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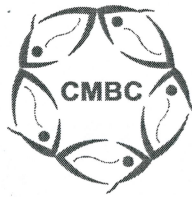
Local participation towards marine conservation in Loreto Bay
National Park

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Spring 2008

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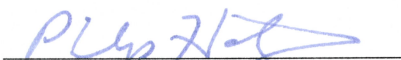
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**LOCAL PARTICIPATION TOWARDS MARINE
CONSERVATION IN LORETO BAY NATIONAL PARK,
MEXICO**



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ABSTRACT

Ten years after declaration as Marine Protected Area (MPA), fish populations in Loreto Bay National Park (LBNP) are declining. The implementation of No-Take Zones (NTZs) has been promoted as partial solution to the declines of fish stocks and marine biodiversity. However, in spite the benefits of designing appropriate NTZs, their creation is likely to be opposed by some stakeholders, including fishers, as NTZs restrict access to fishing grounds. The stakeholder participation and commitment to establish NTZs inside the LBNP is necessary, since they are the users most affected by this management tool. To achieve conservation goals and economic growth a basic prerequisite in MPA management is to promote stakeholder participation in decision-making. More participation by the stakeholders broadens the information and knowledge on which management decisions are made and can reduce conflict and opposition by increasing social legitimacy. Thus, the objective of this paper is to design a survey to be used as a decision-making tool to evaluate different alternatives for the location of NTZs within fishing grounds of the LBNP. The survey will create a model of social participation as a tool to manage local fisheries. The survey purpose is to provide qualitative and spatial information about the uses of the LBNP by stakeholders and their willingness to accept certain areas as NTZs. Ecological, social, and economic information provided by the survey can help resource managers when assessing the trade-offs of different management strategies. With information about the distributional impacts of NTZs, managers and the local community can estimate stakeholder gains or loses, who will be or not affected, and the number of stakeholders affected. With these methods all affected stakeholders can be involved in the decision, preparation, revision, and/or evaluation of different management alternatives. In addition, the participatory survey may help develop consensus about how the local community can or should utilize the LBNP environment and its resources.

Key words: No-Take Zones, participation, stakeholders, fisheries, Loreto Bay National Park.

1. INTRODUCTION

There is no denial that marine resources are severely threatened primarily as a result of overfishing, habitat destruction, pollution and direct and indirect impacts of climate change (Jackson et al., 2001; Myers and Worm, 2003; Wilson et al., 2006). Fisheries, in particular, are facing a looming crisis, with global declines of fish stocks (Pauly et al., 1998; Pauly et al., 2002) and a great probability of fisheries collapse by the middle of the 21st century (Worm et al., 2006).

This global crisis has stimulated the development of precautionary approaches and management strategies such as Marine Protected Areas, or MPAs (Sladek-Nowlis and Friedlander, 2004). The implementation of large-scale networks of MPAs, for the protection of 20-30% of the world's oceans (Halpern, 2003; Roberts and Hawkins, 2003), has been advocated by politicians, non-governmental groups, and scholars.

MPAs refer to portions of the coastline and/or ocean where human activities, especially fishing, are strictly regulated (Agardy et al., 2003). Other definitions, like that of the IUCN (Kelleher, 1999), are more broad, stating that MPAs are "any area of intertidal or subtidal terrain, together with its overlying waters and associated flora, fauna, historical and cultural features, which has been reserved by law or other effective means to protect part or all of the enclosed environment." The ultimate goals of most MPAs are conservation and sustainable provision for human use. Kar and Matsuda (2008) state that these goals include: (i) the conservation of biodiversity; (ii) the conservation of rare and restricted-range species; (iii) the maintenance of genetic diversity; (iv) the maintenance and/or restoration of the natural ecosystem on both local and regional scales; (v) the conservation of areas vital for vulnerable life stages; (vi) the management of fisheries; (vii) recreation; (viii) education; (ix) research; and (x) the fulfillment of esthetic needs.

1.1. MARINE PROTECTED AREAS IN MEXICO

In Mexico, the Federal General Law of Ecological Equilibrium and Environmental Protection (Ley General del Equilibrio Ecológico y Protección al Ambiente, LGEEPA) defines marine protected areas (MPAs) as aquatic areas of the national territory where the original environment has not been significantly modified by human activities or where the environment needs to be preserved and restored (DOF 05/07/2007).

The framework and authority for all environmental regulations and standards in Mexico are established by the LGEEPA. The LGEEPA regulates the sustainable use and access to natural resources, which involves maintaining economic benefits from these resources while preserving the ecosystem. In addition to the LGEEPA other legal instruments regulate the conservation and use of the marine and coastal resources in Mexico, such as the General Wildlife Law (Ley General de Vida Silvestre); the Federal Fisheries Law (Ley Federal de Pesca, LFP), the General Law for Sustainable Fisheries and Aquaculture (Ley General de Pesca y Acuicultura Sustentable, LGPAS), General Sustainable Forestry Development Law (Ley General de Desarrollo Forestal Sustentable); and the Official Mexican Standard (Norma Oficial Mexicana, NOM-059) which lists endangered and threatened species and establishes legal protections for them.

