

Alternative Analysis of the Need for Additional MPAs within the MBNMS

Socio-Economic Chapter

A Report to the Alliance of Communities for Sustainable Fisheries (ACSF)

by

Barbara L. E. Walker, Ph.D.
Institute for Social, Behavioral, and Economic Research
University of California at Santa Barbara

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Executive Summary

A process is underway to update the management plan for the Monterey Bay National Marine Sanctuary (MBNMS). The new management plan may include marine protected area (MPA) zoning among other existing and prospective management tools (NOAA 2006). If it is determined that there is a need for MPAs in the MBNMS, this chapter provides guidance on the scope and methods that should be used in a socio-economic analysis, based on a review of best-practice examples and consensus in the academic and public agency literature.

Several federal mandates, such as the Sustainable Fisheries Act, the National Marine Sanctuaries Act, and Executive Order 12044 on improving governmental regulations, require that thorough socio-economic analysis is conducted in conjunction with, and at the same scale and excellence as, natural science analysis in support of environmental decision making, management, and monitoring. As such, this chapter provides guidance on how to meet these requirements for utilizing social and economic data in MPA analyses. The following key areas of social science research and analysis that are widely considered necessary for the effective planning, implementation, monitoring, and evaluation of an MPA:

- Current, historical, and projected use patterns among all commercial and recreational uses

Information about use patterns related to both extractive and non-extractive activities, inside and outside of the MPA, should be collected. It is important to also understand the historical, cultural, economic, political, social, regulatory and ecological forces that underlie use patterns, with particular attention to the displacement effects of MPAs. Spatial data about use patterns should be analyzed in conjunction with spatial ecological data in order to maximize the ecological benefits of an MPA while simultaneously minimizing the economic and social costs. Spatial use pattern analysis would be greatly improved if preliminary biological analyses were performed to assess the likely response of different species to the proposed MPAs. This kind of preliminary modeling can inform the socio-economic analysis, and increase the participation of stakeholders.

- Perceptions, attitudes, and beliefs about the MPA area, its values, and its uses

The use behaviors of MPA stakeholders are shaped by their perceptions, attitudes, and beliefs about the locations, characteristics, values, and uses of marine resources and ecological processes. There is agreement in the literature that MPA planning processes should attempt to fully integrate the perceptions, attitudes, and beliefs of the range of stakeholders in order to create a shared sense of problems and opportunities, improve stakeholder attitudes about management, and enhance stakeholder compliance with the resulting regulations.

- Economic values

The costs and benefits of market and non-market values should be considered in establishing and evaluating an MPA. Capturing the total costs and benefits of an MPA is challenging because of the difficulty in assigning value to certain features of the marine environment or marine-dependent communities. Spatial analyses of economic indicators, use patterns, and ecological data can allow planners to maximize the ecological benefits of MPAs while minimizing social and economic impacts. However, the collection and analysis of these kinds of data must be conducted with the utmost respect to the privacy and trust of stakeholders.

- Community-wide social and economic relationships and linkages

The social and economic linkages between primary stakeholders, secondary actors, and surrounding communities should be accounted for in an assessment or evaluation of proposed or existing MPAs. Impacts to all of the individuals and communities along a given commodity chain can have an effect on the success or failure of an MPA. In addition, the social and economic effects of multiple, overlapping fisheries regulations in the central coast should be considered in a thorough ecosystem approach to management and monitoring.

- The legal considerations required by the National Marine Sanctuary Act in relation to stakeholders and surrounding communities

The formal governance of an MPA should take into account the formal regulations AND the informal rules and agreements among and between stakeholders and managers that existed prior to the establishment of the MPA. Establishing an MPA within a National Marine Sanctuary poses questions about the legislative intent of the National Marine Sanctuary Act and the extent to which the MBNMS may regulate fisheries.

- Social science methods for incorporating human dimensions analysis in MPA design

Social science methods and genuine public participation should be engaged in the planning, implementation, monitoring, and evaluation of MPAs. The term methods is used here to mean both social science research methods (ways of collecting and analyzing data) and the methods used by decision-makers, managers, and planners in regard to public outreach and engagement. Forums for public participation must engender fair, transparent, efficient, and positive relationships among and between stakeholders and managers. Social science data must be collected systematically and reliably through valid methodologies. There is not a one-size-fits-all methodological approach to collecting social science data for MPAs, but a positive and trusting relationship between social scientists and stakeholders is imperative to successful and effective results.

It is evident to many stakeholders that a lack of trust between stakeholders and sanctuary management has characterized the process to date to consider MPAs in the MBNMS. Should a socio-economic analysis be undertaken in regard to potential MPAs in the MBNMS, the problematic relationships between and among managers and stakeholders can be improved by a thorough, thoughtful, and transparent program of social and economic data collection and analysis.

Introduction

A process is underway to update the management plan for the Monterey Bay National Marine Sanctuary (MBNMS). The new management plan may include marine protected area (MPA) zoning among other existing and prospective management tools (NOAA 2006). If it is determined that there is a need for MPAs in the Monterey Bay National Marine Sanctuary (MBNMS), this chapter provides guidance on the scope and methods that should be used in a socio-economic analysis, based on a review of best-practice examples and consensus in the academic and public agency literature.

One of the original objectives of the National Marine Sanctuaries Act (NMSA) is to “preserve or restore areas... important to the survival and preservation of the nation’s fisheries and other ocean resources” (Department of Commerce 1974, p. 10255). This and other preservation objectives (endangered marine life, oceanographic features, national monuments, and research areas, to name a few) comprise the multi-use intent and history of the NMSA (Chandler and Gillelan. 2004).

