

Human dimensions of Marine Protected Areas

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Planning, implementing, and managing Marine Protected Areas (MPAs) requires that attention be paid not only to the biological and oceanographic issues that influence the performance of the MPA, but equally to the human dimensions: social, economic, and institutional considerations that can dramatically affect the outcome of MPA implementation. This paper explores ten human dimensions that are basic to the acceptance and ultimate success of MPAs: objectives and attitudes, “entry points” for introducing MPAs, attachment to place, meaningful participation, effective governance, the “people side” of knowledge, the role of rights, concerns about displacement, MPA costs and benefits, and the bigger picture around MPAs. These people-orientated factors and their impact on the success and effectiveness of MPAs are examined in relation to experiences with MPAs globally, and in relation to two Canadian examples specifically, one coastal (Eastport, Newfoundland) and the other offshore (the Gully, Nova Scotia).

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Introduction

Properly taking into account the many human dimensions of Marine Protected Areas (MPAs)—social, economic, cultural, and institutional—is critical to MPA success (Davis, 2002; Pomeroy *et al.*, 2004; WWF International, 2005). Reflecting this reality, recent research and policy discussion of MPAs are increasingly focused on social, economic, cultural, and institutional considerations—seeking a balance with the equally crucial knowledge required of biophysical and ecological aspects (Pomeroy *et al.*, 2004). Efforts to address the human dimensions include those on MPA governance (e.g. Cicin-Sain and Belfiore, 2003; Christie and White, 2007), on socio-cultural aspects (e.g. Pollnac *et al.*, 2001; Pomeroy *et al.*, 2007), and on socio-economic studies (e.g. Bunce *et al.*, 2000; Howard *et al.*, 2007). Such work on MPAs is also linked to the human dimensions relevant more broadly to ocean management, as in applications of the ecosystem approach (De Young *et al.*, 2008).

Drawing on experiences in MPAs worldwide, we highlight ten people-orientated aspects of MPA creation and implementation that are important to incorporate into MPA development and management to move towards better initial acceptance and ultimate performance of MPAs. These dimensions of successful MPAs, ranging from objectives to knowledge, from participation to governance, from rights to costs and benefits, have been chosen to provide broad coverage of the human side of MPAs, both in the frequency of their occurrence in practice and in their reflection of the key themes of recognized importance within the MPA literature.

Although the role of each human dimension is illustrated through examples drawn from a variety of MPA experiences worldwide, a thread running through the paper is provided by

relating each dimension to two specific examples on the Atlantic coast of Canada, the Gully MPA and the Eastport MPA. They are among the first officially designated MPAs in Canada and reflect well the variety of MPA objectives, origins, and characteristics found in practice, particularly because one (the Gully) is located offshore and was initiated largely for biodiversity conservation, whereas the other (Eastport) is a community-based coastal MPA, originally designed to meet fishery goals. Each is described here briefly, to provide the context for discussions in the following section, an analysis of the ten human dimensions of MPAs.

The Gully MPA

The Gully is “the largest submarine canyon in eastern North America” (Fisheries and Oceans, 2008), located approximately 200 km off the coast of Nova Scotia, near Sable Island on the edge of the Scotian Shelf. More than 65 km long and 15 km wide, the Gully features a range of fish species and benthic invertebrates, the highest diversity of deep-sea coral species in the region, and at least 14 species of marine mammals, including a resident population of northern bottlenose whales (*Hyperoodon ampullatus*), designated an endangered species under the Species at Risk Act (2006). There is also a century-long history of fishing in the area, particularly for groundfish and pelagic species (GTA Consultants, 1999). Breeze (2002) provides a comprehensive analysis of the historical fishery profiles for this area. Other socio-economic uses near the Gully include a natural gas line and other sites of potential oil and gas development. Scientific research, transportation, military and Coast Guard, and some tourism are also present, to varying degrees (Fisheries and Oceans, 2008). In 1998, the Department of Fisheries and Oceans (DFO), Canada, identified the Gully as a candidate MPA and, in 2003, created

the Gully Advisory Committee to facilitate stakeholder consultation and input into the regulatory process (Fisheries and Oceans, 2008). In 2004, the Gully was formally designated an MPA under Canada's Ocean Act, the first on the Atlantic coast (Fisheries and Oceans, 2008).