The LGEEPA defines six federal protected area categories, however only four of these are used as MPAs: Biosphere Reserves, National Parks, Flora and Fauna Protection Areas, and Sanctuaries (DOF 05/07/2007). As of June 2008, Mexico had 37 Biosphere Reserves, 68 National Parks, 29 Flora and Fauna Protection Areas, and 17 Sanctuaries (CONANP, 2008). These four Mexican categories correspond to only three IUCN management categories (Kelleher, 1999; Bezaury-Creel, 2005):

- Category I – Strict Nature Reserve, whose primary management objective is scientific research, corresponding to specific zones within Mexican of Biosphere Reserves and Sanctuaries;
- Category II – National Park, whose primary management objectives include ecosystem protection and recreation, corresponding to Mexican National Parks; and
- Category VI – Managed Resource Protected Area, whose primary objective is the sustainable management of natural resources to provide goods and services to communities, represented by Biosphere Reserves and Flora and Fauna Protection Areas in Mexico, currently the most representative IUCN category of MPAs in the country.

Most Mexican MPAs are conceptualized as multiple use zones. Each zone has specific management regimes and has to take into account the area's biological, physical and socioeconomic features (DOF 05/07/2007). The activities allowed are regulated by the thresholds determined by criteria for sustainable use of natural resources. This means that MPAs are not considered as conservation areas separate from the social and economic context in which they are located, but rather participate to improve Mexico's economy within the limits imposed by the need to conserve their environmental conditions (Bezaury-Creel, 2005).

1.2. NO-TAKE ZONES

Scientists and ocean managers worldwide have recommended implementing zones where the extraction of living and non-living resources is, particularly fishing, permanently prohibited as a tool for marine resource management (Hastings and Botsford, 1999; Roberts et al., 2001; Pauly et al., 2002). These areas are commonly referred to as No-Take Zones (NTZs), or core

zones, and only monitoring and scientific research activities are allowed. It must be stated that Mexican MPAs are not true NTZs. Management plans might have certain areas where fishing is banned, these areas are often delineated as distinct zones within the MPA; however NTZs can be created outside MPAs since they are regulated through different legal bases. Some NTZs are time bound and they are commonly referred as closed season; for example, the seasonal prohibition of access within known spawning grounds of a focal species (National Research Council, 2001). Other NTZs are species bound for example, the prohibition to capture totoaba (*Totoaba macdonald*), sea turtles or other endangered species.

Fisheries are one of the principal benefactors of NTZs, as confirmed by empirical measurements (Gell and Roberts, 2003; Halpern, 2003; Roberts et al., 2003). They allow an increase in abundance and biomass of commercial species, individual survivorship, as well as an increase in the proportion of legal-sized fish. Furthermore, they protect larval sources within the NTZ. Marine protected areas that are properly implemented and have NTZs as part of their management program may maintain productive fisheries by protecting a critical stock within their boundaries while improving fishery yield outside them (DeMartini, 1993; Gell and Roberts, 2003; Gerber et al., 2003).

The increasing number of scientific publications reflects the consensus and growing interest of the potential for NTZs as a partial solution to the declines of fish stocks and overall marine biodiversity. However, in spite of the documented benefits of designing appropriate NTZs networks, and the push by scientists and NGOs for more and larger NTZs, the creation of such networks is likely to be opposed by some fishers and/or stakeholders. Particularly for fishers, augmenting the number and size of NTZs can have an impact on their livelihoods as

NTZs restrict access to important fishing grounds and fishers incur an opportunity cost created by this management tool.

Hence, the aim of this work is to create a model for social participation to achieve both increased conservation and social benefits from marine protection for local communities within a Mexican MPA. This model is to be tested in the Loreto Bay National Park (LBNP), by taking advantage of the current NTZs and exploring the possibility of creating additional ones as tools to manage local fisheries.

2. OBJECTIVE

The objective of this paper is to design a survey that ultimately will be used as a decision-making tool. Stakeholders will be surveyed to evaluate different alternatives for the location of NTZs within fishing grounds of the LBNP. In particular, the survey seeks to:

1. Estimate the economic costs incurred and benefits obtained by the stakeholders from their activities inside the LBNP.
2. Identify the concerns of stakeholders and their willingness to accept certain places as a NTZ.