MPAs serve many different purposes and are established for a variety of reasons. As the popularity of MPAs as a marine management strategy has grown in the last two decades, MPA design has mainly focused on natural science information and goals. Unfortunately, sound social science practices regarding MPAs have been developed largely in reaction to failures – either ecological or socio-economic – in past efforts to establish and monitor existing MPAs (Farrow 1996; Badalamenti 2000; Pomeroy 2002; Davis 2005). The human dimensions of marine management have recently come into better focus as user conflicts, legal challenges, delays in process and implementation, and ineffective (or “paper”) parks have come to characterize many MPA processes throughout the world (Fiske 1992; Alder et al. 1994, Alder 1996; White et al. 1994, 2002; Cocklin, et al. 1998; Pomeroy and Beck 1999; Russ and Alcala 1999). For these reasons, it is now clear that the social, cultural, political, economic, historical, and legal dimensions of MPAs must also be integrated into MPA design and monitoring to ensure successful outcomes.

According to the NOAA National Marine Protected Areas Center,

Virtually all of the federal mandates relevant to MPAs refer to the integral role of social and economic factors in MPA policy development and management decisions (e.g. Sustainable Fisheries Act, National Marine Sanctuaries Act, Coastal Zone Management Act, Presidential

Proclamations and Executive Orders). Similar requirements to address the social sciences of MPAs exist in national environmental legislation such as the National Environmental Policy Act (NEPA) and Executive Order 12044 on improving government regulations. In general, all of these mandates refer to the need for interdisciplinary assessment in support of policy and management decisions, including both formal social scientific data and the inclusion of public and stakeholder input.

For instance, the federal law that governs fisheries management, the Magnuson-Stevens Sustainable Fisheries Act, states that:

Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2),¹ in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities [16 U.S.C. 1851 MSA § 301, 109-479(8)].

Thus this chapter provides guidance on how to meet these requirements for utilizing social and economic data in MPA analyses. This chapter covers the following key areas of social science research and analysis that are widely considered necessary for the effective planning, implementation, monitoring, and evaluation of an MPA:

- Current, historical, and projected use patterns among all commercial and recreational uses;
- Perceptions, attitudes, and beliefs about the MPA area, its values, and its uses;
- Economic values;
- Community-wide social and economic relationships and linkages;
- The legal considerations required by the National Marine Sanctuary Act in relation to stakeholders and surrounding communities; and
- Social science methods for incorporating human dimensions analysis in MPA design

This analysis relies on two sets of information about the social science and human dimensions of MPAs. The first is a small number of guidebooks and reports generated by NOAA and other regional and international organizations concerned with MPA design and management. These reports outline best-practice examples and guidelines for social

¹ paragraph 2 states that “Conservation and management measures shall be based upon the best scientific information available” [16 U.S.C. 1851 MSA § 301, 98-623(2)].

science research about MPAs. In particular, the NOAA National Marine Protected Areas Center published a “Social Science Research Strategy for MPAs” (Wahle et al. 2003) that identifies high priority needs for social research goals, themes, and topics.

The second set of information that informs this analysis is a broader collection of papers in the social science literature – largely in academic journals – that gives more general information about specific case studies and specific topical areas related to the social science of MPAs. The majority of case studies documented in this literature are from less-developed countries, particularly in the Caribbean and the Pacific, with fewer examples from the North America and Europe.

There are multiple definitions of “marine protected area” used in varying contexts and by different institutions. Similar terms are also used, such as “marine reserve,” “marine park,” or “conservation area.” There is no international, national, or state standard for the use of these terms. Both the Marine Life Protection Act (California Fish and Game Code Section 2850-2863), and NOAA provide guidance about MPA management. The following definitions indicate that for both institutions, the human dimensions of marine use are integral to the planning and management of MPAs. These definitions notwithstanding, it is also important that local communities participate in the definition and naming of local MPAs (Day et al. 2007).

The California Marine Life Protection Act (MLPA) defines an MPA as:

a named, discrete geographic marine or estuarine area seaward of the high tide line or the mouth of a coastal river, including any area of intertidal or subtidal terrain, together with its overlying water and associated flora and fauna that has been designated by law, administrative action, or voter initiative to protect or conserve marine life and habitat. An MPA includes marine life reserves and other areas that allow for specified commercial and recreational activities, including fishing for certain species but not others, fishing with certain practices but not others, and kelp harvesting, provided that these activities are consistent with the objectives of the area and the goals and guidelines of this chapter. MPAs are primarily intended to protect or conserve marine life and habitat, and are therefore a subset of marine managed areas (MMAs), which are broader groups of named, discrete geographic areas along the coast that protect, conserve, or otherwise manage a variety of resources and uses, including living marine resources, cultural and historical resources, and recreational opportunities [Fish and Game Code, Chapter 10.5, Section 2852(c)].

Related to this definition, an important element of the MLPA is to facilitate adaptive management of MPAs and ensure that the system meets the goals of the Act. The code defines adaptive management as:

a management policy that seeks to improve management of biological resources, particularly in areas of scientific uncertainty, by viewing

program actions as tools for learning. Actions shall be designed so that, even if they fail, they will provide useful information for future actions, and monitoring and evaluation shall be emphasized so that the interaction of different elements within marine systems may be better understood [Fish and Game Code, Chapter 10.5, Section 2852(a)].

Another definition of MPA is provided by the NOAA National Marine Protected Areas Center:

An MPA is any specific area of the marine or estuarine environment that has been reserved by federal, state, territorial, tribal, or local laws or regulations to provide lasting protection for part or all of the natural and cultural resources therein [derived from Executive Order 13158 on MPAs] (Wahle et al. 2003, p. 3).

Specific operational criteria for the key terms lasting, protection, area, marine environment, and reserve within this broad definition were developed by the National MPA Center for MPAs participating in the national system (National Marine Protected Areas Center 2006).

In addition, NOAA affirms an ecosystem approach to management in its 2006-2011 Strategic Plan:

- An *ecosystem* is a geographically specified system of organisms, the environment, and the processes that control its dynamics. Humans are an integral part of an ecosystem.
- The *environment* is the biological, chemical, physical, and social conditions that surround organisms.
- An *ecosystem approach to management* is management that is adaptive, specified geographically, takes into account ecosystem knowledge and uncertainties, considers multiple external influences, and strives to balance diverse social objectives (NOAA 2005, p. 3).