Eastport MPA

This community-based coastal protected area (Eastport Marine Protected Area, 2006) is located in Bonavista Bay on the northeast coast of the island of Newfoundland. Its establishment reflected a combination of the long-standing reliance that Eastport residents have had on marine resources, including "a wide range of groundfish, pelagic fish, shellfish, marine mammals, and aquatic plants" (Fisheries and Oceans, 2007), and the impact of the collapse of groundfish stocks in the early 1990s on the region's fishing communities. To survive after that groundfish collapse, fishers turned more to lobster (*Homarus americanus*), previously only considered a supplemental fishery (Collins and Lien, 2002; Davis *et al.*, 2006). This increased effort on lobster stocks led to a decline in catches, which prompted local fishers to establish the Eastport Peninsula Lobster Protection Committee in 1995 (Rowe and Feltham, 2000; Power and Mercer, 2003). In the course of their conservation efforts, the fishers also recruited scientists from Memorial University of Newfoundland, Parks Canada, and DFO, as well as involving a local high school class to assist with collecting and analysing information (Collins and Lien, 2002). This work led, in 1997, to an agreement between the Committee and DFO to close fishing areas seen as prime lobster habitats (Fisheries and Oceans, 2007), with the aim of building up the lobster stock, with conservation thereby supporting community livelihoods (Collins and Lien, 2002). In 1999, feeling that the closure had been successful and ready for further steps, the Committee requested DFO to consider the closed areas as formal MPAs, to further support ongoing conservation initiatives. The Eastport MPA was officially designated in 2005, under the Oceans Act (Fisheries and Oceans, 2007).

These two MPAs, the Gully and Eastport, will be used in the following discussion of the ten human dimensions of MPAs. This will lead, in the final section, to an analysis and summary of insights gleaned from assessing the role of these ten dimensions, within the two MPA examples as well as in global experience more broadly.

Ten human dimensions of MPAs

This section explores ten human dimensions that, experience suggests, are important contributors to the success of an MPA. We examine these consecutively, drawing on experiences globally, and relating each aspect to the two MPAs, one coastal and one offshore, as described earlier. The human dimensions are:

- (i) objectives and attitudes,
- (ii) people-orientated "entry points",
- (iii) attachment to place,
- (iv) make participation meaningful,
- (v) knowledge has a "people side"
- (vi) effective governance is critical,
- (vii) get the rights right,
- (viii) costs, benefits, and distribution,

- (ix) deal with displacement, and
- (x) see MPAs in the bigger picture.

Objectives and attitudes

Fundamentally, MPAs are created and function in the context of societal and/or community objectives, which inherently reflect human aspirations and values. Understanding the objectives being pursued is clearly necessary to make any decision about an MPA properly.

In considering the goals of an MPA, one might think first of biological and ecological ones. For a closed area, the goal may be to protect the spawning fish, to produce an improved fish stock, whereas for a no-take MPA, there may be a number of biological objectives, such as biodiversity conservation and insurance against stock collapse.

On the other hand, each of these may have human-orientated objectives as well (e.g. developing participation in the MPA process, and buy-in leading to better compliance). Furthermore, for a zoned MPA, there are certain to be multiple objectives, e.g. combining biological goals (biodiversity) and resource management goals (increased fish catches) with human-orientated ones, such as tourism development and conflict resolution.

Understanding the full range of policy objectives is crucial to moving ahead with an MPA. Also important, however, is to examine the objectives of participants and stakeholders in the MPA (or in the area proposed as an MPA). What do the fishers, the tourism players, etc., wish to accomplish? What are their priorities? For example, in an ideal world, fishers may want a long-term livelihood from the sea, but if faced with high levels of poverty and a lack of food, the immediate objectives may be quite different.

Related to objectives are attitudes. How are the sea and its resources perceived by those with connections to the MPA? To what extent is a conservation ethic in place? How much community spirit and social cohesion are there? Supportive attitudes can be critical to meeting societal objectives, and conversely, disasters, such as fishery collapses (Charles, 1995), have been traced to the underlying attitudes of those involved.

In the Eastport example, the MPA's key objective was related to fisheries, but its development supported community goals as well as fishery goals. The community's sharing of these objectives is reflected in the words of Luke Turner, a 14-year-old student. In a video on Eastport (Memorial University School of Continuing Education, 1997), he comments on his work on lobster data analysis, "We have new communication between us and the parents; now we have something in common to discuss...". The Gully MPA had biodiversity conservation as its primary objective, and many of the stakeholders share this objective. However, conflicting goals did arise between DFO and a group of fishers who had traditionally fished in the core zone of the proposed MPA. This situation is discussed later.

People-orientated "entry points"

Social, economic, and institutional factors all play major roles in MPAs. In this respect, four major "entry points" might be envisioned (adapting an analysis of this topic applied to the ecosystem approach to fisheries in De Young *et al.*, 2008).

- (i) Social, economic, and institutional factors are **driving forces** behind the need for MPAs.

- (ii) The potential **costs and benefits** of MPAs to individuals and society will have social, economic, and management components, as well as ecological ones.
- (iii) Social, economic, legal, and institutional **instruments** can aid in the development of MPAs and, in particular, are relevant to creating incentives for MPA adoption.
- (iv) Social, economic, and institutional factors can have **supporting or constraining roles** in the implementation of MPAs.

In other words, social, economic, and institutional elements can be simultaneously drivers, constraints, and/or supports for the creation and implementation of MPAs; in addition, there can be social, economic, and institutional outcomes of that implementation. The perception of MPA benefits and costs is influenced by values and objectives, as are the choices among social, economic, legal, and institutional instruments available for MPA implementation. All of these entry points must be considered in MPA discussions. In particular, understanding the entry points into MPA discussions will help clarify the desired form of the MPA and a suitable approach to its implementation (Charles and Sanders, 2007).

