

Chapter 4

Learning and Adaptation: The Role of Fisheries Comanagement in Building Resilient Social–Ecological Systems

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4.1 Introduction

This chapter focuses on how robust self-organizations can be formed within fisheries comanagement systems. Over the last 30 years, comanagement has been increasingly advocated as a blueprint solution for small-scale fisheries crisis. Many governments, NGOs, and international and donor organizations are catalyzing projects for implementing fisheries comanagement. On the one hand, the international attention devoted to promoting and supporting comanagement is an important accomplishment; it recognizes that without the help and support of fishers, government can do little to help achieve sustainable, equitable, and resilient fisheries management. On the other hand, as comanagement becomes “mainstream,” it risks being regarded as a straightforward technical and organizational process, through which states devolve both rights and responsibilities for the difficult tasks of resource conservation and livelihood improvement. This carries the danger that the widespread occurrence of ill-conceived comanagement systems, which do not account for comanagement’s core values, will, through their inevitable failures, leave a legacy of degraded commons and impoverished resource users, thus leading to a backlash against participatory approaches to management (Pinkerton 2003; Wilson et al. 2003). The message is that people-centered, devolved approaches to renewable natural resource management risk being discredited if ecosystem conditions continue to decline.

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For comanagement systems to be resilient, they need to allow for feedback learning in the face of disturbance that produces a change from which people can learn (Berkes et al. 2003). It is disturbance (e.g., political, ecological) that initiates cycles of adaptive renewal. Thus, the interplay between disturbance, and the capacity to respond to and shape change, is what makes renewal and reorganization possible in the adaptive renewal cycle. Interplay is an important component for building resilience in social–ecological systems (Berkes et al. 2003; Folke et al. 2003; Berkes and Seixas 2005). Adaptive capacity is defined as the ability of actors, in a social–ecological system, to cope with novel situations without losing their options for the future (Walker et al. 2004). Systems with high adaptive capacity are able to reconfigure themselves without significant decline in crucial functions in relation to primary production, hydrological cycles, social relations, and economic prosperity.

Berkes and Jolly (2001) extend the concept of adaptation to embrace the responses of communities of resource users to increase the chances of success/survival in a changing environment. They differentiate two types of responses: coping mechanisms and adaptive strategies. Coping mechanisms are short-term emergency responses to abnormal seasons or years. Adaptive strategies are “ways in which individuals, households and communities change their productive capacity and modify local rules and institutions to secure livelihoods.” These concepts are the key for achieving resilient comanagement systems.

This chapter takes a critical look into the past to draw some insights for the future on the factors affecting successes in the field of fisheries comanagement in terms of building robust and resilient organizations. These insights are defined in terms of the degree to which a system builds internal capacity for learning, adapting, innovating, and self-organizing as mechanisms to deal with the pressure from internal and external factors (Carpenter et al. 2001; Olson et al. 2004). Lessons are drawn from a comparison of the commonalities and differences in outcomes of selected comanagement case studies: Lake Malombe and Lake Chiuta (Malawi, Africa); Patos Lagoon and Arraial do Cabo (Brazil), and the Areas for Management and Exploitation of Benthonic Resources (Chile). The chapter ends by discussing the lessons learned from the cases, focusing on the key characteristics of comanagement with reference to their contribution (or not) in enabling the conditions for building resilient social–ecological systems. It closes with a discussion on the policy implications of implementing fisheries comanagement regimes.

4.2 Case Studies

4.2.1 *On the Right Track: Comanagement’s Positive Outcomes in Chile and Malawian Lake Chiuta*

Territorial use rights to fisheries (TURFs) was a comanagement arrangement type that originated in Chile on account of a major crisis in the “loco” fishery that

followed a closed season for a 3.5-year period (Castilla and Fernández 1998; Orensanz et al. 2005). Fishermen continued to fish illegally and the economic consequences and social distortions created by traditional administrative management measures (such as closures, quotas) motivated the subsequent search for management alternatives. Three main aspects were key to the establishment of the Chilean TURFs (Orensanz et al. 2005): (1) the presence of historical fishing territories in Chile; (2) the organization of artisanal fishers that lobbied the incorporation of the TURFs into the fisheries legislation; and (3) and informal management experiments (e.g., closures, protection of nursery grounds, removal of predators and competitors, translocations, and manipulation of species upon which loco preys) conducted voluntarily by fishers in some communities. Hilborn et al. (2005) describe this comanagement initiative in Chile as a successful one if compared with the disastrous situation that faced Chilean Benthic resources a decade ago, where TURF systems had proved to be the rights incentives to prevent and restore overfished benthic resources. These authors compared the severe contrast between the status of the stocks within the TURFs and those in open access “historical grounds” and found out that “fishermen are highly protective of the first, while a ‘tragedy of the commons’ situation prevails in the latter” (Hilborn et al. 2005, p. 52). Other positive aspects of the comanagement include gathering of knowledge about the response of the stocks to the harvest, great improvement in marketing practices, improved product quality and reliability of supplies and, most important, strengthening of fishermen’s organizations stemming from shared responsibilities and appropriate incentives (Stotz 1997; Hilborn et al. 2005).

