: "Secure high-quality viable protected areas should be the core of a hierarchically connected representative network including satellite natural areas, linkages, and compatible surrounding land (and water) uses. This network would be designed as part of a planned land use mosaic and, along with contributions from agricultural forestry, and human settlement lands, would ensure in situ biodiversity conservation" (Stephenson 1994).

Grumbine's (1994) characterization of protected area ecosystem management programs—ecological boundaries, ecological integrity, conservation information, monitoring, working with others, adaptive management, organizational change, humans integrated as part of nature, and social values—directed our efforts. The insights into how protected area ecosystems could be managed from new scientific fields like restoration ecology, conservation biology, and landscape ecology generated a wide range of projects, plans, and partnerships.

By 1994 a pattern of key ecosystem management activities began to emerge, and by 1995 the major documents that summarized direction and results became clear. It also became more necessary to demonstrate tangible progress to Parks Canada's management as organizational changes and severe budget constraints (not unknown elsewhere, of course) became decisive factors—even though ecosystem management program was, and continues to be, a low-investment initiative.

In spring 1996 we formally identified 11 ecosystem management products. Six were categorized within a planning framework and five within a technical framework. These were each characterized each in terms of status and essential content (Table 1). We undertook an assessment of our progress towards protected area ecosystem management at all eight of the Parks Canada locations in Ontario. A sample of the recording form used during the evaluation is given in Figure 2. A synthesis was prepared for each protected area focusing on areas or directions where progress has been weak, potential to achieve more exists, or substantial ongoing effort is needed to ensure that achievements continue as well identifying as specific projects (often transferred from park to park). Each time the assessment was performed the content requirements were refined and, collectively, a twelfth component, "Human Dimensions" (Decker et al. 1996; Ewart 1996; U.S. Department of Agriculture–Forest Service 1994), is under consideration as part of the technical framework. Protected areas ecosystem management is "a work in progress" and this is reflected in the assessment procedure and the way it is reported to Parks Canada's management.

The result is that Grumbine's (1994) characteristics were transformed into more pragmatic, tangible demonstration of how to implement ecosystem management (Zorn et al. 1997). A description of the ecosystem management program assessment used in Ontario's national parks and recreational waterways, illustrated with examples from St. Lawrence Islands National Park, follows.

Ecosystem Management Program Assessment

As we have noted, there are 11 components to the assessment. They are described below, in an order that makes for logical presentation. More information about the activities or internal reports used to illustrate each example, and on the essential contents of each component, can be obtained by contacting either author, since the specifics offered here only highlight the work undertaken.

Ecosystem Conservation Plan. As the major synthesis and summary document used to present the entire ecosystem management concept and determine practice for a given park, it is essential that the Ecosystem Conservation Plan be done with partners. Because of its complexity, usually only those interests with scientific capabilities and jurisdictional control are invited. At St. Lawrence Islands National Park, education and acceptance of a national park role beyond its boundaries was the first focus of the group. Once the participatory rather than pre-emptive nature of a federal government-led exercise was understood, roles, goals, generic tasks, and activities flowed readily and communications beyond the groups began.

Table 1. Ecosystem management program products

Planning Framework	Technical Framework
• Ecosystem Conservation Plan	• Greater Park Ecosystem (GPE)
• Area of Cooperation	• GPE Inventory and Analysis
• Stakeholder Analysis	• Scientific Research Program
• Ecosystem Management Partnership Groups	• Ecological Integrity Indicators
• Information Network	• Ecological Integrity Monitoring Program
• Communication Strategy	

Product available for evaluation?

Progress Achieved	**Evaluation Criteria**	**Comment**
(5) Complete / Formal Program On-Going	1. Data storage issues (e.g., location, funding, maintenance, capacity)	
(4) In Progress with Specific Tasks and Completion Dates	2. Compatibility with partner agencies' databases	
(3) Listed in Work Plans (or ECP) with Tentative Funding Allocations	3. Quality control / assurance.	
(2) Planned with Five-Year Time Horizon	4. Information dissemination.	
(1) Planned Beyond Five-Year Time Horizon		
(0) Not Planned		
Progress Evaluation (5)		Content Evaluation (/5)
		Total Product Evaluation (/10)
COMMENTS		

Figure 2. Sample recording form.

