



Stakeholders' perceptions on the management of natural resources in the marine territories of the Northeastern Corridor in Puerto Rico (CEN Marino)

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Final Report (First Year)

I. INTRODUCTION

The following report describes different perceptions that main users hold towards CEN Marino. How do stakeholders perceive the use and management of natural resources in the maritime zone of the North East Corridor? Are there conflicts and contradictions that emerge from different perceptions, worldviews, and practices among different stakeholders? What proposals and perspectives on the future management of C.E.N. Marino do stakeholders hold? These are the questions that this project strives to answer.

One way of answering these questions is by looking at the already established marine reserves within CEN Marino's territory and the way stakeholders think and feel about them. These are, *Arrecifes de la Cordillera* (AC) and *Canal de Luis Peña* (CLP) natural reserves. The following report is the final analysis of the first year of a two-year research project on CEN Marinos' stakeholders' perceptions, that is part of a broader multidisciplinary effort to inform the management plan of the area and its implementation, *North-East Corridor Natural Reserve Integrated Management Plan*. It both integrates parts of previous progress reports on the project and expands the discussion. The report concludes with several suggestions for future research.

Arrecifes de la Cordillera reserve (AC) is a system of cays and islets of great socio-ecological value where all types of water activities are allowed. Some of



the uses practiced in AC include: recreational activities from private vessels, tourist concessionaires and charters, commercial fishing, snorkeling, and scuba diving, among others. Different from AC reserve, the Canal de Luis Peña Marine Protected Area (MPA) is a not-take reserve, where fishing is not permitted but other recreational activities related with eco-tourism, scientific research, and water sports are allowed. The CLP MPA is located in the eastern side of the island-municipality of Culebra, Puerto Rico. While this MPA was implemented in a more participatory process, where some community members supported its creation, it has not been free of important disagreements and conflicts among different stakeholders and management authorities.

II. METHODOLOGY

The following report is based on data - gathered through interviews, focus groups, community meetings, and field notes - that describes the most pressing conditions and dynamics ruling over the management of the reserves that are within the territory of the North East Corridor's maritime zone, *Arrecife de la Cordillera* and *Canal de Luis Peña* reserves. The participants belong to the following interest groups: Small-scale commercial fishers, DNER's managers, rangers and other decision makers, Fish & Wildlife Services' personnel, educators from Culebra and Fajardo, local residents, local NGO's, Divers' Association representative, tourist concessionaires and a journalist specialized on the region. More specifically, collected data is the product of two focus groups with representatives from many of the fisheries organizations of Puerto Rico's northeast region; ten semi-structured interviews and life stories from the older fishers in the Fajardo region; more than fifteen written interviews to tourist concessionaires, local teachers, NGO's, biologists working in the area as researchers, and FWS personnel, sent and answered through email; several group meetings with Culebras' local teachers, community leaders, and NGOs; twelve semi-



structured interviews with DNER's rangers, local NGOs, DNER's high officials, marine biologists, tourist concessionaires; and three notebooks filled of field-notes observations.

These qualitative research strategies are useful in looking at CEN Marino from its main users and stakeholder's point of view; a necessary approach if we want to recognize people's attitudes, perceptions, opinions and beliefs about the uses, conditions, and management of the natural resources in the region. During the last decade the scholarly literature has been clear in the necessity of integrating local communities and stakeholders in MPAs' management processes (Brenchin et al. 2002; Christie et al. 2003; Christie 2004; Acheson 2006; Pomeroy et al. 2007; Ferse et al. 2010; Jentoft et al. 2012).

As described above, a significant amount of our data comes from fishers' perceptions. Opting for a broader space for fisher's visions the study pretends to balance the asymmetric power and participatory dynamics dominant in most environmental decision-making and governance structures in place. Among stakeholders, small-scale commercial fishers are the group with less political-economic influence. Listening, recording and analyzing their perceptions and ecological knowledge are necessary practices in the effort to bridge the gap of trust and collaboration that exists between them and government agencies. Further, integrating their experiences and socio-ecological knowledge can "lead to better-informed fishery management, as well to improving the political position of small-scale fishers, an often disadvantaged stakeholder group in contests for access to coastal resources (García-Quijano 2007: 534). Moreover, acknowledging the potential impacts of MPAs towards fishers' lifestyles and the local economy, it is crucial that any management plan should include fishers' perceptions in order for it to be successful (Pita et al. 2011). In their systematic review, "An overview of commercial fishers' attitudes towards marine protected areas", Pita et al.'s



argue 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. Much of our research confirms this pattern. Tellingly, most articles dealing with enforcement issues analyzed by Pita et al., reported that fishers do not complied with regulations (op cit.). This has to do with local fisher's lack of participation in MPA's establishment and management processes, with inconsistent enforcement practices from government agencies, or with exclusion of small-scale fisher's ecological knowledge, among other dynamics. 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)."

On the other hand, this work recognizes an important gap in the data collected among CEN Marino's main users, perhaps the biggest presence in the area, and one perceived by many to have significant local ecological impact. These are the marinas and private vessels operators. This project pretends to fill this gap in its second year of research.

III. DISCUSSION OF RESULTS

On July 22, 2014, two fishermen lost their boat. Puerto Rico's Department of Natural and Environmental Resources confiscated it because, according to DNER's rangers, the fishermen did not have required permits and security measures for transporting passengers to some of Arrecifes de la Cordillera Natural Reserve' cays. The story's subtitle, reported by *El Nuevo Día* (Puerto Ricos' main news journal) reads like this: "Fishers in Fajardo lost their jobs for DNER requirement" (July 23, 2014).

