



Centro para la Conservación del Paisaje, Inc.

(CEN Marino)

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Progress Report # 5:

LITERATURE REVIEW

The following literature review focuses on works exclusively related to the main themes of our research project: (1) the management of Marine Protected Areas and (2) its development in the Caribbean and Puerto Rico. It contains the main concerns and arguments of a broader scholarly conversation about the social dynamics produced and transformed by the establishment of MPAs. Informed by this literature, this research project continues this conversation that strives to shed light towards more inclusive, democratic and just, conservation policies. The themes above, are divided into five different areas: (1) Marine Protected Areas; (2) Marine Protected Areas and Fishers; (3) Marine Protected Areas and Social Justice; (4) Marine Protected Areas in the Caribbean; (5) Marine Protected Areas in Puerto Rico.

Marine Protected Areas

Quickly growing as a conservation strategy around the world – from 118 in 1970 to more than 6,300 until 2011 – the development of Marine Protected Areas (MPAs) need to be analyzed from different multidisciplinary angles in order to inform effective and successful planning and management practices. While the number of MPAs around the world is increasing, their reach is still very low (approximately 1.6%) when compared to the 10% of the planet's oceanic space agreed upon at the United Nations' Convention on Biological Diversity (2006).



Following the increase of MPAs, the academic literature has reached a diversity of conclusions about the importance of management in any successful MPA (Thorpe et al. 2011). In many instances, the establishment of MPAs has resulted in “biological successes and social failures” (Christie, 2004). Furthermore, while the social dimensions of MPAs are increasingly being acknowledged by an array of researchers, it is still evident that evaluating MPAs from a narrow biological perspective without looking at the broader social, cultural, and socio-economic context, produces results that are far from illuminating in terms of the more complex socio-ecological reality (Pomeroy et al. 2007).

Following this argument, it is increasingly noticeable that there is “a strong linkage between social and biological success, with social considerations determining the long-term biological success (155).” When thinking and planning for the establishment of an MPA, both biological and social aims should be the focus of their design (op. cit.). The cultural, social, economic and political dimensions of a territory cannot be divorced from its ecological dynamics and their management (Fiske 1992; Christie et al. 2003; Christie 2004; Acheson 2006; Pomeroy et al. 2007; Ferse et al. 2010; Jentoft et al. 2012).

Social researchers have been suggesting different approaches to apprehend stakeholders’ ideologies (Agardy et al. 2003), images (Jentoft 2012), knowledge (Johannes 2000; Berkes 2009; Gerhardinger 2009), and perceptions (Suman et al. 1999; Breem 2008) about existing MPAs and their management.

Marine Protected Areas and Fishers

Acknowledging the potential impacts of MPAs towards fishers’ lifestyles and the fishing industry in general, it is crucial that any management plan should include fishers’ perceptions in order for it to be successful. In other words, the



human dimensions - which include fishers but also other groups like tourist concessionaires and marinas, NGO's, among others – need to be part of any analysis of MPAs success or impact in a specific (socio) eco-system. As Pita et al. suggest, research “in attitudes, perceptions, beliefs and preferences related to MPA issues have been identified as priority social science topics in need of research (2011).”

Following this, Pita et al. developed a systematic review of all the existing peer-reviewed academic literature they found about MPAs and commercial fishers' perceptions towards marine reserves until September 2009. Their results are relevant to this project's analysis since they resonate with much of the concerns of this project and also help clarifying the different lacunae that still exists in the broader academic literature. An important conclusion is that most research concerned with commercial fishers' perceptions towards MPAs, emphasized on (a) governance issues; (b) environment and biodiversity conservation; and (c) impact of MPAs on the fishing activity (292).

It is revealing that in Pita et al.'s systematic review, only three articles analyzed “fishers' perceptions regarding conflicts between different resource-users (294).” Social relationships among different ‘stakeholders’, ‘interest groups’ and/or main ‘resource-users’ should be a central aspect of any discussion about the management of a MPA, since different interests and needs have the potential to collide, especially when new mechanisms of management and control enter into an already limited territory and evermore scarce resources. Furthermore, only one study reported about fishers' attitudes towards a no-take MPA.