3. STUDY AREA

3.1. LORETO

The municipality of Loreto is located in the central western coast of the Gulf of California in the state of Baja California Sur, Mexico. It has a population of 11,812, from which 85% live in the Loreto urban area and the remaining are distributed in other localities (Fig. 1;

INEGI, 2000). The municipality of Loreto is made up of the municipal seat, which is the city of Loreto, the only urban community, by four delegations and 11 sub-delegations (Centro Estatal de Desarrollo Municipal, Gobierno del Estado de BCS, 1997).

Fishers are based in San Nicolás, Loreto, Juncalito, Ensenada Blanca, and Agua Verde (Fig 1; Ivanova and Cota, 2007). The working fishing fleet is comprised of approximately, 574 *pangas* (small open boats), of which 383 are dedicated to commercial fishing and 191 to sport-recreational fishing. It is estimated that the fishers' population in the municipality encompass 1,176 individuals, which represents 10% of the total municipal population. The fisheries sector consists of 12 social cooperatives and more than 15 commercial fisher *permisionarios* (concessionaires; Gutiérrez-Barrera, 2001). Fishers move out to different fishing areas on the islands and the coast, where they set up their fishing camps. Fishing camps are used for shelter and allow the fishers to spend several days without returning home, which saves them fuel costs and maximize fishing efforts. In the mainland region, 16 temporary fishing camps exist and 61 have been documented in the islands (Gutiérrez-Barrera, 2001).

Fish harvesting includes commercial, sport and recreational fishing, and "Hookah" (compressor) diving. Commercial fishing encompasses hook and line, bottom fishing, traps, and driftnets, the latter using nets of different mesh sizes and material. Commercial fishing targets species of top value in the market (first quality) such as yellow snapper and red snapper (*Lutjanus*), parrotfish (Family Scaridae), sea bass, gulf and broomtail grouper (*Mycteroperca*), and yellowtail. Also included in the fisheries are other species of lesser market value (second and third quality), such as ocean whitefish (*Caulolatilus*), mojarra (Family Gerreidae), lucero (*Paralabrax*) humpback grunt (*Microlepidotus*), and many others (Bermúdez, 2007).

