MPAs MEXICO

SAMUDRA Monograph

Coastal and Marine Protected Areas in Mexico

Julia Fraga and Ana Jesus

International Collective in Support of Fishworkers
www.icsf.net

About the Author

Julia Fraga, a Ph D in social anthropology, is a professor at the Department of Human Ecology, Centre for Research and Advanced Studies, National Polytechnic Institute (CINVESTAV-IPN), Mexico. She can be reached at jfraga@mda.cinvestav.mx

Ana Jesus did an M Sc in marine biology from the University of Algarve, Portugal, with a dissertation on the community-based management of a marine protected area in a small Mexican fishing village. She can be contacted at anacristinajesus@gmail.com

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Written by
Julia Fraga and Ana Jesus

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Tel: +91 44 2827 5303 Fax: +91 44 2825 4457
Email: icsf@icsf.net
www.icsf.net

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Acronyms and Abbreviations

BANPESCA	National Fisheries Bank
BR	Biosphere Reserve
CBD	Convention on Biological Diversity
CCRF	Code of Conduct for Responsible Fisheries
CINVESTAV-IPN	Centre for Research and Advanced Studies, National Polytechnic Institute
CIRNAC	Centre for the Integrated Management of Natural Resources
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COBI	Comunidad y Biodiversidad A.C.
CONANP	Comisión Nacional de Áreas Naturales Protegidas (National Commission for Natural Protected Areas), Mexico
CONAPESCA	Comisión Nacional de Acuacultura y Pesca (National Commission for Aquaculture and Fisheries) Mexico
COP7	Seventh Meeting of the Conference of Parties (of the CBD)
CSAR	Centre for Sustainable Aquatic Resources
DOF	Diario Oficial de la Federación (Official Journal of the Federation)
EEZ	exclusive economic zone
est	established
FFPA	Flora and Fauna Protection Area
FMCN	Mexican Fund for Nature Conservation
GEF	Global Environmental Facility
GOMBR	Gulf of Mannar Biosphere Reserve
GOMNP	Gulf of Mannar National Park
GPA-LBA	Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities
ha	hectare
ICLARM	International Centre for Living Aquatic Resource Management
ICM	integrated coastal management
ICSF	International Collective in Support of Fishworkers
IDRC	International Development Research Centre
IOC	Intergovernmental Oceanographic Commission
IOCARIBE	Intergovernmental Oceanographic Sub commission for the Caribbean and Adjacent Regions

INEGI	Instituto Nacional de Estadística, Geografía e Informática (National Institute of Statistics, Geography and Informatics)
IUCN	International Union for Conservation of Nature
km	kilometre
LAN	Ley de Águas Nacionales (National Waters Law)
LFD	Ley Federal de Derechos (Federal Law of Rights)
LFM	Ley Federal del Mar (Federal Sea Law)
LFP	Ley Federal de Pesca (Federal Fisheries Law)
LFT	Ley Federal de Turismo (Federal Tourism Law)
LGBN	Ley General de Bienes Nacionales (General Law of National Property)
LGDFS	Ley General de Desarrollo Forestal Sustentable (General Law for Sustainable Forestry Development)
LGEEPA	Ley General del Equilibrio Ecológico y la Protección al Ambiente (General Law for Ecological Equilibrium and Protection) Environmental
LGPAS	Ley General de Pesca y Acuacultura Sustentables (General Law for Sustainable Fisheries and Aquaculture)
LGS	Ley General de Salud (General Health Law)
LGVS	Ley General de Vida Silvestre (General Wildlife Law)
LN	Ley de Navegación (Navigation Law)
LP	Ley de Puertos (Ports Law)
LPAEY	Law for the Environmental Protection of Yucatan State
m	metre
MAB	Man and Biosphere (Programme of UNESCO)
MARPOL	International Convention for the Prevention of Pollution from Ships
MER	marine extractive reserve
mgt	management
MIMP	Mafia Island Marine Park
mn	million
MPA	marine protected area
MXN	Mexico peso
NGO	non-governmental organization
NOM	Norma Oficial Mexicana (Official Mexican Standard)
NP	National Park
OET	Programas de Ordenamiento Ecológico del Territorio (Ecological Zoning Programmes)

PA	protected area
PA PoW	Protected Areas Programme of Work (of the CBD)
PEMEX	Petróleos Mexicanos (National Petroleum Company)
PET	Programa de Empleo Temporal (Temporary Employment Programme)
pop	population
PoW PA	Programme of Work on Protected Areas (of the CBD)
PRODERS	Programas de Desarrollo Regional Sustentable (Sustainable Regional Development Programmes)
PROFEPA	Procuraduría Federal de Protección al Ambiente (Federal Department of Environmental Law Enforcement)
SAGARPA	Secretaría de Agricultura, Ganadería, Desarrollo Rural, Pesca y Alimentación (Secretariat of Agriculture, Livestock Farming, Rural development, Fisheries and Nutrition)
SCT	Secretaría de Comunicaciones y Transportes (Secretariat of Communications and Transportation)
SECOL	Secretariat of Ecology of Yucatan State
SECTUR	Secretaría de Turismo (Secretariat of Tourism)
SEDUE	Secretaría de Desarrollo Urbano y Ecología
SEGOB	Secretaría del Gobiernación (Secretariat of Governance)
SEMAR	Secretaría de Marina (Navy Secretariat)
SEMARNAP	Secretaría de Medio Ambiente, Recursos Naturales y Pesca (Secretariat of the Environment, Natural Resources and Fisheries)
SEMARNAT	Secretaría de Medio Ambiente y Recursos Naturales (Secretariat of the Environment and Natural Resources)
SENER	Secretaría de Energia (Secretariat of Energy)
SHCT	Secretaría de Hacienda y Crédito Público (Secretariat of Finance and Public Credit)
SRA	Secretaría de la Reforma Agraria (Secretariat of Agrarian Reform)
SSA	Secretaría de Salud (Secretariat of Health)
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFSA	United Nations Fish Stocks Agreement

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PREFACE

As the conservation of marine resources becomes a growing global priority, the concept of marine protected areas (MPAs) is being widely propagated. Since most MPAs are located in coastal areas of great biodiversity, their development has direct relevance and concern to the livelihoods, culture and survival of small-scale and traditional fishing and coastal communities.

An MPA is considered to be any coastal or marine area in which certain uses are regulated to conserve natural resources, biodiversity, and historical and cultural features. The Convention on Biological Diversity (CBD) defines an MPA as "any defined area within or adjacent to the marine environment, together with its overlying waters and associated flora, fauna, and historical and cultural features, which has been reserved by legislation or other effective means, including custom, with the effect that its marine and/or coastal biodiversity enjoys a higher level of protection than its surroundings".

As an area-based management tool, MPAs are considered useful in implementing both the 'ecosystem approach' and the 'precautionary approach', since their design involves managing pressures from human uses by adopting a degree of protection, which can range from strict protection, where all use activities are barred, to less stringent measures like sanctioning areas where multiple uses are allowed and regulated.

In 2004, the Seventh Meeting of the Conference of Parties (COP7) of the CBD agreed that marine and coastal protected areas, implemented as part of a wider marine and coastal management framework, are one of the essential tools for the conservation and sustainable use of marine and coastal biodiversity. The meeting noted that marine and coastal protected areas have been proven to contribute to (a) protecting biodiversity; (b) sustainable use of components of biodiversity; and (c) managing conflict, enhancing economic well-being and improving the quality of life. Following on this, Parties to the CBD subsequently agreed to bring at least 10 per cent of the world's marine and coastal ecological regions under protection by 2012. In 2006, only an estimated 0.6 per cent of the world's oceans were under protection.

Protected areas (PAs) need to be seen not just as sites copious in biodiversity but also as regions historically rich in social and cultural interactions, which often have great importance for local livelihoods. In practice, however, MPAs

have increasingly become tools that limit, forbid and control use-patterns and human activity through a structure of rights and rules. While numerous studies have examined the ecological and biological impacts of MPAs, few have focused on their social implications for communities and other stakeholders in the area who depend on fisheries resources for a livelihood. A particular MPA may be both a "biological success" and a "social failure", devoid of broad participation in management, sharing of economic benefits, and conflict-resolution mechanisms. Clearly, for MPAs to be effectively managed, it is essential to consider the social components needed for the long-term benefits of coastal communities.

It is in this context that the International Collective in Support of Fishworkers (ICSF) commissioned studies in six countries to understand the social dimensions of implementing MPAs, with the following specific objectives:

- to provide an overview of the legal framework for, and design and implementation of, MPAs;
- to document and analyze the experiences and views of local communities, particularly fishing communities, with respect to various aspects of MPA design and implementation; and
- to suggest ways in which livelihood concerns can be integrated into the MPA Programme of Work, identifying, in particular, how local communities, particularly fishing communities, could engage as equal partners in the MPA process.

The studies were undertaken in Brazil, India, Mexico, South Africa, Tanzania and Thailand. Besides the Mexico study, the rest were based on primary data collected from selected MPA locations within each country, as listed in the table opposite.

The studies were undertaken in the context of Programme Element 2 on governance, participation, equity and benefit sharing in CBD's Programme of Work on Protected Areas (PoW PA, also referred to as PA PoW), which emphasizes the full and effective participation of local and indigenous communities in protected area management. Taken together, the studies provide important insights into the MPA implementation process from a fishing-community perspective, particularly on issues of participation.

It is clear from the studies that the most positive examples of livelihood-sensitive conservation come from Brazil, where communities are in the forefront of demanding, and setting up, sustainable-use marine extractive reserves (MERs). Communities there are using PAs to safeguard their livelihoods, against, for example, shrimp farms and tourism projects. The Brazil study also highlights the many challenges faced in the process, which are related, among other things, to the

need for capacity building of government functionaries and communities; funding; strong community/fishworker organizations; an interdisciplinary approach; and integration of scientific and traditional knowledge.

Country	Case Study Locations
Brazil	• Peixe Lagoon National Park, Rio Grande do Sul • Marine Extractive Reserve (MER) Mandira, São Paulo • Marine Extractive Reserve (MER) Corumbau, Bahia
India	• Gulf of Mannar National Park (GOMNP) and Gulf of Mannar Biosphere Reserve (GOMBR), Tamil Nadu • Malvan (Marine) Wildlife Sanctuary, Maharashtra
South Africa	Five MPAs in three of the country's four coastal provinces, namely: • Langebaan Lagoon MPA • Maputaland MPA • St Lucia MPA • Tsitsikamma MPA • Mkambati MPA
Tanzania	• Mafia Island Marine Park (MIMP)
Thailand	• Had Chao Mai Marine National Park, Trang Province, Andaman Coast • Ra Island, Prathong Island, Prathong Sub-district, Kuraburi District, Phang Nga Province, Andaman Coast

On the other hand, the studies from India, Mexico, South Africa Tanzania and Thailand indicate that communities do not consider themselves equal partners in the MPA process. While, in all cases, there have been recent efforts to enhance community participation, in general, participation tends to be instrumental– communities are expected to participate in implementation, but are not part of the process of designing and implementing management initiatives. The studies also document clear costs to communities in terms of livelihood options lost, expulsion from traditional fishing grounds and living spaces, and violation of human/community rights. The affected communities regard alternative livelihood options as providing limited, if any, support, and, in several cases, as in South Africa, Tanzania and Thailand, they do not perceive substantial benefits from tourism initiatives associated with the PAs. There tends to be a resistance to MPAs among local communities, a mistrust of government and non-governmental organizations (NGOs) that lead such processes, and violations of rules and regulations, undermining the effectiveness of the MPA itself.

The studies in this series of *SAMUDRA Monograph*s stress that there is a strong case for putting in place, or strengthening, a legal framework for supporting community rights to manage resources, building the capacity of both governments and communities, strengthening local organizations, and enhancing institutional co-ordination. They also highlight the need for more, independent studies on MPA processes from the community perspective, given that the few existing studies on social dimensions of MPA implementation have mainly been undertaken by MPA proponents themselves. Where clear examples of violations of community rights, and unjust costs on communities are identified, easily accessible redressal mechanisms need to be put in place, nationally and internationally.

Empowering indigenous and local fishing communities to progressively share the responsibility of managing coastal and fisheries resources, in keeping with the CBD's PA PoW, would undoubtedly meet the goals of both conservation and poverty reduction. This is the challenge before us. The future of both effective conservation and millions of livelihoods is at stake.

Chandrika Sharma
Executive Secretary, ICSF

Coastal and Marine Protected Areas in Mexico

INTRODUCTION

Protected areas have been advocated as one of the most important and effective tools for safeguarding the world's biodiversity. A major reason for this is that they protect species from their greatest threat: habitat loss. The CBD defines a "protected area" as "a geographically defined area, which is designated or regulated and managed to achieve specific conservation objectives" (CBD, 2005). International Union for Conservation of Nature (IUCN)describes it as "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means" (IUCN and WCMC, 1994), further expanding the description to specifically define a "marine protected area" (MPA) as "any area of intertidal or subtidal terrain, together with its overlying water 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" (Kelleher, 1999). It is important to bear in mind that these definitions do not exclude protected areas having additional objectives, such as livelihood improvement or promoting education or research, as so often happens and as Wells et al highlight (Wells et al 2007).

The CBD's Programme of Work on Protected Areas affirms that protected areas are "essential components in national and global biodiversity conservation strategies". They are considered as a key mechanism for achieving the CBD's overall goal of significantly reducing the rate of biodiversity loss by 2010, or 2012, through the establishment and maintenance of ecologically representative and effectively managed protected area systems encompassing at least 10 per cent of the world's terrestrial and marine ecological regions, respectively (CBD, 2005). According to Langhammer et al (2007), this Programme of Work comprises four elements: implementation, governance and equity, enabling activities and

monitoring, each having several specific goals. To accomplish this ambitious programme, the several parties involved are expected to develop and put in place monitoring and evaluation frameworks to ensure the efficiency of their national protected area systems. However, with 2010 fast approaching, progress on this has been slow, the funding to implement the Programme of Work not being a priority for many donors and governments (Langhammer et al, 2007).

THE NEED TO INVOLVE STAKEHOLDERS

It is crucial to emphasize current thinking that a fundamental prerequisite to achieve sustainability in MPA management is promoting ongoing stakeholder participation in decisionmaking through the establishment of co-management arrangements with the government authorities. As Salm et al (2000) point out, the management of an MPA frequently fails because its surrounding land uses and social context are not taken into account and because there is often no wide cooperation from agencies, stakeholders (including local user groups) and others affected. These are factors that limit the success of MPAs and they definitely need to be overcome in the near future.

STUDY OBJECTIVES

To better understand the social dimensions of MPA implementation, the International Collective in Support of Fishworkers (ICSF) undertook studies in several developing countries, including Mexico, with the following objectives:

- to provide an overview of the legal framework for, and of the design and implementation of MPAs at the national level;
- to document and analyze the experiences and views of local communities, particularly fishing communities, with respect to various aspects of MPA design and implementation; and
- to suggest ways in which livelihood concerns can be integrated into the MPA programme of work, identifying, in particular, ways in which local communities, particularly fishing communities, may participate as equal partners in the MPA management process.

METHODOLOGY

This study is based on a review of secondary data sources (such as scientific papers, academic theses and government publications and reports), including an analysis of the legal provisions to do with the design, establishment and operation of protected areas. Among the factors examined were government coastal management policies, including fisheries policy; the establishment and

management of coastal and protected areas, where special attention was paid to the efficiency of enforcement mechanisms; decentralization strategies to enable public participation; and gender equity.

The study also draws on the perspective of key informants, namely, Mexican experts on coastal and ocean management issues, including government officials, decision-makers, researchers, members of relevant NGOs and consultants. An e-mail survey was conducted by sending out more than 500 questionnaires, each comprising 21 questions. Fifty people responded (24 per cent women and 76 per cent men). Among the respondents, 50 per cent were researchers, 28 per cent were government officials and 24 per cent were members of NGOs.

The study discusses two case studies of MPAs in detail and summarizes the findings from four others, focusing primarily on the role played by local communities in managing coastal and marine resources. In choosing the case studies a major objective was to combine the authors' field experience, particularly in the Yucatan Peninsula[1], with the work of others. The overall aim was to provide an overview of how local stakeholders are engaged in the conservation of natural resources, how their livelihoods are affected by the establishment of protected areas and what their interests are. All case studies have been developed from an ethnographic perspective–using the observations of participants, focus groups, semi-structured and structured interviews and questionnaires–by researchers who, in general, have been working for more than 10 years in the coastal communities concerned.

SECTION I

COASTAL MANAGEMENT IN MEXICO

THE MEXICAN COASTAL ZONE

Mexico is the twelfth largest country in the world in terms of extent of coastline and marine surface area. It has an exclusive economic zone of 314,992,000 ha, a continental platform of 39,460,300 ha and a coastline that stretches 11,500 km. Of this, 1,600,000 ha is covered by estuarine areas and about 1,250,000 ha is covered by coastal lagoons, which explains the country's extraordinary biodiversity in terms of coastal and marine resources and ecosystems (wetlands, mangrove forests, barrier islands, dunes, coral reefs, seagrass meadows and nearshore islands) distributed along four different seas: the Pacific Ocean, the Gulf of California, the Gulf of Mexico and the Caribbean Sea (INEGI, 2007, Vidal, 2005).