Fishers' feelings towards the reserve were negative and critical of this conservation strategy since migrating fish could not be protected in such a localized and limited way (298). It is also revealing that most articles analyzed in Pita et al.'s systematic review dealing with enforcement issues, with the exception of one, reported that fishers do not complied with regulations.



Moreover, almost all researches on enforcement suggested the “enforcement of regulations to be lacking (299).”

Another important result from Pita et al.’s article is that most studies suggest a lack of fishers’ participation in the decision-making and management processes. This includes the absence of communication mechanisms between fishers and management bodies (op. cit.). Finally, the authors conclude that fishers’ perceptions are more in tuned with the establishments of MPAs “implemented for the purpose of fishery management rather than conservation (30).” While there should not be a contradiction between these two emphasis, when conservation is only associated with no-take MPAs, then fishers are much more adamant to support this policy.

An array of researchers questioned the “strong emphasis given to no-take MPAs as a means to address broad conservation and sustainable fisheries exploitation (op. cit.).” In their final remarks, Pita et al., declare that their literature review on commercial fishers’ “attitudes, perceptions, opinions and beliefs about MPAs reveal above all that the number of studies which communicate primary research in these topics is still considerable small (303).”

Marine Protected Areas and Social Justice

Establishing an MPA is a quintessential political and social action. Indeed, it is a “public policy” used for conservation purposes. Turning a specific territory into an MPA has direct and indirect consequences in the lives and relations among and between different groups in society. Power relations, worldviews, livelihoods, economic survival, and community reproduction among other dynamics are part and parcel of the different processes that can be affected by radical changes in the way people relate with their socio-ecosystem. Therefore, the more restrictive, punitive, and authoritative the implementation and management of an MPA become, the more resistance it will receive, and



possibly the more negative effects it will have on stakeholders, especially those already situated in the lower echelons of the socio-economic structure (Brenchin et al. 2002, Christie 2004). In other words, *how* an MPA is established is fundamental to its social, political, and ecological success (Brenchin et al. 2002). This implicates that social justice and ecological protection shall be seen as mutually inclusive, and not as exclusive and antagonistic goals (op. cit. 42).

Social research is capable of pointing out many of the social and political dynamics at play among stakeholders in a MPA. Patrick Christie shows how different conflicts among resource users related with MPA implementation were invisible before studying the area from a social perspective (155, 2004). Tellingly, one of the conclusions of his analysis is that “in the tropics, conflict often stems from the marginalization of artisanal fisheries by other forms of resource utilization...(op. cit.)”

Following the guide for the socioeconomic dimensions of coral reefs (Bunce et al. 2000), Christie suggests three measures of social success as fundamental: strong and ample participation from stakeholders, equitable sharing of economic benefits, and existence of conflict-resolution mechanisms (156). Interviewing 73 informants about their perceptions on the diverse management regimes that operate in four MPAs with both conservation and socio-economic goals in the Philippines, Christie’s “most troubling” conclusion is the total lack of formal conflict-resolution mechanisms working with stakeholders different interests and needs (162). This is a problem since conflicts without organized resolution tend to reproduce animosity, and less support in management efforts (op. cit.). His paper concludes suggesting that MPA “management plans and monitoring protocols should be designed to address local conditions (162).”



Marine Protected Areas in the Caribbean

Pollnac et al. suggest that the successful application and compliance of MPA regulations by stakeholders has much more to do with complex social relations than just the enforcement of rules. His conclusion is the result of comparing socioeconomic and cultural factors of 127 marine reserves in the Caribbean, the Philippines and the Western Indian Ocean. Specifically in the Caribbean, there is a strong relation between negative fish biomass and high population density (2010). In their, “Participation, Process Quality, and Performance of Marine Protected Areas in the Wider Caribbean”, Dalton et al. recognize that while the number of MPAs in the region is continuously increasing, there is a low management performance.