In the case of the African Lake Chiuta in Malawi, comanagement originates from a conflict that grew from the late 1980s to the early 1990s between indigenous fishers and the immigrant *nkacha* operators (Njaya 2002) who were allowed to fish in this lake by local leaders. Because of indigenous fishers request in 1995, comanagement evicted 300 *nkacha* operators from the fishery in this lake (Njaya 2002). These migrant fishers were allowed by local leaders to operate in the lake, conflicting with the interests of indigenous fishers who considered these leaders to have been corrupted by *nkacha* seine owners (Hara et al. 1999; Njaya 2002). Local fishers were opposed to the use rights given to migrant fishers on the basis that migrant’s fishers: (1) used gears that destroyed fish habitats and caught juvenile fish; (2) landed larger catches than indigenous fishers whose use gear were fish traps and gill nets; (3) fish prices were down due to the above-mentioned items and had a negative effect on trap and gill net fishers (Hara et al. 1999). Hara et al. (1999) draw attention to how resource users identified the damaging effects of *nkacha* and then approached the fisheries department (FD) for advice, indicating their willingness to take care of their exploited resource. Fishermen created the beach village committees (BVC) and established the following regulations: (1) ban on the *nkacha* seine owners; (2) establishment of a minimum 38 mm mesh size; (3) conflict resolution mechanisms; (4) 100 mm as minimum tackable size of chambo; and (5) beach seiners not allowed on the lake and absence of a closed season (Njaya 2002). These fisheries regulations were approved by the Malawi government and are reviewed and enforced by the BVCs and local leaders. The role of communities is related to

enforcement (i.e., expulsion of *nkacha* fishers; ban on use of *nkacha*, mesh sizes, no seining, immature fish, prosecution), and controlling access to the fishery. Other management actions are carried out on a consultative, co-operative, and delegated basis (e.g., licensing, resource-monitoring, problem solving, among others) (Hara et al. 1999). Communal property rights are considered but there is no clearly stated interest of the Government so that convergence of interests from both partners is assured (Hara et al. 1999).

4.2.2 The Challenge to Participatory Management: The Struggle to Implement Comanagement in Malawi and Brazil

Fisheries comanagement was introduced in Malawian Lake Malombe as a response to fisheries crisis precipitated by collapse of the more valuable species in the fishery (Hara et al. 2002) The Lake Malombe Participatory Fisheries Management Program (PFMP) started in 1993 as a pilot comanagement project to reverse the conditions of fisheries decline (Njaya 2002). The initial motivation of the PFMP was the decline of the “chambo” fishery (from around 8,300 ton in 1982 to less than 100 ton in 1994) and the failure of the existing management regime based on centralized government control and regulation. Established regulations were supposed to help restore fish habitats, protect juveniles and breeding fish and reduce fishing effort. Although these had a sound biological basis, they were not enough to ensure the successful implementation of regulatory measures. Recognized constraints were associated to budget limitation and enforcement capability. In addition, an increasing defiance and open resistance to compliance of regulations from fishermen (Hara et al. 2002) were observed and incidences of violence in the early 1990s against fisheries inspectors out on patrol duties had become common (Hara et al. 2002; Njaya 2002). The Government had to search for an alternative regime. The regime that seemed to provide the best option and chance for success seemed to be the one which involved some amount of self-regulation by the user communities. Government actors hoped that if this approach was successfully introduced it would satisfy both the government’s and the user’s objectives of biologically-sustainable exploitation of the resource and continued economic viability. These objectives were expected to be achieved at less cost to government on the assumption that self-regulation and increased acceptance of the regulations by users would result in much less need for outside enforcement of the regulations while ensuring sustainable economic viability of the resource for the fishing communities (FD 1993) (Hara et al. 1999). In addition user participation in resource management became one of the conditions for donor aid as it is believed that this will result in greater accountability and also as part of the general drive to empower the formerly disenfranchised population. Thus donor support for finding solutions to the problem of Lake Malombe came in the form of funding for activities aimed at promoting increased involvement of users in management of the fishery (Hara et al. 1999).

The Lake Malombe participatory program (PFMP) was launched and implemented as a multidonor funded project. The main donors were the German Technical Foundation (GTZ), the United Nations Development Program (UNDP), the Overseas Development Administration (ODA), and the World Bank (WB).

In Brazil, the major step to move toward participatory community-based comanagement was the creation of the Marine Extractive Reserve (MER) within the Brazilian legal framework of National System for Conservation Units (known as SNUC). This policy is significant because it represents the first government-sponsored effort toward comanagement and has enormous potential for conserving coastal areas and securing the livelihoods of coastal populations. The MER in Arraial do Cabo, RJ, was created in 1997 to protect the resident beach seining community and the resources their livelihoods depend on (Pinto da Silva 2002). The rich marine environment nourished by coastal upwelling attracted fishers that have been fishing in the cape for centuries. Local fishers in the region employ relatively sustainable fishing methods and depend on migratory stocks, such as mullets, that are managed inside the boundaries of the MER by a body of traditional rules governing the fishery for generations that became legalized and warranted the creation of the reserve (Pinto da Silva 2004). However, Pinto da Silva shows that these rules implemented by the MER are no longer robust and significant social barriers will need to be overcome to revitalize and fully integrate them into the reserve structure. Ownership patterns among beach seiners have changed dramatically even before the implementation of the MER and are concentrated in the hands of few individuals who own the majority of canoes and nets, thereby controlling the associated norms such as access days to the fishing grounds. This author concludes that the MER has not significantly fortified local management institutions and has overlooked or not been able to deal with these obstacles to participation and empowerment. She also concludes that although at different stages, the reserve has demonstrated some characteristics from the entire spectrum of comanagement arrangements, the role of fishers and State has not been ideal and both sides lack the capacity (funds, training, and experience) to support an effective system for participatory governance (Pinto da Silva 2002).