For example, one can contrast the fishery-orientated *drivers* of the Eastport MPA—the historical collapse of the region’s ground-fishery, the concern over declining lobster stocks, and the impacts this would have on community livelihoods—with those of the Gully, which were largely conservation-orientated, along with an element of integrated management. Similarly, there is a contrast between the *instruments* used in the development of the MPA; legal and institutional instruments were needed in both cases, but in Eastport, social mechanisms were particularly important as well. Those in government managing MPA development were able to adapt to these different realities to make each MPA work in its own context.

Attachment to place

MPAs are located somewhere. They are not simply laws, regulations, or management measures, but each is a specific place. Understanding the human dimension of MPAs requires an acknowledgement that each location has its unique social and ecological context that influences the MPAs’ design, implementation, and impact (Pomeroy *et al.*, 2007). Particularly with coastal MPAs, a key consideration is the extent to which people care about the “place” under consideration, the attachment to place. The connection of people and place could be fostered from an economic perspective, such as the extraction of natural resources and services from a specific area or driven by socio-cultural values associated with a “special place” that has significant meaning to a community.

For example, the association of people and value to a particular place is noted in the establishment of the Eastport MPA, where the focus was on “setting aside specific areas of ‘prime lobster habitat’ that have historically and traditionally been recognized and valued by these communities” (Collins and Lien, 2002; Davis *et al.*, 2006). The Gully MPA, being located relatively far offshore, has had little coastal community attachment, but (i) fishers using this area do have a “user-social” attachment and a significant knowledge base relating to the offshore environment, and (ii) while not place-based, a broad network of individuals in government, environmental NGOs, the academic sector, and the general public support the Gully and its objective of biodiversity conservation.

Meaningful participation

Experience has shown that the imposition of MPAs without broad consensus often leads to failure (Christie and White, 2007). Furthermore, strong participation has been demonstrated empirically to be a factor in the success of MPAs in various circumstances (e.g. Pollnac *et al.*, 2001). These realizations have led to an understanding of the desirability of undertaking participatory processes in all stages—consultation, design, implementation, and monitoring. Developing effective MPAs is typically seen as requiring the engagement of relevant stakeholders, from the start of the process. This tends to enhance information exchange, encourage accountability of experts and authorities, build confidence in the decision-making process, and allow collaborative discussion among stakeholder groups, leading to mutually acceptable solutions (Jones, 2002; IUCN, 2007).

Geoghegan and Renard (2002) propose that, for active participation in protected area management, it is often more important to have ongoing public consultation programmes than to have a few selected representatives discuss the process on behalf of the larger community. Community participation has also been credited as being one of the main factors contributing to the success of the Great Barrier Reef Marine Park and usually went well beyond the level required in the legislation (Day, 2002). Day (2002) further notes that, although such levels of public participation had costs in resources and time, the final outcome was considered worthwhile and cost-effective in the long term.

For Eastport, the initiative to form an MPA came from the grass roots. In this case, the building of trust and collaboration started with an initial process of participatory research, then the creation of local management measures, leading eventually to the establishment of a full MPA. Throughout the process, the local fishers participated in data collection and resource management decisions, and were recognized by DFO through what was initially a co-management arrangement and then evolved into an advisory committee (Davis *et al.*, 2006). Consequently partnerships were crucial—with the local schools, adjacent communities, and academic institutions, as well as governments—leading to a successful community-driven co-management approach.

For the Gully MPA, with its offshore location, participation has not been community-based, but rather has involved bringing together a diverse range of interests through the multistakeholder Gully Advisory Committee, which was established and is operated by the federal government to provide advice on the MPA evaluation and regulatory process, conservation planning, and implementation of a management plan for the Gully (Fisheries and Oceans, 2008). While operation of the MPA is carried out entirely by the government (DFO), consultation with the advisory committee is ongoing, and academic research activity continues in the area.

Knowledge has a “people side”

In all MPAs, there is a critical need to supplement biophysical and ecological data with people-orientated information: about the human values and goals that relate to the area, about historical and current human uses of the area, and about social, economic, and institutional considerations within the area. Such human-orientated baseline assessments and ongoing monitoring are needed to balance the corresponding biological aspects. Relevant knowledge of the “people side” may include “gender, resource

use patterns, stakeholder characteristics and perceptions, market attributes for extractive and non-extractive uses, market and non-market use values" (Bunce *et al.*, 2000).

Human-related goals (e.g. poverty alleviation and economic development, social and environmental justice, and capacity building) also should be included within the overall planning and management framework for an MPA (IUCN, 2007; Pomeroy *et al.*, 2007). One approach is through integrated indicator frameworks, such as the Nova Scotia (Canada) Genuine Progress Index marine report, which describes indicators of marine and fishery well-being that "value both the *natural* and *social* wealth, similar to conventional accounts that value produced or manufactured wealth" (Charles *et al.*, 2002).