After a great deal of discussion a satisfactory document was produced. The park representatives were then able to develop general timeliness and participation costs which were presented and approved by management. Unfortunately, it was necessary to integrate more specific information about ecological integrity monitoring as this work was carried out in parallel. Resubmission of a more expensive program is likely to cause some concern among managers. The partner participants have all become involved (often as leaders with other program components) but remain available as an informal overall focus group.

Greater Park Ecosystem. Activities in this topic have been the most significant in driving ecosystem management because they provided a new, improved definition of what the park is all about. A series of island and island fragments in the Thousand Islands part of the St. Lawrence River, the park was regarded primarily as a docking facility for boaters and was considered rather insignificant as a representative national park. However, when conservation biology and landscape ecology concepts were applied, the park's importance was revealed and embraced by both its staff and its partners. First, the Frontenac Axis, a geological feature that joins the Canadian Shield and the Adirondack Mountains (and in fact forms the islands where the St. Lawrence cuts across it), was identified. It is a macro-landscape corridor feature, and is clearly the best remaining location for north–south biotic movement. At either end of the formation are Algonquin Provincial Park (Ontario) and Adirondack State Park (New York), the two largest protected areas in northeastern North America, with St. Lawrence Islands National Park straddling the major corridor barrier—the river and the human disturbance along it (Figure 3). This establishes a biogeographic context and large-scale linkage, while closer to the river itself a Greater Park Ecosystem, or GPE (a set of watersheds encompassing the islands on both the Canadian and U.S. sides; Figure 4), was identified. The role of the park in its GPE is to facilitate continued ecological functioning of the Frontenac Axis. The reasoning behind this re-definition of the park is being documented (Zorn 1997) using an approach adopted from the protected area boundary-setting literature (Grigoriew et al. 1985). The hierarchy characteristic of protected area ecosystem management has definitely been achieved.

Area of Cooperation. Obviously, the identification of the GPE within the Frontenac Axis allowed identification of an Area of Cooperation at two scales. At the scale of the Axis, the park catalysed interest in an Algonquin-to-Adirondack ("A2A") Conservation Corridor initiative by publicizing the role of the Axis and hosting an international Frontenac Research Needs Symposium at which keynote speakers addressed the idea and current research was reviewed to determine useful directions. This initiative is now a project of the Canadian Parks and Wilderness Society which has (with some Parks Canada support) created its own international group of partners, including provincial and state biologists, academic representatives from all three parks, the New England Wolf Recovery Team, and the Wildlands Project, among others. A proposal document (Keddy 1995) organizing workshops, consensus-based vision exercises, various communications, scientific projects, and fundraising have been started. This Conservation Corridor may have the same impact in the East as the Yellowstone-to-Yukon ("Y2Y") Corridor has had in the West.