Arguing that he has nineteen (19) years of experience transporting tourists to the cays, the frustrated fisher insisted that this is a traditional economic



activity in the fisher's community of Las Croabas. "All his life my 96 year old grandfather maintained his family with this [job]. It is a traditional job in Las Croabas. DNER has taken three registered and licensed vessels."¹

Also, loosing his boat, the quoted fisherman was not able to fish. His economic means were halted until he recovered his boat. This was not the first time that DNER confiscated it. Eight years before this new incident, DNER took his boat for the same reasons. The courts returned the vessel to their owners.

On July 24, 2014, *El Nuevo Día* followed the story and quoted the same fisherman arguing that boats that "come out of the private marinas and charge much more for the trips, don't have any problems transporting passengers. How do they get the permits? I don't know, because I have been years trying to find them [the permits] and they [DNER] tell me that they don't give any." A local tourist lamented that this was a "tourist economic option for all, and they [fishermen] don't do anything different from the rest [of tourist concessionaires]. If the big boats can do it [carrying passengers to the cays], why the small fisher can't? (op. cit.)."

Revealingly, DNER's Secretary argued that the new DNER is a law abiding one that makes sure laws and regulations are obeyed. Furthermore:

"If it was not done in the past, that was the responsibility of the last secretary. Here we are [dealing with] a working team that have our laws and regulations clear and we want to make them work for the protection of [natural] resources, but also in order to offer our visitors a pleasant and safe touristic experience (op. cit.)"

¹ Translation from Spanish to English is the report's author.



This account summarizes some of the most ingrained perceptions between two key players in the management of CEN Marino's reserves. Conflicts between local small-scale commercial fishers and DNER's personnel are one of the main obstacles for a sound and efficient socio-ecological management in the marine area of Puerto Rico's Northeastern Corridor.

Environmentalist groups and NGOs around Puerto Rico celebrated the designation of the new DNER's Secretary in the year 2013. Coming from a trajectory of environmental advocacy and community organizing, the new Secretary symbolized a "U turn" in the government's environmental policy that for decades has been based on economic growth through the massive construction of residential complexes and high scale non-sustainable tourism (Hernández et al. 2012). Indeed, the new DNER administration has been very active in advancing natural conservation and integrating Climate Change concerns in the governmental discussions. The fact that DNER's enforcement procedures dealing with marginalized groups and communities within a MPA continue to reproduce a punitive model – and that the discourse of the agency's secretary represented by the media legitimize it - suggests that this is a systemic practice that needs more structural and long-term transformation. In the quote above, DNER's secretary emphasizes two factors, namely environmental protection and tourist safety and enjoyment. Small-scale commercial fishers' conditions and their participatory possibilities in the management of the area do not seem to be part of the official discourse. Several days after the incident – which happened during one of tourism's highest season in the area, DNER returned the boat and gave the corresponding licenses to the fishers. Furthermore, DNER is now calling for proposals for tourist concessions catered to local fishers. This could enable local fishers' to drive tourists to the cays and help built better relations with DNER.



A. *Conflicts*

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.)”

As suggested at the beginning of this document, among the main conflicts described by this study’s participants, is the difficulty that fishers have in acquiring tourist concessionaires’ licenses. This is a real economic and security need for fishers. Acquiring a license allows them to legally carry passengers to the cays without danger of losing their boats. Also, tourists would be able to receive service from a licensed, and thus, ‘legitimate’ water taxi counting with all the required security measures.

The question of *who* receives the concessions in a context of socio-economic marginality becomes a justice issue. For example, in the case of Culebra’s Canal de Luis Peña Reserve (no-take MPA), participants established that most of the tourist activity related with recreational charters and tours in the reserve is dominated by concessionaires from other parts of Puerto Rico or from the United States. This has an economic impact since only few locals receive licenses or get employed and benefit from such eco-tourist activity.

In other words, it is perceived that a great deal of Culebra’s and Canal de Luis Peña natural reserves’ economic potential benefits “outsiders” and not so much the local economy. As one of the field notes suggest: “In the opinion of some culebrenses, this represents an issue of justice since they do not have access to, nor benefit from the economic activity produced by tourism in CLP.” If in Arrecife de la Cordillera’s reserve small-scale commercial fishers have big obstacles in receiving concessions for tourist transportation, in Canal de



Luis Peña reserve culebrenses seems to share the same experience. Both groups seem to be socially marginalized when compared with most tourist concessionaires. The need to integrate these groups into broader economic activities in the reserves is evident.

In the case of Arrecifes de la Cordillera's reserve a DNER's official argues that DNERs rangers have a serious trust and credibility problem among fishers, tourist concessionaire and the general public for, according to them, their lack of commitment and care towards the management of the reserve. This lack of trust makes it very hard for the local community and other stakeholders to collaborate with the agency. This is the product of a history of "bad examples" and abuse. According to this DNER official, it is evident that most rangers do not have any type of commitment with, and understanding of their work as public servants and as members of the marine unit in DNER's vigilance corps. Also, more efforts to promote the community's conscience about its natural resource's conservation, and establish collaboration with DNER vigilance efforts as volunteer agents. On the other hands, not all DNER personnel have this vision towards the rangers. From some DNER's officials that are part of the rangers' division, the main challenges that rangers face, is the lack of economic and human resources.