The Mexican coastal zone[2] provides a wide diversity of goods and environmental services, being an area of great ecological importance and economic and social dynamism. The country has 166 municipalities distributed among 17 coastal States, which have a population of about 13,378,450 (approximately 14 per cent of the national population) (Rivera-Arriaga and Azuz-Adeath, 2004). As in other coastal nations, Mexico's coastal and marine environments are also deteriorating, contaminated by the byproducts of several money-making activities (like the oil industry, tourism, agriculture, urban development, fisheries and mining), population growth and a lack of proper planning. This is an issue of paramount importance in Mexico because it affects the viability of numerous fragile and ecologically important ecosystems. It is also a menace to coastal resources (like fishery resources) and productive activities of great economic and social value, which a large number of people depend on (Quijano-Poumián and Rodríguez-Aragón, 2004, Saavedra-Vázquez, 2004). In this sense, one of the greatest challenges now facing coastal nations is how to prevent further loss of biodiversity, and how to manage, in a sustainable manner, the human use of coastal areas.

INSTITUTIONAL AND LEGAL FRAMEWORK

In Mexico, jurisdiction over the coastal zone is centralized as everything related to water, such as rivers, streams and all freshwater bodies, has an adjacent federal zone 5 m wide (when the stream is less than 5 m wide) or 10 m wide (in all other cases). There is also a 20-m federal maritime-terrestrial zone surrounding the coastline (beaches, coastal lagoons, estuaries). Coastal resources management is delegated

to the State and/or the municipalities only under particular circumstances and under legal instruments such as General Laws, which enable the decentralization of federal jurisdiction and regulatory authority for specific purposes (Saavedra-Vázquez, 2004). It is relevant to mention that all the 31 Mexican States have their own environmental legal instruments. Nevertheless, Bezaury-Creel (2005) believes the role States and municipalities are expected to play in policymaking on coastal and marine issues is negligible. But land-related issues come under the jurisdiction of the States and municipalities (especially those related to land use and building permits). Coordination among the three levels of government is thus important for an appropriate legal framework for integrated management of the coastal zone (Saavedra-Vázquez, 2004).

Numerous legal instruments–laws, regulations, decrees, secretarial agreements and official standards–regulate coastal and marine issues in Mexico. Among the most important laws that regulate the access to natural resources and their use is the General Law for Ecological Equilibrium and Environmental Protection (LGEEPA)[3]. It defines the tools of the national environment policy within the logic of a sustainable use of natural resources, which entails obtaining economic benefits while preserving the ecosystem. In addition to the LGEEPA, the main legal instruments that regulate conservation and use of the country's biological diversity are:

- the General Wildlife Law (LGVS);
- the Federal Fisheries Law (LFP);
- the General Law for Sustainable Fisheries and Aquaculture[4] (LGPAS);
- the General Law for Sustainable Forestry Development (LGDFS);
- the Official Mexican Standard (NOM); NOM-059-*Secretaría de Medio Ambiente y Recursos Naturales* (SEMARNAT)-2001 lists threatened and endangered species and NOM-022-SEMARNAT-2003 regulates conservation, sustainable use and restoration of coastal wetlands located in mangrove areas;
- the General Law of National Property (LGBN), which incorporates legislation on coastal areas (such as beaches), the 20m federal maritime-terrestrial zone and reclaimed land;
- the Federal Tourism Law (LFT), which regulates all tourism activities;
- the Federal Sea Law (LFM), the General Health Law (LGS) and the National Waters Law (LAN), which govern ocean pollution; and
- the Ports Law (LP) and the Navigation Law (LN), which regulate marine transportation, prohibiting all vessels from contaminating the country's waters.

All the above-mentioned pieces of legislation, as well as other instruments covering a wide range of subjects (water supply, mineral and energy resources, agriculture, human settlements and property rights), apply within protected areas. This includes the Penal Code, which has chapters with important regulations meant to protect marine life. They impose penalties of up to 10 years in prison on those who capture or harm marine turtles, marine mammals, coral reefs and any aquatic species during periods when fishing is banned and on those who reclaim wetlands, mangrove areas, lagoons or marshes, with an additional penalty of up to three years in prison if the offence is committed in a protected area or affects one (DOF 06/02/2002). Further, protected areas (should) have their own establishment decree and management plan and are ruled by a Regulation derived from the LGEEPA, published in 2000 (DOF 30/11/2000). The possibility of charging entrance fees in protected areas, or in any other public place, has its legal basis in the Federal Law of Rights (LFD), which specifies the amount that can be charged in each particular situation.

Mexico has, since 1962, signed several international conventions and agreements on the conservation and regulation of coastal and marine ecosystems. These include:

- the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention, 1979);
- the Convention on International Trade in Endangered Species of Flora and Fauna (CITES, 1973/79);
- the United Nations Convention on the Law of the Sea (UNCLOS, 1983);
- the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean (Cartagena Convention, 1985);
- the Convention on Biological Diversity (1992);
- the International Convention for the Prevention of Pollution from Ships (MARPOL, 1992); and
- the Convention on Wetlands of International Importance (Ramsar, 1972/86).

Mexico also subscribes to the principles of

- the United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks (UNFSA);
- the Food and Agriculture Organization's Code of Conduct for Responsible Fisheries (CCRF); and

- Global PoA for the Protection of the Marine Environment from Land-Based Activities (GPA-LBA).

Besides, Mexico participates in the Intergovernmental Oceanographic Commission (IOC) and in its subcommission for the Caribbean and Adjacent Regions (IOCARIBE) (Bezaury-Creel, 2005).

According to several experts (Bezaury-Creel, 2004, 2005, Quijano-Poumián and Rodríguez-Aragón, 2004, Saavedra-Vázquez, 2004, Vidal, 2005), the country's legislation to regulate access to coastal resources and their use is very fragmented, incomplete, overlapping and, at some points, inconsistent, based as it is on legal instruments that were formulated from a sectoral perspective. Moreover, its implementation and enforcement are by several uncoordinated government agencies, all of which are responsible for some aspect of coastal and marine management. For instance,

- the Secretariat for the Environment and Natural Resources (SEMARNAT) has jurisdiction over forestry, wildlife, endangered species, water, pollution and the 20-m federal maritime-terrestrial zone and is responsible for formulating the national environment policy;
- SEMARNAT is supported by the National Commission for Natural Protected Areas (CONANP) when it comes to the establishment, management and enforcement of federal protected areas;
- the Secretariat for Agriculture, Livestock Farming, Rural Development, Fisheries and Nutrition (SAGARPA) is responsible for managing fishery resources through the National Commission for Aquaculture and Fisheries (CONAPESCA);
- the Secretariat of Communications and Transportation (SCT) has jurisdiction over the ports and navigation;
- the Navy Secretariat (SEMAR) is responsible for defending Mexico's territorial waters and also monitors ocean pollution;
- the Health Secretariat (SSA) has jurisdiction over contamination problems that might affect public health;
- the Secretariat of Tourism (SECTUR) promotes and regulates tourism-related activities;
- the Secretariat of Agrarian Reform (SRA) deals with communal land tenure;
- the Secretariat of Energy (SENER) has the National Petroleum Company (PEMEX) under it; and

- the Secretariat of Governance (SEGOB) has jurisdiction over national islands and cays.

Bezaury-Creel (2005) says the situation is further complicated by highly fragmented intra-secretarial departmental responsibilities, as well as separate departments belonging to States and municipalities, plus their operative units. Quijano-Poumián and Rodríguez-Aragón (2004) believe amending existing laws, as was done with the LGEEPA in July 2007, and promulgating new ones such as the LGPAS, which aims to regulate fisheries and aquaculture from an integrated perspective, would represent a considerable advance in natural resources administration. However, they point out that it is crucial to make all the components of the Mexican legal framework fully compatible and integrated. Several experts have suggested establishing a General Coastal Law on the basis of existing legislation and it might be a step in the right direction (Rivera-Arriaga and Azuz-Adeath, 2004, Saavedra-Vázquez, 2004, Vidal, 2005). Nevertheless, to achieve integration, it is necessary to promote cooperation across and within the three levels of government, as pointed out by Saavedra-Vázquez (2004).

Vidal (2005) refers to another important issue. Despite there being an extensive body of laws, regulations and NOMs, the efficiency of this legal framework has never been analyzed or evaluated. The legal instruments lack mechanisms to evaluate their efficiency–whether they are having the desired impact on natural systems, whether the outcome of regulations is what was envisaged and whether real progress is being made in terms of the sustainable use of ecosystems.

IS THERE INTEGRATED COASTAL MANAGEMENT IN MEXICO?

According to several authorities, Mexico's attempts to integrate environmental management have not succeeded because implementation continues to be in the hands of several independent government agencies (Bezaury-Creel, 2004, 2005, Quijano-Poumián and Rodríguez-Aragón, 2004, Saavedra-Vázquez, 2004, Vidal, 2005). Even though the necessity of adopting integrated coastal management[5] (ICM) practices has been widely discussed in academic circles over the last two decades, no explicit ICM strategy has been formulated because it has not been regarded as a high priority by administrations at the federal, State and municipal levels. The first serious attempt to discuss an ICM policy by the government was during the 1994–2000 presidential administration, within the Secretaría de Medio Ambiente, Recursos Naturales y Pesca (SEMARNAP) (Bezaury-Creel 2004, 2005). However, nothing effective came of it because coordinating SEMARNAP's fragmented intra-agency departmental responsibilities related to coastal and ocean management was per se an intimidating task.

Vidal (2005) observes there are two critical types of limitations affecting planning for sustainable development of Mexico's coastal zone: knowledge limitations (regarding biophysical, socioeconomic and cultural aspects) and management limitations (regarding administrative aspects). León-Corral et al (2004) point to the existence of legal gaps on certain subjects, the juridical weaknesses of State governments, the lack of transparency in institutional performances and inadequate participatory mechanisms as the main factors that inhibit effective coastal management. Rivera-Arriaga and Azuz-Adeath (2004) make some key recommendations to improve coastal management:

- establish a national policy and create an integrated instrument (juridical and administrative) that will be effective in the long term;
- develop mechanisms that promote intra (among the same sector) and intersectoral integration (between all the involved sectors), conflict resolution and strategic planning, including fund-raising strategies; and
- promote the creation of an environmental database which will help plan development strategies and contribute to solving coastal issues, encourage multidisciplinary studies, impart environmental education and get the public to participate.

Nevertheless, there are only two environment policy tools being used now: ecological zoning programmes[6] and MPAs. The development of these tools might establish the baseline for a future ICM policy in Mexico (Bezaury-Creel, 2004, 2005).

SECTION II

COASTAL AND MARINE PROTECTED AREAS

BRIEF HISTORY OF PROTECTED AREAS IN MEXICO

The LGEEPA defines protected areas as 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). According to it, the establishment of protected areas aims to:

- preserve representative and fragile ecosystems, to guarantee ecological equilibrium and the continuity of ecological and evolutionary processes;
- safeguard wildlife genetic diversity and ensure the preservation and sustainable use of national biodiversity, particularly with regard to endangered, threatened, endemic and rare species, and all those under special protection;
- guarantee the sustainable use of ecosystems, including their elements;
- encourage scientific research and the study of ecosystem dynamics;
- generate, recover and divulge knowledge, practices and technologies, both traditional and modern, which might allow for the preservation and sustainable use of national biodiversity;
- protect villages, basic and industrial infrastructures, agricultural lands and the hydrological cycle of drainage basins; and
- protect the natural surroundings of monuments, archaeological, historical and artistic remains as well as tourist areas and other places important for recreation and culture and to the identity of indigenous people (DOF 05/07/2007).

It is interesting to note that this list makes no reference to improving the livelihood of local communities through such aims as poverty alleviation.

Protected areas began to be established in Mexico in 1876, under the presidential administration of Sebastián Lerdo de Tejada, with the Desierto de los Leones becoming a National Park in 1917 because of the importance of its groundwater bodies (Bezaury-Creel, 2004, SEMARNAP, 2000). MPAs emerged later as a conservation tool and it was not until 1922 that the first Mexican protected area to have a marine component was created. It included the territorial waters surrounding Isla Guadalupe (an island in the Pacific Ocean) and was meant for

"the protection and development of its natural riches". It was re-established in 1928 as a Hunting and Fishing Reserve under the 1925 Fisheries Law, essentially to protect the declining populations of Northern Elephant Seal (Mirounga angustirostris) and Guadalupe Fur Seal (Arctocephalus townsedi) (Bezaury-Creel, 2004, 2005).

The first coastal national park was Lagunas de Chacahua in 1937, created under the Forestry Law by the Forestry, Hunting and Fishing Department[7], to protect an important estuarine area on the Pacific coast of Oaxaca. It was only in 1973 that an exclusive MPA was established, the Costa Occidental de Isla Mujeres, Punta Cancún y Nizuc National Park in the Caribbean Sea to protect coral reefs, based on the 1972 Fisheries Fostering Law (Bezaury-Creel, 2004, 2005).

To better understand the progress in establishing protected areas, including MPAs, through time it is important to correlate the process with the sequence of presidential administrations (currently of six years) because federal decisions made through agencies with jurisdiction over fisheries, wildlife, forestry and the environment have exerted a determining influence on the rate and the course of creating and enhancing such areas in Mexico (Bezaury-Creel, 2004, 2005, SEMARNAP, 2000).

In this context, it is relevant to point out that after decades of being administered at a departmental level, with all its limitations, environmental issues were raised to an under-ministerial level during the presidential period of 1982–1988. This created a Secretary of Urban Development and Ecology (SEDUE), which contributed to the unification of protected areas management in Mexico (Bezaury-Creel, 2004, 2005, SEMARNAP, 2000). Another important event was the promulgation, in 1988, of the LGEEPA, which became the main legal basis for the creation of new protected areas, complemented by forestry and fisheries laws whenever necessary (DOF 05/07/2007). During the 1994–2000 presidential period, integrating renewable natural resources management became the focus with the creation of the SEMARNAP, which incorporated jurisdiction over wildlife, fisheries, water, pollution and the 20-m federal zone along the coast (Bezaury-Creel, 2004, 2005). Protected area management got a boost and its operational status improved significantly with the creation, in June 2000, of the CONANP, a decentralized consulting agency meant to support the SEMARNAP in the formulation, implementation, monitoring and evaluation of government policy on the establishment, management and enforcement of federal protected areas (DOF 05/07/2007). During the presidential administration of 2000–2006, fisheries was again separated from the SEMARNAT and placed under the SAGARPA, a

move which, Bezaury-Creel (2004, 2005) says, had adverse repercussions on MPA management and the establishment of new ones.

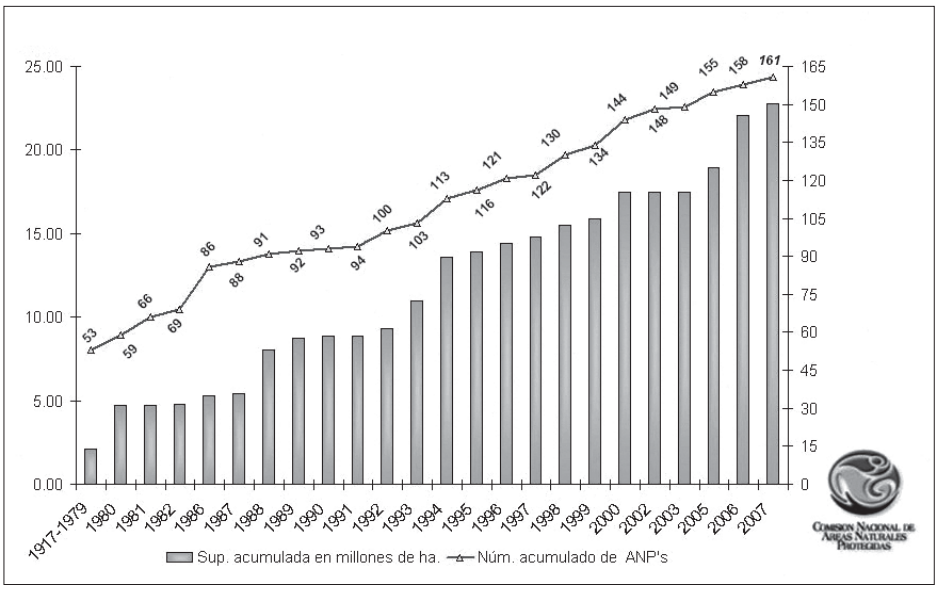
By 2007, the number of protected areas in Mexico had grown to 161, covering 22,712,285 ha (see Figure 1 and Figure 2). Of the total area covered by federal protected areas, 18,210,140 ha (80 per cent) was terrestrial, representing 9.5 per cent of Mexico's terrestrial territory[8], and 4,502,145 ha (20 per cent) was marine, representing 21.5 per cent of Mexico's territorial sea[9], 11.5 per cent of its continental shelf[10] and 1.5 per cent of its exclusive economic zone (EEZ)[11] (see Table 1).