In sum, these definitions assert that human, social, and economic dimensions should be integral to the political and scientific processes that establish, manage, or monitor MPAs.

Current, Historical, and Projected Use Patterns among All Commercial and Recreational Users

Use patterns are the spatial and temporal characteristics of stakeholder activities (both extractive/consumptive and non-extractive/non-consumptive) within and surrounding an MPA. Understanding MPA use patterns is fundamental to the establishment,

management, and monitoring of an MPA. It is also critical to understand the forces (economic, political, social, and ecological) that underlie these uses (Walters 2000; Wahle et al. 2003; Adger et al. 2005; Lunn and Dearden 2006). Additionally, historical and projected future use patterns should be considered along with current uses in order to understand potential temporal patterns and trends (Wahle et al. 2003), and to anticipate and monitor the displacement of activities and income generation that typically occurs when an MPA is established (Jones 2006; Richardson et al. 2006; Guidetti 2007; Kellner et al. 2007). Unfortunately use pattern data, particularly for extractive activities, is sometimes difficult to collect. Because consumptive users of marine resources rely on detailed spatial information about their resource in order to maintain their incomes, they may not be willing to share this information with managers and/or other stakeholders. Thus, data collection techniques must be designed to overcome the privacy issues associated with consumptive use.

A comprehensive understanding of use patterns, in juxtaposition with spatial ecological data, is crucial to MPA siting decisions. Thorough use pattern data allows MPA planners to equitably distribute the costs and benefits of MPAs among stakeholders, while maximizing habitat protection (Edgar et al. 2004). Data about use patterns before and after the establishment of an MPA are necessary to monitor and evaluate both the ecological and socio-economic effectiveness of the MPA, particularly in regard to areas outside of the MPA, where use is likely to be redirected (Sanchirico et al. 2006; Kellner et al. 2007; Stelzenmuller et al. 2007). Baseline data about use patterns prior to the establishment of an MPA allows for anticipating and monitoring shifts in activities as a result of the MPA, thereby helping to minimize unintended ecological, economic, and social consequences of MPAs (Pomeroy 2002).

It is important to note that fishermen's scientific knowledge should be included in the collection of ecological data. Fishermen's scientific knowledge is alternately referred to in the literature as "anecdotal," "traditional," "experiential," and the like. A growing literature shows that this knowledge is often complimentary with Western positivist science (Johannes 1994, Ruddle 1998, Bergmann et al. 2004, Drew 2005), and can be valuable to modern management strategies in that it can contribute to management design, and scientific research (Dyer and McGoodwin 1994, Neis et al., 1999, Berkes and Seixas 2005). These studies have promoted the acceptance of environmental co-management (Christie et al. 2002), yet in many cases, state agencies and scientists are reluctant to fully accept the legitimacy of fishermen's scientific knowledge (Robinson et al. 2005, Gelcich 2006, Murray et al. 2006, Cinner and Aswani 2007).

The establishment of MPAs displaces fishing effort and other income-generating activities into the surrounding ecosystem, often directly adjacent to MPA boundaries (McClanahan and Kaunda-Arara 1996; Kelly et al. 2000, 2002; Bohnsack and Ault 2002; Goñi et al. 2006; Kellner et al. 2007). For this reason, social and natural scientists alike recommend adaptive management strategies in order to continuously mitigate and improve the ecological and socio-economic effects of the MPA (Young et al. 2007). Specifically, the boundaries and placement of MPAs should be considered flexible over time, and subject to being moved, expanded, contracted, or eliminated should future

studies determine that different spatial arrangements would create improved ecologically and socio-economically effective management (Walter and Hilborn 1976, 1978; Murray et al. 1999; McClanahan and Mangi 2000; Ehler 2003; Agardy et al. 2003; Grafton and Kompas 2005; Cook and Heinen 2005; Pomeroy et al. 2005; Uychiaoco et al. 2005; Granek and Brown. 2005; Cinner et al. 2006).

Spatial socio-economic analysis would be greatly improved if preliminary biological analyses were performed that assess the likely response of different species to the proposed MPAs. Walters, Hilborn and Parrish (2007), for instance, created a simple model to predict the effects of three MPA packages on five historically overfished indicator species on California's Central Coast. The results of this study suggest that MPA packages proposed by the Marine Life Protection Act Initiative (MLPAI) will not be successful at improving fisheries yields unless accompanying fisheries management measures are successful. This and other studies illustrate how predictive models can be used to anticipate the effects of MPAs (Walters, et al. 1999; Walters and Martell 2004; Hilborn et al. 2006), and thus can inform predictive socio-economic modeling as well. If such models can provide stakeholders with choices about likely spatial biological and economic MPA scenarios, stakeholders would be more likely to participate in the planning process.

While knowledge of use patterns is fundamental to MPA siting and management issues, it is also important to understand the economic, political, social, and ecological forces that underlie use patterns. These forces provide a context for managers to understand how and why stakeholders behave the way they do, and how changes in the management regime will affect them. For example, a fisherman might harvest species X at a certain location for several different and possibly overlapping reasons, such as: a) species x only exists in this location, b) this location is closest to the fisherman's port, c) weather patterns make fishing easier at this location, d) this is the location where the fisherman's family has fished for generations, e) the fisherman doesn't know that species x exists in other locations, f) State or Federal regulations disallow the fishermen from fishing in preferred areas, etc. Knowing this information would better inform MPA siting decisions, and allow managers to respond to stakeholder concerns with specific interventions such as subsidies or education.