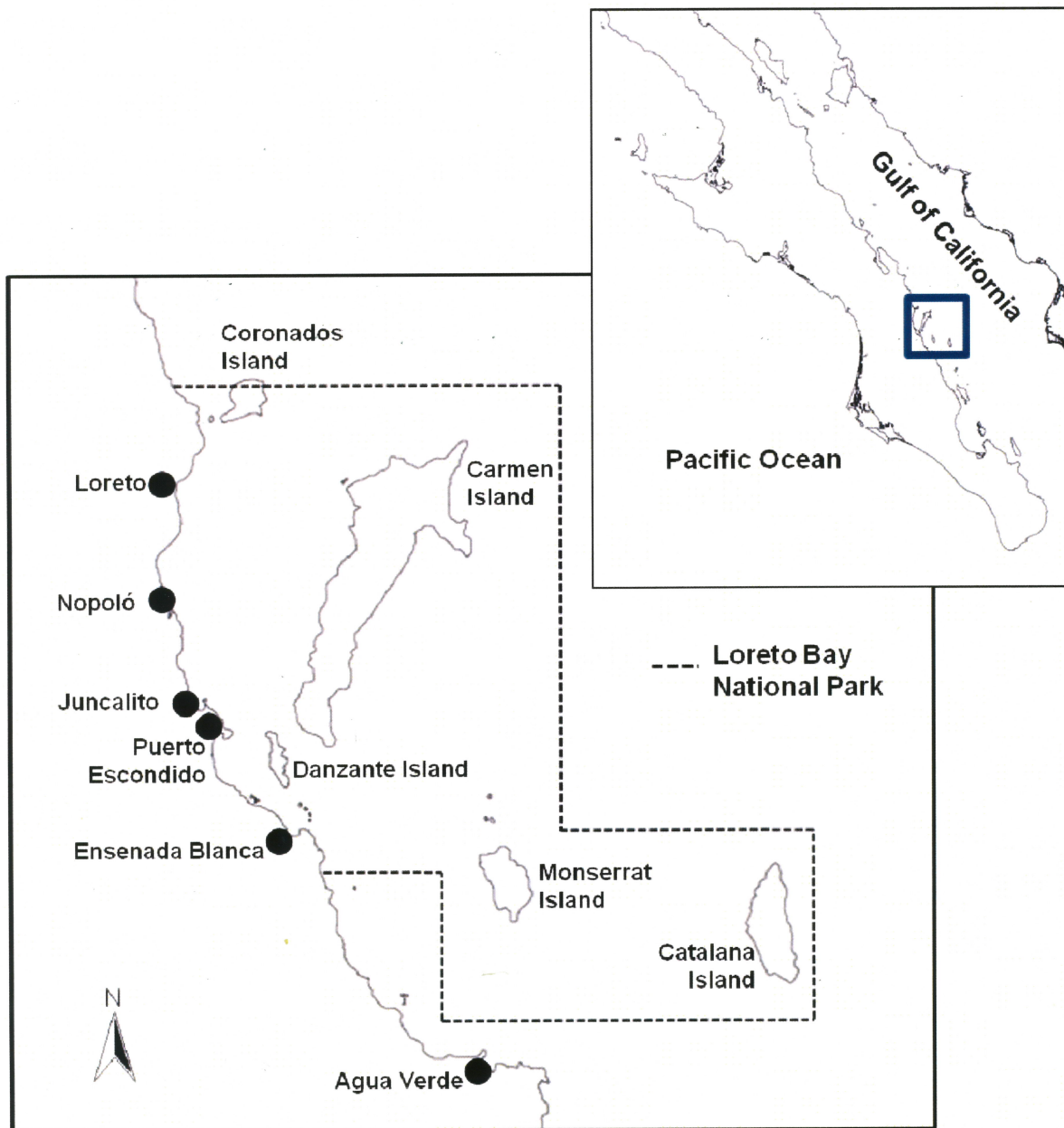


Figure 1. Map of the municipality of Loreto and National Marine Park.

Sport fishing has been practiced in the area for more than 40 years; it is a renowned and valuable activity that brings many tourists to Loreto. The fishing gear generally used is hook and line, and the species caught include marlin (*Makaira*), swordfish (*Xiphias*), yellowtail, and grouper (Carabias et al., 2000). Surface and bottom fishing stand out as the two main types of sport fishing. The main species in surface fishing are yellowtail, dorado (*Coryphaena*), and marlin. On the other hand, bottom fishing targets grouper and snapper (Ivanova and Cota, 2007)

Finally, “Hookah” diving, whether commercial or recreational, mainly yields giant Pacific rocky oysters (*Crassostrea*), spiny clam, chino snails (*Muricanthus*), chocolate clams (*Megapitaria*), and burro snails (*Strombus*). The most commonly used fishing gear is a compressor and a flashlight if the diving is done at night however this activity is illegal inside the LBNP (Gutiérrez-Barrera, 2001; Ivanova and Cota, 2007).

3.2. LORETO BAY NATIONAL PARK

The LBNP is in front the coastal zone of Loreto (25° 35' 18.41" and 26° 07' 48.72" N and 110° 45' 00" and 111° 21' 08.67" W; Fig. 1). The park comprises an area of 510,500 acres (206,581 ha), of which 89% corresponds to a marine area and the reminder to insular zones. Five large islands and 19 islets are contained within the boundaries of the LBNP. The islands are: Carmen (150 km²), Catalana (40 km²), Monserrat (19km²), Danzante (4km²), and Coronados (9km²; Carabias et al., 2000). LBNP is considered a place of high biodiversity (Gaitán-Morán and Arizpe, 2007) with more than 300 species of fish, along with 1500 marine invertebrates, 250 species of algae and more than 30 species of marine mammals living within LBNP boundaries (Bermúdez, 2007).

The LBNP was established in 1996 by a presidential decree from Ernesto Zedillo (Carabias et al., 2000). The process began at the end of the 1980s with a group of local citizens lobbying the municipal authorities to support the creation of a marine protected area in Loreto. The reason for protection was the urgent need to recover the population of some commercial fisheries that were overexploited due to industrial fishing activities, mainly shrimp trawling, and the lack of fishing regulations (Bermúdez, 2007).

After the establishment of the LBNP, the design of a management plan began in 1998 with a public consultation that included 7 fishing communities, tourists, the fishing industry, academics, and the municipal, state, and federal government, as well as non-governmental organizations (NGOs). This process culminated with the publication of the management plan in 2000, in which regulations and the area's zoning were established (Carabias et al., 2000).

Even though the park is recognized for its abundant fish populations, after 10 years of government efforts to protect Loreto's waters many populations are declining and catch volume and individual sizes are getting smaller (Sala et al., 2002). However, two NTZs inside the park have shown otherwise. The NTZs are small seamounts that comprise 1.5 km² (0.07% of the total park area), and were started as a project by Comunidad y Biodiversidad (COBI), a Mexican conservation-oriented NGO, and culminated in an agreement with fishers and park authorities in 2002. The monitoring data show that populations within the NTZs have maintained their abundance and species diversity compared to the staggering decrease in three fishing grounds inside the LBNP that were used as control (Sáenz-Arroyo and Torre, 2005). In light of these results, many scientists studying the area have promoted expanding the area of NTZ's to comprise 30% of the total park area.

4. INVOLVING LORETO STAKEHOLDERS

In order to increase the size or number of the NTZs in the Loreto area, the stakeholder commitment to establish and respect more NTZs inside the LBNP is essential, since they are most affected by this management tool. The participation of stakeholders comes from the idea that in order for a conservation area or program to work then the perceptions, values, concerns, and interests of the local community towards the natural resources must be taken into consideration (Cinner and Pollnac, 2004). Participation refers to involvement by local people in the creation, content and conduct of a program or policy that can change their lives (Campbell and Vainio-Mattila, 2003).