Small-scale commercial fishers are required to have a license for commercial fishing activity as well. For each license application they must pay an estimated amount of \$40.00. Many fishers informed that they wait months, and on occasions a full year before receiving their license. In the meantime, they are not supposed to engage in fishing activities. Fishers argue that many times license's applications are denied without further explanation of the reasons for the denial. Then, they must start the process again, paying \$40.00 and waiting for their commercial fisher's license again. They must pay an insurance policy. Furthermore, fishers must travel to DNER's headquarters in San Juan in order to deliver their papers and pay for their license'



applications. It is in this context that some artisanal fishers decide to continue fishing illegally. DNER's bureaucratic procedure discourages fishers' legalization initiatives. Developing mechanisms to facilitate the concessions of licenses and necessary permits is an important goal in the broader efforts to improve the relationship between the agency and local small-scale commercial fishers. In sum, there is a bureaucratic conundrum in the way DNER's deals with commercial fishing's license. Given the lack of communication between the agency and artisanal commercial fishers, the constant charging for repeated procedures, makes it very difficult for small-scale commercial fishers to legalize their way of life, since it is both time consuming and expensive.

During the two focus groups with commercial fishers representing the fishers' organizations from the northeastern region of Puerto Rico, fishers main concerns had to do with their relationship with the governmental agencies. Ranking which were their main concerns in terms of the agencies, they described an array of experiences with law enforcers from DNER and UFRA - or Puerto Rico police's United Forces of Rapid Action ("FURA" in Spanish) - that suggest a highly contentious context that needs to be transformed with great urgency if any type of socio-environmental regulation and management effort pretend to work in a positive and effective manner. In fact, the more restrictive, punitive, and authoritative the implementation and management of an MPA becomes, the more resistance it will receive, and possible 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, Christies 2004).

The following is another example, out of many, that dramatically demonstrates the tense conflict between small-scale commercial fishers and government agencies. One of the participants and leader of a fisher's organization



described a dramatic event experienced in a DNER's intervention process when rangers almost sink his boat in the middle of the sea. According to the participant, DNER's rangers insisted on entering into his vessel even after he warned them about the bad weather conditions. The story ends with a broken and confiscated boat (the fisher's) and the fisher's arrest - handcuffed for more than seven hours (from 11am to 6 pm) without any water or food, inside the rangers' vehicle. The next day, a judge ruled in favor of the fisher and his boat was returned, although not fixed. The intervention was supposed to be just for verification purposes in terms of the size of three fishes - the fisher's catch at the moment of intervention. No regulation was transgressed. Three "legal" fishes, one broken vessel, and a seven hours arrest, handcuffed without food or water, shirtless and barefooted (FG, November, 2014).

Furthermore, many commercial fishers feel discriminated against by the police force. Another fisher participating in one of the focus groups, referring to Puerto Rico Police's FURA, argued that police activity in the area "...is an everyday persecution." According to their accounts, fishers have been pointed with firearms and treated with great repression without any reason. When referring to FURA, one of the participants said that they "are more dangerous and savage...than DNER or any other [agency]." He explains that one of the problems with FURA is that they think most people are seen as suspects of been involved in drug trafficking, and if they see a lonely vessel in the area they intervene.

This is an invisible aspect that is barely mentioned in studies and reports about the area. Puerto Rico's intense drug trade and the war on drugs policies, both federal and local (O'Neill and Gumbrewicz 2005) are also part of the highly complex and labyrinth-like laws and control mechanisms that mark the whole areas' marine and coastal territory. Commercial fishers must



navigate through the different hurdles and obstacles that this socio-political-ecological reality presents.

C. Illegal fishing practices

There is a shared perception among different key-players that recreational fishers engage in illegal commercial exchange. Commercial fishers perceive that recreational fishers are not being monitored and this gives them free range to sell some of their catch whenever they will. According to commercial fishers, while they (commercial fishers) are constantly watched, there is much more impact on natural resources from recreational fishing. On the hand, for most of the study's participants, recreation fishing is ubiquitous in the region. The differences between the regulation of recreational fishers and commercial/artisanal ones are perceived to be lamentable since there seems to be very little enforcement and regulations for recreational fishing. For some, recreational fishers catch even more fish than commercial fishers. As one DNER's ranger argues, today, "recreation [fishers] captures a bigger amount of fish than commercial fishers." Moreover, an administrative official from DNER also manifests this: "a great part of the [negative] impact towards the [marine] resource comes from recreation fishing."

The state does not require recreational fishers to have a license. On the other hand, small-scale commercial fishers are required to pay for a license and to report each month the amount of their catch and classify it by species. According to one DNER high-rank official there are more than 100,000 recreational fishers and many are involved in illegal fishing practices, like selling their catch after the different fishing tournaments organized by the marinas and sponsored by an array of multinational corporations. This type of underground commercial activity includes the selling of big fish like mahi mahi, marlins, swordfish, tunas, among others. This also affects the fish market and negatively impact small-scale commercial fishers' sales.



According to an interviewed high-ranking DNER official, a lack of knowledge and understanding about the fishing practices and marine resource uses of recreational fishers, hinders any response and management decision of the area.

There are a diversity of recreational fishers, with different interests and needs. Some recreational fishers outside the marinas, and with less socio-economic means, fish sea bass near the river mouth, they also fish red snapper and other species that, according to DNER, are overfished. It is very difficult to know the effects of recreational fishers in the area since they are not licensed and therefore are not required to report their catch.

There is a general perception that owners of private boats increasingly pack fishing areas during the weekends, and at certain seasons of the year.

According to tourist concessionaires, the existence of boat drivers that organize trips to the cays without the required permits and license is a real problem.