In the Gully, such knowledge has been obtained through a series of socio-economic assessments, carried out to better understand resource values and historical patterns of human use (e.g. Breeze, 2002). With Eastport, knowledge acquisition was supported by the steering committee that was formed in 2002 by representatives from DFO, the committee, and other stakeholders. This committee guided the evaluation process for establishing the MPA, which included both ecological and socio-economic studies (Power and Mercer, 2003).

It is important to build into MPA decision-making the local and traditional knowledge that may be available: the understanding of natural and social environments by individuals, based on their own observations, experiences, beliefs, or perceptions (Johannes, 1998; Huntington, 2000). The importance of local and traditional knowledge in supporting the establishment of MPAs has been documented in many studies (Berkes *et al.*, 2000; Johannes, 2002; White *et al.*, 2002; Aswani and Hamilton, 2004).

In the Gully, DFO was able to draw on fishers' knowledge of the ocean habitat in the area, to inform ecological studies, and it continues to use the Gully Advisory Committee as a mechanism to build knowledge about aspects of conservation, human use, and management in the Gully (Fisheries and Oceans, 2008). In Eastport, the knowledge that local community fishers had of potential juvenile lobster rearing habitat was particularly useful in determining where to close areas to lobster fishing, to enhance egg production in the local populations, and increase recruitment (Rowe and Feltham, 2000; Collins and Lien, 2002; Power and Mercer, 2003). As fisher leader George Feltham notes, this contribution to scientific monitoring using local knowledge "gives us as a group of fishers a lot more credibility when we're talking about conservation with the fishery department" (quoted in Memorial University School of Continuing Education, 1997). The Eastport process has been so successful that it is used by DFO to illustrate the approaches that can be taken to link scientific and technical methods with community knowledge (Fisheries and Oceans, 2007).

Effective governance is critical

Pomeroy *et al.* (2007) state "As management tools, MPAs are a set of rules, prepared by managers to govern human behaviours and activities within a specific area". However, if the lessons from historical fishery conservation failures are to be heeded, MPAs require effective governance and well-functioning management institutions if they are to be ecologically and socially successful (Charles, 2004, 2005). As frequently noted (e.g. Ostrom, 1990, 1995), some of the key ingredients for achieving this are (i) vertical and horizontal integration between and within governing

institutions; (ii) governance capacity; (iii) institutional sustainability and resilience; (iv) co-management arrangements; and (v) governance designed for effectiveness and acceptability. These ingredients are addressed briefly below.

- (i) The links to higher level governing institutions provide a vertical and horizontal governance framework whereby MPA planning, implementation, and evaluation can take place. For the Eastport MPA, the successful cross-scale governance linkages were achieved through community leadership and cooperation between government agencies and local communities.
- (ii) Building governance capacity increases understanding of the social-ecological system within which the MPA is embedded and improves institutional capacity through organizational structures within which people interact, goals and objectives are pursued (including financial, operational, and facilitating support mechanisms), and organizations are managed towards achieving these goals (Charles, 2005).
- (iii) Institutional sustainability and resilience (Berkes and Folke, 1998) are enhanced through institutional arrangements that strengthen social-ecological systems to be more responsive to feedback, to provide a mitigating environment in the face of natural and human perturbations, and to be flexible to deal effectively with surprise (Charles, 2004, 2005). A supporting goal that drove the Eastport MPA was the recognition by stakeholders of the need for a strong and sustainable local presence in managing the lobster fishery, after seeing the collapse of the cod fishery.
- (iv) Co-management arrangements to share decision-making and management functions between government and MPA stakeholders have been practised with some degree of success in Asia-Pacific countries (Veitayaki, 2000; Johannes, 2002; Christie and White, 2007), but have taken longer to establish in western countries. The two Canadian MPA examples each include a limited degree of co-management. Eastport has engaged in a co-management agreement with DFO in the past, and now, since designation of the MPA, the steering committee is continuing on a voluntary basis as an advisory body. This body will be involved in the management of the MPA by aiding with data collection, public awareness, and other work that will help the Eastport MPA reach its conservation objective (Fisheries and Oceans, 2007). The Gully MPA, as noted earlier, also has an advisory committee that, although without legal or delegated powers, is recognized by DFO, and provides an opportunity for its diverse membership to comment on measures to manage the Gully (Fisheries and Oceans, 2008).
- (v) In designing for effectiveness and acceptability of MPAs, the works of Ostrom (1990, 1995) and the experiences in developing countries (Christie and White, 2007) suggest that key issues relate to (i) who has access to and use of the resources; (ii) what are the agreed upon rules and how will they be enforced; and (iii) how were these regulations developed and who was involved. The effectiveness and acceptability of an MPA by local communities and government agencies relies on how well these issues have been considered and incorporated into the planning, establishment, and

evaluation of the MPA. For all MPA stakeholders, capacity building and awareness raising (socio-economic, cultural, governance, ecological) are essential if there are to be meaningful participation, development of conservation ethics, and shared responsibility, all leading to a healthy MPA embedded in a wider framework of sustainable and resilient communities and institutions.