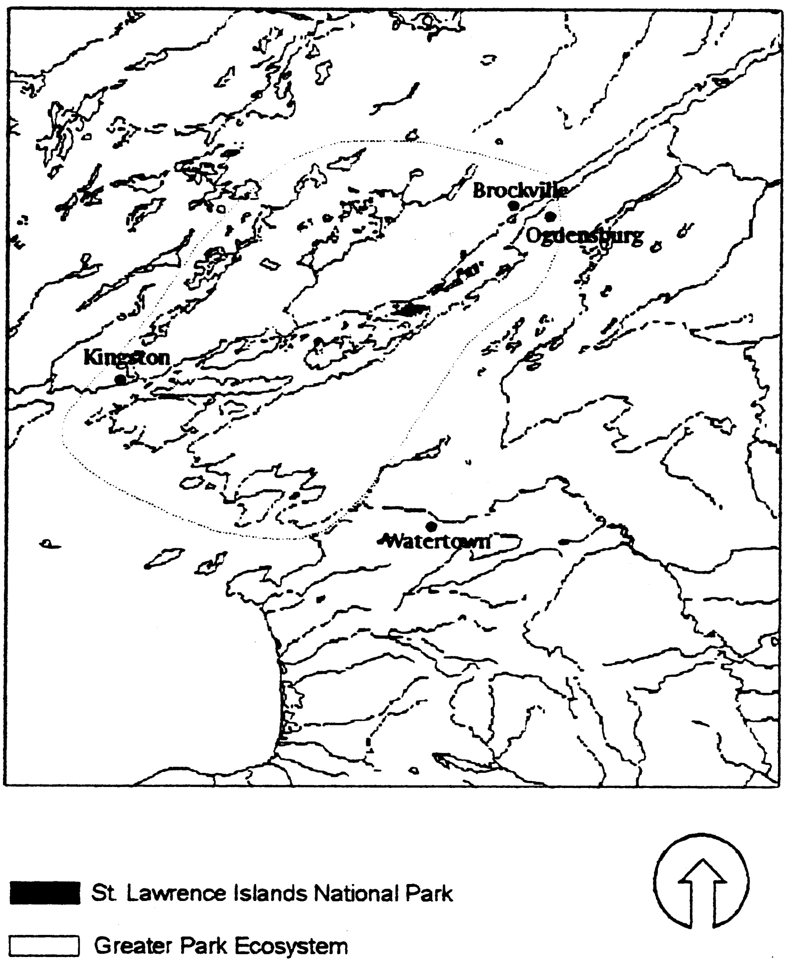

Figure 3. St. Lawrence Islands National Park Greater Ecocsystem.

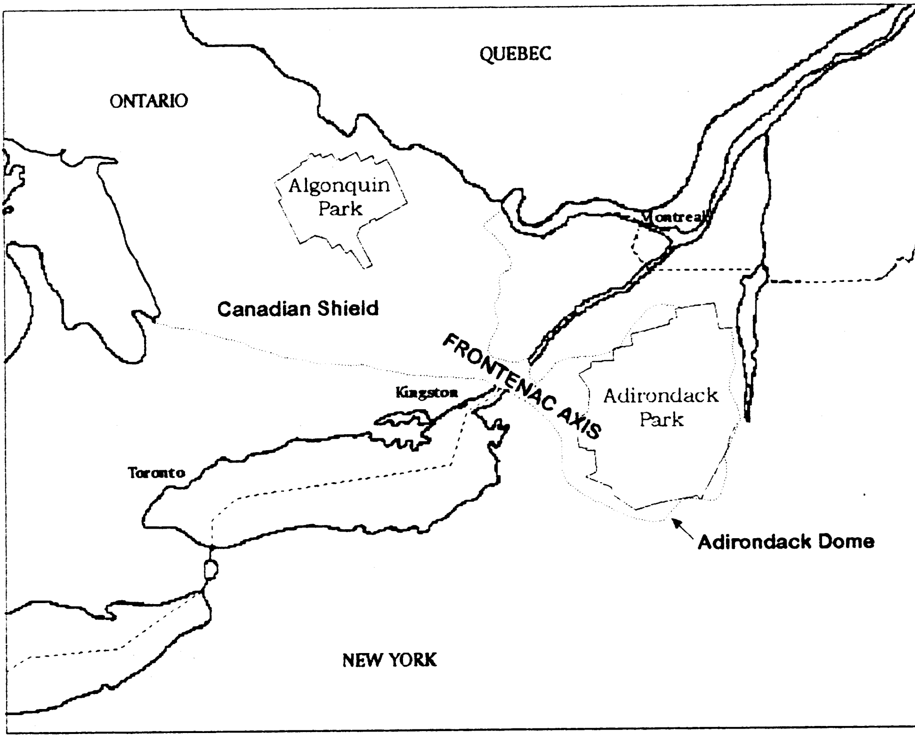

Figure 4. Frontenac Axis and its regional context.

Within the GPE, the park has taken a lead role with townships (Ontario) and counties (New York), state and provincial parks found along the river, existing multi-interest groups oriented to improving the health of the St. Lawrence River, U.S. and Canadian land trusts, and others. Difficulties in spanning topics from data management to the quality of conservation land use and community values has meant that several sub-groups have been established (these are mentioned elsewhere). Overall, however, multi-partner cooperation has moved forward in a fashion that enhances ecosystem management.

Stakeholder Analysis. Stakeholder analysis is not a formal activity at Parks Canada except in the sense of assessing park visitors for interpretive targeting and expenditure estimates for tourism purposes. Extensive informal knowledge exists through the experience of park staff who live in and are a part of the local community. This expertise has been drawn upon throughout the ecosystem management program. The ecosystem conservation plan and the area of cooperation, for example, have expanded this knowledge.