Table 1: Coverage of MPAs in Mexico

PAs with a legal decree	No.	%	Area (a) (ha)	Terrestrial or coastal area (ha)	% (of a)	Marine area (ha)	% (of a)
Total Federal PAs*	161	100	22,712,285	18,210,140	80	4,502,145	20
Total State PAs**	—	—	3,041,800	2,785,534	92	256,265	8.5
Total Federal & State PAs	—	—	25,754,085	20,995,673	81.5	4,758,410	18.5
Total Federal MPAs*	61	38	13,336,390	8,834,242	66	4,502,145	34
Total State MPAs**	15	—	512,275	256,007	50	256,270	50
Total Federal & State MPAs	76	—	13,848,660	9,090,249	65.5	4,758,410	34.5

* *Source:* CONANP, 2007a
** *Source:* Bezaury-Creel, 2004

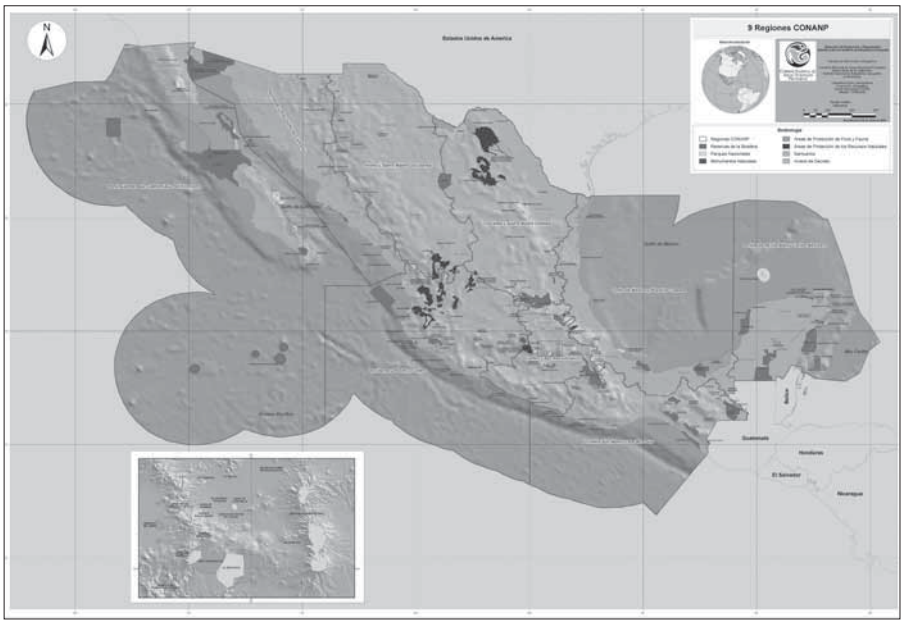
Figure 1: PAs in Mexico: Number and Area, 1917-2007



Source: CONANP 2007b

In March 2007, Mexico had 61 MPAs with valid establishment decrees, occupying 13,336,390 ha (4,502,145 ha marine and 8,834,245 ha coastal) or 58.5 per cent of its total federal protected area (see Table 1). However, according to the available data, in May 2005, only 22 (or 37.5 per cent) of 59 MPAs, covering an area of 7,402,050 ha (or 57.5 per cent of the total marine and coastal area under protection) had an official management plan and administrative rules defined within them (INEGI, 2005). Though the country is working towards the decentralization of environmental management, until 2004, only three of its 17 coastal States had established protected areas (Baja California Sur, Sonora, Veracruz) and only four (Campeche, Chiapas, Quintana Roo and Yucatan) had established MPAs (Bezaury-Creel, 2004, 2005), producing a total of 15 MPAs being run by State governments, occupying 512,275 ha (see Table 1). At the municipal level, only two municipal governments, La Paz in Baja California Sur and Tampico in Tamaulipas, had established protected areas in coastal ecosystems. As for private land protection efforts, only four small private protected areas had been established until 2004 to protect coastal lands (Bezaury-Creel, 2004, 2005).

Figure 2: Geographical Distribution of Mexico's PAs



Source: CONANP 2007b

DESIGN AND IMPLEMENTATION

According to the LGEEPA (DOF 05/07/2007), the establishment of a protected area in Mexico has to take into account an area's biological features, the social conditions of local communities and traditional land uses. The proposal must be based on preliminary studies carried out by the SEMARNAT, by itself or in collaboration with other institutions (universities, research centres). Preliminary studies must include:

- general information about the area;
- a description of its ecosystems and their relevance at the national and regional levels;
- the reasons that justify a protected status to the area;
- the area's historical and cultural characteristics;
- the area's socioeconomic status;
- a description of traditional and potential land uses and the property rights regimes involved; and
- a management plan proposal that includes information on zoning, administration, operation and financing.

When concluded, these studies should be made available to the public for a 30-day consultation period. Further, the SEMARNAT has to solicit the opinion of State and local governments, government agencies with jurisdiction over the area, public and private social organizations, the indigenous people, universities, research centres and other institutions interested in the establishment, administration and monitoring of protected areas (DOF 05/07/2007). The results of the public consultation and the opinions should be considered by the SEMARNAT before it proposes to establish a protected area (DOF 30/11/2000).

The LGEEPA (DOF 05/07/2007) specifies that the establishment decree of a protected area must contain information on the precise geographic location and limits of the area and corresponding zones and subzones, its protection status, the description of the activities that can and cannot take place in it, the public benefits that justify land expropriation, if that is the case, management plan and guidelines for its administration, operation, financing and enforcement.

The key informant survey makes it possible to point out the main benefits, problems and conflicts of interest that characterize the establishment of MPAs in Mexico. This exercise revealed that MPAs do have the potential to provide several environmental and social services, protect biodiversity, regulate and promote the sustainable use of coastal and marine resources (like reducing fishing pressure on fish resources) and enable the participation and the empowerment of local resource users. But this potential is not being made optimum use of, mainly due to the lack of financial resources, personnel and infrastructure, factors that are aggravated by the weak inter and intra institutional and/or government coordination, which are conducive to only managing a very limited protected area.

Other important factors affecting the performance of protected areas are the absence of management plans, which even when available are often outdated; the debilities that characterize enforcement mechanisms, which are not able to end illicit activities in protected areas; the lack of involvement of local stakeholders, often leading to conflicts regarding resource use; and the influence of strong political and socioeconomic interests that go against conservation interests. For instance, MPAs are subject to enormous pressures from multinational corporations connected to the tourism industry, which demand the massive development of all kinds of infrastructure in coastal areas.

A conflict of interests is most commonly seen between conservationists and local resource users who lack both involvement and alternative livelihood options. In addition, tourism, oil and fishing have strong economic interests that do not

always coincide with conservation aims. The same obtains in the clash between urban development policies and conservation strategies. And as one key informant mentioned, sometimes conflicts of interest occur because the agendas of international donors do not correspond to national or local conservation needs.

According to Mesta and Martínez (2004), the social actors that generally take part in the complex conflicts over coastal and marine resources management in Mexico include the authorities at the three levels of government (federal, State and municipal), landowners, resource users, permit owners, NGOs, research institutes and international agencies. Despite the diversity of issues involved, they say the origin of conflicts in the coastal zone is motivated by:

- the lack of an integrated coastal management policy, which eventually leads to contradictory programmes;
- the poor development of the legal framework in terms of planning, managing and administering protected areas and in terms of promoting the sustainable development of coastal and marine ecosystems;
- the lack of patrolling and other enforcement mechanisms, mainly due to lack of financial and material resources; and
- the lack of baseline information to monitor the socioeconomic and environmental impacts of resource use and due to tensions between scientific and traditional knowledge.

PROPERTY RIGHTS IN PROTECTED AREAS

As specified by the LGEEPA, the establishment of protected areas in Mexico does not affect property rights within their boundaries. Protected areas may encompass lands under any type of property rights over resources but land use is restricted and landowners must submit to the new land use regimes specified in the protected area establishment decree, management plan and by the local ecological zoning programme. However, responsible authorities shall provide those landowners with fiscal benefits and economic compensation (DOF 05/07/2007). This procedure has as its legal basis in the Article 27 of the Mexican Constitution, which states that originally all land and water bodies belong to the nation, which has the right to create private and communal property but also impose land use restrictions for public benefit.

MANAGEMENT INSTRUMENTS AND CATEGORIES

Though Mexico had been establishing protected areas for almost a century, the majority of these did not have a management plan, staff or funding until 1994,

according to the SEMARNAP (2000). All they had were establishment decrees protecting their "virtual" existence. The responsibility over federal protected areas was delegated by the SEMARNAT in June 2000 to the CONANP, a decentralized agency.

Along with the establishment decree, the main regulatory and planning instrument held by a protected area is its management plan. Theoretically, according to the LGEEPA, the SEMARNAT has one year after the promulgation of the establishment decree, to formulate the management plan for any protected area, giving its inhabitants, landowners, other government agencies, State and municipal governments and social organizations the opportunity to participate (DOF 05/07/2007). The management plan should contain:

- a description of the physical, biological, social and cultural characteristics of the protected area;
- property rights regimes within the protected area;
- the short, medium and long-term activities that have to be carried out such as research, environmental education, protection, sustainable use, recreation, building of infrastructure, fund raising and enforcement;
- a description of the protected area's administrative structure, participatory mechanisms and specific aims; and
- refer to all the applicable NOMs and all its administrative rules, which includes a description of all the activities permitted in every zone and subzone (DOF 05/07/2007).

The management plan should be revised at least every five years, after evaluating its efficiency and proposing possible modifications (DOF 05/07/2007).

After having an official management plan, the administration of a protected area may be delegated by the SEMARNAT to the State or the municipal government, to *ejidos*[12], communities, indigenous people and social organizations through the ratification of specific partnership agreements (DOF 05/07/2007). The federation, the States or the municipalities may assign specific authorizations for the use or exploitation of natural resources in protected areas, according to the law and to the establishment decree and management plan, to entities such as landowners, social organizations (public or private) and indigenous people (DOF 05/07/2007).

According to Arrellano et al, though the management plan is the main regulatory instrument held by a protected area, it has little judicial weight because its content is often conditioned by the existing legal and regulatory framework to do with

territorial administration, land use and the use of natural resources. This means it cannot go against pre-established norms or regulations and therefore hardly works as an ad hoc instrument designed to include the necessary management measures required by each protected area.

The LGEEPA defines six federal protected area management categories and only four of these—sanctuary, biosphere reserve, national park and flora and fauna protection area—were in use in January 2007 (see Table 2) (DOF 05/07/2007, INEGI, 2007). Zoning is possible within each management category and has to be done according to the area's biological, physical and socioeconomic features (DOF 05/07/2007). As of March 2007, Mexico had 19 biosphere reserves, occupying 8,123,770 ha (or 60 per cent of the total area), eight flora and fauna protection areas, occupying 4,420,390 (or 35 per cent), 17 national parks over 791,535 ha (or 5 per cent), and 17 sanctuaries in a mere 689 ha.

Besides the federal categories, the LGEEPA mentions two other possible categories of protected area: (1) State reserves (or parks), as well as other possible categories that any State government might decide to establish according to its laws; and (2) ecological preservation areas to be established by municipal governments, once again, according to their specific laws (DOF 05/07/2007). In addition, indigenous people, social, public and private organizations and whoever is interested might promote the establishment of protected areas within their own lands before the SEMARNAT, becoming managers of the newly decreed protected areas along with the Secretariat (DOF 05/07/2007).

According to the criteria used by the IUCN, MPAs in Mexico correspond only to three categories:

- Category Ia – Strict Nature Reserve, whose primary management objective is scientific research, corresponding to the core zones 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 the buffer zones of biosphere reserves and Flora and Fauna Protection Areas (FFPAs), currently the most representative IUCN category of MPA in the country.

This indicates that MPAs promoting the sustainable use of natural resources prevail over no-take areas in Mexico. According to Bezaury-Creel (2005), no-take areas should only be established when the capacity to enforce and monitor these areas exists.

Table 2: LGEEPA Management Categories for PAs

National category		Compatible activities	IUCN Category
Sanctuary		Compatible research, recreation and environmental education.	Ia
Biosphere Reserve	Core zone	Preservation of ecosystems and their elements, research, environmental education.	Ia
	Buffer zone	Productive activities carried out by the local communities or with their participation.	VI
National Park		Natural resources protection, wildlife enhancement, preservation of ecosystems and their elements, research, recreation, tourism and environmental education. Additionally, natural resources use in marine zones.	II
Flora and Fauna Protection Area		Preservation, repopulation, propagation, acclimatization, refuge, research, sustainable use of species of flora and fauna, education and dissemination. Natural resource use by local communities when there are available studies proving its feasibility.	VI

Source: Adapted from Bezaury-Creel, 2005

In 2007, several Mexican protected areas, including MPAs, benefited from international recognition by the United Nations Educational, Scientific, and Cultural Organization (UNESCO). Five areas, including three MPAs, were classified as World Heritage Sites by UNESCO; 35 biosphere reserves (15 coastal and

marine) were internationally recognized within the framework of UNESCO's Man and Biosphere (MAB) Programme, making Mexico the country with the fourth largest number of biosphere reserves within the UNESCO-MAB framework; and 67 wetlands were classified as Ramsar sites (5,317,855 ha), including 45 coastal wetlands, making Mexico the country with the second largest number of Ramsar sites in the world.

FINANCING AND STAFFING PROTECTED AREAS

Since the CONANP was established in 2000, the number of federal protected areas has increased 11.5 per cent (144 in 2000 to 161 in 2007), the personnel assigned to them (both in central offices and on site) has increased 29.5 per cent (445 persons in 2001 to 575 in 2007) and the funds invested in them have gone up an amazing 352 per cent (171 mn pesos in 2001 to 773 mn pesos in 2007) (see Table 3) (CONANP, 2007b, 2007c).

Besides government funds, the CONANP obtains donations and funding from the Global Environmental Facility (GEF), from national and international NGOs and from social organizations. The possibility of charging entrance fees in MPAs, first raised in 2002, and using the money obtained for operational needs still holds great potential. In 2004, 20 MPAs were given authorization by the Fiscal Authority (SHCP) to charge entrance fees and 14 of them (13 marine and one coastal) have implemented systems for collecting and recycling such fees. During 2002, approximately US$1.02 mn was collected from MPAs and in 2003 this increased to US$2.28 mn (Bezaury-Creel, 2005).

The growing availability of funds has helped to increase the number of protected areas with assigned personnel, going from 10 out of 103 (or 9.5 per cent) in 1993 to 70 out of 144 (or 48.5 per cent) in 2000, and finally to 80 out of 158 (or 50.5 per cent) in 2006 (CONANP, 2007c). In 2005, 33 of 59 MPAs were supported with federal funds through 24 administrative bodies, representing 98.5 of the coastal protected area and 56 per cent of the marine protected area (Bezaury-Creel, 2005). Among other things, this economic growth has allowed the CONANP to undertake a regional decentralization process to enhance protected area management capacity, which resulted in the conformation of nine administrative regions in 2007 (see Figure 2).

Table 3: Mexico's PAs: Staffing (1995-2007) and Investment (2001-2007)

Years	Personnel assigned to Mexico's protected areas (at central offices / on site)	Invested Amount (mns of MXN)
1995	136 (136/0)	-
1996	274 (136/138)	-
1998	312 (119/193)	-
2000	392 (119/273)	-
2001	443 (-/-)	170.9
2002	439 (-/-)	240.0
2003	556 (-/-)	307.9
2004	577 (-/-)	367.2
2005	580 (-/-)	424.7
2006	583 (-/-)	587.1
2007	574 (-/-)	773.0

Source: Bezaury-Creel 2004, CONANP, 2007c

ENFORCEMENT

As Bezaury-Creel (2005) points out, environmental law enforcement is still weak in Mexico, especially in coastal and marine areas where access is difficult to control. Depending on the nature of the infraction, the government agencies responsible for law enforcement in protected areas are the Federal Department of Environmental Law Enforcement (PROFEPA), a SEMARNAT department in charge of monitoring compliance with the regulations imposed by protected areas, and the CONAPESCA, a SAGARPA department responsible for managing fish stocks, and thus responsible for all fishery-related infractions. In addition, within MPAs, the SEMAR is supposed to collaborate with the PROFEPA.

The lack of institutional collaboration between the environmental and the fishery sectors is a major handicap to increasing the levels of compliance in protected areas and consequently their effectiveness. The situation is aggravated by the fact that the personnel who work for the CONANP have still not been given the legal mandate to carry out enforcement activities, dramatically reducing the effectiveness of on-site staff, who need to call the PROFEPA's inspectors, who, in turn, may have to bring with them other State or federal authorities.