Get the rights right

Who has the right to enter an MPA and extract resources? Who has the right to be involved in managing an MPA? These questions, major topics of investigation and debate in modern ocean and coastal management, as well as in fisheries, relate to two forms of rights that arise in managing natural resources and spatial areas.

On one hand, *management rights* specify who is to be involved in MPA management decision-making. On the other hand, *use rights* specify who can have access to an MPA (or to a fishery resource), how much activity individual participants are allowed, and how much can be extracted (Charles, 2001, 2005). Use rights arise as either *access rights*, which authorize entry into the MPA, specifying and constraining who is to be involved in using the area, or as *withdrawal rights*, which specify for each individual or group involved the allowable levels for activity in the MPA (e.g. number of days) or for extraction (e.g. number of fish that can be withdrawn from the MPA).

Management rights and use rights are increasingly recognized as crucial to the pursuit of effective and sustainable resource use and spatial management. In some cases, the rights may have been in place through traditional practice (Customary Marine Tenure and Territorial Use Rights); in other cases, they may be developed through policy and legislation. Rights may be permanently assigned or obtainable by purchase, whether in a market or from the management agency.

The matter of rights involves inherent human dimensions. There are basic issues concerning the nature of the rights and who should hold them. Such choices must be made carefully because they can have a major impact on the acceptability and effectiveness of MPA management. The rights must be appropriate to the cultural and historical situation, the policy directions, and the financial and personnel capacities of the particular MPA situation. They also need to be perceived as just and fair, with rights operating in conjunction with responsibilities for stewardship and conservationist use of the resources.

Therefore, MPA managers and planners, together with interested parties (relevant governments, ocean users, community members, NGOs, and the general public), need to build a set of rights that will work in practice. To this end, it is important to understand the structure and underlying nature of the MPA, e.g. (i) society's objectives with respect to the MPA; (ii) relevant history and traditions; (iii) the social, cultural, and economic environment; and (iv) key features of the corresponding marine ecosystem.

For the Gully, little discussion arose over management rights, it being generally accepted that such rights were held by the federal government. However, use rights were the subject of much debate, particularly in relation to what would happen to traditional access rights for fishers in the core no-take area (see later). In Eastport, management rights were prominent, with a co-management arrangement in place during the pre-MPA stage,

based on local fisher experience with research, conservation, and eventually management actions, such as initiation of a lobster fishery closed area. Participation has continued in the MPA process, although from a regulatory point of view, the government has not devolved any powers over use of the MPA (e.g. with respect to compliance, enforcement, or approvals for activities) to the community.

Costs, benefits, and distribution

Many MPA-focused reports and articles provide lists of the potential benefits of MPAs. Typically, these include both human-orientated and environmental–ecological benefits and, indeed in many (e.g. Independent World Commission on the Oceans, 1998), most are human-related. However, as Pomeroy *et al.* (2007) noted, “MPAs have potential benefits and costs . . . that are realized over both the short and long terms, however, the implications of economic, social, and cultural aspects have not been well studied”.

In considering MPA benefits, it is useful to place these into an organized set of major classes; some significant ones include:

- (i) increased fishery and other direct resource-use benefits;
- (ii) increased benefits from non-consumptive use (e.g. ecotourism);
- (iii) increased spin-off benefits to the coastal economy (e.g. through diversification);
- (iv) non-use value (e.g. increased oxygen production from the sea);
- (v) existence value (the societal value resulting from the existence of an MPA and its contents);
- (vi) option value (the value of maintaining a marine ecosystem for future use);
- (vii) insurance policy (the value of having a hedge against uncertainty).

Note that there can be positive feedback among these benefits. For example, when MPAs play a role in diversifying the coastal economy, e.g. through tourism and conservation work, this can also reduce stress on fish stocks and lead to greater levels of direct resource-use benefits.

Although the benefits of MPAs are often discussed (and often listed), it is equally important to examine the *costs* of MPAs. Certainly there are management costs (i.e. additional costs to manage the MPA), but there may also be costs incurred by those affected by the MPA. Notably, for fishery interactions, MPAs can affect individual fishers, the fisher's household, and the fishing community (Charles, 2001). There may be both opportunity costs (e.g. of lost catches as a consequence of restrictions in the MPA) and direct operating costs (e.g. extra travel costs for fishers, crowding externalities). Furthermore, such impacts on local people may produce costs for social and political capital (World Bank, 2006).

Also important is a careful assessment of the distribution of benefits and costs. Who benefits? Who suffers the costs? How are benefits and costs distributed spatially and temporally? Spatially, benefits and costs may occur over a variety of geographical or administrative scales (local, national, international). For example, a particular benefit may be international in scale (e.g. the existence value of biodiversity), whereas a corresponding

cost is local (e.g. the negative impact on displaced fishers near the MPA). There are challenges in capturing the benefits of MPAs at “geographical scales required to protect ecosystem processes, while also addressing socio-economic, cultural, and political realities of regulating what may have been historically considered common property” (World Bank, 2006). Over time, there are intergenerational flows of benefits and costs; for example, the benefits might be realized in the long term but with costs arising in the short term, leading to questions about suitable compensation approaches across space and time.