The current thinking is that in order to achieve conservation goals and economic growth a basic prerequisite in MPA management is to promote stakeholder participation in decision-making through the establishment of co-management arrangements with the government authorities (Jentoft, 2000; Sandersen and Koester, 2000). The underlying principle of co-management is that more participation by the stakeholders broadens the information and knowledge on which management decisions are made (Sandersen and Koester, 2000).

One of the goals of co-management is to reduce conflict through participation processes. The assumption is that increased participation in management will reduce conflict and opposition because of increased social legitimacy of policy and regulatory decisions (Pomeroy, 1998). For example, fisher participation in management can provide local knowledge to supplement scientific information, and because of the fishers frequent presence they may help monitor the resource, and in the long run improve overall management. Hence, resource users gain a sense of ownership and tenure security of regulations (positive economic incentives; Pomeroy and Williams, 1994; White et al., 1994; Pomeroy, 1995), which can be of great importance in

situations where monitoring and enforcement costs are high (transaction costs; Jentoft and Sandersen, 1996).

The different ways the local people can become involved ranges from contributing information, to assessing and recommending solutions, to involvement in the final management decisions (Weiner et al., 2002). In other words, local participation in management can be done in a number of ways or at a number of levels (Table I). While the lowest level might involve informal communication between scientists or regulators and the public, higher levels may seek some degree of public input, as in the solicitation of public opinion or the active participation of public representatives in the decision-making process itself (Rowe and Frewer, 2000).

The mode of local participation that this work seeks is that where stakeholders are consulted and viewed as actors (Table I). Hence, participation is a process of collaboration and implies that fishermen, scientists, and managers work together in the conception, design and/or implementation of the management project or strategy (Daniels and Walker, 2001).

Table I. Typology of participation (from Cornwall, 2003).

TYPE OF PARTICIPATION			
Mode of participation	Associated with...	Why invite/involve?	Participants viewed as...
Functional	Beneficiary participation	To enlist people in projects or processes, so as to secure compliance, minimize dissent and lend legitimacy	Objects
Instrumental	Community participation	To make projects or interventions run more efficiently by enlisting contributions and delegating responsibilities	Instruments
Consultative	Stakeholder participation	To get in tune with public views and values, to collect good ideas, to resolve opposition, and to enhance responsiveness	Actors
Transformative	Citizen participation	To build political capabilities, critical consciousness and confidence, to enable to demand rights, and to enhance accountability	Agents

5. SURVEY

The survey was chosen as a decision-making tool for different alternatives of NTZs in LBNP. This method was selected because surveys can be a powerful and useful tool for collecting data on human characteristics, attitudes, thoughts, behavior, economic, and ecological information. The goal of almost all surveys is to enable the researcher to predict accurately the characteristics and/or thoughts of a predefined group of people (Salant and Dillman, 1994). Moreover, surveys provide a process for active participation of stakeholders in management discussions.

There are several different ways of administering a survey. The most common methods are written surveys through the mail, telephone surveys, and in-person interviews. Each of these methods can be effective, and have a unique set of strengths and weaknesses (Salant and Dillman, 1994). For the purposes of this project, in-persons interviews were chosen because they are more practical since they allow the use of diagrams and multipart questions, and the possibility of obtaining more complete and accurate results than other survey methods. However, among some of the limitations of surveys are that they are insufficient to determine causality, they depend on participants to truthfully and accurately report what they are asked, they may have threats against validity (bias: history, selection, regression towards the mean, invalid questions, etc), and they represent only a snapshot of behaviors or characteristics (Fowler, 1995).

6. METHODS

For the creation of the survey questions, information was obtained either from internet searches and/or from the library of the Universidad Autónoma de Baja California Sur and Scripps Institution of Oceanography. This work is based on a review of published and grey literature, such as scientific papers, academic theses and government publications and reports. Information was also obtained from interviews with economic researchers, ecological scientists, and directors of NGOs that work in the study area.

Once draft of the survey questions was completed, a focus group session took place with five fishermen at La Paz, B.C.S. Due to time constraints it was impossible to hold the focus group in Loreto. The purpose of this pilot-test of the interview survey was to refine and improve the survey, especially to test if the questions were understandable and composed in a way that was suitable for the general public.

The survey was intended to provide qualitative and spatial information about the uses of the LBNP by stakeholders, and their willingness to accept certain areas as NTZs. Also the purpose of the majority of questions is to assess the degree of specialization or diversification of stakeholder participation, which can be evaluated with information of the local fleet composition, percent of commercial and recreational use, target fisheries, and gear types used.

