

EVALUATION OF MANAGEMENT EFFECTIVENESS AT THE SAGUENAY–ST.
LAWRENCE MARINE PARK, QUÉBEC, CANADA : A CASE STUDY

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SUMMARY

The IUCN World Commission on Protected Areas (WCPA) Marine, the World Wide Fund for Nature (WWF) and the National Oceanic and Atmospheric Administration (NOAA), with the support of the Commission for Environmental Cooperation (CEC) and other organizations, developed a tool to assess and monitor management effectiveness of marine protected areas (MPAs). This type of performance evaluation aims to help managers demonstrate and monitor long-term positive impacts of marine protected areas on biodiversity as well as on the well being of local human communities. The implementation of this approach has been field tested world-wide in eighteen MPAs, the majority of which are located in tropical or subtropical environments. Saguenay–St. Lawrence Marine Park is one of three high-latitude pilot sites and we wish to report on results of this management effectiveness evaluation study.

The 1,138 km² Saguenay–St. Lawrence Marine Park consists of a large estuary linked to a deep inland fjord. A strong upwelling of nutrient-rich arctic water favours a very high concentration of euphausiids, one of the basic links of the marine food chain. A resident population of endangered beluga whales as well as summer visiting minke, fin and blue whales, are major components of the ecosystem. Multiple uses of the MPA comprise, among other activities, commercial and recreational fishing, scientific research, commercial navigation, a strong whale watching industry as well as various recreational activities such as kayaking and scuba diving.

To implement MPA management effectiveness initiative the following activities will take place: 1) formation of a work group composed of MPA managers and professionals, 2) detailed review of MPA goals and objectives and selection of a number of indicators permitting to monitor biophysical, socioeconomic as well as governance aspects of the MPA, 3) development of an indicators measurement workplan, 4) collection, analysis and reporting of data, and 5) review of draft Guidebook.

1. Introduction

MPAs are being subjected to increasing anthropogenic pressures and many of them, particularly in developing countries, are finding it difficult to meet their management objectives¹. To address this problem, an international effort under the leadership of IUCN World Commission on Protected Areas (WCPA) Marine, the World Wide Fund for Nature (WWF) and the National Oceanic and Atmospheric Administration (NOAA), has developed

a methodology and a set of 42 biophysical, socioeconomic and governance indicators to help MPAs assess their management effectiveness². Eighteen pilot site MPAs, including Saguenay–St. Lawrence Marine Park (SSLMP), are currently field-testing the implementation of this Management Effectiveness Initiative (MEI) in different contexts. We wish to report here on the possible application of this methodology at SSLMP.

This project is quite timely since Parks Canada is currently in the process of implementing, at every individual national park and MPA, a mandatory « Report on the State of the Park » which will include monitoring the protected area's ecological integrity using a host of biophysical indicators. In addition, the next generation of Parks Canada Management Plans will be built around « measurable » objectives which individual MPAs will need to monitor using various indicators. In that context, we wished to evaluate the pertinence of the set of 42 proposed MEI indicators and how they could relate to and be integrated into the SSLMP management activities.

2. Description and particularities of the Saguenay–St. Lawrence Marine Park

The majority of pilot sites are located in tropical or subtropical coral reef environments but Saguenay–St. Lawrence Marine Park, one of three high-latitude sites, is different in many aspects. Its physiographic setting is complex³, with an inland fjord, the Saguenay, characterised by sheer 450 m cliffs and 275 m deep basins, flowing into a vast estuary, the St. Lawrence Estuary. Hydrologic conditions are quite dynamic with the fast flowing fresh waters from the drainage basin meeting salt waters moving inwards from the Gulf of St. Lawrence and subjected to 4 m tides. An upwelling of glacial waters from the Gulf continually enriches surface waters with nutrients essential to phytoplankton growth, the basic link of an extremely rich food web.

Euphausiids (krill), the largest concentration in the Northwest Atlantic, as well as various fodder fish species (smelt, herring, capelin, etc.) are sought after by summer visiting whales

such as endangered blue whale, minke, fin and humpback whales. Also feeding on this bounty is the endangered resident population of beluga whales, the MPA's flagship species. Among the habitats of the SSLMP we can mention tidal mud flats, marshes, underwater cliffs, banks, etc.

Located at the crossroad of two major navigation routes, the SSLMP is the site of a large number of human activities, both recreational and commercial. While there is some commercial harvesting (shellfish, halibut, snow crab, etc.) the SSLMP is more oriented towards summer tourism with whale watching being the foremost activity, followed by kayaking, diving, sailing, fishing, etc.