Spatial information about marine resources is often extremely valuable to resource users and they are unlikely to yield this information to managers and other stakeholders (Maurstad 2002, Silver and Campbell 2005). Even if spatial information about use patterns is accurately described by stakeholders, faulty social science methods and analyses can skew the data in ways that can harm stakeholder livelihoods when MPA siting decisions are made. In a previous study of potential MPAs on California's Central Coast, Ecotrust was contracted to collect and analyze commercial and recreational spatial socio-economic fishing data in order to help decision-makers review MPA packages in the MLPA Initiative process (Scholz et al. 2006). The data collection and analysis in this study was flawed in several ways, and led to the adoption of an MPA system that created uneven costs and benefits to different types of resources users, and to different people within the same user group (McCay et al. 2006). Major inadequacies of the study

included: a sample of interview participants that was too small and un-stratified; single species units of analysis as opposed to fishery groups that are more commonly harvested by individual fishermen; and a weighting system that skewed the relative value of harvest for individual fishermen (Ibid.). Among the problems resulting from the study was that some fishermen's use patterns were unaffected while other fishermen were completely displaced by the new MPAs (Ricketts, personal communication 2007). In order to improve the results of future studies by Ecotrust, several improvements can be made to the methodology, and these have been outlined in detail by McCay et al. (2006).

However, given the extremely sensitive nature of fishermen's information, it may be impossible for Ecotrust to gain the trust of fishery participants that is necessary to collect accurate data in future studies (Grafton 2005; Sall 2007; Sekhar 2007). Apart from the problems outlined above, one fisherman's confidentiality was violated during the Ecotrust interview process. According to Tom Hafer:

I got a call from another fisherman about his interview with the Astrid [Ecotrust] team. He told me that the girls [field staff conducting the interviews] showed him all that I had done and said in their meeting with me the day before. I signed a contract that stated that all my information was confidential. This is a breach of that contract. I called Astrid and told her I was upset and she apologized and said the "girls" didn't know better, but I didn't believe her, because the "girls" had gone over the confidentiality agreement with me in advance. She wanted to know how she could make up for it but I told her the damage was done. (Tom Hafer, personal communication).

Confidentiality was stated as a principal tenet of the data collection process designed by Ecotrust. According to the consent form provided to fisheries participants in the data collection interviews, "only Ecotrust staff (operating under a strict confidentiality protocol) will handle the raw data generated during the interviews. All information collected in the interviews is anonymous and confidential on the individual level." Information about this breach of confidentiality spread throughout the fishing community and created mistrust and animosity toward Ecotrust, and has exacerbated fishermen's reluctance to share social and economic information with any social scientists or marine management agencies working in the area.

Perceptions, Attitudes, and Beliefs about the MPA Area, its Values, and its Uses

Perceptions, attitudes, and beliefs of marine stakeholders shape their behaviors and choices related to resource use. While natural science attempts to define single truths about the natural world, MPA planners and managers must accommodate the reality that different resources users may have radically disparate opinions about the location, characteristics, values, and uses of marine resources and ecological processes (Gelcich et al. 2005; Weible 2007). Furthermore, different stakeholders may have differing opinions about the utility and risks of MPAs and other management practices (Pomeroy and Beck

1999, Crosby et al. 2000; Fiske 2002). Conflicting perceptions, attitudes, and beliefs should be studied, addressed, and mediated in order to avoid contentious, protracted, and expensive planning processes, in addition to illegal uses in the resulting MPAs (White et al. 1994; Suman et al 1999; Alder et al. 2002; Himes 2003).

A planning process that fully engages a full range of stakeholders can contribute to a shared sense of the problems and opportunities inherent in an MPA (Pomeroy 2002; Dalton 2005; Carey et al. 2007). Genuinely incorporating the beliefs, attitudes, and perceptions of all stakeholders will improve the attitudes of stakeholders toward management, and the success of an MPA (Crosby et al. 2000; Pollnac et al. 2001; Agardy et al. 2003; Richardson et al. 2005; Alcala and Russ 2006). Similarly, according to NOAA directives and social science publications, socio-economic goals should be prioritized alongside conservation goals (Wahle et al. 2003; NOAA 2005), which has not been the case in the majority of MPA planning processes (Leslie 2005; Richardson et al. 2006).

The diverse expectations of stakeholders should be considered as well. Managers should present a realistic portrait of what can be expected from an MPA in both ecological and socio-economic terms. Along with this, stakeholders should be made aware that there are many unknowns in MPA science, and that beneficial outcomes are not guaranteed (Wolfenden 1994; Kaiser 2005; Holland and Schnier 2006; Hiddink et al. 2006; Jones 2007). In many cases, the commitment to adaptive management of an MPA has promoted positive stakeholder (particularly fishermen) involvement in the process, and higher rates of satisfaction and compliance with the resulting regulations (Russ and Alcala 1999; Clifton 2003; Uychiaoco et al. 2005; Danielsen 2005; Gelcich et al. 2005; Aswani 2005; Davis et al. 2006; Cinner et al. 2006).

As in many case studies documenting the establishment of MPAs, there is a particular disjuncture between the attitudes, perceptions, and beliefs of fishermen and environmentalist/protectionist stakeholders in the MBNMS. The attitudes, perceptions, and beliefs of fishermen have been especially shaped by the historical context of the establishment of the Sanctuary. Previous experiences among and between stakeholders and managers should be acknowledged in MPA planning processes. Prior experiences can go far to set the stage for new cooperative planning processes and co-management plans. During its inception in 1992, fishermen were assured by NOAA, environmentalists, and state and local decision-makers, that the Sanctuary would not impose regulations on fishermen (McLaughlin 2003). This historical agreement has significantly shaped fishermen's attitudes toward Sanctuary management. Former Congressman Leon Panetta was quoted as saying "I think the reason we were able to get such a large consensus [for the creation of the MBNMS] was that I made it clear the sanctuary wasn't going to represent a whole new bureaucracy imposing regulations on fishermen" (Ibid, p. 8B). Congressman Sam Farr recounted the "promise" made to fishermen in a letter to the MBNMA management, dated January 31, 2002:

...in the process of building support for the designation of the sanctuary, a clear commitment was made to the fishing community that the sanctuary

would not impose any regulations directed at fishing activities or fishing vessels. This agreement is based on the understanding that the fisheries within the sanctuary are already being regulated and that there is neither the necessity nor the resources for the National Marine Sanctuary Program to take on this responsibility. This management plan review process should not be used as a means toward altering this basic agreement. The regulation of fishing in the Sanctuary should remain under the jurisdiction of the California Department of Fish and Game and the Pacific Fishery Management Council. Any future reexamination of this relationship should be conducted directly with representatives of the fishing community and these two agencies.