Being able to demonstrate tangibly the benefits and ensure that they are equitably distributed over a wide range of users could be the deciding factor for the acceptance and long-term success of an MPA (World Bank, 2006). “The success of the Jaragua National Park in the Dominican Republic, Negril, Montego Bay Marine Parks in Jamaica, and the Soufriere Marine Management Area (SMMA) demonstrate that programmes aimed at providing benefits to, or mitigating the negative impacts of management, on displaced stakeholders . . . enhances involvement in the area’s management” (Geoghegan and Renard, 2002).

The matter of the distribution of benefits and costs also arose in the two Canadian examples, though in different ways. For Eastport, the grass-roots origin and participatory nature of MPA development created win–win situations in which it appears that no one was seen as a loser. For the Gully, there was a lengthy process of accommodation of the various interests involved. Some (e.g. conservation organizations) were seen as winners, while one fishery group (the swordfish fishers) saw itself as a loser in the process. This group protested a plan to exclude them from the part of their fishing areas lying within Zone 1, the proposed inner no-take core of the MPA (GTA Consultants, 1999). In the end, however, most stakeholders were satisfied with the plan, and the MPA designation process continued to a successful conclusion, with no exceptions made for existing fishing activities in Zone 1 (Canada Gazette, 2004). The swordfish fishers were negatively impacted as a result of being excluded from Zone 1, and received no compensation, but were able to shift their fishing (and catch rights) outside the zone, where the swordfish fishery is now conducted.

Deal with displacement

Yet another aspect of the distribution of MPA benefits and costs is the reality that, if the MPA involves a reduction or elimination of resource use (even if just for an inner no-take area), those who traditionally use the area itself or the resources inside it will be displaced. Here we focus on dealing with displacement in the specific situation of fishery–MPA interactions.

The creation of an MPA may imply that displaced fishers no longer have access to “their” fish stocks or fishing grounds. The fate of these individuals is a basic issue in establishing MPAs, one particularly important in coastal areas, in which fishers typically harvest resources near their home ports, whether for convenience, safety, economics, or regulations. Consider the options for dealing with displacement of fishers when introducing an MPA.

- (i) Fishing rights might be formally removed from those who have traditionally fished within the area that is now an MPA, so that displacement is actually removal from the fishery. This option, as it stands, places the negative impacts of the MPA directly on these fishers, while providing benefits to those remaining in the fishery. However, if it is

accompanied by either the provision of compensation to displaced fishers for loss of their livelihood or efforts of the government to provide alternative employment, it could be acceptable to those displaced and thus produce desired conservation benefits through governmental financing.

- (ii) At the opposite end of the spectrum, one might avoid displacement by allowing fishers located near the MPA to continue fishing even within a no-take zone (perhaps based on recognition of historical rights). This arrangement can be effective if the impact of local fishers on the fish stocks is relatively small compared with the actual or potential impact of outsiders. It is also possible in such cases that the flexibility towards local communities can increase the effectiveness of the MPA through its greater acceptance by local people, leading to local stewardship and enforcement activities.
- (iii) Intermediate between these two possibilities is the option of shifting the fishing activities of those displaced into certain areas outside of the MPA. This option maintains the full conservation benefits of the MPA itself (because, relative to the second option, it does not involve fishing in the MPA), but allows for continued fishing by those displaced from the MPA (rather than removing these fishers entirely). However, there are conservation and socio-economic implications to this approach as well, including the concentration of fishing effort in areas just outside the MPA.

Each of these options has benefit and cost implications. For example, in the last case, suppose that fishers located in communities that traditionally fished stocks that are now inside the MPA are to be displaced, given access to the nearest stock outside the MPA (i.e. the closest remaining fishing opportunity). On the one hand, this new fishing location, adjacent to the MPA, may give these fishers the best available access to any benefits accruing from the MPA, i.e. if reduced fishing within the MPA and a healthier ecosystem lead to rebuilding of the relevant stock, which then migrates out of the MPA to be caught by the displaced fishers. On the other hand, relocating the activities of these fishers implies three negative impacts on their profits: (i) extra costs in travelling farther to their new fishing grounds; (ii) less time available for fishing owing to greater travel times; and (iii) crowding on the new fishing grounds outside the MPA, which they must share with those traditionally there. Additionally, displaced fishers may be unwelcome in the new area, where they will be fishing alongside others holding longer-standing rights, and the concentration of fishing effort outside the MPA may cause excessive pressure on the stocks in that area, with consequences that could counteract the benefits of the MPA itself (a subject of current debate; see e.g. Jones, 2007). In any case, the balance of the various positive and negative factors will affect the balance of benefits and costs, their distribution, and the acceptability of the MPA to fishers.