Management of the multiple-use SSLMP is unique in many aspects : it is the first marine park implemented in Québec and it is the result of an innovative cooperation between two levels of government, federal and provincial. At every stage of the planning and implementation process, public consultations permitted to forge a solid relationship with local communities and stakeholders. Management structure now includes federal and provincial co-directors, a supporting co-ordinating committee comprising various stakeholders and four advisory committees (conservation, interpretation, marketing and infrastructures). The First Nation Innu people inhabit the growing community of Essipit and are active in SSLMP management as well as in various committees.

3. SSLMP Management Plan Goals and Objectives in relation to Guidebook generic goals and objectives

The main purpose for the establishment of Saguenay–St. Lawrence Marine Park (SSLMP) was to increase protection level and to preserve species and ecosystems in a representative portion of the Saguenay Fjord and the St. Lawrence Estuary marine environment. Conservation being the most important and encompassing issue, five general objectives, each comprising many specific objectives, were stated in the Management Plan⁴ :

- 1) Preservation of the park's ecosystems, underwater landscapes and cultural features;
- 2) Education of visitors so that they better understand the park's ecosystems value and the need for protecting them;
- 3) Promotion of scientific research to increase the understanding of the ecosystems and help management of activities;
- 4) Harmonization of conservation and local development with the goal of constant resource renewal in all aspects (tourism, harvesting activities, etc.);
- 5) Integration of park projects and activities with those of local communities.

Contrary to the set of generic goals and objectives compiled in the MEI Guidebook², the SSLMP objectives do not focus on the sustaining of fisheries to enhance food security and local livelihood. Also, more emphasis is put, in the SSLMP objectives, on scientific research as a management tool.

4. Indicator selection and description

The next step was to rate SSLMP goals and objectives as to their priority. This was followed by the selection of a subset of 21 indicators (out of a possible 42) that should permit us to adequately to verify attainment of most of the important park objectives.

4.1 Biophysical indicators

A total of nine biophysical indicators were retained. Their eventual measurement will be closely linked to the comprehensive Environmental Surveillance Program currently being implemented at SSLMP, following recommendations of the SSLMP Conservation Plan⁵. This monitoring program will focus on issues specific to the SSLMP but many of its aspects are directly related to the nine selected MEI biophysical indicators :

B1) *Focal species abundance.* A bi- or triennial aerial survey of endangered beluga whale abundance has been conducted since 1988 by Fisheries and Oceans Canada⁶ and will form the basis of B1. In addition, an indirect inventory of non-resident baleen whale populations

is now performed annually by monitoring the activities of whale-watching boats (location of boats, number and type of whales seen, etc.). Finally, the scarce Barrow's goldeneye, an endangered waterfowl, will eventually be monitored on a regular basis.

B2) *Focal species population structure.* This indicator will be restricted to the beluga whale survey⁶ where adults and juveniles can be discriminated by their skin colour. Three age classes can be identified and will permit a crude evaluation of population structure.

B3) *Habitat distribution and complexity :* A geographical information system (GIS) of habitats and main species distribution, the SIGHAP, has been developed by Fisheries and Oceans Canada⁷. This tool has been implemented at SSLMP a few years ago but it needs a thorough revision and updating. A program of satellite imagery inventory of wetlands is also considered as a potentially useful tool.

B4) *Composition and structure of the community.* Considering the vast number of possible communities at SSLMP, this indicator will target only on those that are particularly vulnerable to human impact. Benthic communities at popular diving sites are being subjected to erosion by careless divers. These communities will thus be monitored according to an experimental protocol⁸ tested in 1997.

B5) *Recruitment success within the community.* Recruitment success will eventually be measured for many individual fish species but the only instance of it being actually monitored for a whole community will be at the diving sites mentioned above, according to the protocol tested by Archambault in 1997⁸.

B6) *Food web integrity.* This important indicator will focus on the main SSLMP food web, the one involving all the baleen and toothed whale species. Plans are under way to implement a comprehensive monitoring of phytoplankton, zooplankton (krill, etc.) and, higher up in the food chain, main fish fodder species (capelin, smelt, herring, etc.). At the

top most level, estimation of whale abundance (beluga and non-residents) will be performed by means of indicator B1 as has already been mentioned.

B7) *Type, level, and return on fishing effort.* No reliable data can be obtained for commercial fisheries since fishing permits span vast areas, much larger than the MPA itself. On the other hand, a continuing program of recreational ice fishing monitoring has been performed in the Saguenay for the last ten years⁹. Another program is currently in the process of being implemented to measure some aspects of summer recreational fishing.

B8) *Water quality.* Because of the dynamic nature of water circulation in the SSLMP, it is difficult to reliably monitor water quality. This variable will rather be measured using indirect integrating bioindicators, such as the contamination level of molluscs, presently monitored by Environment Canada, or the necropsies performed by Université de Montréal with the help of Fisheries and Oceans Canada on beluga whale carcasses.