In the key informant survey, 26 of the 50 respondents (or 52 per cent) believed that the level of compliance in MPAs that have a management plan is low, 18 (36 per cent) rated it medium, and only three (6 per cent) thought it high. According to the key informants, the major weaknesses affecting the effectiveness of law enforcement mechanisms in MPAs are:

- the lack of financial resources, personnel (especially patrollers) and equipment, which restrict the number of patrolling actions;
- the lack of inter (municipal, State, federal) and intra (sectoral) government coordination, a factor that leads to excess bureaucracy when it comes to enforcement;
- the lack of management plans, which means the absence of regulations; and
- the lack of compliance by local users, often because of their poor involvement in management, lack of information about use restrictions and regulations, and/or lack of alternative livelihood options.

The proposed solutions were:

- increasing patrolling efforts by boosting the number of salaried and trained personnel/patrollers, as well as making available more equipment;
- increasing the funds assigned for these purposes and establishing independent fund-raising mechanisms;
- developing strategies to increase inter and intra governmental coordination, especially between the PROFEPA, CONAPESCA and SEMAR;
- promulgating, revising and updating the regulatory and legal framework, including management plans that need to be adapted to evolving circumstances;
- involving local stakeholders more actively in the administration and management of protected areas and in enforcement activities;
- providing alternative livelihood options to those who depend on the resources;
- developing efficient communication networks among the stakeholders to promote consensus building; and
- conducting environmental education campaigns among the stakeholders and the public.

SECTION III

FISHERIES

FISHERIES DEVELOPMENT IN MEXICO

As Hernandéz and Kempton (2003) point out, Mexico has not had a long tradition in fisheries. Before the 1970s, total landings corresponded to less than 200,000 tonnes a year (see Figure 3). It was during the presidential administration of Luis Echeverría Álvarez (1970-1976) that fisheries assumed an importance never seen before, with the government putting forth a policy focused on developing the fishing sector and providing it with guidelines. The aim was to increase total landings to 500,000 tonnes by 1976 (Alcalá, 2003, Hernandéz and Kempton, 2003).

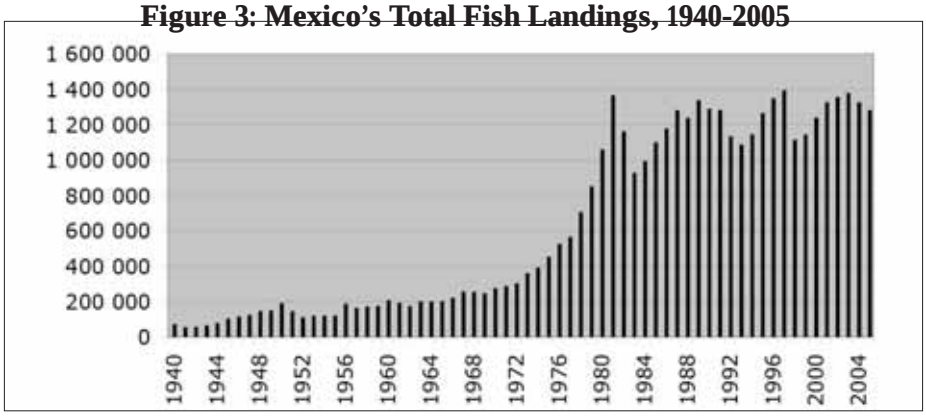
During this period, new laws were promulgated, the Undersecretariat of Fisheries was created, a quasi-government enterprise was established to facilitate the access of fishing products to markets, subsidies were allocated to increase and modernize fishing fleets, and fishing concessions were given to fishing cooperatives and private firms, inducing thousands of unemployed peasants to migrate to coastal areas (Alcalá, 2003, Hernandéz and Kempton, 2003). The fishing sector grew at an annual rate of 12.2 per cent in this period as a result of capture diversification and the number of marine species exploited in 1973 (24) was twice that in 1956. This happened alongside the expansion of both small and large-scale fleets (see Figure 4) (Alcalá, 2003). By 1976, total landings had reached 525,000 tonnes.

During the next presidential term (1976-1982), José López Portillo continued to support the sector, but this time the goal was much more ambitious: to make Mexico one of the world's five largest producers. The Under-secretariat of Fisheries was elevated to the departmental level in 1977 and to the secretariat level in 1980 (Alcalá, 2003, Hernandéz and Kempton, 2003). BANPESCA, a State-directed fisheries development bank created in 1971 to provide easy, low-interest loans to the public, social and private fishing sectors, was strengthened by taking a loan of about US$80 mn from the Inter-American Development Bank to add to the US$120 mn assigned by the Mexican government. This capital was invested in the development of fisheries and port facilities, in aiding small-scale fishermen and in encouraging the capture of the most important commercial products: shrimp, tuna and sardines (Alcalá, 2003).

This policy pushed up landings at an extraordinary annual growth rate of 21 per cent over the next six years (see Figure 3). In 1979, total landings were about

851,000 tonnes, and two years later, in 1981, at the end of the López Portillo term, landings reached a peak of about 1.36 mn of tonnes. Since then, shrimp has been the most important product of the Mexican fishery sector. In 1981 it accounted for 77 per cent of the 3,684 large vessels in operation, whereas sardine accounted for 3 per cent of them and tuna only for 2 per cent (CONAPESCA, 2007). An important move during the Portillo period was the government's decision to give exclusive rights of shrimp and lobster exploitation to fishing cooperatives[13], prompting the growth of hundreds of cooperatives, which received financial assistance. This led to an increase in the catch of shrimp, a product essential for the international market (Alcalá, 2003, Hernandéz and Kempton 2003). In subsequent years, motivated by the easy availability of small-scale fishing permits, the number of fishermen kept growing in tandem with the small-scale fishing fleet but capture quantities did not keep pace (see Figure 3, Figure 4, Figure 5).

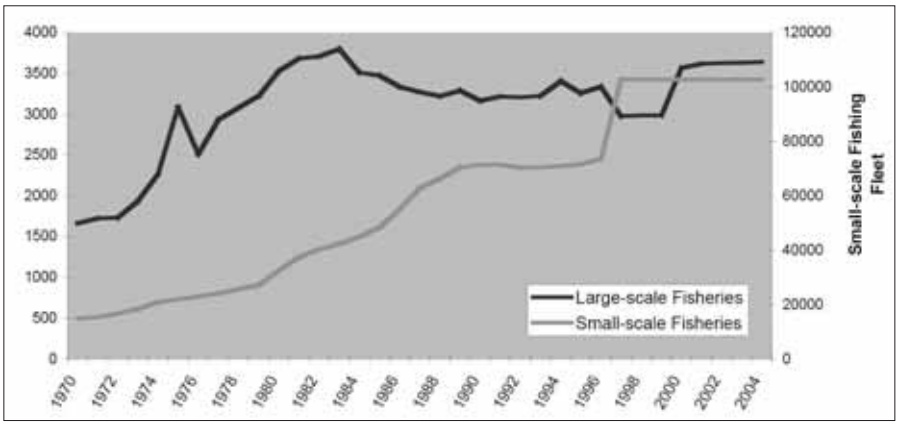
Figure 3: Mexico's Total Fish Landings, 1940-2005



Source: CONAPESCA, 2007

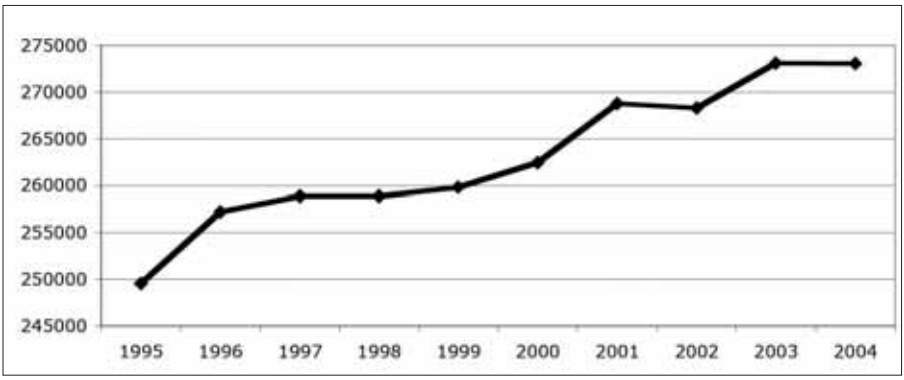
The Carlos Salinas de Gortari government (1988-1994) continued the efforts, initiated by the previous administration, towards promoting the private sector within fisheries. To make the fishery sector economically attractive to private investors, the government invested the few resources it had in the expansion, modernization and industrialization of the large-scale fleet and processing sector (Alcalá, 2003). The exclusive fishing rights for high-value species, such as shrimp and lobsters, which had been given to fishing cooperatives, were abolished to allow the private sector to capture and commercialize such species. Small-scale fisheries that were (and still are) dominated by national fishermen (90 per cent or more) were then considered a low priority sector to receive federal investment, a tendency that has continued down the years (Alcalá, 2003). Also, reflecting the

Figure 4: Mexico's Fishing Fleet, 1970-2004



Source: CONAPESCA, 2007

Figure 5: Number of Fishermen in Mexico, 1995-2004



Source: CONAPESCA, 2007

deep economic crisis that Mexico was going through, the government announced the bankruptcy of BANPESCA (the National Fisheries Bank). This was the result of granting thousands of loans without guarantees, injecting resources into infeasible projects and financing non-existent projects, all without strict supervision and enforcement (Alcalá, 2003, Hernandéz and Kempton, 2003).

In the early 1990s, the federal agency in charge of fisheries revealed clear signs of inefficiency, say Hernandéz and Kempton (2003), as the fishery policy continued to promote economic growth based on increasing landings, ignoring its environmental consequences. Further, the continuous and chaotic growth of the small-scale fleet had severely impaired the efficiency of monitoring and enforcing mechanisms (see Figure 4). So the situation in most of the fisheries was that of open access regimes characterized by low stock levels. The status of most fisheries was difficult to determine because small-scale fisheries had not been addressed; there were a number of fishermen beyond the optimal; there were no incentives to conserve resources; and capital's capacity had exceeded that of resources.

In 2004, total landings reached 1,325,135 tonnes, worth US$1,182,440 mn[14] (see Figure 3), while the total number of registered fishing vessels was 106,449: 97 per cent (or 102,807) belonging to the small-scale sector[15] and only 3 per cent (or 3,642) belonging to the large-scale fishing[16] fleet (see Figure 4). In the same year, there were 273,040 registered fishermen in the country, of which the majority were certainly small-scale fishers though the only official record available is that of the number of fishing cooperatives. Forty-nine per cent (or 1,572) of these were purely small-scale fishing cooperatives and only 14 per cent (or 442) were large-scale fishing cooperatives (CONAPESCA, 2007). However, in the small-scale fishing sector, there were also a great number of independent fishermen and private fish traders, who frequently established labour relationships among themselves (Flores and Ramos, 2004). This clearly indicates that despite being considered a subsistence occupation, small-scale fisheries generate a large number of direct and indirect jobs and support an economic activity that has great social and economic importance.

Lately, Mexico, one of the world's 20 leading fish producers, has been producing about 1.3 mn tonnes of fish a year (see Figure 3) or catching about 1 to 1.5 per cent of the world's capture fisheries production (Rivera-Arriaga and Azuz-Adeath, 2004). It can be considered a fish exporting country because the balance of trade for fishery products has been positive during the last two decades, reaching US$235 mn in 2004 (the last year for which data is available) (CONAPESCA, 2007). But the current status of Mexican fisheries is alarming. Since 2004, 67 per cent of Mexico's fisheries have been fully exploited, 23 per cent are overexploited or depleted, and only about 10 per cent offer the potential for expansion (see Table 4). A great management effort exploring innovative and more participatory management strategies based on a holistic view of the ecosystem will be critical to stop the devastation of fishery resources in Mexico and to avoid its unpredictable ecological, social and economic consequences. It is time to act or it will be too late.

Table 4: Status of Exploitation of Mexico's Fisheries, 2000-2004

Status	Fisheries			
	2000		2004	
	No.	%	No.	%
Offering potential for expansion	12	18.5	7	9.6
Fully exploited	37	56.9	49	67.1
Overexploited or depleted	16	24.6	17	23.3
Total	64	100.0	73	100.0

Source: SEMARNAT, 2005

FISHERIES MANAGEMENT TOOLS

As Alcalá (2003) points out, Mexican fisheries policy has always been a top-down affair based on centralized government institutions. This explains why until 2007, before the promulgation of the new LGPAS, the main tools used to manage fishery resources in Mexico were granting fishing concessions, permits and authorizations, as enunciated in the former Fisheries Law (DOF 25/06/1992). However, as Bezaury-Creel (2004) says, these instruments did not generally specify a geographical location for the fishing concession or the areas allocated were too extensive (like Gulf of Mexico or the Caribbean), allowing fishermen to overexploit certain areas and than move to unexploited ones instead of encouraging them to adopt sustainable practices. This was aggravated by the fact that there were a large number of fishing permits and authorizations, much more than optimal, clearly revealing that these instruments were incapable of promoting ecological and economic sustainability in the fisheries. The LGPAS, which besides assigning fishing concessions and permits, implements fisheries zoning programmes and fisheries management plans, has come as good news to those looking for better management tools (DOF 24/07/2007).

The LGPAS sees fisheries zoning programmes as a set of instruments to regulate and administer fishing activities so that there is a sustainable use of marine and inland fishery resources. They are to be designed on the basis of scientific data on the status of fishery resources and have to dovetail with ecological zoning programmes. They must specify the geographical limits of the area they cover and have an exhaustive and updated list of all the stakeholders within the area, a description of the fishery resources that are being exploited and official fisheries management plans. The authorities are to support the establishment of control

mechanisms based on traditional management systems, where possible, and promote the creation of community groups to co-administer fishery resources and to help to enforce compliance (DOF 24/07/2007).

Fisheries management plans are directed towards the sustainable development of fishing activities, based on updated biological, ecological, economic, cultural and social data. Among other things, they must include the management objectives defined by the national and by the State fishing councils, the geographical location of the areas where fishing activities will take place, the biological description of exploited species, information about the permissible fishing methods, the duration of the fishing season, socioeconomic indicators of the fishing population, and finally, the description of the area's administrative structure and public participatory mechanisms (DOF 24/07/2007).

MPAs AS A FISHERIES MANAGEMENT TOOL

The separation of fisheries management from the government agency in charge of environment and natural resources management, the SEMARNAT, to include it under the SAGARPA has seriously debilitated management capacity and control over an activity that affects biodiversity conservation within protected areas (Bezaury-Creel, 2004, 2005). The lack of collaboration and coordination among environmental and fisheries authorities (SEMARNAT-CONANP and SAGARPA-CONAPESCA) represents a major hurdle, one that has been responsible for a decline in fisheries, for disturbing the equilibrium of marine communities and for the lack of adequate enforcement within MPAs.

In general terms, the opinion expressed by key informants supports these observations. The main arguments enumerated by them are listed in Table 5. According to them, collaboration between the two sectors occurs mostly at the local level but even then only depending on the predisposition of the local authorities on both sides to do so. As a result, cases of overexploitation of fishery resources or fishing activities threatening endangered species in MPAs are common, and the institutional response is inadequate. To make things worse, conflicts between fishermen and MPA authorities are frequent because the fishers do not comply with MPA regulations that often go against their interests.

Table 5: Issues of Co-ordination in Management (The number of respondents referring to a particular area is given in brackets.)

Co-ordination between fisheries and protected areas management
• At the institutional level, the coordination is very poor or non-existent, and when there is some sort of collaboration, it is at the local level (e.g. through advisory councils) (16)
• Fishermen have frequent conflicts with MPA authorities because of not complying with regulations that often go against their interests (3)
• Conflicts will tend to increase with the future implementation of fisheries zoning programmes and management plans, as stipulated by the law, which should be carried out in coordination with MPA management plans. (LGPAS) (2)
• To some extent, the fisheries sector sees MPAs as prejudicial since they impose limitations on fishing activities; they are not seen as a fisheries management tool (2)
• There are several cases of overexploitation of fishery resources or fishing activities threatening endangered species in MPAs and the institutional response to solve these situations is minimal (2)
• There are few fisheries regulations in MPAs, and the majority apply within core zones or no-take zones, which are really hard to implement because of the strong pressure exerted by resource users (1)

However, some key informants believe that with the future implementation of fisheries zoning programmes and management plans, which take the management plans of MPAs into account and allow for the establishment of co-management agreements between the government and local community groups, the coordination between fisheries and MPA managements will improve. Nevertheless, it will take time to implement and operationalize these new instruments. Meanwhile, as pointed out by Bezaury-Creel (2004, 2005), MPAs provide ideal experimentation grounds to develop inter and intra governmental coordination and to experiment with co-management approaches because they have a specific geographic scope and a defined set of conservation objectives. Additionally, MPAs can, and should, be used to protect critical spawning aggregations and nursery areas for the adults and juveniles of commercially important marine species. However, to efficiently

implement such areas, it is crucial to have scientific studies that demonstrate the effects of these areas on adjacent fishing grounds.

Currently, fishing activities carried out in MPAs are regulated by their management plans, through zoning, with all their limitations. The LGEEPA Regulation that guides the use of protected areas says the fisheries bycatch within MPAs should not exceed the volume of the target species, that there should be no incidental capture of a threatened species and that no fishing method that might damage the sea floor should be used (DOF 30/11/2000). These are all vital but still poorly enforced provisions, as pointed out by Bezaury-Creel (2005).