Furthermore, acknowledging the importance of stakeholder’s participation for the betterment of management efforts, they conclude that *how* this participation is planned and executed is as important than just guaranteeing participation (2012). If stakeholders perceive the participatory process as satisfactory, the views towards an MPA performance improve (op. cit.). It is revealing that, after an evaluation of 31 MPAs and their surrounding communities in the Caribbean, and investigating stakeholders perceptions and their relation with MPA performances, they conclude that most participants are active in community organizations, are resources users, tend to be mostly male, and “have lived fewer years in the community associated with an MPA than non-participants (op. cit. 1235).”

Marine Protected Areas in Puerto Rico

Being an unincorporated territory of the United States, Puerto Rico’s legal apparatus is a complex mixture of local and federal laws shaping the spatial regulations that MPAs’ main users have to negotiate with, in their relationships with the socio-natural environment, of which they are also part. According to Aguilar-Perera et al., “a plethora of amendments and categories,



either local or federal, overwhelm local MPA management which in turns greatly precludes rather than catalyze the protection of critical marine resources (971).” Furthermore, knowledge about the management of MPAs is difficult to find, and “the local community is not aware which government under which circumstances is responsible for a given MPA (968).” Aguilar-Perera et al. argue that, “the environmental legislation for establishing coastal and marine protected areas is complex because not only local but also federal US laws affect designations (963).” This legal-governmental apparatus makes the management and use of natural resources a labyrinth of requirements and regulations that both users and managers have to maneuver, sometimes with great difficulty.

Developing an inventory and historical review of Puerto Rico’s MPAs, Aguilar-Perera et al., show that most MPAs in Puerto Rico developed a top-down approach in the process of implementation, following US federal guidelines for the protection of natural and cultural resources. However, more recently, a more public and participatory emphasis is being adopted in the new management plans (961). Since Puerto Rico’s DNER does not have an official definition of MPAs, the author followed US definition in their identification of “similar sites” in Puerto Rico (964). Following this, Puerto Rico counts with 37 MPAs, of which 73% are Natural Reserves, and 13.5% Commonwealth Forests (op cit.). Of these, only two MPAs have a management plan (968).”

US exclusive economic zone (EEZ) starts at the 9 miles out boundary of Puerto Rico’s jurisdiction, and extends up to 200mn from shore. In this zone, primarily NOAA is in charge of designating MPAs (966). In charge of the management of most MPAs in Puerto Rico, DNER, follows the designation of MPAs that NOAA, for the most part, selects (968). The systematic deficiency of enforcement is one of the biggest obstacles in the management of coastal and marine resources, both in Puerto Rico and all the US Caribbean.

According to Aguilar-Perera the Canal Luis Peña NR “succeeded because they were developed from initiatives by community-based organizations,



involving long conversations among stakeholders who analyzed the socioeconomic and conservation value of the area (969).” However, our research suggests a less “successful” and more complicated reality. In the case of Culebra, and the Canal Luis Peña, coral reefs needed to recover from systematic violent abuse caused by a decade (1950-1960) of US Navy military exercises was an important objective (969). “That the DNER has started moving towards incorporating public opinion in the development of management plans constitutes a regional trend underscoring the need for broad public participation in the development and implementation of MPAs (970).”

Aguilar-Perera underlines the need of local communities’ feedback in formation of conservation and management strategies. This is also crucial for solving conflicts related with the use of natural resources. Such a need is still in the process of being met (971).

Aguilar-Perera et al. ask whether MPAs local communities will be more caring about the protection and management of natural resources if they are included during the complete process. Relevant for this study, Aguilar-Perera numbered an array of obstacles in fulfilling the expectations of managers, scientists, and stakeholders. Of these, we emphasize, “lack of communication about scientific studies and results among all parties involved..., and a lack of incentives, either educational or economic, for users (fishers, divers, stakeholders) (op. cit.).” As they declare, “social factors – and not biological or physical – may be the main determinants for the design and performance of MPAs (op. cit.).”