B9) *Area under no or reduced human impact.* Commercial harvesting is currently restricted in certain sectors of the MPA on a species by species basis. However, only in the forthcoming zones I and II of the revised zoning plan will every type of commercial extraction be forbidden. Recreational fishing should also be forbidden in zones I and restricted in zones II.

4.2. Socioeconomic indicators

The chosen socioeconomic indicators will focus mainly on tourist activities, particularly those that can have an impact on the resource : whale watching, recreational fishing, kayaking, diving, etc.

S1) *Local marine resource use patterns.* A study was performed in 1998 describing and mapping human uses in the SSLMP (harvesting and non harvesting activities). An update of this study is currently needed and it could eventually be included in the SIGHAP

geographical information system (B3). Analysis of the human uses patterns, both commercial and non commercial, could form the basis of S1 indicator.

S3) *Level of understanding of human impacts on resources.* This indicator was already successfully tested¹⁰ in the context of whale watching boat tours, the SSLMP main activity. Visitors were asked their perception of the impact the whale watching activity had on whales. A large percentage of visitors were aware of the negative impacts the activity could have. This type of study should eventually be extended to other activities such as kayaking, diving and sailing.

S5) *Perception of local resource harvest.* This indicator, already in place, looks at the perception that recreational ice fishers have of fish abundance. This type of indicator based on user perceptions is never as accurate as true species inventories and can fluctuate greatly according to various factors.

S14) *Distribution of formal knowledge to community.* This indicator was tested with whale watching tourists¹⁰ and sought to learn if the interpretation activities succeeded in teaching visitors sound scientific knowledge. Emphasis of the survey was put on very basic knowledge but it demonstrated that important information can indeed be transmitted by interpretation activities.

S16) *Changes in conditions of ancestral and historical sites, features, or monuments.* As of now, no systematic survey exists at SSLMP of the condition of historical sites on land as well as of submerged sites. Plans are under way to fully inventory all sites and to insure a regular follow-up of their condition. Various local organizations could be involved in the terrestrial aspects. However, the underwater portion is quite costly and difficult so it will be handled by the Parks Canada branch of aquatic archaeology.

4.3. Governance indicators

Of the proposed governance indicators, a total of six were retained for measurement at SSLMP. Some are rather straightforward and require only the verification of the existence of documents while others imply detailed surveys and are much more difficult to implement.

G3) *Existence and adoption of a management plan.* This indicator is one of the simplest to measure since it only verifies the existence and pertinence of the management plan.

G4) *Local understanding of MPA rules and regulations.* This indicator will be indirectly verified by SSLMP staff using reports of infractions classified by groups of users and by types of infraction. Any long term decline in the number of reports could be indicative of better understanding and compliance to rules and regulations by users. In addition, the next generation of the whale watching survey should also include questions relating to the knowledge users have of regulations.

G5) *Existence and adequacy of enabling legislation.* A thorough revision of the Legislation Application Plan¹¹ by SSLMP staff is under way and directly addresses the adequacy of current legislation. This work focuses not only on the MPA enabling legislation but also on all the laws, both provincial and federal, that have an impact on the resource. This process is an essential step in the forthcoming revision of the management plan.

G9) *Degree of interaction between managers and stakeholders.* SSLMP staff will monitor meetings with various committees (co-ordinating and advisory) as well as ad hoc meetings with specific user groups.

G12) *Level of stakeholder participation and satisfaction in management processes and activities.* The measurement of this indicator will be restricted to members of the established co-ordinating and advisory committees who will be the object of a simple survey.

G16) *Degree of information dissemination to encourage stakeholder compliance.*

Measurement will make use of a successfully tested methodology focusing on whale watching activities. It will target various groups doing sea-based whale watching (boat tour operators, clients, kayakers, etc.) and will be combined with other surveys focusing the same users (S3, S14, and G4).

5. Conclusion

Even with the particular characteristics of the SSLMP (large range focal species, dynamic water circulation, emphasis on recreotouristic users, management of commercial fisheries for conservation and not to increase local livelihood, MPA co-management, etc.), it is still possible to apply with success the MEI procedures and indicators.

It is not feasible, because of time and budget constraints, for the biophysical indicators to encompass the whole of the MPA communities, habitats or ecosystems. Instead, the indicators will focus on a few focal species, particularly those with precarious status (beluga, non-resident whales, Barrow's goldeneye, etc.), endangered communities, main habitats or basic food web links. Given limited time and resources, socioeconomic indicators will need to focus more on a few individual user groups, particularly those that have an impact on the SSLMP, such as visitors, whale watching industry or recreational ice fishers. Finally, governance indicators should focus on a few management instances, such as the coordinating and advisory committees, instead of addressing all of the stakeholders or numerous and varied local communities, as suggested.

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