The Forum of Patos Lagoon was created in 1996 as an institutional response to the crisis of estuarine fisheries resources and the miserable situation that small scale fisheries communities in the estuary of Patos Lagoon were continuously facing (Reis and D’Incao 2000; Kalikoski 2002). The weak fishing season of 1995/1996, which helped trigger local changes in fisheries management, had one of the lowest landing volumes in 50 year. The Forum was an initiative of a group of people, led by the Church, the Fishers Colonies and in partnership with the local branch of the Federal Environmental Agency (IBAMA–CEPERG). The objective was to initiate an action plan to reverse the crisis that artisanal fisheries were facing. There was a general consensus on the part of the different actors related to fisheries management that, to reverse the fisheries crisis, a rearrangement of fisheries management was needed to accomplish a better organization of the sector in relation to management policies (Reis and D’Incao 2000). The representatives of the Forum comanagement arrangement concluded that through a collaborative partnership among

communities and governmental and nongovernmental organizations, and using a negotiation-style of decision process, the fisheries could move toward a more productive status (Forum of Patos Lagoon minutes). The Forum has been an attempt to share responsibility and authority as concerns the management of fisheries resources. However, it still lacks the mechanisms for empowering the community and delivering fully the principles affiliated with comanagement. The model adopted by the Forum resembles more that of a stakeholder centered comanagement than a community-centered comanagement (Kalikoski 2002; Kalikoski and Satterfield 2004).

4.3 Deconstructing Fishery Comanagement Arrangements

Later we discuss the relationship among adaptive capacity, context-specific social-ecological systems, institutions, and collective action efforts, and, therefore, why certain comanagement regimes perform better than others. We propose that the adaptive capacity of comanagement systems will be dependent upon how well-prepared these systems are to deal with power imbalances, legitimacy crises, adaptive learning mechanisms, and the threat of erosion in social cohesion.

4.3.1 *Power Imbalances*

The lack of government commitment to devolving sufficient decision-making power to resource users will affect the incentives to their participation in fisheries management on equal terms with government. Unless power is genuinely shared and territorial and managerial rights are assigned to communities or other stakeholder groups, comanagement risks being captured, co-opted, and misapplied by the power holding actors maintaining the status quo in the fisheries governance (Jentof 2003; Pinkerton 2003). Transferring property rights is a mechanism that empowers users to make collective decisions. A property right potentially confers the power to (1) use or manage a resource or area, (2) the power to sell it or grant it, and (3) the power to take its yield as a harvest, rent, or royalty (Scott 2000). The owner of a fishing boat has all three powers over his/her boat: he/she can run it, sell it, and make a profit from the fish landed by it. The same fisher in his role as participant or occupier in the fishery may have only the third power. The first and second powers may be vested in the State or simply poorly specified and thereby appropriated and controlled by the powerful (Béné 2003). This, in theory, leaves the individual fisher with no incentive to look after the fishery as individual restraint may increase the value of the fish stock, but the individual has no powers to capture this extra value.

Transferring property rights back to the communities was an important instrument to deal with power imbalances in comanagement systems of TURFs in Chile,

for instance, but was not successful in the MER of Arraial do Cabo in Brazil. In Chile enacting the allocation of TURFs was allowed only among organized fishing communities exploiting benthonic resources by a legal framework that devolves to fishers the power and gives them the means to govern the resources (Hilborn et al. 2005; Orensanz et al. 2005; Parma et al. 2003; Castilla et al. 1998; Castilla and Fernández 1998; González 1996). Resource use within TURFs is based on the exploitation plan that requires fishers to make projections of stock status that are used by the government to set a quota for the area. The fishers under TURF then decide how that quota is to be caught. In addition to TURFs, the fisheries Act contemplate management instruments that include size limits and seasonal closures and a system of marine protected areas (Orensanz et al. 2005). The request of exclusive TURFs of benthic shellfish is possible if communities meet certain criteria according to the law. Artisanal fishers must be part of a traditional organized community and are generally entitled to operate only in the region where they are registered. Artisanal rights are vested in fishers, not vessels, and are not transferable (Orensanz et al. 2005). As concluded by Castilla and Defeo (2001) the allocation of TURFs, when accompanied by a strong community-based comanagement, ameliorates the weaknesses of enforcement regulations, diminishing information and enforcement costs. Fishing grounds outside of benthic TURFs are open to all fishers registered in the region but exclude industrial fleets and artisanal fishers registered in other regions.