The survey is divided into sections (Appendix 1). The first one gathers demographic information and identifies the type of user group of the interviewee (e.g. commercial or sport fishers, eco-tourism, conservationists, or scientists). These users are the main stakeholders to be concerned or affected by the implementation of NTZs.

Information about the user's income percentages that come from their ocean-related activities is asked for two reasons: (1) to estimate the revenue the users obtain from their activity,

which will indicate the opportunity cost to the stakeholder of lost fishing opportunities; and (2) to determine whether the stakeholders are part or full-time users.

If the interviewee is a fisher or ecotourism user, information about the vessel (if applicable), crew size, and furthest point on their last trip is gathered in order to determine the costs they incur from their activities. The furthest point on their last trip is the way to estimate fuel costs.

If the primary activity is fishing, the interviewee is asked what gear they use and which species they target. Loreto fishermen usually capture different species depending on the season so the survey gathers information of the targeted species in the winter and summer season in order to have a more comprehensive view of the places and resource use. Finally the conservationists/scientists users are asked their area of expertise and/or concern.

All types of users will be asked to identify the locations visited to carry out their ocean-related activities, by drawing on a map. After drawing the places they use the interviewees are asked to assign a monetary value of the relative economic importance to them of each location. Each interviewee has a total of 100 pesos to spend in all locations. The results from this question will give spatial information about the areas and uses, the economic importance, and hence an estimate of the lost income the user will have if NTZs are established in those areas.

Finally, based on scientific maps of areas of important biological value, the interviewees are asked to assign with an ordinal scale their willingness to accept different areas as NTZs (1 being strongly willing, and 5 being strongly reluctant). Also, they have the opportunity to include an area they might think should be protected by a NTZ. The idea behind this question is to recognize which are the areas of the stakeholders' concern, and how much are they willing to accept certain areas as NTZs.

The survey should be applied to persons that represent each user group. A list with the names of the minimum of stakeholders to be interviewed is provided in Appendix 2. The participants can provide a second set of suggested persons to be interviewed; in other words, “snowball” sampling of stakeholders should be encouraged.

7. IMPLICATIONS

The approach developed for this project, through an interview survey and maps, provides a decision-making tool that not only offers the stakeholder a process for active participation in management discussions related to marine issues. It also offers a structure that can give ecological and economical information about specific user group which can be significant in the management of the area’s fisheries.

Furthermore, ecological, social, and economic information provided by this decision-making tool can help resource managers when assessing the trade-offs of different management strategies. For example, the local community and managers might begin to recognize the economic or distributional impacts of different alternatives of NTZs. Some stakeholders are going to gain or loose with the implementation of NTZs, so understanding the distributional impacts is of great importance. With information about the distributional impacts of NTZs, managers and the local community can estimate stakeholder gains or loses, who will be or not affected, and if the gainers and losers are big or small groups. With complete distributional impact information, all affected stakeholders could then be involved in the decision, preparation, revision, and/or evaluation of different management alternatives.

Spatial representation of stakeholder uses and economic importance can guide management strategies. The process of collecting spatial information provides the spatial usage patterns of the Loreto stakeholders inside the park. If this information is available to park managers, then it can be used to stimulate discussions with the community about the implications of alternative areas as NTZs, therefore generating an interest in mutual learning. In addition, the participatory survey and mapping process may help develop consensus about how the local community can or should utilize the LBNP environment and its resources.

Many stakeholders and park managers have stated their concern about the fish populations decline in LBNP. Some agree that stringent management approaches and more enforcement are needed. However, increased enforcement implies that the park needs better infrastructure and more funding to accomplish these tasks, which is unlikely to happen in the LBNP because even though there has been an increment in funding Mexican MPAs the amount provides only a minimum operative base and is still insufficient to cover many urgent needs (Bezaury-Creel, 2005) such as enforcement or staffing. Plus, a stringent management approach implies additional opportunities forgone by the stakeholders, particularly the fisher population.

Nevertheless, if local participation is promoted then stakeholders gain a sense of ownership over the regulations and can help in the monitoring and enforcement activities by providing information on resources' condition, and the location and identity of potential offenders. In turn, park managers can gain insight into the stakeholders concerns, ideas, information, and knowledge. Most importantly, managers should do as much as possible to integrate, document and use the stakeholders' input in management and enforcement decisions. Increasing the level of local participation in decision-making processes may also reduce conflict

in management decisions and increase social legitimacy in policy development (Pinkerton, 1989).