It is also important to mention that in the National Fisheries Chart (Carta Nacional Pesquera), an official document that contains a summary of all the relevant information for the diagnosis and evaluation of fishing activities, including availability and conservation indicators for the main fishery resources, there is a chapter dedicated to MPAs. This chapter contains the fishing specifications contained in the establishment decree, or in the management plan (when available) of every MPA in Mexico, plus a few management and research recommendations.

SECTION IV

ENVIRONMENTAL DECENTRALIZATION

DECENTRALIZATION AND PARTICIPATORY METHODS

As Robles et al observe, "decentralization" is a delicate subject that requires coherent implementation strategies, which include an analysis of local capacities and the potential repercussions each decentralized aspect could have on national integrity (for instance, in terms of environmental sustainability). Only this will strengthen the democratic system, promote the equitable distribution of available resources, reinforce local authority and lay the foundation to enable the participation of local stakeholders in decisionmaking.

Following contemporary global trends towards stakeholder participation in natural resources management, MPAs in Mexico now have the possibility of integrating stakeholder participation in their design and management. The revised version (1996) of the LGEEPA states that the federal government will promote responsible participation of society in planning, executing, evaluating and supervising compliance with the environment and natural resources policy (DOF 05/07/2007). To accomplish this, the SEMARNAT envisages entering into partnership arrangements with several types of organizations, indigenous people and community groups for establishing, administering, and managing protected areas; and forming advisory councils to make recommendations and support the directors of protected areas in their functions (DOF 05/07/2007).

The role of an advisory council includes:

- proposing and promoting specific actions to enhance an MPAs management capacity;
- participating in the elaboration and evaluation of its management plan;
- proposing actions to be included in its annual operative programme;
- promoting public participation in conservation and restoration actions;
- expressing its opinion on the implementation of any project in the protected area;
- proposing specific actions to achieve management objectives;
- collaborating with the director to solve any kind of problem or ecological emergency;

- collaborating in the search for financial sources to enable the development of conservation projects;
- suggesting the establishment of efficient financial resource management mechanisms; and
- participating in the elaboration of diagnosis or research projects (DOF 30/11/2000).

Each advisory council can have a maximum of 21 members, including the State governor (the honorary president of the council), the director of the protected area, the corresponding municipal mayor(s), and representatives of academic and research institutes, social organizations, landowners and communities. It must have its own internal regulations, and an annual schedule of ordinary meetings, and it must meet at least once a year. It may invite other governmental entities to its meetings if need be.

In 2002, 29 of 55 federal MPAs had 25 advisory councils (Bezaury-Creel 2005). However, from the above description, a few key questions emerge: How representative are these advisory councils in reality? Do they employ participatory methods that promote the equitable participation of all members? Do they have consensus-building and/or conflict-resolution mechanisms? Do they actually meet enough to produce desirable and consistent outcomes? What is their real contributions towards decisionmaking?

Even if the environmental sector now has a normative framework that enables putting consultation mechanisms in place and encouraging social participation in decisionmaking, it is necessary to recognize that there are major issues constraining the development of such consultative actions into co-responsible decision-making mechanisms that truly influence policy-making (SEMARNAT, 2007b). According to Robles et al, it is impossible to achieve efficient decentralization when there is a lack of technical and juridical capacities, infrastructure and the political will to ensure that the mandate given to local governments will be efficiently and effectively exercised.

On the other hand, as Bezaury-Creel (2005) points out, the concept of stakeholder participation is still quite new in the Mexican context and there are important forces supporting sectoral and top-down decision-making processes. A great deal of stakeholder capacity-building needs to take place to achieve positive and long-lasting results. Besides, a greater effort has to be directed towards institutional decentralization to strengthen the roles played by the State and municipal governments (León-Corral et al, 2004, Robles et al).

COMMUNITY INVOLVEMENT

Building up or strengthening local institutions involves motivating local stakeholders to participate in the identification, planning, implementation, monitoring and evaluation of any environmental management programme, emphasise Robles et al. Without social participation, environmental management strategies focusing on the sustainable management of natural resources are pointless.

Table 6: MPAs Resulting from Local Initiatives

Management Category	Name	State
Flora and Fauna Protection Area	Yum Balam (1)	Quintana Roo
National Park	Arrecifes de Xcalak (5)	Quintana Roo
National Park	Arrecifes de Puerto Morelos (3)	Quintana Roo
National Park	Punta Occidental Isla Mujeres, Punta Cancun y Punta Nizuc (1)	Quintana Roo
National Park	Cabo Pulmo (3)	Baja California Sur
National Park	Bahía de Loreto (2)	Baja California Sur
Biosphere Reserve	Bahía de los Angeles, Canales de Ballenas y Salsipuedes (6)	Baja California
Biosphere Reserve	Isla San Pedro Mártir (1)	Sonora
Biosphere Reserve	Chamela-Cuixmala (1)	Jalisco
State Reserve	Actam Chuleb: marine portion of the Dzilam State Reserve (2)	Yucatan
Sanctuary (marine turtles)	Playa de Maruata y Colola (1)	Michoacan
Sanctuary (marine turtles)	Santa Gertrudis Miramar (1)	Oaxaca

To learn more about bottom-up efforts in the establishment of MPAs, key informants were asked if they knew about any such initiative taken by local communities. Of the 50 respondents, 22 (or 44 per cent) gave an affirmative answer, while 26 (or 52 per cent) confessed that they did not know any protected area set up in Mexico under such circumstances. In total, 12 protected areas were mentioned as fitting the required criteria. Four of them are located in the Caribbean Sea (Quintana Roo State); four in the Gulf of California (two in the

State of Baja Califonia Sur, one in Baja California and one in Sonora); three in the Pacific Ocean (in the States of Jalisco, Michoacan and Oaxaca); and one in the Gulf of Mexico (Yucatan) (see Table 6).

The key informants were also invited to share their opinion on the effectiveness of community-based management regimes. Of the 50 respondents, 40 (or 80 per cent) believed that MPAs might work effectively if locally managed while only seven (or 14 per cent) disagreed. To justify their agreement, the key informants pointed out that local communities are generally the most interested in natural resources conservation because their livelihoods depend on these resources. Their sense of ownership, associated with their ecological knowledge of the environment, might lead to more adequate natural resources management proposals and increase local compliance with the regulations, making them easier to enforce.

Nevertheless, the key informants said it was very important to have financial and operative resources, capacity-building action and support and recognition at all the three levels of government if community-based management regimes were to work. On the other hand, a few key informants said it was not possible to speak in absolute terms about the effectiveness of community-based management regimes because much depended on the local context. "In some particular cases it might work, but in others it won't, even if local users are the ones who know natural resources better and how they function. In many situations there are particular power and/or political relations, machismo, etc., deep rooted inside certain communities, limiting the development of equity and social justice processes," said one male respondent.

There were also a few key informants who said the majority of local communities lacked the administrative, technical, juridical and political capacities to take on management functions, and that in many situations the intervention of the federal government was essential to resist the powerful economic pressures on coastal and marine resources and ensure impartiality. They suggested that implementing co-management agreements between local institutions and the three levels of government would be a better strategy to start with.

THE ROLE OF TRADITIONAL KNOWLEDGE

Berkes et al (2001) define "local ecological knowledge" as a cumulative and dynamic body of practical knowledge about the relationship of living beings with one another and with their environment, building on experience and adapting to changes by adaptive processes. The valorization of this traditional knowledge held by resource users is an essential precondition to developing sustainable natural resource management regimes.

Table 7: MPAs Influenced by Traditional Knowledge Systems (The number of respondents referring to a particular area is given in brackets.)

Management Category	Name	State
Biosphere Reserve	Sian Ka'an (6)	Quintana Roo
Biosphere Reserve	El Vizcaíno (4)	Baja California Sur
Biosphere Reserve	Banco Chinchorro (3)	Quintana Roo
Biosphere Reserve	Isla San Pedro Mártir (3)	Sonora
Biosphere Reserve	Bahía de los Angeles, Canales de Ballenas y Salsipuedes (1)	Baja California
National Park	Cabo Pulmo (3)	Baja California Sur
National Park	Bahía de Loreto (3)	Baja California Sur
National Park	Arrecifes de Puerto Morelos (3)	Quintana Roo
National Park	Archipiélago Espírito Santo (2)	Baja California Sur
National Park	Arrecifes de Xcalak (2)	Quintana Roo
National Park	Arrecifes de Cozumel (1)	Quintana Roo
National Park	Punta Occidental Isla Mujeres, Punta Cancun y Punta Nizuc (1)	Quintana Roo
Flora and Fauna Protection Area	Islas del Golfo de California (6)	Baja California, Baja California Sur; Sonora, Sinaloa
Flora and Fauna Protection Area	Yum Balam (2)	Quintana Roo
State Reserve	Actam Chuleb: marine portion of the Dzilam State Reserve (1)	Yucatan
Ecological Conservation Zone	Sanctuario Manatim Bahia Chetumal (1)	Quintana Roo
Ecological Conservation Zone	Santa Gertrudis Miramar (1)	Oaxaca

The key informants were asked if they knew of any MPA in Mexico where traditional knowledge played a crucial role in management. Of 50 respondents, 29 (or 58 per cent) gave an affirmative answer while 16 (or 32 per cent) said that they did not know of any. In total, 17 protected areas were mentioned as fitting the required criteria[17] (see Table 7).

All the key informants considered it important to combine scientific and traditional knowledge to improve the management of MPAs in Mexico, all 50 responding affirmatively to the question: "In your opinion, is it relevant for the management of Mexican MPAs to combine, in an effective way, scientific knowledge with traditional knowledge?" According to them, the main benefits of combining scientific knowledge with traditional knowledge have to do with their complementary nature.

Together, they generate a more accurate picture that values not only the theoretical but also the empirical. In the opinion of many, only by combining these two types of knowledge will it be possible to effectively protect and manage natural resources in protected areas. Moreover, it is a way of integrating local users in the management of natural resources and promoting the establishment of co-management agreements, which will obviously enhance the compliance of local users and facilitate consensus-building processes. A few key informants also believed that the use of traditional knowledge would be helpful in the development of environmental, biological and social monitoring methodologies to support decisionmaking, besides being a means of conserving both natural resources and cultural identities by avoiding the loss of sustainable practices.

SECTION V

GENDER FOCUS

GENDER EQUITY IN NATURAL RESOURCES MANAGEMENT

The 20th century has seen an evolution in the role played by women in Mexican society with their active participation in the labour and professional spheres, acknowledges the National Development Plan 2007-2012 (Presidencia de la República 2007). Many women have taken on the double roles of mothers and workers, becoming an important source of income to their households, with or without their husbands. This applies to the fishery sector as well.

However, neither the laws nor social conventions have been ready to fully recognize the fundamental role women now play. Shamefully enough, women still continue to suffer from inequity, discrimination and violence. It is the responsibility of society and the government to end this and work towards effective gender equity, for it is only when men and women are able to freely and responsibly act and decide about life, family, work and public issues that Mexican society will be truly humanized. Since the 1990s, gender issues have been increasingly incorporated into public policy and it is now time that the nation recognizes the central role that women play in attaining the aims of sustainable development (Presidencia de la República 2007).

At the environmental level, from 2002 to 2006, the SEMARNAT carried out a programme entitled "Gender Equity, Environment and Sustainability[18]" (SEMARNAT, 2006), aiming to institutionalize a gender focus in environmental policy by developing and consolidating participatory mechanisms that promote gender equity in the access, use, management and conservation of natural resources. From 2007 to 2012, the aims of an equivalent programme[19] that has followed include promoting women's participation in decision-making processes and capacity building to learn how to organize and manage environmental projects (SEMARNAT, 2007b). In 2006, the SEMARNAT invested about 9 mn pesos in the programme, from which about 45 per cent was used to support 40 capacity-building and productive projects submitted by women's organizations. Other promotional and educative activities such as workshops, meetings, compilation of documents, training of workers from the public sector and experience exchanges were also conducted (SEMARNAT, 2007b).

One of the aims of the gender focus programme carried out by the SEMARNAT was establishing the concept of gender equity within the CONANP. In 2006,

CONANP conducted several workshops and training sessions to familiarize its technicians, administrators and advisory councils with the concept of gender equity and the associated factors that had to be taken into account when programmes and projects are carried out within protected areas (SEMARNAT, 2007b). In several protected areas, the CONANP, in collaboration with experts from the National Women's Institute[20], organized workshops with groups of local women to enhance their organizational, administrative, management and commercial skills, and improve the efficiency of their productive projects. These groups of women were also given the opportunity to exchange their experiences with other groups and publicize their products in national forums (SEMARNAT, 2007b).

The Temporary Employment Programme (PET), which also applies inside protected areas, has included gender equity in its agenda, allocating financial resources for it. In 2006, the PET funds invested by the CONANP in 360 conservation and productive projects were almost 35 mn pesos (of which 68 per cent was given to men and 32 per cent to women) benefiting 13,339 people (67 per cent men and 33 per cent women) (see Table 8) (SEMARNAT, 2007b). On the other hand, Sustainable Regional Development Programmes (PRODERS) have allocated 46,601,375 mn pesos to foster the implementation of a decentralized, participatory and democratic regional planning model endorsing sustainable development aims in which, in the medium term, the use of natural resources might contribute to poverty alleviation, to improve productivity and to increase incomes in priority conservation areas. This was carried out through 710 community projects in which 22,637 people, 65 per cent men and 35 per cent women, participated.

It must, however, be stressed that there are still discrepancies in Mexico between the federal funds allocated to men and women. There are also cultural issues that limit the participation of women in community projects. Further, groups of women are less organized than those of men (SEMARNAT, 2007b). Much of the time, the mechanisms employed to institutionalize a gender focus in environmental and other policies fail to be effective in that women are not actually being empowered.

It is important to underline that in spite of all governmental efforts to plant the concept of gender equity in all its sectors, an effort that has included employing women to assume administrative functions in the CONANP, there is still a long way to go.

Table 8: Projects Incorporating Gender Component

Year	No. of Projects	Invested Amount (MXN)			No. of Beneficiaries		
		Men	Women	Total	Men	Women	Total
2006	360	23,696,240 (68%)	11,151,170 (32%)	34,847,410 (100%)	8,940 (67%)	4,400 (33%)	13,340 (100%)

Source: SEMARNAT, 2007b

GENDER EQUITY IN FISHERIES

Women play a vital role in Mexico's fisheries. The women of fishing communities function as fishers, bait gatherers, fish traders and fish processors. Their activities in the fisheries are not merely extensions of their domestic work, as is often perceived, but activities that have a major impact on local and regional economies (Gavaldón and Fraga, 2006). However, their role often remains unacknowledged and undervalued, which has several social, economic and environmental consequences.

Nevertheless, there are fishing communities, such as San Felipe on the Gulf Coast of Yucatan, where the fishermen widely recognize the importance of women to fisheries development. Women here work as fishers and they are also the main suppliers of a few crustacean species (like *maxquil*) that are used as bait in the octopus fishery, one of the most important in Yucatan State (Gavaldón and Fraga, 2006, Salas et al, 2006). Interestingly, in this fishery, men and women are engaged in a symbiotic relationship, each depending on the other. The bait can only be fished during the night and the octopus is fished only during the day and obviously octopus fishermen cannot work 24-hour shifts (Gavaldón, 2004). Encouraged, among other things, by their local ecological knowledge and by the economic benefits they could get, in the coastal village of San Felipe, women fishworkers have organized themselves into a cooperative society named "Mujeres Trabajadoras del Mar" to fish for *maxquil* (Gavaldón, 2004). The society, created in 2001 with 13 members, has established new, complex power relations with its main customers, the local octopus fishermen, who are also the members' husbands (Uc, M, 2004). It is also important to highlight that this female cooperative society has received, on two different occasions, funding from government agencies to carry out mangrove reforestation projects in the village.

According to Salas et al (2006), besides San Felipe, there are two other coastal villages in Yucatan State were women play a significant role in fisheries, Celestún and Chabihau. The women of Celestún became involved in fisheries related

activities when the "chinchorro", a gillnet operated from the beach, was introduced to catch small pelagic fish in 1984. For about 10 years, they sold fillets of the most abundant species, bought at a very low price from fishermen, obtaining from it a guaranteed income which helped them sustain their households (Salas et al, 2006). The net was later officially banned due to its poor selectivity. Some women in the area still buy fish to sell as fillets while others have branched out into aquaculture-related activities.

In Chabihau's shrimp fishery, women have played a central role in operations carried out in the lagoons on the coast. So much so they are a remarkable example of women who have organized themselves to gain access to the exploitation and management of a fishery resource (Salas et al, 2006). In addition, women from coastal villages all along the coast of Yucatan work as snail gatherers, a fishery activity with subsistence purposes as its products are mainly for personal consumption. In 1999, the Yucatan Fisheries Department recognized women as gatherers of bait species, such as crabs and snails (Gavaldón, 2004).