It has become clear, however, that it is necessary to create greater receptivity to the benefits of conservation-oriented land use decision-making in the community. Critical in this process is a more sophisticated understanding of what is typically referred to as "human dimensions," including local governance mechanisms, current knowledge and values, and predictive economic models. This need has been recognized in all Ontario national parks, so an integrated program to gather and use this information has been proposed to management. As noted above, a new ecosystem management program component will result, and stakeholder analysis will become more formalized over the next three to five years.

Ecosystem Management Partnership Groups. As noted under "Area of Cooperation," at the scale of the Algonquin-to-Adirondack Conservation Corridor other partners have taken the lead using established large-scale organization skills. In the GPE two important partner groups have been established.

The park drew together all the agencies and interests (on both sides of the border) that held databases with the objective of establishing a common, accessible, updatable electronic Geographic Information System database. This group is called FASTLINE (Frontenac Axis St. Lawrence Information). Assembly of the information—including scale, quality assurance and quality control concerns, access, and liability concerns—has been successful. The co-operation of the Queen's University GIS Laboratory was instrumental. Updating issues remain unresolved, and there is a strong (and, it is to be hoped, residual) reluctance to undertake analyses within the GPE (e.g., GAP analyses leading to a land use proposal). In the latter case, it is noteworthy that local governments (townships in Canada, counties in New York) are very weak, being without full-time planners, and are not adequately represented in the group. As a simple data-sharing initiative, there has been considerable success.

The other international group is called the Thousand Islands Vision Group, which has developed from a tourism sub-committee of government and business interests (the "decision-maker" market) to include alternative forms of governance in the GPE. This group has held two workshops on the biosphere reserve concept and the implications of the local geography. Speakers from Canada's Man and the Biosphere Program and the Southern Appalachian Biosphere Reserve have participated in the discussion group, and a vision document for the region expressing the conservation option is in preparation. This group is easily distracted by immediate tourism benefits, and sees the conservation option in this light. However, this is a very appropriate approach for this stakeholder group.

GPE Inventory. St. Lawrence Islands National Park already had an extensive GIS-based inventory, including such items as historical air photos (to 1924) and current interpreted American, French, and Russian satellite images. The highest data density was for park properties, but coverage of the GPE was strong due to the scattering of park properties throughout the Thousand Islands. The data-sharing group, FASTLINE, made a critical contribution by identifying and making virtually all the remaining existing information for the GPE available. At the scale of the Adirondack-to-Algonquin Conservation Corridor, the lead organization (the Canadian Parks and Wilderness Society) is also assembling a database, with that of FASTLINE making a major contribution.

Existing data does not constitute a comprehensive inventory by any means, but the results are better than average for similar areas in North America. Additional information will be systematically generated by priorities that come from ecological integrity analyses and associated research, but current information is sufficient for most conservation analyses if it is kept in mind that these are refined iteratively.

Ecological Integrity Indicators. The National Parks Act (1989) requirements to maintain or enhance ecological integrity means a suite of indicators measured hierarchically (the park within its GPE) against baselines and ecological standards is needed. This is particularly obvious for a fragmented national park such as St. Lawrence Islands.

The selection process was done in steps. First, all monitoring projects from any source in the GPE were identified. Second, they were analysed to see if they would contribute to evaluating the Ecosystem Conservation Plan goals and objectives, if they contributed to understanding stresses and stressors, and if they were cost-effective as well as communicable. Third, the most useful were entered on an ecological organization matrix developed from a definition of biodiversity (Noss 1990). Wherever a box in the matrix is empty, new monitoring needs to be designed.

With these steps completed (Leggo 1996), existing monitoring is being redesigned, and new monitoring, along with analyses and reporting mechanisms, are being developed within a variety of partnerships.

Scientific Research Program. Parks Canada does not have a formal research capability, but instead relies on limited capital funds, local opportunities, overlapping interests, and so forth to maintain a minimum of activity. Fostering useful research without stable support is an on-going challenge. FASTLINE, the Frontenac Axis Research Needs Symposium, the interest of academics in the Algonquin-to-Adirondacks Conservation Corridor, the identification of ecological integrity monitoring needs, and other park-originated communications (e.g., a catalogue of research needs) have already stimulated more and better research. The park has sponsored two MSc candidates, and several others working on conservation research can be found at local universities, both Canadian and American. The critical element is some form of shared financial support and a number of ideas are being considered. For the future, research capabilities beyond those previously existing seem assured.