In the MER of Arraial do Cabo, power sharing is limited mainly because social capital has been disrupted within the community and government officials are not prepared to engage in such collaborative arrangement (lack of funds, training, and experience) (Pinto da Silva 2002). The MER was created because of the existence of local-based rules devised through generations that were resilient over time. However, those resilient governing institutions became less robust and have been co-opted by a few fishers controlling the fishery for their own benefit (Pinto da Silva 2002). Power devolution via transferring property rights was not sufficient in Arraial do Cabo because social capital has been eroded before the MER was created. Fishing communities were not homogenous, lack cohesion, and the fishery was locally controlled by some powerful groups within the community – the ones that own the boats, control the market, and ultimately decide resource use norms and rules (Pinto da Silva 2002). No means were given to fishing communities by the MER to deal with the power imbalances that have rather augmented over local governance at the community-level. Conflicts inside the MER also increased because powerful groups boycotted it when realized that their own organizational structure were at risk by this new arrangement. Powerless fishers also felt threatened. They were the employees of the power holders and did not have the means to engage within this comanagement otherwise they would risk losing their means of living. Comanagement in this case augmented power imbalances at the community level despite government's efforts to share its power over the governance of fisheries. Historically fishers' experiences with government have generally been negative; they do not trust officials and complain about corruption and inefficiency within government organization. This view has not improved with

the creation of the MER since many feel that the reserve is an added responsibility placed on fishers (Pinto da Silva 2004).

Similar challenges halting adaptive capacity in comanagement systems have been observed in Lake Malombe (Malawi) and in the estuary of the Patos Lagoon (Brazil). In Lake Malombe and Lake Chiuta, a legal framework for comanagement is in place the Fisheries Conservation and Management Act (approved in 1997) still kept the management control in the hands of the government. The new Act conceded community participation, resource ownership, and empowerment of local communities, although transferring property rights to user communities was not part of the Act (Njaya 2002). The Act also stipulates that the local-level management groups will function under the “protection” and “advise” of the FD (Hara et al. 2002). Nevertheless, in Lake Chiuta, fishing communities convinced government of their capabilities and comanagement rapidly evolved toward a co-operative community-based comanagement, and this was partially due to the rapid self-organization capacity of local communities. Self organization in this Malawian lake is definitely a key point for cross-scale management. In Lake Malombe, local communities did not take any action to change their marginalized status quo. Although 31 BVCs were created around Lake Malombe as a two-way channel of communication between user groups and the FD (Njaya 2002), most BVCs lack fishers participation (Njaya 2002). Some argue that BVC’s composition was influenced by government and donor agencies that ended up controlling: (1) a beach via the listing of its members and type of gear used; (2) the entry of additional gear owners; (3) the access and use of each beach; (4) right to expel members who do not comply with the agreed management measures (e.g., closed season, gears types, etc); (5) the meetings to discuss problems and management solutions; and (6) representation of BVCs members at higher levels of decision making (Njaya 2002). The BVCs have thus been seen as representing government interest rather than those of the communities (Hara et al. 2002). Comanagement under these circumstances may halt therefore the opportunities to institutional adaptive capacity that is a function of (1) self-organization, (2) nurturing diversity for reorganization and renewal, and (3) combining different types of knowledge for learning (Folke et al. 2003, p. 355). The struggle to devolve power from the government to the fishing communities has been a recurrent problem in the Lake Malombe comanagement project and has been evident since the beginning.

Similar to Malombe, in the case of the Forum of the Patos Lagoon, the struggle is also associated to the control that the government ultimately keeps in the final decisions over the establishment of the management rules. Also, the challenge to shift fisheries governance toward decentralization is related to the different levels of preparedness of people and institutions to adapt and make such a shift. The Forum is composed of 21 institutions involved in small scale fisheries management decisions (Kalikoski 2002). All of them have the right of one vote each and the representatives of fishers (e.g., colonies, associations, etc.) were each given the rights to two votes. Assigning more votes to fishers representatives is an attempt to shift the locus of control to the institutions representing artisanal fishers. Despite this effort, the Forum still lacks the mechanisms for empowering the community

and delivering fully the principles affiliated with fisheries comanagement. It has been shown to work via a combination of partial empowerment augmented by the support of elite representatives and in some instance the Forum has been co-opted by the powerful institutions (Kalikoski and Satterfield 2004). In fact, the groups with capacity to adapt in this new arrangement are the most successful in promoting their own interests. Among them are fishers colonies (that seek to keep their power over fishers) and the central government (that has to approve final decisions by law) (Kalikoski 2002; Kalikoski and Satterfield 2004). One impediment of power sharing in the Forum is associated with the illiteracy and socio-economic marginalization of fishers that create low expectations among scientists and officials of the management value of fishers' knowledge (Kalikoski and Vasconcellos 2007). Kalikoski's (2002) analysis has demonstrated that the Forum is an attempt to share responsibility and authority as concerns the management of fisheries resources. However, it still lacks the mechanisms for empowering the community and delivering fully the principles affiliated with fisheries comanagement. Following O'Riordan (2003) "the achievement of pluralist power relationships in a society implies the capacity of empowerment, where all individuals are aware of their ability to recognize what is going on in their name, and have a capability to express their needs and reactions in such a manner as to be respectfully heard." According to the same author, "in many instances, however, pluralism gives way to neo-elitism where coalitions collude to determine what is to be done and how. Empowerment thus becomes possible in different forms of policy space" (O'Riordan 2003), such as in the case of the estuary of Patos Lagoon, where it has been shown to work via a combination of partial empowerment augmented by the support of elite representatives. Such procedures can be helpful, as discussed by O'Riordan (2003) "if genuinely representative groups are present," but as it has been shown here, this is still not the case in the Forum of Patos Lagoon where adaptive mechanisms have been easier to power holders. This challenge is amplified if cohesion among community members is weak as in this case.