In addition, a number of elected bodies in the Monterey Bay region have urged the Sanctuary to respect the promise made to the fishing community. Thus the prospect of creating MPAs in the Sanctuary has broken the trust that fishermen felt for management, has infuriated fishermen, and has made them reluctant to participate in future management processes. There is consensus among fishermen that the fisheries should be managed and regulated by the State Department of Fish and Game and its Commission, and the Pacific Fishery Management Council, guided by the Magnuson-Stevens Act (Ibid.).² Dave Danbaum is a retired Monterey Bay fisherman who led local fishermen in their original negotiations with NOAA representatives during the establishment of the MBNMS. His statement summarizes the perceptions, attitudes, and beliefs about the potential for MPAs in the Sanctuary:

Concerns from the fishing industry about a Federal program that would call the Central Coast a “Sanctuary”, leading to possible new regulations of fishing by this agency, mobilized fishermen to work against and defeat Sanctuary designation in the mid 1980’s. Then a proposal for a Monterey Sanctuary surfaced again in the early 90’s. At this time, as a leader in local and state fisheries, and a member of the Pacific Fishery Management Council (holding the obligatory seat for the State of California) I was asked by our Congressional Representative to assist him in bringing the commercial and recreational fishermen together in support of the proposed Sanctuary. Early on, fishermen were clearly promised that the new Sanctuary would not regulate fishermen or fishing activities. If the Sanctuary had any concerns, they would work with us for a mutually acceptable solution. This promise was made both by elected officials, and also NOAA representatives. It was unequivocal: we wouldn’t have to worry about this new agency. We would get benefits, like the ban on oil development, a water quality program, and enhanced and collaborative research with us for better knowledge on fish populations. These are all things fishermen value. Fishermen had had a positive working relationship with Gulf of the Farallones National Marine Sanctuary Manager Ed Uber. With the promise in place, we anticipated that we would have that kind of

² These regulations are reviewed in the below section on legal considerations.

relationship with the new Sanctuary. Now, the reality is frustrating and disappointing. Fishermen perceive the Sanctuary as working to find ways to break this promise, especially over the MPA issue. Fishermen were deeply angered to see the MBNMS go on record as wanting a State MPA network that was even more extreme than what the State wanted, and which had zero support from the fishing community. Because of my deep involvement in bringing the fishing industry, elected officials and NOAA together in reaching the agreement that led to the creation of the MBNMS, I feel personally responsible for any adverse consequences now facing the fishing industry. If this Sanctuary breaks its promise made to fishermen by changing the Designation Document to regulate fishing, I will go to my grave regretting my support of the new Sanctuary, and regret my role in getting other fishermen to go along (Dave Danbom, personal communication).

The attitudes, perceptions, and beliefs of the environmentalist/ protectionist stakeholders are also important to account for in a socio-economic study of potential MPAs in the MBNMS. According to Kaitlin Gaffney, Chair of the MBNMS Conservation Working Group:

Marine Protected Areas (MPAs), including marine reserves, are an important ecosystem management tool that can contribute to protecting the living marine resources and habitats of the Monterey Bay National Marine Sanctuary. MPAs are supported by scientific and policy experts and are closely aligned with the statutory goals of the National Marine Sanctuaries Act and should therefore be included in the Monterey Bay National Marine Sanctuary's suite of management tools.

Scientific experts including the American Fisheries Society, the American Association for the Advancement of Science, and the National Research Council of the National Academy of Sciences, as well as policy experts such as the Pew Oceans Commission and U.S. Commission on Ocean Policy have all identified marine protected areas and marine reserves as important, even necessary, tools for protecting and restoring marine ecosystems (American Fisheries Society Policy Statement #31a, Protection of Fish Stocks at Risk of Extinction; National Research Council, 2001, Marine Protected Areas: Tool for sustaining ocean ecosystems, National Academy Press; Pew Oceans Commission, 2003, America's Living Oceans: Charting a Source for Sea Change; U.S. Commission on Ocean Policy, 2004, An Ocean Blueprint for the 21st Century: Final Report of the U.S. Commission on Ocean Policy).

According to the National Academy of Sciences (NAS): "A growing body of literature documents the effectiveness of marine reserves for conserving habitats, fostering the recovery of overexploited species, and maintaining marine habitats." The NAS Report concludes: "Networks of

marine reserves, where the goal is to protect all components of the ecosystem through spatially defined closures, should be included as an essential element of ecosystems management” (National Research Council, 2001, *Marine Protected Areas: Tool for sustaining ocean ecosystems*, National Academy Press, p. 176.) Both the Pew Oceans Commission Report and the U.S. Commission on Ocean Policy Report specifically recommend use of MPAs as an important ecosystem management tool.

The Sanctuary system has a statutory mandate to “maintain the natural biological communities in the national marine sanctuaries, and to protect, and, where appropriate, restore and enhance natural habitats, populations, and ecological processes” [16 U.S.C §1431(B)(3)]. The many scientifically documented benefits associated with MPAs match closely the goals of the National Marine Sanctuary Program. Accordingly, the Monterey Bay National Marine Sanctuary should adopt a system of MPAs capable of helping to protect, restore and enhance sanctuary resources (Gaffney, personal communication).

