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Essay

Engaging the Recreational Angling Community to Implement and Manage Aquatic Protected Areas

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Abstract: *Recreational angling is a popular leisure activity, the quality of which is greatly dependent on fish abundance and well-functioning aquatic ecosystems. Aquatic protected areas (APAs) are used to help maintain and even restore aquatic systems and their associated biota, including fish species that are popular with recreational anglers. Paradoxically, the use of APAs has been a source of much contention and conflict between members of the recreational angling community and those interested in or mandated to protect aquatic resources on the basis of the interests of multiple stakeholder groups. The angling community is concerned about the loss of fishing opportunities and effectiveness of APAs. Although it is still unclear whether establishment of APAs alone can effectively protect aquatic resources, actively including the recreational angling community in the design, implementation, and management of APAs will help ensure the values of this rather substantial user group are incorporated into aquatic conservation strategies. Conversely, the probability of increasing the sustainability of recreational angling and related economies will be greatest if recreational angler groups remain open minded to both short-term and long-term goals of fisheries conservation strategies, including the use of APAs.*

Keywords: aquatic protected areas, conflict, engagement, planning process, recreational anglers

Involucrando a la Comunidad de Pescadores Recreativos en la Implementación y Manejo de Áreas Acuáticas Protegidas

Resumen: *La pesca recreativa es una actividad popular, cuya calidad depende en gran medida de la abundancia de peces y el buen funcionamiento de los ecosistemas acuáticos. Las áreas acuáticas protegidas (AAP) son utilizadas para mantener y aun restaurar sistemas acuáticos y su biota asociada, incluyendo especies de peces que son populares entre los pescadores deportivos. Paradójicamente, el uso de las AAP ha sido motivo de discordia y disputa entre miembros de la comunidad de pescadores recreativos y quienes están interesados en o administran la protección de los recursos acuáticos sobre la base de los intereses de diversos grupos. La comunidad de pescadores está preocupada por la pérdida de oportunidades de pesca y la efectividad de las AAP. Aunque no está claro si el establecimiento de las AAP por sí solo puede proteger los recursos acuáticos efectivamente, la inclusión de la comunidad de pescadores recreativos en el diseño, implementación y manejo de las AAP ayudará a asegurar que los valores de este grupo importante de usuarios sean incorporados en las estrategias de conservación acuática. Por el contrario, la probabilidad de incrementar la sustentabilidad de la pesca recreativa y economías relacionadas será mayor sí los grupos de pescadores recreativos permanecen abiertos a las metas de corto y largo plazos de las estrategias de conservación de pesquerías, incluyendo la utilización de AAP.*

Palabras Clave: áreas acuáticas protegidas, conflicto, involucramiento, pescadores recreativos, proceso de planificación

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Nature of the Recreational Angling Community

Capturing fish with a hook and line has a long history in human society (reviewed in Policansky 2002). Initially, fishing with hook and line was invented as a method to catch fish for food; however, over time the motivations for angling became more diverse, with the social status associated with fishing ranging from something fit for slaves and children to an activity reserved for the upper class (Policansky 2002; Arlinghaus et al. 2007). During the Middle Ages (1200–1500 AD) in Europe, greater controls over the use of aquatic resources and the privatization of fishing rights developed in response to unsustainable levels of fishing, further fueling the segregation between social groups. By the nineteenth century, the popularity of recreational angling grew considerably especially as Europeans immigrated to North America, where natural resources were comparatively abundant and public ownership of fish and game more prevalent (Arlinghaus et al. 2007).

Recreational angling is now one of the most popular leisure activities worldwide, with average participation rates of roughly 10% of the adult population in high-income countries (Arlinghaus & Cooke 2009). Those engaged in recreational angling still span a wide range of human society, from young children to the elderly and from the rich to the poor (Arlinghaus et al. 2008). Equally diverse are the motivations behind recreational angling, including catching fish for personal consumption, thrill of capture and then release, seeking trophy-sized fish, competition of tournament angling, camaraderie in angling clubs, and connecting with nature (Fedler & Ditton 1994).

Recreational angling also represents a leisure activity that spans a wide range of aquatic systems, from small mountain streams to rivers, lakes, coastlines, and open seas, and the ability to access novel environments and to target novel species and seemingly undisturbed fish populations in exotic locations is increasing (Ditton et al. 2002). As new target species become popular and as current target species become more difficult to catch because of decreased abundance, the use of different tactics by recreational anglers (e.g., gears, techniques, strategies) is also increasing. In many cases, angler groups have developed around the use of a specific gear type (e.g., fly rod) or the targeting of a specific group of fishes (e.g., bonefish [*Albula* spp.] or muskellunge [*Esoxmasquinongy*]), which creates even more diversity within the angling community (Oh & Ditton 2006). As the recreational angling community becomes more diverse, so does its capacity to contribute to local and regional economies (Pitcher & Hollingworth 2002; Arlinghaus & Cooke 2009) through revenue generated via the manufacture and sales of fishing equipment, tackle, apparel, and boats to services provided by bait shops, lodges and hotels, and fishing guides and through the advertizing sales associated with fishing magazines, television shows, and tournaments popularized as spectator sports. In 1996 in the United States, recreational anglers spent US$38.0 billion on fishing in freshwater (U.S. Fish and Wildlife Service 1997).