To cite one more example, in Veracruz State, there are several women who play an important role in fisheries. In the coastal village of Alvarado, for instance, fisherwomen formed a cooperative society named "Mujeres Experimentando" a few years ago when fishery resources started to decline and their husbands' fishing cooperatives failed. Helped by the University of Veracruz and supported by the government, which gave them 12 boats with outboard motors, this group of 11 women has set up aquaculture systems to grow clams and three species of fish, besides going on daily fishing expeditions in the lagoon (Cano, 2007). After the success of this female cooperative, other women decided to follow its example and two other fisherwomen cooperatives emerged: "La Mujer Costeña" with eight members and "Laguna la Flota", the only one that admits male members. Now "Mujeres Experimentando" wants to go into ecotourism but government restrictions and the associated bureaucracy stand in its way (Cano, 2007).

In brief, Mexico's women play an important role in fisheries but they have traditionally had limited access to financial resources and training. They continue to have a marginal role in decisionmaking and still do not occupy positions of responsibility (Gavaldón and Fraga, 2006, Salas et al, 2006).

SECTION VI

ANALYSIS OF CASE STUDIES

INTRODUCTION

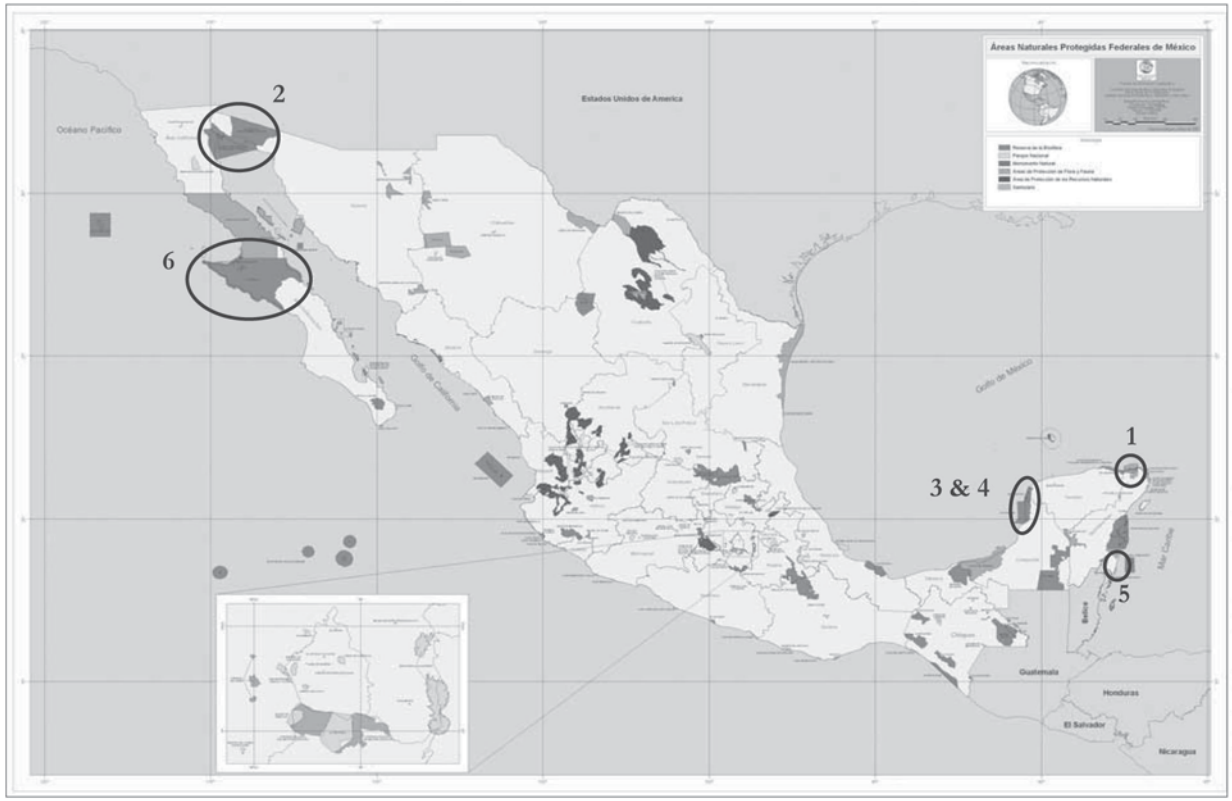
This chapter attempts to present the challenge of fitting different socioeconomic contexts under a national conservation policy, focusing on the establishment and strengthening of protected areas in Mexico. It shows that understanding and addressing the social diversity of human communities is a major challenge for natural resources conservation and highlights the necessity of taking into account the opinions, needs, livelihoods and knowledge of local resource users while engaging them as equal partners in the process of managing natural resources.

The case studies discussed in this chapter (see Figure 6 for their geographical location) combine the authors' work with that done by other experienced researchers. Their focus is on:

- how local resource users perceive protected areas as conservation tools;
- the role played by local communities in natural resources management in protected areas;
- the main conflicts of interest that undermine the compliance of local stakeholders;
- how the livelihoods of local resource users are affected by protected areas;
- the major bottlenecks that constrain achieving a sustainable equilibrium between resource use and conservation; and
- on the critical importance of enhancing the effectiveness of coastal and marine conservation and fisheries management through participatory processes.

Two of the case studies are presented in detail. The first discusses the development of a bottom-up initiative to implement an MPA and establish a co-management agreement and its strengths and weaknesses 12 years later while the second analyzes how the livelihoods of local resource users living in an MPA are affected, as well as their perceptions and interests.

Figure 6: Location of PAs in case study areas



Geographic location of the PAs where the case studies took place: 1 – Actam Chuleb; 2 – Biosphere Reserve of the Upper Gulf of California and Colorado River Delta; 3 & 4 – Biosphere Reserves of Ría Celestun, and Los Petenes; 5 - Arrecifes de Xcalak National Park; 6 – Biosphere Reserve El Vizcaíno

Source: Adapted from CONANP, 2007b

CASE STUDY 1: ACTAM CHULEB MPA: THE STORY OF BOTTOM-UP IMPLEMENTATION[21]

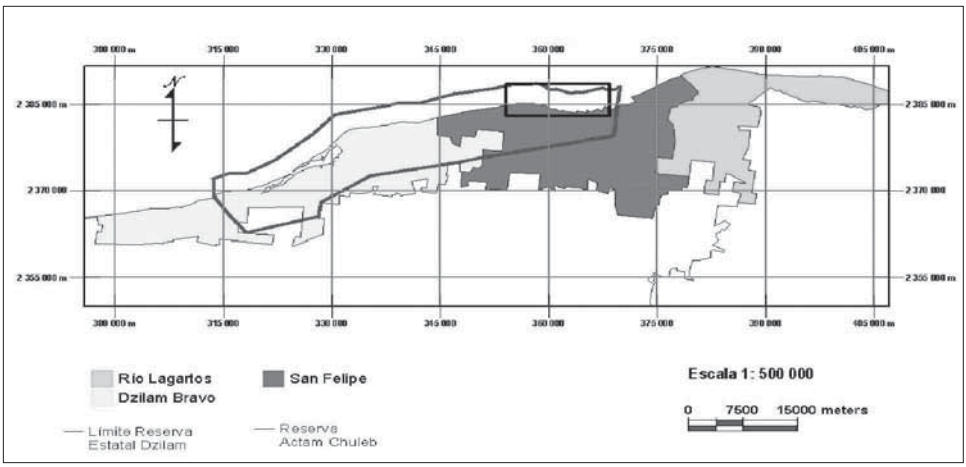
HISTORICAL BACKGROUND

The Dzilam State Reserve, an MPA decreed in 1989 in the Gulf Coast of Yucatan (see Figure 7), remained a "paper reserve" until its management plan was finally promulgated in 2006. In 1995, a group of fishermen from the local fishing cooperative, supported by the municipality and by other local authorities and organizations in San Felipe[22], decided to establish a municipal marine reserve in a shallow coastal area, 5 km west of the village. This was done disregarding the fact that part of the coastal waters adjacent to their municipality were already under the legal "protection" of the Dzilam State Reserve (see Fraga et al, 2006b, 2006c, 2006d, Chuenpagdee et al, 2002, 2004). The entities who set up the municipal reserve agreed that whoever violated the agreement would have to pay a fine of about US$651 to the municipality. According to them, the agreement had been signed by the all the major local authorities (mayor, harbour master, a delegate of the regional Federation of Fishing Cooperative Societies and a delegate of the Secretariat of Fisheries) and thus had legal sanctity. The municipal MPA in San Felipe had the aim of protecting an area that experienced local fishermen knew provided spawning and nursery grounds for several commercial important marine species, and was being overexploited. It was also motivated by the desire to preserve an area near the village, sheltered from marine currents and waves by topographical features, which would serve as alternative fishing grounds from which fishermen could subsist during periods when fishing was banned or the weather was bad.

Heavily dependent as it was on the increasingly overexploited fishery resource, the community of San Felipe, of which 55 per cent of the economically active were fishermen (INEGI, 2000), organized itself to enforce the initiative, particularly to patrol the area, now known as the Actam Chuleb MPA, on a voluntary basis. In 1997, the fishing cooperative, in collaboration with CIRNAC (Centre for the Integrated Management of Natural Resources), an environmental NGO from Mérida, managed to provide a natural resources management training course, financed by the United Nations Development Programme (UNDP) and by the Mexican Fund for Nature Conservation (FMCN), for a few of its members. It subsequently managed to obtain more funding from these two agencies to improve patrolling and to reduce its costs. In 1999[23], the fishing cooperative contacted the Secretariat of Ecology of Yucatan State (SECOL) and handed in a potential management plan for the municipal MPA, which had been elaborated by a few

of its members in cooperation with the NGO. It also presented the guidelines for what could be a partnership arrangement between the State and the local government to manage the Dzilam State Reserve and within it the Actam Chuleb MPA. Unfortunately, the cooperation attempt fell through. This happened despite the Law for the Environmental Protection of Yucatan State (LPAEY) stating that the State government and the municipalities would promote the participation of the civil society in the formulation of environmental policy and in associated activities, particularly by entering into[24] partnership arrangements with civic organizations to establish, administrate and manage protected areas (since 1999, Article 87).

Figure 7: Location of Actam Chuleb MPA and Dzilam State Reserve



Source: Adapted from Fraga et al. 2006d

In 2004, a conflict broke out between the fishing cooperative and the municipality, apparently due to partiality shown during patrolling and in the granting of some sanctions, and also because the MPA did not have a legal framework authorising it to levy fines. Following this, the "*Fuerzas Vivas*" council (a village council comprising the leaders of local organizations, which has the power to take decisions on any community matter) stopped gathering to resolve compliance problems. Not much later, the fishing cooperative itself split into two and lost control of the Actam Chuleb MPA management and enforcement. A local NGO founded in 2000 by the most environmentally "active" members of the fishing cooperative with the support of CIRNAC inherited the role in 2005. A timeline summarizing the story of the MPA as on 26 January 2007, can be seen in Figure 8.

Twelve years after the bottom-up initiative of establishing the MPA many things have changed internally, in the community's social dynamics, and externally, with periodic changes in municipal and presidential administrations, with the interventions of academics through research projects[25] and with the interventions of international development agencies. Unfortunately, some of these changes did not occur as fast or as "ideally" as they needed to and others probably did not occur in the most "desirable" direction. This direction would have been towards the implementation of an equitable and participatory decision-making mechanism to co-manage the Actam Chuleb MPA, as advocated by several local user-groups.

Figure 8: Timeline of Actam Chuleb MPA

1989	The Dzilam State Reserve was decreed.
1995/7	Fishermen's cooperative supported by a community council establishes a municipal MPA with rules & fines. MPA patrolling is carrier out sponsored by United Nations.
2002/4	Other stakeholder groups wish to decentralize MPA management carried out only by the fishing cooperative. Division of the fishing cooperative → political issues. Local gatherings to solve MPA compliance issues stopped.
2005	A local NGO assumed the management + enforcement of the MPA supported by the Secretariat of Ecology.
2006	The Dzilam State Reserve management plan was published.
2007	Secretariat of Ecology + Actam Chuleb civic organization celebrated co-management partnership for the conservation of natural resources in Yucatan.

STUDY AIMS

This study attempts to better understand the factors that might foster or constrain the establishment and development of a co-management arrangement. It has two specific objectives:

- to analyze stakeholder perceptions on the benefits of the MPA and the obstacles to its functioning and co-management 12 years after its implementation; and
- to identify the key issues that influence stakeholder support, indifference or opposition to the MPA.

The methodology involved an analysis of secondary data, observations by participants, an in-depth stakeholder survey and a participative community workshop.

STRENGTHS OF THE MPA CO-MANAGEMENT PROCESS

A bottom-up initiative like the establishment of a municipal MPA in San Felipe and its continued functioning (successful or not) in accordance with a local agreement were based on a set of conditions that, according to Agrawal (2003), had to do with the nature of the natural resources, with the characteristics of the community groups that depend on these resources, with the particulars of the institutional arrangement itself and with the nature of the relationship between the community groups and external forces such as markets, States and technology.

In the case of San Felipe, the high dependence on coastal resources; the small area of the village; its relatively small population; shared norms imposed by religious homogeneity and close kinship ties among community members; and its considerably high social capital[26] were in its favour. The last factor is illustrated by the organizational capacity of local user groups, that began developing in the early 1970s with the creation of a fishing cooperative, and by the cooperation in resources management which saw a local advisory council known as "las Fuerzas Vivas" operating in the village.

Other positive factors that enabled cooperation were the apparently low levels of poverty; the MPAs proximity to the village; its easy access and safety even during bad weather; the fact that it was established as an area where resources would be used in a sustainable manner (only trolling is allowed), which gave fishermen the hope, they would directly benefit from its conservation; and the fact that the MPAs rules were simple and easy to understand, having been locally devised.

The Actam Chuleb MPA was, or still is, quite a well-consolidated bottom-up initiative, widely supported by the community of San Felipe and recognized for its benefits. As the results of a project carried out by the International Development Research Centre (IDRC) illustrate, in 2000, the majority of the interviewees were aware of the existence of the MPA and considered it as a good idea. In 2006, an in-depth stakeholder survey revealed that the MPAs aims were well known and understood. Its main benefits were also widely recognized and emphasized by the interviewees and by the participants in a 2007 workshop. The majority in both groups were related to fisheries, the major source of economic activity in the village, and to tourism. The community would like to preserve the benefits thay have gained in these areas into which they have invested considerable effort. The local fishermen, who recently became tour operators by organizing themselves

into four cooperative societies offering tourism-related services in an attempt to diversify their sources of income, are considered to be a stakeholder group with great potential to push forward the MPA management in the near future.

WEAKNESSES OF THE MPA CO-MANAGEMENT PROCESS

One of the main issues standing in the way of the collaborative management of the Actam Chuleb MPA functioning in an effective manner is the lack of communication. The exchange of information is poor between the MPAs management body, which comprises the Actam Chuleb NGO, the San Felipe municipality and the SECOL, and the rest of the stakeholder groups. It is also unsatisfactory among the members of the local NGO that was restructured in 2004 with the support of the SECOL to guarantee the representation of many stakeholder groups and broaden the scope of interests managed by the former MPA committee, which essentially had only members from the fishing cooperative.

Although communication was not among the top three obstacles when interviewees were requested to rank a series of problems affecting the MPA, communication issues were clearly reflected in stakeholders' perceptions about the performance of the MPA administration, its poor patrolling effort given the availability of funds and the lack of information on the MPAs legal aspects. The need to increase and improve communication among the MPA stakeholders was also stressed during the 2007 workshop. As some participants mentioned, the lack of communication had led to a widespread disinterest among stakeholders, a trend that needed to be reversed if participative decision-making mechanisms are to be set up to manage the MPA.

However, a few circumstances might be hampering the stakeholders' capacity to act in a collective fashion, such as the strong political bi-partisanship among the inhabitants of San Felipe, which ended up dividing the fishing cooperative and with it entire families; stakeholders' short-term vision of the benefits; conflict of interests; misunderstandings; and stakeholders' passiveness associated with the fact that they do not depend on the MPA for survival.

The legal side of the Actam Chuleb MPA had long been a thorny issue and only with the publication of the Dzilam State Reserve management plan in 2006 did it finally acquire an official legal status and a regulatory instrument. Up to that point, the MPA was merely a marine component of the Dzilam State Reserve, a "paper park" decreed on January 25, 1989 without specific regulations, which meant that all the fines that were levied by the San Felipe municipality were illegal, since it had no legal authority to collect fines in a State reserve and the area was not yet officially regulated. All the enforcement mechanisms of this

period were only based on a local agreement between the fishing cooperative and the municipality.

As the survey results reveal, the legal dilemma of the MPA was generally well known and a majority of the stakeholders saw it as a major issue. Particularly because in the absence of a legal and regulatory framework it would be impossible to fine "illegal" fishermen, an enforcement mechanism essential to check non-compliance. When, during the workshop, the participants were informed that the MPA had been decreed in September 2006, they expressed the hope that fines could be legally imposed 12 years after the reserve had been established. However, a key question emerged: how would the law be enforced? In the past, when an illegal fisherman was caught in the MPA by a local patroller, he was taken to the municipality, which immediately decided what penalty he should pay in terms of the pre-established agreement. The process was quick and very effective.