These are only partial perspectives of the perceptions, attitudes, and beliefs of two stakeholder groups involved in the management of the MBNMS. Another relevant source of information about stakeholder perceptions, attitudes, and beliefs indicates that when considering the livelihoods of California’s fishing families, a random sample of 801 California residents support harvest limitations over complete harvest bans, and that only 23% of seafood consumers would be willing to forgo buying California seafood knowing that doing so would drive family-run commercial fishing boats in California out of business (Responsive Management 2007). These examples illustrate that a spectrum of perceptions, attitudes, and beliefs typically exists both among and between stakeholder types, and that many individuals may identify themselves as a member of multiple stakeholder groups when deliberating complicated situations that encompass both environmental and economic considerations (Ibid.; Gelcich et al. 2005; Richardson et al. 2005). Thus, information about the perceptions, attitudes, and beliefs of all stakeholders should be collected in a comprehensive socio-economic study of the potential for MPAs in the MBNMS.

Economic Values

Understanding the costs and benefits of market (consumptive) and non-market (nonconsumptive) values of an MPA is essential to successful MPA establishment and evaluation (Pomeroy 2002; Wahle et al. 2003; Richardson et al. 2006). It is often theorized that MPAs will simultaneously generate ecological benefits in the ecosystem AND social and economic benefits to stakeholders (Hannesson 1998; Sanchirico and Wilen 1999; Amo et al. 2005). However, these theories are controversial, and have not been substantiated with empirical evidence in very many cases (Alcala and Russ 1990;

Dixon 1993; White et al. 1994, 2002; Russ and Alcala 1999; Badalamenti 2000; Alder et al. 2002; Oracion et al. 2005).

Capturing the total costs and benefits of MPAs is challenging because it is difficult to assign market values to certain features, or “off-site experiences” of the marine environment, and there have been few empirical studies on the extent to which MPAs can directly affect nonconsumptive values (Carter 2003). Qualities such as the aesthetic value of the seascape, the social value of sport fishing, the cultural value of belonging to or visiting a fishing community, or the ability to bequest marine resources to future generations, are nearly impossible to quantitatively calculate.

Attempts to account for multiple values of the environment have been conceptualized by neo-classical economists as “non-market valuation,” which attempts to identify and quantify economic values associated with goods and services that are not traded in organized markets. There are a variety of different non-market valuation methods, such as “total economic value” (Pearce and Turner 1990), biological or ecosystem service valuation (deGroot et al. 2002; Derous et al. 2007), limits of acceptable change analysis (Roman et al. 2007), travel cost method (Davis and Tisdell 1996; Bhat 2003) and willingness to pay analysis (Togridou et al. 2006), among others. The applicability of each method depends on the specific type of values and policy context in question. These methods are reviewed in several papers, including Freeman (2003), Champ et al. (2003), Lipton and Wellman (1995), Louviere et al. (2000), Bateman et al. (2002), Mitchell and Carson (1989).

There is not a standard measure for non-market values in an MPA, and these methods have been widely debated and critiqued (Eberle and Hayden 1991; More et al. 1996; Bateman and Langford 1997). None of these methods can be legitimized in a theoretical or applicable sense from a neoclassical, psychometric, or general systems point of view. Because neo-classical economics depends on assumptions about human behavior conforming to mathematical logic, the assumed human behavior in the theory is highly artificial (Eberle and Hayden 1991). Notwithstanding these debates, the majority of economists working in this area conclude that the theories, data, and empirical methods are sufficient to warrant including estimates of non-market values for many ecosystem services (Boyd et al. 2004; Holland et al. forthcoming).

An analysis of the economics of an MPA is more useful when integrated into a spatial analysis of use patterns and ecological indicators (Smith and Wilen 2003; Young et al. 2007). Such a spatial economic analysis will allow planners to simultaneously maximize the ecological benefits of MPAs and minimize socio-economic impacts (Richardson et al. 2006). As mentioned earlier, an economic analysis of the effects of potential MPAs in the MBNMS should be done in conjunction with predictive modeling of the biological effects of potential MPAs.

Collecting spatial economic data is often difficult, yet critical to future socio-economic monitoring of an MPA. Collecting spatial data from stakeholders, particularly consumptive users, may be hampered by privacy concerns, especially when these data are

coupled with spatial information about extractive activities (Silver and Campbell 2005). In at least two instances – separate MPA designation processes in the Channel Islands, CA (Pomeroy and Hunter 2005; Leeworthy et al. 2005) and the Central Coast area of California (Scholz et al. 2006) – protocols have been designed that allow stakeholders to confidentially report their spatial economic information. Stakeholders’ (largely commercial fishermen’s) data were then displayed or published only at an aggregate level that protected the privacy and “trade secrets” of the individual study participants. Nevertheless, because of the aforementioned issues regarding trust relationships between stakeholders and management, many fishermen in each designation process disagreed with the results of the spatial economic analysis, and felt that the data collection and analysis processes were flawed, if not purposefully manipulated (Helvey 2004; Pomeroy and Hunter 2005; McCay et al. 2006). Wilen and Abbott note that the potential for strategic bias (or gaming behavior) by study participants in studies of fishermen’s activities is great when there are weak cooperative relationships between regulators and fleets, and when fishermen perceive that their interview responses may influence future punitive policies (2006). Under these circumstances, fishermen may identify fishing areas incorrectly – either identifying the wrong area altogether, or inflating or deflating the size of a fishing location – in an attempt to prevent their fishing areas from being regulated or closed off by an MPA.

Community-wide Social and Economic Relationships and Linkages

MPA stakeholders are not the only individuals or groups that should be considered in the process of establishing an MPA. Social and economic relationships and linkages – also known as a commodity chain – extend beyond the immediate location of an MPA and beyond the individual stakeholder. For instance, resources that are extracted from an MPA pass through several hands and institutions along the way to the consumer, including receivers, processors, harbors, and other support businesses (Pomeroy 2002; Bhat and Bhatta 2006). Less quantifiable resources, such as the MPA as a recreational area or the fishing community as a tourism destination, are also linked to wider communities through tourism services and retail businesses. Thus the costs and benefits of an MPA must be analyzed at a community-wide scale which accounts for the myriad linkages in each commodity chain associated with an MPA. In the case of the MBNMS, for instance, the area’s heritage of commercial fishing, and the ability of visitors to eat fresh, local seafood, are major draws for a robust tourism industry (Responsive Management 2008). Historic Cannery Row, Fisherman’s Wharf, the harbor, and seafood are all featured prominently on the City of Monterey’s visitor web-site and other tourism publications (<http://www.monterey.org/visitorinfo.html>).