4.3.2 Legitimacy Crisis

Achieving legitimacy depends on (1) how well the designed rules within the comanagement fully represent the interests of local fishers as a whole and (2) the recognition that actions taken locally are truly legitimized by the responsible federal agencies (Ostrom 1990; Jentoft 2000; Kalikoski and Satterfield 2004). This is strengthened by the existence of a legal framework that formally recognizes collective rights and emphasizes the importance of a coherent integration between different levels of governance. As argued by Jentoft (2000, p. 142): "...legitimacy should not be anticipated regardless of institutional design of comanagement. Comanagement may perhaps be the best available solution to the legitimacy problem but it may also, in itself, be the source of disappointments and loss of legitimacy. What if decisions resulting from collaborative and communicative

processes produce regulatory outcomes that do not fulfill expectations of user-groups?"

This is well illustrated by the challenges faced in the comanagement arrangement in Lake Malombe. Hara et al. (2002) observed that the management objectives set by the comanagement institution were mainly government driven. FD attempted via capacity building to align fishers' objectives to its own, i.e., recovering the status of the fisheries in the Lake. Government also retained ultimate power to regulation's design and implementation (e.g., mesh size, net length, and closed-season restrictions) with the promise that at a later (unspecified) stage, greater input into decisions would be transferred to the fishing communities (Hara et al. 2002). The government's concentration of decision power helped to hinder the legitimacy of this comanagement process and, consequently to its failure (Hara et al. 2002). There is no evidence of rebuilding – neither resilient fishing livelihoods nor resource recovery (Hara et al. 2002). Part of the problem relates to the wrong assumption, based on a consultancy report, that local-based community institutions were inexistent, but they were not (Hara et al. 1999). They have been hijacked by BVCs and conflicted with the existent traditional authority systems held by fishing village headmen (Hara et al. 1999).

A different story happened in Lake Chiuta where comanagement can be considered a remarkably successful model (Hara et al. 1999). It is self-sufficient in terms of time and financial resources (Hara et al. 1999). Communities were the first to identify a crisis and proposed regulatory measures in a legal context. Sustainability of the program is associated with the fact that comanagement program was initiated to chase away *nkacha* fishers and the government was identified as a key partner. It took only 4 months to drive away *nkacha* fishers and 2 years later rules revisions were included in fisheries regulations (Hara et al. 1999). Fishers saw in this new organization an opportunity to challenge the historical power held by the village headmen and to empower and reorganize themselves through this new arrangement. "Village headmen had alienated themselves from the fishers following allegations of corruption and collusion with *nkacha* fishers" (Hara et al. 2002). Although this new organization generated an antagonism between these new and old power bases, through the creation of BVC's fishers took more control on their fisheries and acquired the power basis for their local decisions (Hara et al. 2002). Fishers, in this case, showed cohesion and were empowered by comanagement. They played an active role in this new institution since the beginning. Legitimacy of this comanagement arrangement is identified through the following: (1) improved catches; (2) improved relationship with government; (3) improved compliance to regulations; (4) reduced conflicts with the expulsion of *nkacha* fishers; (5) reduced illegal fishing based on fear of sanctions; (6) reduced costs for government; (7) improvement of natural resources conditions; (8) quick actions that may threaten survival of indigenous fishers (Hara et al. 1999, 2002; Njaya 2002).

A major risk to comanagement legitimacy in Lake Chiuta relates to a mismatch between the scale of the comanagement arrangement and the boundaries of the fishery, which is shared with Mozambican fishers under different management jurisdictions (Hara et al. 1999). A similar problem is observed in the MER of

Arraial do Cabo and in the Forum of Patos Lagoon (industrial fishers exploit the same resources outside the comanagement's jurisdictions boundaries) and poses a major challenge to the adaptive capacity to co-manage migratory resources. Comanagement can fail not because it has not been capable to adapt its governance system. It can fail because of the risk imposed by outsiders that have not engaged in the same arrangement and have not compromised to comply with new established rules. The estuary of the Patos Lagoon area managed by the Forum differs from the boundaries of the ecosystem in which the artisanal and industrial fisheries operate. Consequently, the management priorities defined in the Forum also differ from those of fishers, who see no point in enforcing rules inside the estuary when there is no control of access and exploitation of resources in the ocean by industrial fishing operations. This institutional misfit is a factor affecting the acceptance of the Forum among fishers (Kalikoski 2002).

4.3.3 Adaptive Learning Mechanisms

Adaptive learning involves the ability of comanagement institutions to receive and to respond to environmental feedback, through mechanisms for generation, accumulation and transmission of knowledge, flexibility to change rules accordingly, and a time frame to revise regulations and redesign management systems (Gunderson et al. 1995; Berkes and Folke 1998; Holling et al. 1998). It also measures the ability of institutions to learn how to better implement comanagement, through mechanisms that improve participation of resource users in decisions, or the representation of their interests, increasing trust among participants. Flexible social systems that proceed through learning-by-doing are better adapted for long-term survival than are rigid social systems that have set prescriptions for resource use (Holling et al. 1998).