Also, it is necessary to account for, and understand local ecological knowledge and resource utilization practices by community members (972). This will help to change the management top-down tradition in Puerto Rico, based for the most part on outside interests (op. cit.), where “prevalent US federal regulations have more authority than local initiatives.”



Assessing local community's perceptions about what occurs within established MPAs, and obtaining their say about conservation and management continuous to be the main research goals in order to inform more holistic management policies (973).

Arrecifes de la Cordillera (AC)

As Hernández et al.'s study suggests, a number of stakeholders "felt that the agency was draconian and thus did not foster stakeholder confidence in being fair in the management of a no-take MPA (18)." According to Hernández et al., stakeholders agree that coral reef's conditions are in decline as well as water quality. As the main causes for this, stakeholders in Hernández et al. study identified land-based pollution - related with coastal tourism, sedimentation - water quality, and overfishing (12).

Stakeholders around the AC reserve perceive public participation to be either very poor or futile, since, in the occasions they do participate, their opinions are not taken into consideration in the final decisions (op. cit.). As an important recommendation Hernández et al. argue for the betterment of "stakeholders participation, understanding of management objectives, actions, and accomplishments, and building stakeholders trust (2)."

The tourist concessionaires' universe of Hernández et al. research is composed of dive and snorkel operators, catamaran and other large vessels operators, and fishing and mixed-trip charters. These represented the total universe of tourist concessionaires at the moment of their research ([Final report NOAA Award NA05NMF4631050](#), May 31, 2009). The majority of tourist concessionaires convene in the opinion that coral reef's health and marine biota is deteriorating (12). Most of the concessionaires, if not all, depended on the resources of AC reserve for their livelihood.

Identifying Icacos and Palomino as main conflict localities, product of the high



concentration of users, recreational divers and private boaters were identified as the main protagonists of these use conflicts. Relevant for our analysis of main users' perspectives on the management of CEN Marino - of which Arrecifes de la Cordillera reserve is an integral part - is that 70% of the concessionaires "were in favor of a no-take MPA with the ALCNR (2, 2014)", allowing diving, snorkeling and cruising. For most of them this no-take zone should be established in the most visited areas like Icaco and Cayo Lobo and other less visited like Cayo Diablo y Palomino.

Hernández et al. study suggests that concessionaires have a better view of DNER personnel than artisanal fishers in that they would not object to have the agency as the main responsible of the management of the possible no-take zone proposed in their study. However, acknowledging DNER's lack of material resources necessary for a broader, and deeper, enforcement, they preferred to have a federal agency as the responsible entity of the area's management (19).

Developing a self-administered survey instrument for data collection among registered vessels in a local marina of Fajardo, Hernández et al. describe the perceptions of an array of private boaters that are main users in the Arrecife de la Cordillera' zone.

A revealing conclusion from Hernández et al. is that more than a third of the registered vessels' ignored the Arrecife de la Cordillera' status as a natural reserve. This is surprising since, according to Hernández et al., these "were prolific boaters" which were "knowledgeable about the region and its resources (2009)." As they say, if "the group were to be engaged in a process to set up a no-take MPA, part of the process would have to involve boater (and, indeed, general public) education on the existence of the reserve and its present boundaries and regulations." Of those owners of registered vessels that recommended a location for a no-take MPA, the great majority (90%) selected Icacos to be the one, although Cayo Lobos and Palomino were also selected by 70% of registered vessels.



According to Hernández et al. some respondents perceived that DNER have failed to manage successfully the natural resources of the two reserves in the regions: Arrecife de la Cordillera and Canal Luis Peña no-take natural reserve. Pretending to expand the enforcement responsibilities of the government agency is perceived as a futile endeavor (18).

Puerto Rico's Un-sustainable Tourism

Puerto Rico's tourist industry has been characterized for its destructive and non-sustainable growth in terms of socio-ecological dimensions. The displacement of poor and working class local communities, destruction of coastal ecosystems, concentration of resources (like water and energy), have been ubiquitous in the history of construction and tourism in Puerto Rico. In fact, one can find tourism and the construction industry among Puerto Rico's most important sectors of the economy (Hernández et al. 2012).