Attention to community relationships contributed to the successful establishment of a widely supported National Marine Sanctuary in Fagatele Bay, American Samoa (Fiske 1992) and the Apo Islands Reserve in the Philippines (White et al. 1994). The failure to incorporate community-wide participation and analysis resulted in unsuccessful attempts to establish MPAs in California’s Central Coast (Wood 2007), Puerto Rico (Fiske 1992), St. Lucia (Sanderson and Koester 2000), and the Galapagos Islands (Davos et al. 2004).

Another set of social and economic linkages that should be thoroughly examined is the combination of regulations that may exist in a given marine area, prior to the establishment of an MPA (Robinson et al. 2005). Many areas of state and federal waters off the coast of California are already subject to spatial (for instance depth), gear-specific, and/or species-specific closures. These restrictions on fishing can be seasonal, year-round, permanent, or created in temporary response to emergencies. There is little coordination in California among the various agencies responsible for enacting and managing marine regulations (the National Marine Sanctuaries, the California Department of Fish and Game, the Pacific Fisheries Management Council, and the Marine Life Protection Act Initiative). It is impossible to accurately assess the biological and socio-economic effects of new regulations because of the unsystematic timing of each regulatory process, and the lack of coordination among agencies. Better planning among the various agencies would improve the conditions for natural and social scientific baseline data collection and subsequent evaluations before and after the introduction of each regulation, in addition to allowing for cumulative analyses and a cohesive ecosystem approach to management.

The Legal Considerations Required by the National Marine Sanctuary Act in Relation to Stakeholders and Surrounding Communities

According to Ostrom (2005), institutions are:

the prescriptions that humans use to organize all forms of repetitive and structured interactions including those within families, neighborhoods, markets, firms, sports leagues, churches, private associations, and governments at all scales (p. 3).

The governance of an MPA occurs through multiple, over-lapping institutions that may range from social agreements among local fishermen to international regulations. An enormous body of research on common property systems shows that local groups of resource users typically have a dynamic set of rules and reward/punishment mechanisms that governs the use of a given resource. This system of local governance can operate in concert with, in opposition to, or in the absence of overarching formal governance structures such as municipal, state, and national regulations. Several studies have illustrated how interactions between local and formal institutions have both supported and undermined the effectiveness of MPAs (Fiske 1992; Johannes 1998; Pomeroy and Beck 1999). Thus, it is critical for MPA planners to understand existing local and formal regulations prior to establishing new MPAs and their attendant regulations. Efforts should be made to integrate or complement existing norms within new regulations.

The potential for establishing MPAs within a National Marine Sanctuary poses questions about prior informal arrangements among and between managers, fishermen, and other stakeholders in a Sanctuary. It also calls for a review of the formal laws that govern the management of our National Marine Sanctuaries, and their relevance to new MPA

regulations. There have been several public discussions regarding the extent to which the National Marine Sanctuary Act (NMSA) should prioritize the protection of natural resources over multiple uses within the Sanctuaries (CINMS 2001). The NMSA does not address this concern directly. A study by Chandler and Gillelan (2004) attempts to answer the question: “Is the overriding purpose of the Act the preservation and protection of marine areas, or is it the creation of multiple use management areas in which preservation use has to contend with every other use, even exploitive ones like oil and gas extraction?” (p.10506). The authors conclude that throughout the history of the Act, the U.S. House of Representatives has encouraged both preservation and extractive uses, and that Congress has repeatedly confirmed multiple use as a significant purpose of the Act. The ambiguity of the intention of the NMSA underscores the importance of incorporating all stakeholder institutions, perceptions, beliefs, and concerns in the establishment and management of an MPA in order to foster management decisions that are supported by stakeholders while meeting management objectives and conservation goals (Dalton 2005).

Another critical legal question is the extent to which National Marine Sanctuaries may impose fisheries regulations under their management plans. The National Marine Sanctuary Act requires that Sanctuaries first allow the appropriate regional Fisheries Management Council – the Pacific Fishery Management Council in this case – to draft regulations in accordance with the Magnuson-Stevens Act and in cooperation with other appropriate fishery management authorities, such as the Department of Fish and Game.

Specifically, the National Marine Sanctuary Act states that:

The Secretary shall provide the appropriate Regional Fishery Management Council with the opportunity to prepare draft regulations for fishing within the Exclusive Economic Zone as the Council may deem necessary to implement the proposed designation. Draft regulations prepared by the Council, or a Council determination that regulations are not necessary pursuant to this paragraph, shall be accepted and issued as proposed regulations by the Secretary unless the Secretary finds that the Council’s actions fail to fulfill the purposes and policies of this Chapter and the goals and objectives of the proposed designation. In preparing the draft regulations, a Regional Fishery Management Council shall use as guidance the national standards of section 301(a) of the Magnuson-Stevens Act (16 U.S.C. 1851) to the extent that the standards are consistent and compatible with the goals and objectives of the proposed designation. The Secretary shall prepare the fishing regulations, if the Council declines to make a determination with respect to the need for regulations, makes a determination which is rejected by the Secretary, or fails to prepare the draft regulations in a timely manner... The Secretary shall also cooperate with other appropriate fishery management authorities with rights or responsibilities within a proposed sanctuary at the earliest practicable stage in drafting any sanctuary fishing regulations (Sec. 304. [16 U.S.C. 1434]).

A body of case law illustrates that courts have repeatedly ruled against NOAA in cases brought by injured parties seeking damages for fisheries regulations that cause disproportionate economic impacts on small businesses or on specific resource-dependent communities. As a result of these lawsuits and a general desire by federal decision makers that agencies assess economic impacts and identify lower cost regulatory alternatives, NOAA fishery management decisions are required to be defensible based on scientific merit and on the rigor and timeliness of the underlying social science (Hendricks 2000). The key statutes governing this change are:

- the 1980 Regulatory Flexibility Act (RFA) (5 USC 601 et seq.) as amended under the 1996 Small Business Regulatory Enforcement Fairness Act (SBREFA) (5 USC 801 et seq.),
- the 1993 Executive Order #12866 (Regulatory Planning and Review).