The Management Plan is the tool employed to accomplish the goals of any protected area in Mexico. The LBNP Management Plan requires a review every five years, and a revision is currently taking place. More importantly, the park authorities have proclaimed their willingness to carry out the revision focusing on the participation of the stakeholders where their perspectives are taken into account in the final document. The goal of the park authorities is to agree on technically adequate solutions that meet the needs and interests of the majority of stakeholders. It is in the same vein that a survey as a decision-making tool described in this document, can be helpful in achieving consensus and integrating a variety of input on how viable it is to augment NTZs inside the LBNP, and will be useful when analyzing the potential socioeconomic impacts to the LBNP stakeholder from different management strategies.

Finally, the legal framework for local communities to participate in decisions regarding the management of the fishing resources changed in 2007 when the Mexican Federal Government enacted the General Law for Sustainable Fisheries and Aquaculture (Ley General de Pesca y Acuacultura Sustentable, LGPAS). Before the LGPAS, fisheries were almost exclusively regulated by the federal government. Thus, state entities had no direct involvement in their fisheries; the only legal possibility for the local governments to participate was through agreements and arrangements coordinated between the federal and state governments.

However, the federal regulations have given poor results. Many Mexican fisheries are overexploited and many target species are no longer a sustainable resource. Given the fact that fish stocks are declining, the federal government acknowledged in 2007 the urgent need to transform how it regulated and managed fishing activities and the resources they target. One of

the biggest problems acknowledged was the centralization of management within the federal government and/or lack of coordination with local representatives. Specifically, the federal government sought to give more political and management participation to the local government through the LGPAS. The outcome is that, beginning in 2008, the state governments will be able to create their own Fishing Department, allowing the establishment of additional and specific regulations for the fisheries under the state's jurisdiction.

With the adoption of the LGPAS, the federal government has taken the first step towards decentralization of fisheries management, even though the federal agencies still have some degree of authority over the fisheries. The adoption of the LGPAS is a major policy shift in how fisheries are to be managed in Mexico. The LGPAS promotes the community participation by helping in the decision-making of issues related to the administration and management of the fishing resources. It provides a legal framework and a legitimate process for all stakeholders essential to achieve social participation, and augments the social and conservation benefits derived from marine protection.

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APPENDIX 1.

Stakeholder survey to evaluate different alternatives of zoning NTZs within fishing grounds of the LBNP.

SECTION 1
Date of interview
Interviewee
Name
Last name
Age
Gender
Education
Years working and/or visiting the area
City of residence
<p>What kind of user are you? (circle)</p> <ul style="list-style-type: none"> • Commercial fisher • Commercial sport fisher • Private sport fisher • Eco-tourist • Conservationist/Scientist • Other (define)
<p>During the last year, what percentage of your monthly income came from the following activities:</p> <ul style="list-style-type: none"> • Commercial fisher • Commercial sport fisher • Private sport fisher • Eco-tourist • Conservationist/Scientist • Other (define) <p>How many months do you do this activity?</p> <p>Is your monthly income above or below 3,000 pesos?</p>

SECTION 2. Commercial fisher / sport fisher
Are you captain or other (define)?
Vessel length (m)
Vessel motor (hp)
Haul capacity (kg)
Home port
Landing port (s)
Crew size
Main type of fishing gear you use <ul style="list-style-type: none"> • Hook and line • Gillnets • Hooka (compressor) • Traps • Trawling • Purse seines • Other (define)
Second type of fishing gear you use:
Mainly, which species do you target in the winter (if applicable)? <ul style="list-style-type: none"> • Shark and skates • Coastal reef fish • Deep reef fish • Migratory fish • Benthic invertebrate • Shrimp • Other (define)
Mainly, which species do you target in the summer (if applicable)? <ul style="list-style-type: none"> • Shark and skates • Coastal reef fish • Deep reef fish • Migratory fish • Benthic invertebrate • Shrimp • Other (define)
SECTION 2. Map
A map is provided to draw the locations employed inside the LBNP in their ocean-related activities
After each map drawn goes:
If you have 100 pesos in total, how many do you give to each location?
What's the furthest point on this map that you traveled on your last trip?

SECTION 3. Eco-tourism
Name of the company
Type of employee: <ul style="list-style-type: none"> • Owner • Guide • Capitan of a boat • Other (define)
How many people are working for the company?
Vessel length (m)
Vessel motor (hp)
Haul capacity (kg)
Home port
Landing port (s)
Type of tourism activity <ul style="list-style-type: none"> • Dive • Snorkeling • Kayaking • Whale watching • Other (define)
SECTION 3. Map
A map is provided to draw the locations employed inside the LBNP in their ocean-related activities
After each map drawn goes:
If you have 100 pesos in total, how many do you give to each location?
What's the furthest point on this map that you traveled on your last trip?