Ecological Integrity Monitoring Program. The process outlined above under "Ecological Integrity Indicators" identified broad monitoring categories, including fragmentation–connectivity, disturbance patterns, species distribution across the St. Lawrence River, and important species for which genetic- through ecosystem-function information could be assembled.

A series of projects geared to priorities, the amount of funds available, and partner interests have been implemented to describe each indicator and its data requirements as well as the way analyses and reporting will be done. Those are all cooperative and involve credible scientists. Documenting this monitoring program results in new tasks, data files, and communication, all of which are being integrated into related ecosystem management program products. This is especially important in the case of the ecosystem conservation program which is used to seek management support. Reporting will occur in the ecosystem conservation plan, during park management plan reviews, and as part of the "State of the Parks" report required (every two years) by the National Parks Act (Government of Canada 1989), as well as a variety of local cooperative mechanisms.

Information Network. An introduction to FASTLINE was given above under "Ecosystem Management Partnership Groups." Obviously, this type of database-sharing involves numerous technical considerations. Its establishment and maintenance represent one of the largest financial investments in ecosystem management and at the same time it is one of the greatest factors creating multi-partner cooperation. FASTLINE called an organizational meeting, established sub-committees, and effectively used the capabilities of Parks Canada, a provincial land-management agency, and Queen's University to resolve concerns. It then held two longer (two-day) workshops where hard-copy maps were evaluated, new information identified, and, for those partners lacking adequate computer capability, ways to use the data determined. At present, about half the partners have direct access, and maintenance has devolved to St. Lawrence Islands National Park and the provincial agency which have GIS operator capabilities. Considering the importance of the information network, efforts to connect it to scientific research and ecological integrity monitoring as strongly as possible are being made. A third FASTLINE workshop was held in conjunction with the 4th St. Lawrence River Ecosystem Symposium (Potsdam, New York, April 1997) to publicize the database and seek additional partners.

Communication Strategy. Communications strategies are more formal at Parks Canada then stakeholder analyses but primarily focus on park visitors, particularly non-local residents and local school children. Sanctioned expansions of communications are currently geared to revenue and image concerns, but obviously the communication needs generated by the ecosystem management program are extensive and require organization for effective delivery. Initially, a communication plan (May 1994) was proposed which addressed the need to advocate the integrated land use needs of core protected areas and the benefits of conservation-oriented decision-making. The audience was primarily partners and potential partners rather than the community at large.

An upgraded communication plan is now scheduled for cooperative production and implementation. Interestingly, the organizational change characteristic of protected area eco-system management has come into play. Most partners, especially government agencies, have been severely cut back and are searching for "new ways of doing business." At St. Lawrence Islands National Park, this has meant that the interpretive function has been separated from facility management, revenue concerns, and recreation. It is now a part of the conservation section and ecosystem communications are now a distinct, funded, and staffed element on the parks organization chart. The future of targeted transfer of knowledge in a way that achieves community conservation-oriented decision-making is bright.

Conclusion

The results of the ecosystem management program at St. Lawrence Islands National Park (and other Ontario national parks) demonstrates the feasibility of restructuring existing in-park conservation programs to deal more effectively with implementing the modern protected area paradigm. The philosophy, theory, policies, and characteristics of ecosystem management can be brought together with existing protected area management practices to create a new management model. While it is not possible to name all the participants here, the understanding, acceptance of change, and commitment of staff at St. Lawrence Islands and their partners in the community are absolutely essential. Direction from "above," if you will, is not sufficient. The concepts must be grasped locally and translated into day-to-day reality. Sociocultural awareness, in order to create receptiveness in the community, is as important as good scientific information. The ecosystem management program developed by Parks Canada-Ontario with its planning and technical components helps do this.

This model—with tailoring and refinement to local opportunities and circumstances—is recommended for any protected area that is considering (or that has already embarked) on ecosystem management. In this way, the modern protected area paradigm can replace the old, and the path to a more sustainable future be made clearer.

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