Institutional learning has been identified in the implementation of the TURF system, which evolved through an elaborate process of institutional feedback. Orensanz et al. (2005) explain that evaluation of the TURF's implementation process was conducted by the Institute for the Promotion and Development of Fisheries (IFOP), with national funding to identify challenges and to provide feedback to the managers. This evaluation process included a survey conducted by IFOP of perceived problems among managers, scientists, consultants and leaders of fishers' organizations, and used the results to develop the agenda of a one-week workshop held in September 1999. According to Orensanz et al. (2005), the workshop, cosponsored by government involved all the participants in the management system, plus an international panel. At the end, the panel produced a consensus report with the following recommendations (Orensanz et al. 2005): (1) the need to expand the TURF to encompass the whole fishery; (2) the need to design simpler process to implement the TURFs; (3) the need to simplify data collection system; and (4) the need to work toward the empowerment of fishers organizations and the recognition that education was needed so that fishers and managers could participate actively in the comanagement

arrangements. This resulted in an adaptive comanagement that led to what Orensanz et al. (2005) defined as a simpler process that pays substantial attention to the socio-economical aspects of management. The TURF system expanded at a fast pace (e.g., by 2001, 264 more TURFs had been decreed) as fishers' organizations learned about management successes in other regions. Many new organizations are being formed, prompted by the prospects of claiming a TURF. One identified adaptive process was the shift in the origin of the catch brought about marked economic benefits to the fishers, who are now better positioned to arrange sales. In the past, the catch was sold "on the beach" and individual fishers were unable to make convenient sales and price and sale conditions deteriorated when fishers were driven to operate illegally (O. Avilés, pers. comm). In the case of TURFs, sales are prearranged. The organization decides how much to sell and receives offers from middlemen. Middlemen occasionally send their own divers to verify the quality of the locos in the TURF. Once a price is negotiated, fishers bring the catch to the beach on a prearranged date. Given the quality and predictability of supplies from the TURFs, some organizations are evaluating the possibility of advertising shellfish from TURFs with a "certified origin" label. Another significant development was increased emphasis and investment in vigilance, with many villages patrolling their TURFs. There is positive feedback between the establishment of a TURF and fishers' organization (Payne and Castilla 1994) and according to Orensanz et al. (2005) this is, in itself, a significant plus.

In the estuary of the Patos Lagoon studies demonstrate that fishers' knowledge can provide a valuable set of information about the relationship between the fisher and its local environment, and about the characteristics of practices, tools and techniques that led a more sustainable pattern of resource use in the past (Kalikoski and Vasconcellos 2007). Local knowledge can broaden the knowledge basis needed for management and hence improve institutions that mediate the interaction between communities and their use of the resources. This would play a strong link toward cross-scale management and facilitates institutional learning. Recognizing the value of fishers' knowledge is a precondition for the willingness of institutions to involve fishers in the management process. A reforming and restructuring process, including the revision of rules, is occurring within the Forum at this time showing elements for adaptive institutional learning. Change toward a more inclusive process of rule making has been recently observed and fishers' inputs were used to revise Decrees and Laws. Although, inputs from fishers were taken into account in the revision of regulation (e.g., mesh size, and calendars for catfish, mullet, and croaker), their knowledge was only considered valid following considerable scientific scrutiny.

4.3.4 The Threat of Erosion of Social Cohesion

"When resource users find themselves disembedded from the social bonds that connect them to each other and to their community, the dynamic represented in the

tragedy of the commons may result” (Hanna and Jentoft 1996, pp. 35–55). The tragedy of the commons, argued by these authors, is the product of social disruption rather than a natural outcome of individual rational behavior, in this case; and once removed social cohesion cannot be easily reestablished. For example, reestablishing management responsibilities within the local community through the design of comanagement regimes and the inclusion of user-knowledge in resource management is a difficult task in the historical context of marginalization or social exclusion that faces small-scale fisheries worldwide. A comanagement arrangement provides an opportunity for communities to influence their development through their participation in the governance system and their involvement in tailoring better management rules to local circumstances (Ostrom 1990). However, as argued by Jentoft and McCay (1995), comanagement institutions must be designed with social integration in mind, and users must be involved in their creation as social cohesion has been shown to be an important precondition supporting comanagement in other geographical settings (Pinkerton 1989).

Despite government’s assumption that there were no customary local-based institutions in Lake Malombe, in fact, they existed and the newly comanagement system established helped to disrupt them (Hara et al. 2002). When the BVCs were created through comanagement as a partnership mechanism between fishers and government, customary traditions were disregarded. Also, the kind of partnership established with this comanagement arrangement was mainly to perform enforcement of regulations that expose BVCs to implement confrontational tasks such as (1) collection of money for licenses and handing it over to FD for issuance of licenses; (2) checking of fishing gears for the legal mesh sizes and that they have been licensed; and (3) carrying out patrols especially during the closed season. This augmented conflicts and animosity between BVCs and fishing communities jeopardizing local relationships in the fishing villages.

“BVCs also saw themselves as doing the ‘dirty’ work on behalf of the Department of Fisheries. . . BVCs felt betrayed by government and that government simply used them while all along it had never really intended to hand over this responsibility in the first place” (Hara et al. 1999, p. 16).