According to a SECOL representative, the current patrollers from the Actam Chuleb civic organization will need to be trained by the PROFEPA to become official "community patrollers" and be able to present formal accusations directly to the SECOL. The SECOL will have to forward these accusations to the PROFEPA or to the CONAPESCA, depending on the nature of the accusation. The same official points out that the biggest problems menacing the effectiveness of this process are poor articulation and coordination (vertical and horizontal) among the different levels of government and governmental agencies, which will considerably delay the process of imposing fines.

OPPORTUNITIES AND LIMITATIONS

The first consummated attempt to formalize a co-management partnership between the State government and a local stakeholder organization from San Felipe took place in June 2007, 12 years after the bottom-up implementation of the Actam Chuleb MPA, with a five-year general agreement for the administration and management of the protected areas in the State of Yucatan between the Actam Chuleb civic organization and the SECOL. Whether or not this is a "desirable" co-management partnership in the case of the Actam Chuleb MPA, only time will tell. Either way, it will take some time for this co-management agreement to become operational, especially the process of concluding other agreements, more so because the new presidential administration replaced all the SECOL administrative personnel in July 2007.

That said, the excessively long period of time that the State government took to officially recognize this bottom-up initiative, prepare a management plan for the Dzilam State Reserve and formalize a general co-management partnership to

manage the Actam Chuleb MPA (among other protected areas) has to be noted, especially when the major legal instruments were already available, both at the State and the federal levels.

LESSONS LEARNT

The Actam Chuleb case study illustrates the complexity of the process of consolidating a sustainable co-management agreement to manage a protected area, even when it has been initiated by a bottom-up initiative. It highlights the long time needed and the factors that might encourage or discourage cooperation for natural resources management while a variety of interests are negotiated. This underlines the importance of having the government's recognition and legal, technical and economic support from it, the academic community and civil society (like NGOs). According to Berkes (2004), there is the need to deepen our knowledge about the key factors that might support or constrain the establishment of a co-management partnership.

The experience of Actam Chuleb points to an aspect crucial for the success of any co-management agreement. In this case, the strategy used to decentralize the MPA management and broaden its scope of interests by promoting the active participation of the main stakeholder groups in management failed completely. The restructured Actam Chuleb civic organization was actually reduced to a few members at the beginning of 2007. From its founding in 2004 to the beginning of 2007, there had never been an informative and/or consultative meeting on the MPA between it and the other stakeholder groups in the community. So no effective participative decision-making mechanisms were developed to involve the community in the MPAs management process.

One of the main lessons learned from this case study is that a great deal of importance must be given to the adoption of effective decentralization strategies, both at the community and at the government level. They must enable the establishment of truly inclusive participatory decision-making mechanisms if collaborative management strategies are to succeed, and they must be advocated as a means of promoting civic participation and sharing the responsibility for the sustainable management of natural resources. Otherwise a feeling of mistrust will impede compliance by the "excluded" stakeholder groups. Besides, when a local management committee is dominated by a restricted group of people and therefore a limited scope of (personal) interests, the risk exists that these interests will not be truly representative of those of the community, something that will affect management sustainability in the long-term.

CASE STUDY 2:
THE EFFECTIVENESS OF PROTECTED AREAS AS A CONSERVATION POLICY: THE CASE OF THE BIOSPHERE RESERVE OF UPPER GULF OF CALIFORNIA AND COLORADO RIVER DELTA[27]

INTRODUCTION

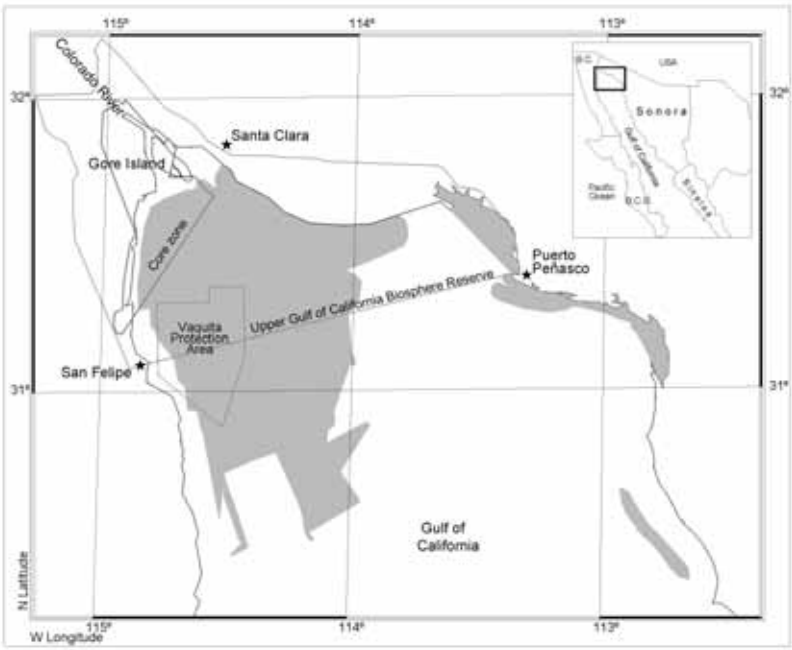
In the Upper Gulf of California, the demand for economically important species has led to an increase in fishing and the use of fishing gear and practices that are dangerous to some critical species facing the risk of extinction, such as the *totoaba* (*Totoaba macdonaldi*), the endemic croacker (Cisneros-Mata et al 1995) and the *vaquita* (*Phocoena sinus*), a rare species of porpoise found in the northern part of the Gulf of California (Sea of Cortez) that has the most restricted distribution range of all marine mammals in Mexico (Rojas and Jaramillo, 2001). The vaquita is accidentally caught in all kinds of gillnets used in the Upper Gulf (D'Agrosa et al., 1995, Blanco, 2002) and faces the risk of extinction due to its limited numbers and its reduced habitat range (Rojas-Bracho et al., 2006).

The Upper Gulf of California and the Colorado River Delta were declared a Biosphere Reserve on June 10, 1993, covering 934,756 ha, including marine and terrestrial environments (DOF, 1993) (see Figure 9). The MPA was implemented to protect species inhabiting that region, some of which were commercially important, endemic or under risk of extinction, and its management plan is designed to promote both sustainable use activities and biodiversity conservation (Rojas-Bracho et al, 2006). The MPA provides a habitat for several species with high commercial value, such as the corvina or gulf croaker (*Cynoscion othonopterus*), an endemic species that spawns in the Upper Gulf, and the blue shrimp (*Litopenaus stylirostris*), which is highly priced in local and international markets (Cudney and Turk, 1998).

The most recent measure to protect the vaquita and its habitat was the declaration, in December 2005, of a Marine Sanctuary (126,385 ha) to further limit fishing activities (Figure 9). Managing the MPA and the sanctuary imply taking a series of actions that protect critical species while allowing the sustainable use of commercially important ones. Fishing in the Upper Gulf is an economic activity with environmental implications. Conservation measures in the MPA and the sanctuary have to be designed to both minimize the negative impact of fishing on the vaquita and maximize the well-being of fishers and fishing communities in the MPA (DOF, 2005). Mexican legislation recognizes that it is through the participation of the local communities affected by these measures that the objectives of agreements can be achieved (Palumbi et al, 2003). Facing this

challenge requires a clear definition of common goals in fisheries management and conservation, all expressed in a single policy.

Figure 9: Geographic location of the Upper Gulf of California and Colorado River Delta Biosphere Reserve. Grey areas represent fishing grounds used by the artisanal fishing fleet



FISHERY ANALYSIS

A total of 2,554 catch reports by artisanal fishermen in three fishing communities of the Upper Gulf were compiled and analyzed. In addition, 146 fishermen were interviewed.

Based on catch volume and economic value, six artisanal fisheries are the most important in the Upper Gulf: shrimp (*Litopenaus stylirostris*), corvina (*Cynoscion othonopterus*), bigeye croaker (*Micropogonias megalops*), Spanish mackerel (*Scomberomorus* spp.), rays (several species) and sharks (several species). Due to its high value, shrimp represents the highest gross income to artisanal fishermen. The corvina is the second economically most important species to the fishermen of El Golfo de Santa Clara, bigeye croaker to the fishermen of San Felipe and rays to those of Puerto Peñasco (Figure 9).

The largest number of "pangas" (artisanal vessels) is officially registered in El Golfo de Santa Clara, where artisanal fishing is virtually the only economic activity. The authorized fishing effort is concentrated on two types of fisheries, shrimp with 606 pangas and scale (corvina, bigeye croaker, Spanish mackerel, sharks and rays) with 882 pangas. The largest number of authorized pangas for both shrimp and scale fisheries are registered in San Felipe and El Golfo de Santa Clara.

Survey data and GIS analysis showed that all six major fisheries figure in the Vaquita Sanctuary and 75.22 per cent of all catches occur inside the Biosphere Reserve (Figure 9). Artisanal catches inside the sanctuary vary, depending on the species: shrimp 97 per cent, corvine 94 per cent, sharks and rays 85 per cent, Spanish mackerel 69 per cent, and bigeye croaker 78 per cent. In terms of economic value, shrimp represents the highest gross income – US$5 mn, whereas sharks and rays represent the lowest gross income with only US$11,500.

SOCIAL ANALYSIS

The opinions of fishermen can be interpreted as guidelines to a comprehensive strategy. When they were asked what their activity would be if the most important fishery were closed, 56 per cent of the fishermen responded that they would continue fishing; 22 per cent said that they would fish the same species; and the rest said they would fish other species. The last group mainly comprised fishermen of El Golfo de Santa Clara, who do not have employment alternatives as Puerto Peñasco and San Felipe fishermen do. Nearly 24 per cent of the fishermen said they would demand compensation and 19.6 per cent said they would ask for credit to start a new business or switch occupations (such as becoming a plumber, carpenter or construction worker).

When they were asked what they would do if they were asked to stop fishing, a high number of fishermen said they would switch to the tourism and the trade sectors (49 per cent), 6 per cent said they would like to work in aquaculture, 25 per cent said they would work in another fishery (molluscs, clams, oysters) or remain in the same, and 20 per cent said they would become artisans of another sort.

VAQUITA RECOVERY ANALYSIS

Currently, two possible scenarios for the recovery of the *vaquita* are offered, both based on the possibility that the population of *vaquita* could increase in the long term. The first scenario uses 1994, when there where 224 *vaquitas*, as its reference. From 1994 to 2000, the number of artisanal craft increased and there was a decrease in the number of *vaquitas*. However, from 2000 to 2006, the *vaquita* population has grown steadily. Therefore, it can be expected that from 2007 to

2025 the *vaquita* could be in a recovery period that would increase its population by 76 per cent (395 individuals).

The second scenario uses 2007 and an initial population of 567 *vaquita*s as reference. Adopting an optimistic view of the recovery process, it estimates that in less than 20 years the population of *vaquita* could grow to nearly 1,000. This would mean an annual population growth of 9 per cent and an annual reduction of the artisanal fleet by 15 per cent.

FINAL COMMENTS

This case study showed that both the Biosphere Reserve in the Upper Gulf of California and the Colorado River Delta and the Vaquita Marine Sanctuary are important artisanal fishing grounds. Shrimp fishery generates the greatest income for artisanal fishermen. The results indicate that 98 per cent of the artisanal fishermen of El Golfo de Santa Clara and 100 per cent of the fishermen of San Felipe catch shrimp because of its high commercial value, gross revenues and availability during the fishing season (September to January). This poses an important challenge to fulfilling the goals embraced by both the MPA and the sanctuary, particularly because the number of registered *pangas* is greater than what was recommended when the sanctuary was declared (DOF, 2005).

Operation costs determine, to a great extent, where fishing is conducted in the Upper Gulf of California and this depends on the distance between the fishing grounds and the ports and on the seasonal distribution of natural resources. San Felipe is the fishing port nearest to the Marine Sanctuary and fishermen from there work in the vicinity all through the year. Although El Golfo de Santa Clara has the largest number of registered permits and pangas, fishermen from this port do not fish near the sanctuary because the distance makes it very costly. Fishermen of Puerto Peñasco fish near the coast of Sonora State to reduce their operation costs by saving on gasoline and oil.

The large numbers of pangas (2,100) working in the Upper Gulf present a clear threat to the *vaquita* (Rojas and Jaramillo, 2001, Blanco, 2002). The bulk of artisanal fishing is done using gillnets to catch corvina (100 per cent), shrimp (93 per cent), Spanish mackerel (68 per cent), bigeye croaker and rays (44 per cent), and sharks (10 per cent) (D'Agrosa et al, 1995). Gillnet mesh sizes vary from 5.7cm to 17.8-cm and the highest *vaquita* mortality has been registered in gillnets with a 11.43-cm-mesh size (Ortiz, 2002). These nets cover a great portion of the water column where they are set and left for several hours (Turk-Boyer, 1989, D'Agrosa et al, 1995). The lengths of these nets vary from 99 to 1,485 metres, the most common measuring between 594 and 990 metres with a mean height of 5.4 to 18 metres (CSAR, 2004).

The success of an MPA in the Upper Gulf of California as a conservation tool depends on how carefully it considers all social aspects (like the social importance of fishing activities). Any buy-out programme to restrict fishing activities within the Vaquita Marine Sanctuary would have to be followed by a medium-term plan providing viable, alternative livelihood options that are in accord with fishermen's interests and in accord with what they might consider important to them and to the region. Some fishermen will not stop fishing because that is the only activity they feel comfortable with and have done for years.

In this context, some fisheries must be assessed, such as shrimp fishery since it is known that this has only a low impact on *vaquita* mortality (D'Agrosa et al, 2000, Rojas-Bracho et al, 2006). This assessment must be carried out considering the economic value of fishing and its impact on the environment. It should also consider that allowing a specific number of fishermen and fishing tools by species to fish within the MPA and within the Vaquita Sanctuary would probably increase the compliance of local resource users, besides regulating the fishing effort in the area.

Conserving the *vaquita* requires adopting strategies that contribute to managing and conserving the ecosystem (Palumbi et al, 2003) and that includes paying heed to the fishermen's points of view throughout the negotiation process. This entails knowing what the fishermen would be willing to settle for in return for not fishing in the Vaquita Sanctuary. The success of conservation in this case must be measured on the basis of agreements that dignify the inhabitants of the Upper Gulf. Governments at all levels and conservation organizations should promote development of the region and must strive to improve the fishermen's quality of life while rescuing the endangered *vaquita*, considering socioeconomic, ecological and institutional factors (Davis, 2005, Harris et al, 2005, Leslie, 2005). The success of most fisheries management policies in preserving species is contingent upon species vulnerability, size of the protected area and the availability of economical alternatives. Therefore, given the critical situation of the *vaquita*, one should consider whether the enforcement of a no-take zone would save this species from extinction.

FINAL CONSIDERATIONS

To conclude, we discuss the benefits obtained and the problems faced by resource users living in Mexican MPAs with the following question in mind: Do local resource users benefit from living in protected areas?

As part of the discussion we present the summaries of four case studies carried out in MPAs in the last five years:

- Magdalena Lagunas Vazques[28] describes the evolution of a cooperation agreement for the conservation of coastal and marine resources concluded between a fishing cooperative (Buzos y Pescadores de Isla Natividad) in the Biosphere Reserve El Vizcaíno, Baja California Sur, and an NGO (Comunidad y Biodiversidad A.C. - COBI).

  This long-term pilot project, initiated in 2003, aims to monitor the benefits of establishing no-take areas in three of the 42 fishing concessions (or 4 per cent of the total area) owned by the fishing cooperative, for which it represents an annual investment of about US$300,000, including monitoring and patrolling costs. The cooperative hopes that the data obtained will, by 2011, help it decide if no-take areas should be considered a key tool in their fishery resources management strategy.

- Julia Fraga and Nidia Echeverria[29] describe two different social settings co-existing in the Biosphere Reserve of Ría Celestún: one "pro-conservationist", represented by the fishing community of Isla Arena, which respects fishing ban periods, sticks to minimum catch sizes and allowed fishing methods; and one "anti-conservationist", embodied by the community of Celestún, where there is a great lack of compliance with fishing management measures.

  However, both communities see "conservation" as a "prohibition" that limits the use of natural resources. In Celestún, the benefits of living in a protected area are basically enjoyed by those engaged in tourism activities. The citizens of Isla Arena believe that the only beneficiaries from the protected area are the people of Celestún in general.

- Marta Rosales Raya[30] describes the case of Isla Arena, a small fishing community in the Biosphere Reserve of Ría Celestún, which is just a few kilometres away from the Biosphere Reserve Los Petenes. The fact that Isla Arena is in Campeche State but falls within the territory of an MPA largely in Yucatan State has meant that its fishermen have been forgotten in the consultation processes carried out by both Biosphere Reserves. They have had no say in the formulation of management plans for either of these Biosphere Reserves though they share common fishery resources. The community of Isla Arena carries out local conservation practices and has interesting proposals on how to better use and manage the area's coastal and marine resources. Unfortunately, these proposals have not produced legally recognized solutions because they have not gained the approval of the federal authorities. The result has been a great feeling of frustration.