For Eastport, areas closed to lobster fishing were relatively modest in size, so it was not an issue of some fishers winning and others losing from the closures. Furthermore, the MPA was seen as a defensive position to ensure that those outside the fishery did not misuse the local marine area, so this again created a win–win situation for local fishers. In the offshore Gully, swordfish fishers would have preferred the second scenario above (to continue to fish in Zone 1, based on historical rights), but instead were ultimately excluded from that area. Other

stakeholders either were not displaced or were accommodated sufficiently for them to accept the process of designation.

As a final point in dealing with displacement, it should be noted that economic diversification is an often-discussed policy direction meant to counter negative impacts of MPAs. In conjunction with the creation of an MPA, efforts can be made to introduce alternative local employment (livelihood), specifically orientated towards fishers and/or their households. Furthermore, the very creation of an MPA can help diversify the coastal economy, e.g. through tourism and conservation-related work relating to the MPA. This in turn may help to reduce stress on fish stocks and increase community resilience (if in fact the benefits of new MPA-related economic activities reach the effected fishers).

See MPAs in the bigger picture

MPAs are embedded within the larger ecological, social, and political context of the coastal-ocean areas of which they are a part (Cicin-Sain and Belfiore, 2003). Therefore, it is important to see MPAs in the overall picture of marine conservation, of coastal livelihoods, of the broader socio-economic environment, including all the ocean uses, such as fisheries. MPAs should not be isolated from a “wider program of coastal resource management, because this could lead to ‘islands of protection’ surrounded by uncontrollable areas of threat, where pollution, habitat destruction, and overfishing are prevalent” (Salm *et al.*, 2000). For example, MPA processes can be at the mercy of larger scale political agendas (the turnover of governments), funding uncertainties, and shifts in MPA support, depending on leadership, interest, and motivation.

From a human perspective, it is useful to consider how MPAs fit into three broader frameworks that are the focus of considerable attention in coastal and ocean affairs: ecosystem-based management, integrated management, and the sustainable livelihoods approach.

First, MPAs relate to ecosystem-based management, which “considers the linkages between human and natural systems and recognizes the need for management strategies that address these relationships” (Pomeroy *et al.*, 2007), while “incorporating human use and values of ecosystems in managing the resource” (Grieve and Short, 2007). In the context of MPAs, ecosystem-based management can be considered a marine spatial planning tool, applied within a specific “place-based” geographic location (Kelleher, 1999; Gubbay, 2004). An ecosystem approach also obliges us to assess how the MPA affects the ecosystem outside the MPA. For example, the concern discussed above about displacement of fishing effort from the MPA to areas outside it relates to the potential for inadvertently overexploiting resources as a result of this concentration of effort.

Ecosystem-based management has clear connections to integrated management, seen as “a comprehensive way of planning and managing human activities so that they do not conflict with each other and so all factors are considered for the conservation and sustainable use of marine resources and shared use of ocean spaces” (Department of Fisheries and Oceans, 2005). Incorporating MPAs in a larger spatial system of protection provides a more robust management framework, while acknowledging the social, cultural, and economic factors that drive resource use in a specific coastal or ocean area. The Great Barrier Reef Marine Park, Australia, is an example of a multiple-use zoning approach, which is managed as an integrated whole, incorporating the temporal and spatial scales at which

ecological systems operate and the social and economic uses of the park (Day, 2002).

Recognition of the Gully as a unique area, potentially threatened by influences outside of the MPA, initiated a series of conservation efforts starting in the early 1990s, by scientists, environmental non-government organizations, government agencies, and others (Fisheries and Oceans, 2008). However, although there were some conservation efforts in the Gully area before the MPA designation, environmental quality and habitat concerns were not being addressed in a comprehensive manner or providing the enduring protection required. The designation as an MPA provided an opportunity to harmonize efforts across different groups, and allowed habitat and other environmental quality concerns to be addressed across the board (Fisheries and Oceans, 2008).

The third of the broad frameworks, the sustainable livelihoods approach, starts not from the perspective of the ecosystem or the management system, but instead from the perspective of coastal communities and their residents. From this perspective, maintaining sustainable livelihoods (e.g. stable employment with reasonable incomes) is typically a priority of society, so socio-economic and governance concerns should consider the wider coastal economy. Wells *et al.* (2007) suggest that livelihood improvements as a result of MPAs are manifested (i) as “direct revenue generation opportunities caused by the MPA, such as increased fish catches in surrounding waters, or increased employment in tourism”; or (ii) “through donor agencies that have supported programmes to develop alternative and/or supplementary income generating activities, parallel with the development of the MPA”.

Indeed, Eastport’s concern for sustainable livelihoods was the driving force behind the eventual establishment of the MPA in that area. This experience has been shared elsewhere. Wells *et al.* (2007) note, for example, that “in Kenya, women’s groups have benefited from MPA-related enterprises, such as a mangrove boardwalk next to Kisite Marine Park, which is run by women, and a handicraft programme using recycled materials at Kiunga Marine Reserve”. Similarly, in the San-Andres archipelago, Columbia, positive lessons learned from incorporating a community’s socio-economic concerns into MPA planning included strengthened government agencies and community stewardship, which paved the way for co-management and better spatial management arrangements that were embedded in the social-ecological systems of the wider coastal communities (Howard *et al.*, 2007).