The large number of people actively engaged in recreational angling and those supporting the recreational angling industry (e.g., tackle shops) means that a large segment of the population is influenced by the state of aquatic ecosystems and the status of recreational fishes. Declines in targeted fish stocks due to unsustainable levels of harvest, disturbance or destruction of fish habitats, and indirect effects on aquatic communities via mortality of nontarget or incidentally caught species (Post et al. 2002; Cooke & Cowx 2006) can all have cascading negative effects on the quality of the recreational angling experience and the economic viability of the angling industry (Schramm et al. 2003).

Paradoxically, anglers themselves can be responsible for direct (e.g., unsustainable harvest) (Post et al. 2002; Cooke & Cowx 2004) and indirect (e.g., shoreline erosion, O'Toole et al. 2009; accumulation of lead sinkers, Radomski et al. 2006) negative effects on fish and aquatic ecosystems (Lewin et al. 2006), but the degree of these effects differ among sectors within the recreational angling community (e.g., harvest vs. catch-and-release for the same species in the same location). Forty-nine percent of recreational anglers believe their fishing behavior has no effect on the ecosystems in which they fish, whereas 38% believe their actions interfere with aquatic ecosystems in some way (Gray & Jordan 2010). Thus, conflicting views on how fish populations and their associated ecosystems should be managed exist within the recreational angling community (Arlinghaus 2006; Oh & Ditton 2006; Arlinghaus et al. 2007). For example, advanced anglers (i.e., those with greater fishing knowledge or use of specialized techniques such as fly fishing) are more interested in the quality of the angling experience, which may be associated with state of the environment, than in the number of fish caught, whereas the primary interest for novice or occasional anglers is catching fish and relaxing of harvest restrictions (Oh & Ditton 2006). Conflicting views on the management of fisheries and aquatic systems also exist between recreational anglers and the many other stakeholder groups with interests in using and protecting aquatic resources, including government and nongovernmental groups, private industry, and the general public (Suman et al. 1999; Hilborn 2007).

Opinions on Use of Aquatic Protected Areas

Aquatic protected areas (APAs) are relatively popular tools used to assist in the conservation of aquatic animals, their habitats, and the ecological processes that

support aquatic species in marine (NRC 2001; Lubchenco et al. 2003) and freshwater (Saunders et al. 2002; Suski & Cooke 2007) systems. Theoretically, APAs help conserve habitat and promote the accumulation of biomass because of reduced levels of fishing (Jones 2002). The increased abundance of organisms in APAs can in turn result in the migration of adults into adjacent areas and the downstream dispersal of larvae (Roberts & Polunin 1993; Roberts 1997; Murray et al. 1999). Movement of adults and juveniles and downstream dispersal of larvae can contribute to the maintenance of and increase in abundance of harvested and unharvested aquatic species outside APAs, providing social and economic benefits to local and regional communities (Jones 2002).

A functional benefit of APAs is that they can be designed to meet different management objectives and in many cases still allow for the use of such areas by stakeholders who depend on aquatic resources for commercial and recreational activities (Murray et al. 1999; Jones 2002; Sobel & Dahlgren 2004). For instance, marine parks often incorporate relatively high levels of human activities, whereas no-take marine reserves restrict human use entirely (Jones 2002). Regardless of the type however, when the short-term consequences of restrictions on human activity related to the implementation of APAs are obvious (e.g., the exclusion of recreational angling from within protected area boundaries), the potential long-term benefits and tangible gains of such restrictions must be transparent and highly probable to be accepted by stakeholders (Jameson et al. 2002; Agardy et al. 2003; Mascia 2003). Moreover, an APA can be designed to satisfy both conservation objectives and the needs and desires of resource users.

APAs have a relatively long history, particularly in freshwater systems (Suski & Cooke 2007), but the angling community often regards the use of APAs as new. Nevertheless, controls on fishing effort (e.g., size limits, bag limits) are used for both recreational and commercial fisheries, and APAs can have much to offer because such forms of management are familiar to stakeholders (Cox et al. 2002). For instance, given that a large segment of the angling community tends to seek out trophy fish, there may be much to be gained by establishing APAs that protect "the big ones" and thus protect the genetic pool responsible for production of trophy fish (Birkeland & Dayton 2005). Although there is still some debate about the utility of APAs for the protection of certain recreationally targeted fishes (e.g., highly migratory species such as billfish) (Hilborn et al. 2004), APAs could still be useful for the conservation and management of aquatic resources (Lubchenco et al. 2003), including recreational fish stocks and their habitats (e.g., Murray et al. 1999; McClanahan & Arthur 2001; Suski & Cooke 2007).