A common argument among tourist concessionaires, fishers, and NGO's, is that private boats and marinas are main sources of local environmental degradation without much supervision and enforcement from DNER's rangers. This needs further research. A fisheries leader argues, "in my personal opinion, anywhere you see a marina, that gasoline, that diesel, that will also destroy (the environment) in the long run."

From the 1970s until 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 sea grass 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.

Fishers complain of being accused of overfishing, but they argue that they do not have the capacity to overfish and that there are other reasons for the decreasing amount of fish and marine life in the area. Their fishing materials are rudimentary and their boats are small. Furthermore, there are not too many commercial fishers anymore. Following this, one might even say that artisanal/small-scale commercial fishing as a livelihood is in danger of extinction. A common expression among fishers is that “there are not many fishers anymore; they are not much in existence, and in terms of fish, those motor boats scare out fishing, they scare out fishing too much”. By “motor boats they are not referring to their small boats, “lanchas” or “yolas”, which also use motor (usually one small or medium size motor), but to yachts from the neighboring Marinas. In Fajardo, for example, fishers are surrounded by marinas. Many of the fishers’ communities were displaced and evicted in order for the Marinas to be built (Hernández-Delgado, et.al.).

There are fishers that have abandoned their particular artisanal fishing practices because they have too many restrictions. As one fisherman says, “salt water fishermen have been basically eliminated”. On the other hand, according to some fishers, another economic factor related to globalization and Puerto Rico’s relationship with the U.S., affect their economic survival: mega-stores like Costco, Sam’s and Walmart’s selling of fish from different parts of the world at prices and convenience that displace local fishers’ market. A fisherman expresses in his own words: “The [actual] state of fishing is not easy, each day is going to become worst, and people are buying American fish because it is cheaper.”



The following are some of the different regulations that fishers face in their everyday life activities:

- Laws related to the “vedas” or seasonal closures: conch fish, lobsters, yellowtails, and grouper
- Laws related with fishing techniques
- Rules related with distances and fishing locations
- Rules about how to fish and extract conch fish
- Rules on the size of the fishing chord
- Rules on number of fishes or size of catch
- Rules related to the fishing of lobsters and their size
- Rules on the use of motors
- License and permits

The complexity of the legal regime in the zone could be highly constraining for local commercial fishers. It seems that fishers live in a labyrinth of surveillance and regulations designed and enforced by different agencies like DNER, FURA, Fish and Wild Life Services, Coast Guard, NOAA. As one participant argued: “Sometimes in a single trip they [commercial fishers] are detained four different times. What can s/he fish during that day? He already lost the day, lost the gasoline, lost everything and could not fish. And who returns him the time and money inverted [during that day]...?” Living through one of the worst economic crisis in Puerto Rico’s history, this situation becomes even more worrisome.

According the local fishers, while a diversity of species is seasonally prohibited by DNER, consumers can find these same species in the supermarkets and wholesale megastores all throughout the year. In the meantime fishers are not able to fish and sell the more quality and fresher product. They argue that this has a negative impact on the local fishing economy.

Fishers maintain that most of the environmental destruction in the area comes from terrestrial sources. According to them, some rivers are polluted due to



the amount of toxic substances that pharmaceutical corporations throw into the rivers or into the ocean through big pipelines. Furthermore the amount of construction due to urban development and private residential complexes produces a high amount of sediments that end up in the ocean. In the focus groups they also described how the sewage from almost all residential areas leads into the ocean. While small-scale commercial fishers' perceptions about their impact on the eco-system is that they are not the main source of environmental degradation, this is not to say that there is no impact at all, or that all commercial fishers in the area are in tuned with the ecological balance of the MPAs. Small-scale commercial fishers' relation with overfishing and other negative impacts to marine resources needs further research.

D. Local knowledges

Fishers feel that their vast knowledge is not taken into consideration. Restrictions without explanations come from the top without consulting with them. Having an array of maritime resources and sea knowledge that could clarify and illuminate many DNER's decisions, local fishers are not acknowledged by the agency. Preferring the perspectives of biologists and other experts, they argue that DNER do not collect the fisher's perceptions of the eco-system, thus further alienating them from future collaborations related to the management and analysis of the eco-system. As García-Quijano establishes, local small-scale commercial fisher's ecological knowledge "can be the source of insights and information about ecosystem function and change that otherwise are unavailable to Western science, especially to resource management and governance agencies (2005: 529)." According to local fishers, their knowledge about fish species and their reproductive patterns, the conditions of the eco-system, among other local ecological knowledge is ignored and this has repercussions since, they argue, most DENRs rangers do not have this knowledge, and on occasions, stop them or fine them for unsustain reasons. Furthermore, they argue that some



regulations could be better informed if instead of just valuing scientific knowledge, local ecological knowledge from fishers is also integrated in the management analysis.

E. Management

According to a ranger official, there are 32 (including lieutenants sergeants, and officials) rangers responsible for the eastern region of Puerto Rico, covering more than a thousand miles. Vigilance officials perceive that this is a small number for such a great distance. As part of their daily tasks, rangers must cover the coastal and maritime zones of the whole eastern region of Puerto Rico (northeastern, eastern and southeastern), which covers the territory of fifteen municipalities. Furthermore, they must also make sure that rivers are not being polluted and trees cut without the required permits. They must also monitor the hunting grounds. Therefore, there is a consensus among rangers that the lack of personnel is one of the main obstacles for implementing the laws and regulations covering CEN Marino. Also, the lack of equipment is a great obstacle for the vigilance of the area. Having only two functioning boats to cover the whole region, the enforcement of regulations in the reserves becomes highly problematic. In other words, DNER's rangers cannot monitor the reserves on a daily basis.