Discussion and conclusion

This paper has undertaken a broad exploration of the human dimensions of MPAs, through the formulation of a top-ten set of key ingredients, considerations that, experience tells us, are crucial to developing and implementing MPAs. This set, although necessarily subjective, has drawn on a wide range of literature, and thus reflects lessons learned from many global experiences with MPAs, including those of the authors. It is hoped that the list of human dimensions will resonate across a spectrum of MPA realities.

It should be noted that there is a strong overlap and interaction among the ten items. For example, an “attachment to place” creates an opening to “make participation meaningful”, but creates challenges in “dealing with displacement”. Similarly, an MPA situation in which there are supportive “objectives and

Table 1. Human dimensions in two MPAs.

Characteristics	The Gully	Eastport
Objectives and attitudes	Key goal was biodiversity conservation. Inner no-take zone highlighted differing objectives of fishers and government, which led to conflict between them.	Key goals were resource recovery and livelihood sustainability. The MPA supported socio-economic community goals and enhanced communication.
People-orientated entry points	Initial driving forces were academic and conservation organizations; government became the key driver; instruments used were largely legal and institutional.	The driver was socio-economic, with concerns over livelihoods and the future of the fishery. Social instruments were important in implementation.
Attachment to place	Little coastal community attachment, but fishers in this area have a “user-social” attachment and a knowledge base of natural characteristics of the resources.	The MPA is fundamentally part of local community, having originated in efforts of fishers to understand and enhance the lobster fishery and secure their livelihoods.
Make participation meaningful	Located far from the coast, participation has been largely within an advisory committee, with operation of the MPA carried out by government.	A grass-roots initiative of participatory research and data collection. Decision-making was through formal co-management agreement, now more on a voluntary basis.
Knowledge has a “people side”	Socio-economic assessments led to a better understanding of resource values and historical patterns of human use through research and public consultation.	Eastport model is used by the government to illustrate the approaches that can be taken to link scientific and technical methods with community knowledge.
Effective governance is critical	The advisory committee was established and is recognized by DFO, and helps to assess measures to manage the MPA, but does not have legal or delegated powers.	Has history of participation and co-management; now an advisory committee provides input to enhance local and agency support for resource stewardship.
Get the rights right	Use rights have been an issue, notably traditional access rights for fishers into the no-take area. Management rights are held solely by the federal government, but an advisory committee has input on some decisions.	Use rights are at the heart of the fishers’ initiative. Management rights are now through an advisory committee, but have included establishing a lobster fishery closed area, and participation in MPA process.
Costs, benefits, and distribution	Some stakeholders (e.g. conservation organizations) were seen as winners in the process, while others (one of the fishery sectors) initially saw themselves as losers.	The grass-roots origin and participatory nature of MPA development created a win-win situation in which no one was seen as a loser.
Deal with displacement	Relatively few stakeholders were affected in this offshore area, but there was a clear displacement of some fishers from traditional areas.	Small areas meant little displacement of fishers who, in any case, were involved in the process to close areas.
See MPAs in the bigger picture	MPA designation provided an opportunity to harmonize efforts across groups, allowing habitat and other environmental quality concerns to be more effectively addressed.	A sustainable-livelihoods framework was relevant in Eastport, where the dual goals of ecosystem health and livelihoods were both of local importance.

attitudes” allows one to “find suitable entry points” more easily. If MPA planners and stakeholders “see MPAs in the bigger picture”, this can lead to more comprehensive assessment of “costs, benefits, and distribution” and moves to “effective governance” that link the MPA to larger scales of management. Such interactions, although complicating the simplicity of a top-ten list, reflect the reality of MPAs as complex, social-ecological systems, ones in which management will continue to be a challenge, but a challenge made easier by an understanding of underlying human dimensions.

The ten human dimensions highlighted here were examined from a number of angles but in particular from the perspective of two Canadian MPAs, one offshore (The Gully) and the other coastal (Eastport), each with very different characteristics that contributed to the specifics of their evolution. Table 1 summarizes how each human dimension interacts with each of the two MPAs. This should not be seen as a comparison of the two MPAs *per se*, but rather as indicating the widely varying extent to which the human dimensions appear within just two MPAs, including differing objectives, driving forces, and levels of participation in MPA development (Table 1).

This illustrates the common-sense reality that the nature of the interaction between MPAs and human dimensions will depend on the nature of the MPA itself (e.g. its offshore or coastal location, its

primary objectives, etc.) and of the processes and people involved. Indeed, a better understanding of these interactions would be possible, in each case, through more in-depth study and inter-viewing of the individuals and institutions involved.

Ultimately, the goal of this paper has been to reinforce the importance of human dimensions in MPA planning, implementation, and management. These ten considerations, all critical to the success of MPAs, need to be seen as complementary to the attention paid to biophysical aspects in MPA decision-making. Undoubtedly, the balancing act between the biophysical and the human dimensions will be a continuing challenge in the world of MPAs.

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