The recreational fishing community has become a vocal opponent of the implementation of protected areas in marine and fresh-water systems (Lydecker 2004). In the United States, concept and use of APAs has galvanized the recreational fishing community, and the community has used excerpts from position papers, newsletters, websites, and the recreational angling consumer and industry press to build opposition to this form of management (Lydecker 2004). The American Sportfishing Association and the Canadian Sportfishing Industry Association have identified the establishment of APAs as a threat to the recreational angling community and the industries it supports. The angling community is generally concerned with loss of recreational fishing opportunities and access to public resources (Salz & Loomis 2005; Sutton & Tobin 2009). Salz and Loomis (2005) found that despite the different motivations for fishing of specialized and nonspecialized recreational anglers, both groups view APAs as an undesirable management option. The authors highlight that the loss of access to the resource can act as a common rallying point for diverse members of the recreational angling community. The angling community is also questioning the need and effectiveness of APAs. A corporate position statement posted on the website of Shimano, a fishing equipment manufacturer, typifies the sentiment regarding the use of protected areas: "Marine protected areas (MPAs) and wilderness designations should be just one tool among the choice of options available for effective natural resource conservation. Because they can be the most draconian device, use of MPAs and wilderness designations should be considered only after conventional natural resource management measures have failed" (Shimano Corporation 2010). The first part of this statement echoes the peer-reviewed scientific literature that suggests APAs may not be the sole solution to the conservation of aquatic resources (e.g., Boersma & Parrish 1999; Hyrenbach et al. 2000; Rogers & Beets 2001; Jameson et al. 2002; Suski & Cooke 2007).

APAs once were widely advocated as a low-cost and simple solution to management of aquatic resources (Roberts & Polunin 1993). Yet, the enthusiastic and rapid implementation of APAs has led stakeholders and resource managers to doubt whether conservation targets have been achieved (Agardy et al. 2003; Degnbol et al. 2006). Some of the debate in the scientific and management communities can be attributed to uncertainty whether monitoring of protected areas has determined if conservation targets have been met (Agardy et al. 2003; Pomeroy et al. 2005). Other debates have addressed whether APAs can be deemed successful if conservation targets are met at the cost of local and regional social and economic objectives (Mascia 2003; Ami et al. 2005). In spite of such debates, the overall consensus within the scientific and management communities is that if designed and managed on the basis of realistic conservation goals, APAs could contribute greatly to the conservation of fisheries and aquatic resources, including recreational fish stocks (Roberts et al. 2001; Saunders et al. 2002; Lubchenco et al. 2003).

In spite of the potential benefits to recreational fisheries, lobby groups representing the recreational angling sector have attempted to introduce legislation such as the Freedom to Fish Act in the United States to prevent use of APAs to restrict recreational fishing. In addition, rumors about whether the Obama administration in the United States intended to expand APAs in coastal and some inland waters sparked outrage from angling groups because of the fear their right to access fisheries would be lost (Jonsson 2010).

Engaging Recreational Anglers in Decisions on APAs

To increase the effectiveness of resource management stakeholders are often allowed to play an active role in management decisions that affect them. This participation can lead to a sense of ownership of the decision-making process and outcomes of management actions, increased probability that conservation objectives will be achieved, and reduced costs of implementation (Reed 2008). In the case of APAs, failure to engage stakeholders in the decision process has contributed to opposition to conservation efforts and conflict among user groups and managers, largely because the potential costs and benefits of APAs were perceived inequitable (Helvey 2004). There is conflict between recreational anglers and other stakeholders when an area is slated for protection because the use of these areas for activities other than fishing (e.g., SCUBA diving, pleasure boating) is often not prohibited, whereas recreational angling, even catch-and-release, is commonly excluded from APAs (Lynch et al. 2004; Cooke et al. 2006).

Although including stakeholders in the management process is a common message in the literature and among management agencies (Jones 2002), the success of public participation initiatives has been mixed (Suman et al. 1999; Gleason et al. 2010). For example, the lack of public participation early in the development of a statewide network of marine protected areas as part of California's Marine Life Protection Act resulted in considerable resistance to the implementation of APAs (Weible 2008; Gleason et al. 2010). Early in the planning process public outreach was limited to direct mailings to commercial and recreational angling groups, and this effort resulted in few responses to questions they were asked (Gleason et al. 2010). Subsequently, stakeholder groups had strong negative reactions to preliminary proposals for protected areas that were presented without substantial prior public consultation (Weible 2008; Gleason et al. 2010). These negative reactions presented a public relations challenge (Weible 2008) and substantially slowed implementation of the protected areas (Gleason et al. 2010). In the case of the rezoning of the Great Barrier Reef Marine Park, although stakeholders were consulted (Fernandes et al. 2005), the public participation process left recreational fishers with the perception that they were not treated fairly relative to other stakeholders and no clear understanding of how the information they provided was used in the rezoning process (Sutton & Tobin 2009).