Paradoxically then, it seems that the DNER does not have enough material / economic resources for an effective protection of the natural environment. This is indicative of Puerto Rico's broader economic crisis but also of the government's priorities in terms of resource's allocations. This lack of resources has a direct effect in the lack of enforcement. For example in an interview with the DNER's Management Official for the whole area, he explained that they do not have a boat to supervise the marine zone of Canal de Luis Peña reserve. This lack of basic equipment for an effective



supervision also adds to the negative image that most participants hold about DNER's work in the region.

Some of the interviews with DNER personnel and interest groups (NGOs, tourist concessionaires, local school teachers) revealed the lack of communication and coordination among key management players such as the management official, DNER's rangers, and DNER's regional office. A greater interaction and integration among these actors could facilitate the evaluation of the different non-compliance of regulations. Also, a much more coherent and effective enforcement policy informed by educational goals and community concerns, could be better organized and applied with better communication and coordination among DNER's personnel and between DNER's and the different interest groups (Torres-Abreu 2013).

Part of the problem with the enforcement of the fishing regulations is that most DNER's rangers do not have sufficient knowledge about fish and other marine species. Artisanal fishers complain that rangers do not have an idea about the fishes they catch and are erroneously stopped, and even fined, for supposedly fishing species that are forbidden. Another important aspect of the enforcement efforts that needs much assistance is its educational dimension. Many rangers do not know the broader ecological reasons why certain regulations are established. This is a problem because they are not able to explain with informed arguments based on ecological knowledge and conditions of the reserve and its broader implications.

In terms of the fishing regulations, fishers complain about the amount of seasonal prohibitions they have (lobsters, conch, yellowtail, among other species). They argue that such drastic measures are not necessary since they follow a 'natural' cycle of fishing "rest" ("descanso"). This resting period last approximately 30 days. This is, they stop fishing from one of their selected



and 'secret' sites and do not return to it after a month of rest. If they do not follow this 'natural' cycle, they will not find any fish when they return (in a shorter period of time). Therefore, the argument goes, it is not necessary to impose so many seasonal fishing restrictions since they already follow nature's own fishing rules. These temporalities of fishing which structure artisanal fisher's own fishing and non-fishing periods is a local knowledge that is worth taking into consideration. As one fisher in one of the focus groups discussions argued, it is "nature itself that...forces us to follow a rule, because...if we break the routine rules [of nature] we will only obtain losses." According to artisanal fishers this is a moon and monthly cycle. While fishers' vision of their resource uses is one of environmental balance, other participants perceive that commercial fishers also engage in some illegal fishing and destructive fishing practices (like the uses of toxic substances to make octopus and other species move out of their 'caves', among other practices).

There is an expressed need to develop educational mechanisms that maintain a constant relationship of orientation and conversation with commercial fishers. DNER's must explain the ecological reasons behind their regulations and decisions, since they directly affect the lives of commercial fishers. Law enforcers must have a deeper and more acute knowledge and understanding of maritime species (coral reefs, fishes, turtles, among other) -their diversity and characteristics, their life and growth stages and cycles, their reproduction patterns, among others crucial dynamics necessary for a well informed, rigorous, and balanced monitoring of the zone. Both DNER's officials and rangers agree on the need for further and systematic education through workshops, lectures and other activities. Lack of understanding about the reasons behind a regulation related to different species, makes its implementation a harder process. When rangers know why they are regulating a specific fishing or anchoring practice, for example, they feel more



confident and empowered. Furthermore, their intervention can turn into a pedagogical opportunity with the maritime resources users.

Rangers are unaware of the existence of any written protocol for their intervention with lawbreakers or any person that is affecting maritime resources with his/her activity. Rangers complain that during the last years there has been a significant decrease of personnel. These changes are related to the law that declared a state of fiscal emergency and created an “integral plan” to stabilize the economy (Ley #7 del 2009). The plan included firing thousands of government employees. They argue that this affected most services in government agencies, including the monitoring of natural reserve covered by DNER.

Among the necessary educational measures that participants suggested need to be implemented are workshops catered to private boaters. This is a much-needed intervention. According to Hernández et al., “a considerable proportion of private vessel operators may not be aware that they are operating within a marine protected area which, especially if modified to include a no take MPA, must take measures to improve awareness (2012: 143).” They must also receive workshops in terms of best anchoring practices in relation to the protection of environmental resources; knowledge about the reserve’s regulations, and sustainable fishing practices; ecologically responsible waste management, among others.

Rangers concentrate more on safety issues than on ecological infringement. The lack of a general and basic knowledge and understanding of the ecosystem, ecological impacts of different practices, and local, regional, and world ecological contexts (Global Warming and its effects) contribute to this lack of emphasis.



F. Actual Knowledge of the Reserve

There is some confusion with the term “reserve”, of what it is that a “reserve” entails and what are its limits. Most fishermen associate the term reserve exclusively with a non-take zone. In other words, is fishing activity is allowed, then it is not a “reserve.” Furthermore, some fishermen associate the reserve with the buoys that mark the territory. Following this, a great number of fishers assume that the only reserve in existence is the *Canal de Luis Peña* no-take reserve, which has buoys marking the area as a reserve as a no-take zone. This is also confirmed in other studies about Marine Protected Areas (MPA) in Puerto Rico (Aguilar-Perera et. al.). In their, “Marine protected areas in Puerto Rico: Historical Currents and Perspectives”, the authors argue that there is confusion about the meaning and language used for MPA’s “among scientists, managers, fishers and politicians because of the variety in levels of protection incorporated by MPA’s (962).”