In their, "Long-Term Impacts of Non-Sustainable Tourism and Urban Development in Small Tropical Islands Coastal Habitats in a Changing Climate: Lessons Learned from Puerto Rico," Hernández et al. expose the effects that this type of tourist development has had in coastal zones of Puerto Rico. As they argue, Puerto Rico "has embraced a globalized non-sustainable approach of coastal tourism and urban development that include unprecedented planning strategies and policy moves, with poorly addressed long-term environmental and socio-economic impacts (358)." They number nine non-sustainable approaches that characterize the tourist industry in Puerto Rico. These are: (1) Old-style non-participatory, top-down approaches; (2) Significant permanent negative environmental impacts; (3) Socio-economic degradation; (4) Lax regulations; (5) Non-sustainable operations; (6) Decision-making processes with significant conflicts of interests and corruption; (7) Revenue leakage; (8) Construction is often envisioned as the solution to economic constriction; (9) Climate change impacts are still largely neglected by many local governments as a significant threat (359-360).



Another important dimension that adds to the urban sprawl and construction in coastal areas is the local or “internal” tourism, responsible for most of the secondary homes used for vacationing several times a year (362). It is evident that the monumental increase of construction and the tourist industry during the last century (especially the second half, until today) has have a huge impact in the excess sediment delivery to coastal waters in Puerto Rico (364-365). This has a mortal effect to marine ecosystems, especially coral reefs.

One of the cases described by Hernández et al. as illustrative of the devastating socio-ecological effects of tourism in Puerto Rico is Fajardo’s story of Hotels and Marina construction. As Hernández describes, during the 1960s the construction of El Conquistador Hotel “opened the gate of major tourism development across the northeast PR zone; raw sewage discharged from hotel caused localized coral mortality at Las Croabas fringing coral reefs (368).” During the 1970s the development of two large apartment buildings and a private marina at Cayo Obispo, now known as “Isleta Marina” after the residential project, continue a ever more aggressive process of community displacement and ecological destruction that radically transformed the geographic, social, cultural and economic morphology of Fajardo’s coast (369). From the 1970s until the present, the construction of five enormous marinas in Fajardo, including the biggest marina in the Caribbean, meant the “physical displacement of residents” and the “displacement from part of their traditional fishing grounds (969).” Furthermore, the great majority of recreational vessels in Puerto Rico (more than 65,000 units) are located in Fajardo, creating “dramatic increases in recreational boating pressure, groundings, anchoring impacts on coral reef and seagrass habitats, oil pollution, illegal garbage dumping, recreational overfishing, and illegal coral collection as souvenirs (op cit.)” All this has had a detrimental effect in Arrecifes de La Cordillera Natural Reserve, Culebra Island, Vieques, and the US and British Islands.



The Northeastern Ecological Corridor

Recognized as one of Puerto Rico's most valuable natural areas, the Northeastern Ecological Corridor covers approximately 3,000 acres between the municipalities of Luquillo and Fajardo (379). As Hernández et al. explain, this area has been proposed to be designated as a natural reserve since the late 1970s, and during 1990s an important great amount of its territory was designated as a Coastal Barrier (373). Finally, after more than a decade of intense political battles during the 1990s and 2000s, the Northeastern Ecological Corridor was officially approved and designated as a natural reserve in April 2008 (374). Unfortunately, and demonstrating the political minefield that represents ecological initiatives in Puerto Rico, the then new administration of Luis Fortuño, eliminated the NEC designation as a Nature Reserve on October 30, 2009, and in June, 2011 approved the new "Great Northeastern Reserve", which allowed for the "fragmentation and urban development of the Corridor by allowing the construction of residential-tourism projects within 450 acres of the former Natural Reserve (op cit.)." Finally, the yet again new administration of the now governor Alejandro García Padilla, re-established the Northeast Corridor as a Natural Reserve.



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