Even when recreational anglers are included in the planning process for APAs, it is evident that improving ways to institutionalize the consultative process could lead to greater understanding and support within the recreational angling community for the use of APAs (Sutton & Tobin 2009). Communication among resource managers and recreational anglers early in the APA planning process can allow for the collection of data on stakeholder perceptions that can help reveal the diversity of motivations and values related to recreational fishing (Dalton 2005; Sutton & Tobin 2009). Because the social and economic conditions of stakeholders differ by region, standard approaches used to engage stakeholders, such as public meetings or an advisory council, may not be applicable in all situations (Dalton 2005) and may need to be determined case by case (Helvey 2004; Hilborn et al. 2004; Dalton 2005).

Dalton (2005) suggests five core process elements that would allow for an adaptive public-participatory process related to the design and implementation of APAs: active participant involvement, decisions based on complete information, fair decision making, efficient administration, and positive participant interactions. Given the considerable difference of opinion regarding APAs, creating a positive forum for communication could help engage recreational anglers in a constructive discussion about the potential advantages and disadvantages of APAs as they relate to the conservation of fish populations targeted by anglers (Dalton 2005; Reed 2008). In some cases, a neutral facilitator will need to ensure clear communication, respect for divergent views, and collaborative problem solving (Gleason et al. 2010). Given the APA planning process can be protracted, efficient administration, including the availability of sufficient funding and human resources, could allow for sustained participation by anglers (Dalton 2005; Sutton & Tobin 2009). Many recreational anglers have an inherent interest in the status of fish populations, and this interest provides avenues for the direct involvement of recreational anglers in the research and development of effort controls (Granek et al. 2008), which could lead to greater acceptance of the use of management tools such as APAs (Arlinghaus 2006).

Involving anglers in research may clarify for this group the role of fisheries managers and the institutional and scientific framework in which research is conducted to support management of natural resources (Knuth & Siemer 2007). Creating opportunities for dialogue, even by resource managers going fishing with recreational anglers, could increase the level of trust in the formal consultative

process of APAs planning. If resource managers make the time to understand anglers as a group, the goals and perceptions shared by all stakeholders can be emphasized during the planning process (Gray & Jordan 2010). Knowing where recreational anglers get their information on conservation issues, how they prefer to receive new information, and what type of information they are interested in receiving can help structure information and outreach programs, including identifying trusted sources through which targeted information can be conveyed (Gray & Jordan 2010). In addition, information and outreach programs should not treat angler groups as if they were empty vessels to be filled with the knowledge of experts (Gray & Jordan 2010), especially because anglers often have a very good understanding of the nature of the environment where they fish.

In most cases the planning and implementation of APAs will lead resource users and managers to compromise (Agardy et al. 2003). Willingness to reach a compromise is likely founded on the nature of the participatory process and on the distribution of access restrictions among users. One question that frequently emerges is whether catch-and-release angling is compatible with the conservation goals of APAs (Bartholomew & Bohnsack 2005; Cooke et al. 2006), especially if physiological and behavioral effects, injuries, and mortality of fish following release are not negligible (Cooke & Suski 2005; Arlinghaus et al. 2007). Catch and release can result in postrelease mortality, but mortality can be minimized if best practices of handling and release are followed (Cooke et al. 2006). If the effects of catch-and-release angling are known, then there is a stronger basis for assessment about the influence catch-and-release angling has on the protection of fish stocks within the boundaries of APAs. Even if postrelease mortality levels are low, less stringent management measures that allow catch-and-release angling to occur in APAs could accommodate multiple users and reduce negative social and economic effects on local communities (Agardy et al. 2003).

Meeting the objectives of both recreational fisheries and conservation rests on integration of science, management, and policy, all with a broad aquatic stewardship ethic and an ecosystem-level perspective (Cowx et al. 2010). Cowx et al. (2010) suggest that the conflict between recreational fisheries and conservation is likely to persist or even increase and thus negatively affect the future of angling and the persistence of aquatic animals and plants in some areas. Given that aquatic systems and recreational fisheries can both benefit from the establishment of APAs, when deciding whether APAs are a useful tool for conserving and managing aquatic resources there are likely to be more agreements than disagreements among stakeholders. We believe one way to conserve and manage aquatic resources is by engaging recreational anglers in the development and implementation of APAs.

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