Also, apart from “semantic confusions” of what a MPA entails, many are not aware of the reserve (in this case, *Arrecifes de la Cordillera*) because its “presence” is not made explicit by marks or signs in the territory. One of the participants declares:

“There are no buoys in here, there is nothing in here. The only buoys [that are around] are the ones for boats, but in Culebra [the reserve] is marked with buoys, and if they catch you there fishing you get fined, they confiscate [your equipment or boat], and you could be jailed because you are not allow to fish anything...Here no, people say [that there is a reserve] but there is nothing in here, there is no mark, all that ‘cordillera’ is clean. I say that because I travel it [the cordillera] almost everyday.”

A biologist and researcher at the Arrecifes de La Cordillera’s reserve argued that the local community’s perception about DNER’s rangers is negative. The necessity of hiring a biologist that collaborates with DNER’s rangers in



monitoring the area and, at the same time, informing them about the ecological characteristics of the reserve and its species is a common denominator in several of the responses. Most participants commented on the rangers' lack of knowledge about the reserve's ecological condition and its ecosystem. The presence of a biologist will allow rangers having an informed enforcement.

A tourist company owner stressed about the use of social networks through the Internet (Facebook, Twitter, etc.) for educational and promotion purposes. He raised the need to bring information workshops to the region's marinas about the reserves' regulations.

Local teachers also stressed the use of technological means to further the educational and information efforts. Again, the lack of public knowledge about the reserve is a common denominator. Also, rangers are perceived as not having enough knowledge about the overall management plan's regulations.

According to representatives from a federal agency working in the area there is not enough personnel to cover the enforcement and surveillance necessary to meet the regulations of the CLP reserve. Furthermore, they argue that fishers from Culebra, Vieques and other areas near the reserve (e.g. Fajardo), need more instructions about fishing restrictions and ecological effects of illegal fishing. According to these FWS employees, there is a general lack of knowledge about the reserve's environmental regulations. There is also a lack of interest about the reserve over all, and ignorance about its maritime territorial limits. There are no up-to date information signs or signals that announce and/or describe the reserve and its importance. Lack of security marks and buoys for swimmers and other users, like kayaks; and buoys presenting the speed limits and other regulations, is also a pressing obstacle for a more effective compliance. They also addressed the "construction and



development projects adjacent to the CLP reserve that directly and indirectly affect [the reserve] through sedimentation, and erosion of the coast, etc.” As FWS employees, the interviewees have received constant complaints from Culebra communities about DNERs’ rangers lack of enforcement and commitment with Culebra’s MPA. They argue that the local community thinks that FWS has jurisdiction over the CLP reserve, instead of DNER. This is another example that suggests the generalized confusion about the governing structures and legal regimes that rules in the area. As Aguilar-Perera et al. suggest, this is a common confusion in all of Puerto Rico’s MPAs since “ a plethora of amendments and categories, wether local or federal, overwhelm local MPAs.” Furthermore, “the local community is not aware which government under which circumstances is responsible for a given MPA (2006).”

FWS’s interviewees argued about the need of participatory and educational efforts at all levels (local community, fishers, visitors, tourists), including the publication and distribution of the reserve’s regulations. They also raised the necessity of hiring biologist and of contracting more rangers.

Respondents main concerns had to do with the following topics:

Information – lack of signs, material and publications informing about CLP no-take MPA size and territorial limits, regulations, eco-system, and uses possibilities.

Education – lack of workshops catered to local communities, tourists, visitors, marinas, fishers, and rangers. Need to include school’s environmental curricula focused on Culebra’s eco-system, starting from an early age.

Participation – lack of community participation in management and enforcement efforts due to negative experiences with and perceptions towards DNER’s rangers. Also, all participants perceive a lack of interest from most Culebra residents.



Commitment and trust – developing mechanisms for building trust and commitment among and between rangers, Culebra communities (culebrenses, visitors, “Anglo” residents, English speakers), and the mayor’s office). Meetings, educational workshops, participatory decision-making, voluntary vigilance corps, creating a information “line” through the telephone and internet, are some of the ideas suggested as part of the mechanisms for trust building.

Resources – lack of economic and basic material resources for a effective management: like boats and more personnel.

Biologists – Need of a resident biologist that works with rangers in identifying the breaking of regulations and in instructing them about the reserve’s ecosystem.

Construction – all participants where concerned about the development of several construction projects bordering the reserve.

Participation - All participants emphasized the importance of local community participation through different participatory strategies and initiatives (community meetings, cultura/educational festivals, hands-own educational activities, assemblies with communities, rangers and the mayor’s office, among others).

Garbage landfill - There is great and constant concern about the conditions and proximity of the municipal (Culebra) garbage landfill, and its toxic effect on the coast and coral reefs.

One DNER’s high-ranking official argues that one of the main challenges in the management enforcement of the CLP’s reserve is to get DNER’s rangers understand the importance of their function as the reserve’s protectors, and in the process, integrate themselves with the local community through a participatory working plan. They should collaborate with the community in developing preventive patrolling of the reserve. According to this DNER’s high-rank official, DNER’s rangers working in Culebra are themselves from



Culebra (culebrenses), and being a small-town and ‘close’ community, culebrenses are adamant to denounce their own town folks. He suggests a strategy, where rangers from the “big island” (Puerto Rico), that are not residents in Culebra, come and stay for a turn of seven days, and then rotate with another non-resident’s team. This is the same strategy that the state’s police practice in Culebra. This is a delicate situation that must be dealt with carefulness since it could negatively impact local rangers’ working conditions and quality of life by requiring them to move out of their hometown in order to work in other areas of Puerto Rico.