The allocation of TURFs in Chile exemplifies an attempt to shift the governance system toward self-governance by strengthening social cohesion through comanagement. The allocation of TURFs given to a fishing community is dependent upon a formal request from the communities to the government. To be eligible to such request, fishing communities should (1) be legally organized in a form of artisanal fisher’s associations, co-operatives, or other form of organization; and (2) present a resource management plan describing the status of benthonic resources in the area and a set of actions to ensure the sustainable management of the fishery (González 1996). The resource management plan must include a schedule of annual harvests and other proposed management measures. The organization is also required to produce annual follow-up reports of management performance, including trends in estimated abundance. TURFs are assigned for 4-year periods, renewable upon compliance with the regulations. Fishers’ organizations are required to contract

consultants for the preparation of the base-line ecological studies, management plans, and follow-ups. So far, the execution of these studies has been almost entirely subsidized by the state through different agencies and programs with the help and involvement of fishers' communities. Central fisheries authority negotiates the management of TURFs on a one-by-one basis with the individual organizations. The internal arrangements in the organizations that receive a TURF are stipulated in written regulations and include rules that limit the entry of new members, as well as dismissal of old ones because of violation of internal regulations (Orensanz et al. 2005). The rent is distributed among members of the organization (e.g., sailors, divers, owners) and varies among communities. A percentage of the rent is destined to communal needs (school, celebrations, maintenance, vigilance, etc.) and elementary forms of welfare (contribution to widows, elders or sick/injured fishers). Some challenges within the Chilean TURFs comanagement system were identified and include (Parma et al. 2003; Orensanz et al. 2005; Hilborn et al. 2005): (1) a lack of formal coordination for TURF management as negotiation is done between the government and the individual organizations. There is no predefined criteria on the TURF devolution process other than the one proposed by the requiring organizations such as ecological-baseline study and the management and exploitation plan. Fisheries administration does not conduct a previous study to investigate if the TURF claimed will affect and exclude other fishers from their historical fishing grounds. (2) The amount and nature of the information required from the fishermen to get a TURF. (3) The TURF per unit area taxation and the uncertainty once subsidies dry up. (4) The coexistence of TURFs and open-access areas, which makes fishers under TURF also gather as much as possible from "open access" grounds, either to sell it or to enhance the TURFS through translocation, despite the existent but enforceable regulation to avoid this.

Although devolution was associated with strengthening social cohesion by triggering fishers to self-organize at the local level, still, along the Chilean coast, not all communities organized themselves to request a TURF. Some communities have been alienated from the decision making process for so many years that they do not have the capabilities of engaging themselves in management functions without some assistance. The fishing communities that have self-organized guaranteed ownership and decision control over fishing resources. The communities that have not organized themselves became marginalized as they do not have the rights to claim the creation of comanagement regimes. This may be a challenge for implementing comanagement in Chile in the near future. The issue of ownership and property rights in fishing practices plays an important role that may jeopardize collective actions and disrupt efficient and equal rights-based systems.

Similar opportunities and challenges are identified in the case of MER of Arraial do Cabo. Three phases are involved in the case of setting up a MER. First, in the preparation phase, a formal request has to be made to the federal government by the local communities with a description of the setting along with an approximate indication of the area traditionally used by the local community. The formal request should describe also the social, economic, cultural, institutional, and biological importance of the setting in which the reserve will function along with arguments in

support of their proposal. A branch of the government that deals with traditional peoples, then carries an interdisciplinary assessment study that evaluates the biological and socioeconomic potential of the proposed reserve, and the limiting factors that act against its creation. Once the proposal is accepted, the coastal/marine area is declared State (public) land and a contract is signed whereby the government gives the community usufruct rights as a concession for a period of 50–60 years. Second, in the implementation phase, a management plan is developed, which defines rules, rights, and responsibilities over resource use, in essence representing a social contract among appropriators. This plan must then be approved by the government and published in the federal register to codify the rights and responsibilities of government and resource appropriators. Although the State maintains ownership of the physical area, the members have rights of access to resources in the MER. These rights cannot be traded or sold and can only be passed on through inheritance, something that makes it an incentive for sustainable resource use. Diegues (2008) further described the process of implementation as follows: “A director is appointed for the MER by ICMBio and he/she plays a crucial role in mobilizing financial and technical resources. The members of the MER have to be organized into a legal entity that will act as an intermediary between the State (ICMBio) and the users of the resource. In most cases, a new association has to be created. A utilization plan for the MER has to be compiled and implemented by the association, and officially approved by the government in a comanagement process. This temporary plan establishes the activities and practices that are permitted in the area. It also defines penalties for those who do not obey the rules. If the association’s activities deviate from the utilization plan in a way that causes environmental degradation, the contract can be canceled. Next comes the comanagement plan, which replaces the utilization plan and has to be completed in the first 5 years of the MER’s existence. Third, in the consolidation phase, the MER must be self sufficient and be able to depend on funds generated by its members. According to Diegues (2008) at present very few MERs have achieved economic self-sufficiency, and rely mostly on funds provided by the federal government. In the very few cases of self sufficiency, funds are originated from contribution of associated members, from levying a percentage on the fish traded by its members, from fees paid by industrial fishing craft that cross the MER’s space and from the operations of commercial harbors that exist within them” (Diegues 2008).

As shown in Arraial do Cabo by Pinto da Silva (2004), this final phase is the most challenging as it requires robust locally derived institutions sustained by long-term community participation and government support. The MER of Arraial do Cabo was created with the intention to formalize existent sustainable fishing methods and local-based informal institutions that have governed fishers in Arraial do Cabo for generations, i.e., “rights of day” and “right of way” system (Pinto da Silva 2002). Although these current traditional institutions were incorporated by the MER that govern the MER in Arraial do Cabo, Pinto da Silva (2002, 2004) argues that they are no longer considered robust. Rather “. . .institutions have weakened and have been hijacked by a handful of vertically integrated individuals to serve their own interests. . .” (Pinto da Silva 2004, p. 426) The local-based institutions

were already disrupted when the MER was created and this has been overlooked by government despite all evaluation phases needed to set up a MER as showed above. Before, decisions were made in a more collective way by boat owners. Ownership was collectively distributed given that it was impossible for one person to own the entire boat. This scenario has changed before the creation of the Reserve and ownership became controlled by two or three people changing considerably the decision making structure of the past. “. . .Fishers and nonfishers alike refer to the current seining management system as a ‘Mafia’, in which the canoes/nets, refrigeration, and marketing systems are controlled by a tightly knit group” (Pinto da Silva 2002, p. 217).