SECTION 4. Conservationist / scientist

Name of the organization/institution

Type of user: conservationist / scientist

- University (social science, environmental science, etc)
- NGO (non-governmental organization)
- Governmental agency
- Other (define)

Species/areas/ecosystem of expertise or concern

- Coastal reef ecosystem (all finfish and invertebrates associated with coastal reefs)
- Deep sea reefs (all finfish and invertebrates associated on the seamounts)
- Soft bottom (Sand, mud, etc)
- Small pelagic (sardines, anchovy, etc)
- Migratory fish (tuna, sword fish, sailfish, yellowtail, etc)
- Sea turtles
- Sea Lions
- Dolphins and/or whales
- None of the above, specify

SECTION 4. Map

A map is provided to draw the locations employed inside the LBNP in their ocean-related activities (if applicable, if not move to *)

After each map drawn goes:

If you have 100 pesos in total, how many do you give to each location?

*If you are given 100 pesos how would you distribute them to protect the species/ecosystems you circled above?

FOR ALL TYPE OF USERS**Map section of No-Take zones with biological value**

A map is provided with different shaded areas to be considered as No-Take zone because of their biological value.

After each map given goes:

How much are you willing to accept as a No-Take zone each of the shaded areas shown on this map. A No-Take zone would not allow fishing only inside that area. The NTZ may permit the fish to reproduce and grow so that there would be eventually more and bigger fishes in the fishing or recreational grounds of the LBNP. Circle one option for each area.

AREA	Strongly	Willing	Indifferent	Reluctant	Strongly
	Willing				Reluctant
A	1	2	3	4	5
B	1	2	3	4	5
C	1	2	3	4	5
D	1	2	3	4	5
E	1	2	3	4	5
F	1	2	3	4	5
G	1	2	3	4	5

Finally, is there an area you may want to include as a No-Take zone that it is not shown on the map? If so, draw it on the map and briefly explain why you think it is important to consider it as a No-Take zone.

APPENDIX 2.

List of suggested survey participants.

Commercial Fishermen

- Conrado Castro Romero, member Sierra Giganta Cooperative
- Camilo Cazares Cota, member Ligüi Cooperative
- Magdaleno Cortés de la Cruz, concessionaire
- Carmen Cota Castro, member Ligüi Women Cooperative
- Romeo Cota Castro, president Ligüi Cooperative
- Francisco Castro Higuera, president Sierra La Giganta Cooperative
- Rodolfo Castro Amador, president Buzos de Cortés Cooperative
- Alberto Gonzalez Cota, member Playas de Puertito Cooperative
- Manuel Palacios, concessionaire and member Pescadores de la colonia Zaragoza Cooperative
- Rogelio Romero Quijano, presidente Monserrat Cooperative
- Valentin Romero Murillo, concessionaire
- Miguel Antonio Rondero Cota, presidente Islote de Agua Verde Cooperative
- Claudia Talamantes Romero, member Ligüi Women Cooperative
- Jorge Villalejo, commercial fishermen

Sport Fishermen

- Julio Cesar Magdalena
- Pascal Pellegrino Cocone
- Arturo Sussarrey, Arturo's Sport Fishing

Eco-tourism

- Trudi Angell, Paddling South
- Jorge Salas, Paddling South
- Nadia Beaulieu, Loreto Kayak Tours
- Santiago Berruela, Loreto Kayak Tours
- Rafael Murillo Pelayo, diver and manager of the Loreto Guides Association, Dolphin Center
- Alejandro Magaña Ruiz, whale watching, diver and representative of the Tourist Services Cooperative
- Victor Vargas, Cormorant diver employee

Conservationists

- Gabriela Anaya, Niparajá
- Fernando Arcas, Grupo Ecologista Antares (GEA)
- Sergio Morales, Grupo Ecologista Antares (GEA)
- Rodolfo Palacios, Niparajá
- Andrea Saenz-Arroyo, Comunidad y Biodiversidad (COBI)
- Mark Spaulding, Ocean Foundation
- Jorge Torre, Comunidad y Biodiversidad (COBI)

Scientists

- Octavio Aburto, Scripps Institution of Oceanography and UABCS
- Gustavo Arnaud, CIBNOR
- Brad Erisman, Scripps Institution of Oceanography
- Diane Gendron, CICIMAR
- Jeff Jacobsen, Humboldt State University
- Phil Hastings, Scripps Institution of Oceanography
- Sofía Ortega, CICIMAR
- Hector Reyes Bonilla, UABCS
- Rafael Riosmena, UABCS
- Carlos Sánchez, UABCS
- Jorge Urban, UABCS

Government agencies

- Juan Antonio Angulo, Director of the Fishing and Aquaculture Department, B.C.S.
- Jorge Elias Angulo, PROFEPA
- Marco Antonio González, SEMARNAT
- Roberto López, CONANP
- Javier Lucero, Fisheries Sub-delegate, SAGARPA
- Efraín Meza Mayoral, Municipal Fisheries Foment
- Rodrigo Ureña Talamantes, PROFEPA
- Rosalía, Secretariats office CONAPESCA, Loreto