Another DNER high rank official argues that rangers do “receive workshops, yet they do not change. Change must come from the top. Rules do not really matter if there is no will to follow them.” According to the same participant, the rangers have existed for the last forty years, therefore, “if they do not know the rules and protocols of intervention by now, it is not a coincidence, but set by design.” Also, as an example of this ‘design’, this DNER official suggests that the lack of engagement on the area is set on purpose. He suggests that DNER have more rangers than the state of California, yet “if there are only five rangers in the area of the [Canal Luis Peña] reserve, it is because that is the decision of the agency, it is because it is not [part of] the agency’s priorities.” This is a categorical statement that comes from someone that occupies an important position in the same agency that he is criticizing. While this is intriguing, since different personnel within the DNER seems to recognize that there are management and enforcement problems, it also show the difficulties of transforming what appears to be a structural and long lasting pattern of miscommunication and non-cooperation among the agencies departments and between the agency and the community at large.

It seems that a great deal of Culebra’s and Canal de Luis Peña natural reserves’ economic potential benefits “outsiders” and not so much the local



economy. As one of the field notes suggest: “In the opinion of some culebrenses, this represents an issue of justices since they do not have access to, nor benefit from the economic activity produced by tourism in CLP. If in Arrecife de la Cordillera’s reserve artisanal commercial fishers have big obstacles in receiving concessions for tourist transportation, in Canal de Luis Peña reserve culebrenses seems to share the same experience. Both groups are socially marginalized when compared with most tourist concessionaires. The need to integrate these groups into broader economic activities in the reserves is evident.

Among participants’ main emphasis is the engagement of culebrenses in the enforcement process. There is a common perception that the more ownership that Culebra’s communities take on the reserve, the more identify with it and the more committed they will be about its protection and responsible uses. For this, it is imperative to begin building and maintaining effective communication mechanisms based on trust and a common vision. Residents and rangers must become aware of the importance of the reserve and knowledgeable of the rules that are set for its protection.

According to a ranger official, the Culebras’ local economy has benefited from the no-take Canal de Luis Peña reservation. More tourist and visitors come to enjoy the natural seascape and underwater scenery.

G. Participatory Issues

- Teachers - Meetings should also promote the development of solutions, and not just the enunciation of problems and concerns. Otherwise, the meetings could turn into a “complain festival”, with no engagement from local actors in the resolution process.
- There is a common perception that city hall, in Culebra, does not participate in much of the activities related with the management of the reserve.



- Many community stakeholders resent the lack of participation of DNER's representatives in public hearings.
- There is a common agreement among stakeholders about the lack of local fishers' participation in the decisions that pertain to the fisheries and the management of the reserve. Local fishers' engagement in the different processes related to the management of natural resources in CEN Marino is crucial and needs to be established.
- However, there are occasions when different stakeholders collaborate in the protection of the reserve. For example, there are concessionaries that notify rangers about illegal activities that they notice during their visits. This type of relations must be documented and analyzed since they could shed light to the formation of broader formal, and informal, on the ground collaboration in the management of the reserves.

H. Stakeholder's Proposals

A much more intentional and in-depth educational process about the different reserves that exist and a system of buoys and other mechanisms that mark and identify the area as a reserve is needed. In many ways the "presence" of the reserve is acknowledged through its marks, which make the reserve 'real' and 'concrete' to the users since they literally mark the territory. Naming a territory a "reserve" does not turn it into one. In fishermen's, local NGOs, and even DNER's rangers' perceptions, there needs to be a more concrete presence marking the territory, and a clear practical understanding of the different types of Marine Protected Areas.

Other stakeholders confirm the perception that *Arrecifes de la Cordillera* is not a reserve. For example, according to a high-level DNER's official, the *Arrecifes de la Cordillera* reserve was designated as such in 1989 but people are not aware that it is a reserve. "Designation of the area as a reserve 'makes the agency happy' but there is no change in the water." Accordingly, it gives a "wrong impression" of protection.



Development of educational initiatives for and with local communities and stakeholders about the socio-ecological value of the reserves is central for the management efforts. Furthermore, the lack of knowledge about the different regulations in existence is an information gap that needs to be addressed with urgency. Artisanal and recreational fishers, recreational divers, tourist concessionaires, local communities, and visitors in general need to be clear of the different laws that regulate the territory in which they are interacting with others (human and non-humans). It is necessary that stakeholders become active participants in reflecting about the effectiveness, fairness, and socio-ecological necessity of certain regulations. They should also be active in the development of new rules, protocols, requirements, initiatives, and solutions for the socio-ecological protection of the area. These participatory measures should be informed by the contextual realities of the different communities and stakeholders that conform the different areas of CEN Marino's broader territory. While the social dimensions of MPAs are increasingly being acknowledged, it is still evident that evaluating MPAs from a narrow conservation 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). Therefore, Canal de Luis Peña reserve and Arrecife de la Cordillera will share some concerns but others will be different. These social, economic, and cultural differences need to be integrated in the broader CEN Marino's management plan.

As part of the education initiatives fishers asked for the organization of workshops and courses that informs and prepare them for acquisition of the tourist concessionaires' license. Others participants think that artisanal fishers that have also been transporting tourists to the cays and other areas in the region should receive a permit without exam. The difference of academic preparation, and socio-economic status, between tourist concessionaires and



artisanal fishers is notable. Requirements like written examinations could be adapted to artisanal fishers reality, which include a deep and rich knowledge of marine life and the ecosystem expressed in different codes from the dominating academic and scientific ones.