Pinto da Silva’s argument is that although fishing practices in Arraial do Cabo remain very similar today when compared with 50 years ago, local-based institutions are not the same. Negative social capital is manifested in the hierarchical structures, which have come to control this fishing activity, while a historical legacy of deep divisions within this gear group also complicates and constrains participation. As a result, the reserve has not significantly fortified local management institutions and has overlooked or not been able to deal with these obstacles to participation and empowerment. A deep analysis capturing the existence/lack/challenges of social cohesion of fishing communities is not requested as a precondition to implement a MER, and this is one important weakness of the legal framework for establishing MERs in Brazil. The appropriation and control of local-based institutions by a few fishers was the main source of social disruption and an important element of the MER of Arraial do Cabo’s failure.

4.4 Reflections on Advances in Comanagement Arrangements: Lessons from Case Studies

The narratives presented in this study illustrate that, while creating comanagement may be relatively easy, the challenge lies in sustaining these initiatives over the long-term, and ensuring that they deliver both efficient and equitable outcomes. All cases evaluated here show that an institutional change and renewal was the first step that had led to the creation of comanagement arrangements in response to the signal or to prevent an imminent (and foreseen) collapse of fisheries resources and, consequently, to the high risk that such impact imposed on fishing livelihoods survival.

A major struggle impacting on the adaptive capacity of these systems is to design comanagement arrangements with social integration in mind that allows self-organization and autonomous control over decisions. The presence of a “traditional community” with a strong connection to the resource base and with a system of local governance is key. Also the existence of a legal framework that legitimizes comanagement at higher levels of decision making will help cross-scale management. When adaptive capabilities were not identified neither from the part of the government nor from the communities, fisheries comanagement in these cases has

not been able to cope with challenges that appeared along with its implementation. Imposed self-organization generated did not allow for learning and adaptation. Institutional rigidity associated with a complete disregard of fisher's input into the comanagement system also characterized the challenges of adaptive capacity in these cases where comanagement was particularly driven by administrative and political concerns.

Difference and diversity must be taken into account as well as existing power structures that may distort or constrain participation. If not, comanagement could potentially reinforce inequitable power structures instead of promoting broad-based participatory conservation. A mechanism to ensure an assessment of the existence and characteristics of these institutions should be undertaken before including or excluding customary traditional practices. Information on the state of these institutions is essential to design effective regimes to collaboratively manage natural resources.

Where local customary institutions have not been successfully built upon, weaknesses of formal institutions, lack of trust between communities and government and weak social capital are a key constraint to the adaptive capacity of comanagement systems. The analysis here even suggests that in these cases comanagement might further marginalize the fishing communities that they were initially expected to "empower." Wrong assumptions that local communities were self-organized and robust, combined with the lack of adaptive capacity to adjust the comanagement when it became evident that the local system had been in fact eroded, have contributed to the unsuccessful comanagement outcomes. This complicates the possibility to balance the power and restructure internal collective actions, despite the existence of the legal instrument to do so. The devolution of property rights should be done along with incentives for keeping local-based social-ecological systems. When social cohesion and human rights access have been already lost, this may hamper comanagement systems. Rights are meaningless unless practical mechanisms exist to ensure they are legally exercised. However, if actions taken locally come from eroded traditional systems that encourage power imbalances and jeopardize the livelihoods of the poor, then failures will certainly occur.

Involving fishing communities in management depends on the existence of appropriate institutions that are based on a process of shared governance, "the process of communities creating their own pathways to the future" (O'Riordan 2003). This chapter showed that not all institutions created with the comanagement systems are an attempt toward sharing responsibility and authority over the management of fisheries resources. Some comanagement still lacks the mechanisms for empowering the community and delivering such a model of shared governance of fisheries. This is the risk faced when comanagement devolves responsibilities to communities without devolving to them the power to make decisions on management objectives or wider policy. As discussed by O'Riordan (2003), empowerment is by no means a "clean" concept. Without the appropriate power sharing and representation of fisher's set of knowledge-belief-practice system within comanagement systems, it will be difficult to achieve a highly adaptive comanagement.

If social cohesion exists at the local level and collective choices are exercised within the comanagement, self-organization will happen and allow for the use of the best knowledge available that will lead to positive outcomes.

The adoption of comanagement as a management strategy can take different forms: it can integrate existing local systems into the formal new comanagement institution-building, it can build a whole set of institutional arrangement or it can mix both existing traditional systems while creating new arrangements. The cases demonstrated here illustrate that this decision should be context-based. But incentives to create comanagement arrangements from external sources other than communities should be extra careful to understand the conditions and existence of local level customary systems. Traditional institutions should not be disregarded by the comanagement arrangement. Prior to implementing comanagement, a careful analysis should indeed be conducted with fishers to indicate how these institutions should be linked to new comanagement arrangement in place.

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