These laws require judicially reviewable economic impact assessments for any regulations that create major impacts on the economy or significantly affect small business. Furthermore, economic and social impacts analysis must be rigorous on a par with scientific concerns and analysis. A report on these issues identified a variety of barriers that preclude NOAA from providing such rigorous and timely economic and social analysis (Ibid.). These include:

- Insufficient staff levels of economists and social scientists.
- Fragmented data availability and the lack of sufficiently detailed data.
- Unclear guidance on administration of analysis, and the absence of clear standards.
- Inadequate coordination of existing and potentially available resources.
- Lack of communication across offices in developing new capacity to address economic, social, and community based issues.
- Lack of trust and common understanding among NOAA, oversight bodies, and the regulated community, and insufficient structures for rapidly addressing constituent concerns.
- Need for earlier inclusion of economic analysis in policy design (Ibid. p. 5-6).

The above mentioned laws emphasize the critical need for thorough social and economic analysis of potential or proposed MPAs in the MBNMS. The report by Hendricks implies that NOAA may not have the capacity to undertake such a study.

The haphazard introduction of multiple fisheries regulations by different agencies in California (as discussed in the previous section) renders these agencies particularly vulnerable to lawsuits based on the lack of scientific rigor in assessing cumulative economic impacts. Data show that regulations enacted in the last decade in the central coast reduced landing for several species that were not overfished. As a result, the value of landings in the ports adjacent to the MBNMS has declined by 58% in the past decade (Parrish, this report). These data – which suggest the cumulative effects of multiple and overlapping regulations – pose questions about the legality of additional fisheries

regulations in relation to the Regulatory Flexibility Act, the Small Business Regulatory Enforcement Fairness Act, and Executive Order # 12866.

Social Science Methods for Incorporating Human Dimensions Analysis in MPA Design

Social science research methods and public participation go hand in hand when planning for and monitoring an MPA (Pomeroy 2002; Christie, et al. 2003; Dalton 2005). Different forms of eliciting public participation include public hearings, soliciting written comments, workshops, advisory panels, and focus groups. Despite ostensible good intentions, opportunities for public participation do not always foster meaningful dialogue between and among stakeholders and managers, and they can also create biases toward stakeholders who have more expertise, time, or interest in attending meetings.

Based on an analysis of U.S. terrestrial resource management case studies, Dalton (2005) outlines five goals of effective public participation in MPA decision-making. These are:

- active stakeholder involvement,
- complete information exchange,
- fair decision making,
- efficient administration, and
- positive participant interactions.

While public participation is crucial for MPA decision-making, it does not replace the necessity of the systematic, reliable, and valid collection of social and economic information that is necessary to establish and monitor an effective MPA in particular, and the wider ecosystem in general (Pomeroy 2002). The types of social science information outlined in this paper can be collected through a variety of overlapping methodologies. There is not a one-size-fits-all methodological approach to collecting social science data for MPAs. A protocol of several complementary methods should be designed based on the circumstances of each project. In addition, a positive and trusting relationship among social scientists and stakeholders is absolutely fundamental to the success of the social science research undertaken.

In the case of the MBNMS, it is evident to many stakeholders that a lack of trust between stakeholders and sanctuary management has characterized the process to date to consider MPAs in the MBNMS (Scheiblaue, personal communication).³ Should a socio-economic analysis be undertaken in regard to potential MPAs in the MBNMS, the problematic relationships between and among managers and stakeholders can be improved by a thorough, thoughtful, and transparent program of social and economic data collection and analysis.

³ To date, several letters from stakeholders have been submitted to MBNMS managers regarding trust issues and other problems related to the process of considering MPAs in the MBNMS. Some of these can be accessed via the MBNMS Sanctuary Advisory Council meeting agendas and minutes records, at: <http://www.montereybay.noaa.gov/intro/advisory/advisory.html> .

The following publications and web-sites are useful sources of information about social science methods for studying marine management in general and MPAs in particular:

- The NOAA Coastal Services Center provides a useful web-site that inventories potential methodological tools that can be used for various types of social science analyses regarding MPAs: <http://www.csc.noaa.gov/mpass/>.
- Wahle, et al. outline common research methods and approaches that can be used to elicit social science information about MPAs (2003, pp.26-27).
- The United Nations Food and Agriculture Organization (FAO) has published a technical paper to help fisheries officials better understand the cultures of small-scale fishing communities in order to develop more successful management policies and practices. Methods which might help fisheries managers to obtain trustworthy and reliable information about fishing cultures in an ethical manner are also suggested, including methods for rapidly acquiring important information while working within tight budgetary and time constraints: <http://www.fao.org/DOCREP/004/Y1290E/Y1290E00.HTM>
- The National Marine Protected Areas Center in cooperation with NOAA has published a guide to stakeholder participation, with useful sections on how to design, facilitate, and evaluate effective participatory processes. This publication also outlines regulatory requirements for public participation in MPA decision-making processes (Kessler 2004). http://www.csc.noaa.gov/mpa/Stakeholder_Synthesis.pdf

Conclusion

This chapter covers the key areas of social science research and analysis that are widely considered necessary for the effective planning, implementation, monitoring, and evaluation of an MPA. If it is determined that MPAs are an appropriate and necessary management tool for the MBNMS, a thorough social scientific study should be conducted and meaningfully integrated with ecological analysis, to determine the optimal placement of MPAs. It is also imperative that subsequent human dimensions data should be collected on a regular and on-going basis in order to document the socio-economic effects of the MPA, in addition to providing direction for adaptive, sustainable management of the MBNMS's marine resources. These efforts should also be expanded and integrated with analyses of ecosystem-wide biological and human processes.

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