According to the Arrecifes de la Cordillera's regulation enforcement plan (Torres-Abreu 2013), many of the critical aspects described above can be related to an array of social conditions that include the need of communication and trust mechanisms among different stakeholders, policies and initiatives informed by social justice's concerns where historically marginalized groups and communities become more integrated though out the whole management processes, lack of environmental conscience, among others. Acknowledging the social, ecological, cultural and economic value of the AC natural reserve is an integral component in the successful management of the area and for the development of a real sustainable tourism. An organized and systemic educational plan that involves the local communities, main users, and other interest groups like churches, schools, NGOs, among others, is crucial. It is also critical that land-based ecological destruction – coming from urban, industrial and market driven and large-scale tourism, is resisted, tamed and controlled through strong and deep environmental public policies that in turns promotes the development of sustainable ethical tourism where not only economic growth, but also social and environmental development are its main goals.

There are different initiatives that must be implemented:

- (1) Improve the relationships and collaboration between different government agencies, local communities, stakeholders, and NGOs.
- (2) Promote environmental awareness and care among interest groups, including the compliance of environmental regulations



- (3) Strengthening the institutional capacities in order to implement management and enforcement strategies that guarantee the protection of marine-natural resources.

Representatives of the diving industry complain about their lack of participation in discussions and decisions related to the area. They have previously solicited participation with DNER personnel but do not receive an answer, participants indicate.

One of the proposals that come from different stakeholders is the formation of voluntary monitoring groups that will help in guaranteeing the following of regulations in the “field.” Stakeholder’s engagement in the reflection, design, planning, and enforcement processes of CEN’s MPA management could transform what are negatively perceived management practices into co-management processes. Following are various important remarks:

- NGO - The limits of the reserves should be clear for everyone: "you can't enforce it if you don't know the boundaries."
- DNER official patrol: there is need for clarity and comprehensiveness in terms of the management plan and the laws to be implemented. Rangers are unable to guarantee full protection when the laws are not clear and comprehensive.
- Rangers perceive that there is a lack of necessary resources – like a boat - for a responsible and satisfactory management of the reserve.
- Urgent need to hire a full-time biologist for Culebra. The lack of experts makes it more difficult for rangers to clarify doubts about the impacts of some activities. According to DNER rangers, there are not enough personnel.
- Language and translation: For example, in Culebra, a significant community of Anglo-Americans lives in the periphery of the reserve, yet they don't have access to English documents that explain the different laws and regulations that pertains to the area. Also, the great majority



of tourist operators in the area are English-speakers. Therefore, there is a need for bilingual material.

- DNER official patrol: The territory that forms part of the reserve must be clearly marked. There is confusion about the limits and reach of the reserve. This makes it more difficult to manage. In other words, the reserve should be clearly defined not just in the maps but also in the actual 'ground'/water'.
- Rangers need more training related to educational workshops on natural resources (their impact, importance, etc.).

IV. CONCLUSION

There are several questions and gaps that future research needs to address. One has to do with the little knowledge and understanding there is about recreational fishers and private vessels operator's practices. The only study that collects some data from this main user group is Hernández et al.'s, "Development of interdisciplinary criteria to identify priority candidate no-take marine protected areas in Puerto Rico: Integration of ecosystem-based and community-based models" (2012), and it does so with a non-face to face and self administered survey left – for a period of six months - on one of the area's marinas vessels registration office. Hernández et al. point out that since "the vessel operator survey was self administered, there was no opportunity to ask follow up questions (145)." Also, their sample was a limited one (n=102). Still, that is the only information that we know of and more is need it. Studying marinas and private vessels it is a much more difficult endeavor since there are thousands of private vessels in the region and private marinas are more exclusive places. Furthermore, more data from recreational divers is needed.

In terms of extra-local factors, there is great need to analyze the socio-ecological effects of high-scale market-driven tourism and sprawl in Puerto Rico. It is evident that at great deal of the ecological damage and social dislocations occurring in Puerto Rico's northeastern region has to do with



broader and global economic dynamics based on a system of unlimited market growth in a limited planet. This, in a small island-archipelago of the Caribbean, is even more pressing. 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 (Hernández et al. 2012: 364-365). This has a mortal effect to marine ecosystems, especially coral reefs.

In their, “Marine protected areas in Puerto Rico: Historical and current perspectives”, Aguilar et al. argued that the Canal de Luis Peña natural reserve “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 (2006: 969).” However, this project draws a bleaker picture, showing a more complicated MPA management reality where lack of trust, communication, and resources characterize the relation between DNER personnel and stakeholders.

This study confirms Hernández et al. (2006) argument that in Arrecifes de la Cordillera MPA a number of stakholders “felt that the agency [DNER] was draconian and thus did not foster stakeholder confidence (18).” While, their analysis focused on stakeholders perceptions about the possibility of establishing a no-take MPA in some Arrecifes de la Cordillera’s location, our focus on stakeholders perceptions of natural resources management in the area this study shares Hernández et al. recommendation of improving “stakeholders participation, understanding of management objectives, actions, and accomplishments, and building stakeholders trust (2).”

For the second year of this project, we will conduct a survey that will target key coastal resource users in the region. Also, it will include the development participatory mapping activities that will help to localize some of the ‘human practices’ related with the marine resources in the area. The in-depth analysis of this data can illuminate the creation of a robust and more inclusive



management plan for the region.

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