- David Buitrago Tello[31] describes the development of an MPA—Arrecifes de Xcalac National Park, Quintana Roo—that was the result of a proposal presented to the government by the local community in 1995, as a response to territorial planning focusing on low-density tourism, which was endorsed by the State government. Following this, the intervention of other actors in the management of the reserve promoted greater intersectoral interaction but also led to a politicization of the process.

In this scenario, a regional NGO carried out a community-based integrated coastal management project in the area, a strategy that was eventually adopted by the government authorities to manage the MPA. The support provided by this regional NGO to the local population included meetings with government agencies, donors and other national and international NGOs.

But the intervention of other agents saw conservation measures taking a different course, gradually moving away from the development-planning process originally designed in a bottom-up way. The decision-making power of the local population diminished alongside increasing bureaucratization of the MPA.

One decade after the initial proposal and seven years after the promulgation of its establishment decree in 2000, the MPA is administered by the CONANP, which functions with an advisory council and negotiates the implementation of regulations in the area with local organizations. The CONANP has encouraged capacity-building projects for local organizations and tried to keep communication open among the several community groups.

But the people's confidence in the MPAs conservation agenda has diminished. This is especially true of those who are not part of the organizations that benefit from the reserve. In general, people's representation and their decision-making powers in the MPAs management have decreased and disagreements over measures adopted by the MPA administration are frequent.

These case studies and the two on the Actam Chuleb MPA and the Biosphere Reserve of the Upper Gulf of California and the Colorada River Delta (see Table 9, Table 10) show that all is not lost. On the negative side, there is a frequent lack of government recognition and support when it comes to traditional management practices based on the local ecological knowledge of fishing communities. There are also all the typical conflicts of interest between conservationists and local resource users, whose rights are frequently violated when they are forced to abandon ways of earning a livelihood in the name of "conservation".

Table 9: PAs: Main Characteristics

PA	Est	Mgt plan	Area (ha)	Pop	Main economic sectors
Actam Chuleb	1989	2006	4,809	1,825	Fisheries, Livestock, Tourism
BR Upper Gulf of California and Colorado River Delta	1993	1996	934,756	4,400	Fisheries
BR El Vizcaíno	1988	2000	2,493,091	35,000	Fisheries, Mining, Agriculture, Livestock, Tourism
BR Ría Celestún (Isla Arena)	1979/2000	2002	81,482	9,000	Fisheries, Agriculture, Livestock, Tourism
Arrecifes de Xcalak National Park	2000	2004	17,950	252	Fisheries, Tourism

But, on the positive side, there are positive experiences of natural resource management in MPAs, where local resource users actually benefit from living in protected areas. This is testified to by the local initiatives taken to preserve natural resources by establishing MPAs from the bottom up and by the conservation or co-management agreements local resource users have entered into with NGOs, government agencies and research institutes.

These initiatives do take time and a great deal of effort to consolidate and, sometimes, produce concrete results but they empower local resource users living in protected areas and ensure the sustainability of natural resources management and conservation in the long term.

That said, the question emerges: How can fishing communities become equal partners in the MPA management process? We point out a few key conditions that are essential to enable the development of such partnerships in Mexico.

Table 10: PAs: Main Social Issues

PA	Local users opinion: PA management	Main conflicts of interest	Major bottlenecks	Potential solutions
Actam Chuleb	> 46% consider that it is not very appropriate, due to the lack of information and involvement	Local conservation practices vs. short-term profits	Lack of communication; mistrust; lack of involvement in decisionmaking; inefficiency of enforcement mechanisms	Establish a representative community council to co-manage the MPA; decentralization of government's enforcement capacity
BR Upper Gulf of California and Colorado River Delta	> 50% believe that it does not work	Local resource users vs. conservationist NGOs	Lack of economic alternatives	Promote the sustainable use of natural resources
BR El Vizcaíno	Some local users regard the PA as an opportunity; others as a limitation, depending on economic benefits. They have a negative opinion of management capacity, information and participation.	Land use vs. wildlife conservation	Poor administration; directive management; poor participation; local governments lack management functions; poor interaction with research centres	Decentralize management capacity to local governments and resource users; actively involve them in management; establish and evaluate management objectives; perform socioeconomic studies

...contd. on page 59

...Table 10 contd. from page 58

PA	Local users opinion: PA management	Main conflicts of interest	Major bottlenecks	Potential solutions
BR Ría Celestún (Isla Arena)		Economic and political conflicts: Isla Arena vs. Celestún, because they belong to different States but exploit the same marine resources	Lack of agreements among local communities that use the same natural resources	Officially recognize local conservation practices carried out in Isla Arena; analyze if it would be convenient to include it in the BR Los Petenes
Arrecifes de Xcalak National Park	Although it has a local management committee, they disagree and are disappointed with certain aspects but acknowledge conservation benefits	Cooperative fishermen have exclusive access to certain fishing grounds, unlike migrant fishermen; inequitable allocation of tourism benefits; local vs. foreign interests	Great disappointment regarding economic benefits for local resource users; loss of decisionmaking and participation power	Strengthen the capacity of local organizations for tourism activities, and increase decision-making power and participation in planning and resource management.

The federal government must:

- recognize the rights of local resource users, support and legitimize local conservation initiatives by reinforcing local authority, and lay the foundation for a system that enables the effective and equitable participation of local resource users in decisionmaking;
- ensure that local resource users are the main beneficiaries of conservation policies;
- build a relationship of mutual trust based on honest communication between local resource users and governmental officials or staff directly engaged in natural resource management; and
- ensure that communities living in protected areas are always well informed.

SECTION VII

CONCLUSIONS AND RECOMMENDATIONS

We start by highlighting the opinion of key informants on the main challenges faced by the Mexican government when it comes to increasing the efficiency of its MPAs (see page 61). As would be expected, one of the greatest and most urgent challenges is increasing inter (municipal, State, federal) and intra (sectoral) institutional coordination towards the development of an integrated coastal management policy that has an adequate legal framework and embraces long-term objectives. Simultaneously, it is crucial to implement effective and equitable participatory decision-making mechanisms to proactively involve local stakeholders (men and women) in every stage related to the design, implementation and management of protected areas. To achieve these, it is imperative to guarantee the availability and efficient administration of funds and resources (for instance, by strengthening the economic self-sufficiency of protected areas and encouraging the private sector to participate). Adequate funding has to be one of the main preconditions to enhancing management capacity and ensuring the availability and efficiency of law enforcement mechanisms and/or actions. Additionally, these mechanisms would also benefit from federal decentralization.

Another important aspect to ensure the efficiency of MPAs is the necessity of providing those who depend on natural resources with viable alternative livelihood options. Developing and promoting capacity building among both governmental personnel and local stakeholders is another major need. Another aspect highlighted was the necessity to generate knowledge to serve management needs and enable the implementation of ecological, social and economic monitoring and evaluation programmes. In this, the contribution of science is vital and the collaboration between local resource users, the government and academia must be reinforced. It seems fundamental that all protected areas should have updated management plans; that they should work on establishing a representative MPA system; and that MPAs should be used as a fisheries management tool. To conclude, it is important that protected area administrators fight corruption and resist the strong pressures brought to bear on them by powerful political and economic groups.

According to Bezaury-Creel (2005), developing vertical and horizontal institutional coordination and public participation processes are demanding tasks though they are essential to improve the management of protected areas. They cannot be created overnight but require time and human and financial resources to experiment with, adapt and consolidate. Bezaury-Creel suggests these processes should be focused

and straightforward in their early stages, as regards the issues they deal with and their geographic scope. In addition, an important step that needs to be taken first is ensuring that there is basic staff on the sites with basic operating funds, without forgetting that it is a local presence that might help build local support.

The main challenges faced by the Mexican government in increasing the efficiency of MPAs are as listed below. The number of respondents per area is given in brackets.

- increase inter-(municipal, State, federal) and intra- (sectoral) institutional / governmental coordination towards the incorporation of coastal and marine resources conservation into an integrated coastal management strategy (17);
- implement effective participatory decision-making mechanisms to involve local stakeholders in the design, zoning, and management of protected areas (13);
- guarantee the availability of funds to ensure an efficient management and enforcement (13);
- end paternalist policies based on subsidies and provide those who depend on the use of natural resources with viable alternative livelihood options (6);
- professionalize the personnel of governmental agencies (5);
- increase patrolling actions (5);
- implement ecological, social and economic monitoring and evaluation programmes (4);
- promote capacity-building of local users (3);
- strengthen collaboration with academia (3);
- include long-term objectives in government programmes, which go beyond the six-year presidential terms (2);
- increase the efficiency of financial and human resources administration (2);
- ensure that all protected areas have an updated management plan (2);
- generate the necessary knowledge to serve management needs (2);
- strengthen the legal framework (2);
- resist strong pressures applied by powerful political and economic groups (2);

- establish a representative MPA system to protect Mexico's marine biodiversity (1);
- use MPAs as a fisheries management tool (1);
- increase public transparency of national policies (1);
- provide municipal governments with sanctioning capacities (1);
- promote the economic self-sufficiency of protected areas (1);
- encourage funding from the private sector (1);
- promote gender equity (1);
- reduce administrative bureaucracy (1); and
- fight corruption (1).

The CBD target is achieving effective conservation of at least 10 per cent of the world's marine ecological regions by 2012 through the establishment and maintenance of ecologically representative and effectively managed protected area systems (CBD, 2005). This is a very ambitious goal, especially since it requires protected areas to be "effectively managed". As we have seen in the case of Mexico, the efficiency of protected area management or protected area management capacity does not evolve proportionally with the amount of financial resources assigned. The lack of attention paid to the complex social dimension of natural resource management is mainly responsible for this.

According to the CBD (2005), "All protected areas must have effective management in existence by 2012, using participatory and science-based site planning processes that incorporate clear biodiversity objectives, targets, management strategies and monitoring programmes, drawing upon existing methodologies and a long-term management plan with active stakeholder involvement". We now look at the progress made by Mexico on some specific measures (given below within quotation marks) that CBD Parties were invited to adopt to improve site-based protected area planning and management.

- "Create a highly participatory process, involving indigenous and local communities and relevant stakeholders, as part of site-based planning in accordance with the ecosystem approach, and use relevant ecological and socioeconomic data required to develop effective planning processes."

In Mexico, as we have seen, despite all the efforts that have been made by the government, participatory processes, although increasingly talked about, are still considerably immature. For, making them truly representative by paying attention to the views of all relevant stakeholders, including local community groups, is a

very hard task that requires a continuous effort and solid foundations. Instead, these processes frequently end up as non-inclusive.

Moreover, the influence of indigenous and local communities on decisionmaking and/or policy-making is far from effective. This also probably explains the cases analyzed in this study, where local groups that were initially motivated and willing to participate in protected area management, ended up disillusioned with the shortcomings in the system (especially in terms of representation and enforcement) and with the associated bureaucracy.

We have also documented cases where local resource users had no confidence in the ability of government agencies to manage natural resources in protected areas and where they saw conservation and protected areas as a threat to their livelihoods, probably due to their lack of involvement and the absence of alternative livelihood options. In addition, in Mexico, there is a huge lack of ecological, social and economic data to enable monitoring and evaluation programmes, as pointed out by the key informants.

- "As appropriate, but no later than 2010, develop or update management plans for protected areas, built on the above process, to better achieve the three objectives of the Convention."

Once more we have to admit that Mexico is far from providing all its protected areas with regulatory and planning instruments such as management plans, or having all the existing plans updated. As mentioned earlier, in 2005, only 36 of 155 (or 23.2 per cent) federal protected areas had management plans. This included 22 of 59 (or 37.2 per cent) MPAs (INEGI, 2005). Also, despite being the most basic regulatory instrument for any protected area, having a management plan is in itself no major indicator of success, management efficiency and/or capacity.

- "Ensure that protected areas are effectively managed or supervised through staff that are well trained and skilled, properly and appropriately equipped, and supported, to carry out their fundamental role in the management and conservation of protected areas."

Like our key informants pointed it out, the lack of financial resources, qualified personnel and infrastructure and equipment in protected areas is one of the main shortcomings constraining protected area managements. It is true that after the establishment of the CONANP in 2000 there has been an increase in the availability of personnel and funds.

However, neither the assignment of personnel to protected areas nor their management capacity has kept pace with the huge growth in the amount of

funds available. In 2006, only 80 out of 158 (or 50.6 per cent) protected areas had adequate administrative personnel.

A FEW LAST QUESTIONS EMERGE:

- If CBD parties succeed in covering at least 10 per cent of the world's marine ecological regions with MPAs that are not effectively managed, what would be the social and environmental costs that this would have?
- How much would it actually prevent biodiversity from being lost?
- How much would it actually enhance the livelihoods of those who depend on the resources for survival?

What we know is that 2012 is quickly approaching, biodiversity is being lost and we still have a long way to go. To obtain the desired results, we must focus and adopt efficient strategies now. Meanwhile, conservation continues to be a top-down practice in Mexico, and its social dimensions are relegated to the sidelines.

We now focus on major research needs, make a few recommendations and suggest further work that would contribute to enhancing the involvement of natural resource users in MPA management:

- There is a great need to understand protected area management issues within the ambit of local and global social, economic and ecological processes.
- There are few studies in Mexico that focus on the establishment and development of MPAs from a social, economic, power and gender relations perspective. Such studies are necessary to better understand the dynamic nature and the sustainability of natural resource management institutions and crucial to implement validated, and therefore efficient, participatory mechanisms that consider not only formal institutions (like cooperatives and social organizations) but also informal ones.
- Participatory research[32] programmes that consider all categories of fishworkers and resource users, including women, and other key stakeholder groups (the three levels of government, academia, and regional and local NGOs) are essential and should be encouraged in MPAs. Among other things, these programmes should promote continuous capacity building at the community level, with those already educated becoming involved in educating others so as to achieve a multiplier effect. This will contribute to social cohesion by establishing efficient communication networks and promoting voluntarism and cooperation among local stakeholders.

- To better address the complex and dynamic nature of socio-ecological systems, the government and the academic community must collaborate and adopt interdisciplinary ecosystem-based management approaches that encourage social and natural scientists (from a wide range of disciplines) to work together in both the theoretical and practical spheres, considering the views and needs of local resource users.
- The national environment policy must provide local resource users with diversified incentives (not just economic) to sustainably manage natural resources; and promote national and international collaboration and networking among natural and social scientists and the local people working in protected area management.
- Municipal MPAs are one of the less representative and less studied categories of protected areas in Mexico since marine jurisdiction remains strictly federal. However, the potential and viability of this type of protected area should be further explored and analyzed at all levels (such as socioeconomic and environmental) as it could probably encourage local participation and lead to the development of community-based management regimes.

To conclude, we would like to stress that in natural resource co-management there is no such thing as a blueprint or model. In fact, Ostrom (1994) considers "blueprint thinking" to be a powerful threat to community governance, occurring whenever policymakers, donors and scholars suggest standardized solutions to a wide variety of problems grouped under a single name. As Pomeroy and Rivera-Guieb (2006) emphasize, a healthy co-management process changes over time; and partnerships, roles and responsibilities will fulfil their purpose, be strengthened and redefined several times, depending on needs and opportunities, the legal framework, political support and the level of trust, capacity, credibility, legitimacy and success of the partners and the whole co-management arrangement.

There is a wide diversity of cultures, lifestyles, livelihoods and socioeconomic contexts within natural resource management in Mexico. It is therefore impossible to develop a common strategy to address all needs, interests and motivations. Nevertheless, to engage resource users as equal partners in MPA design, implementation and management, and integrate their livelihood concerns into MPA programmes of work, we must:

- improve communication among the different categories of MPA stakeholders;
- understand the needs and interests of local resource users;

- develop local capacities and mutual trust;
- facilitate the development and the sustainability of local natural resource management institutions (such as community councils);
- share protected area management responsibilities by establishing, adapting and consolidating partnership arrangements with government agencies and inclusive community councils;
- provide consensus-building and conflict-resolution mechanisms;
- implement simple, low-cost and effective local enforcement mechanisms; and
- improve existing advisory councils.

Endnotes

1. Julia Fraga has been working with fishing communities along the Yucatan Peninsula for more than 20 years and Ana Jesus has recently carried out a follow-up study on the community-based management of a small MPA in Yucatan.
2. According to Cicin-Sain and Knecht (1998), a "coastal zone" can be defined as the area at the interface between land and sea, suffering both land and sea influences, and its boundaries depend on biogeographical conditions, socioeconomic and cultural uses, existing problems and the legal system.
3. Promulgated in 1988, amended in 1996 and in 2007.
4. Promulgated in 2007.
5. According to Cicin-Sain and Knecht (1998), ICM can be defined as a continuous and dynamic process by which decisions are made for the sustainable use, development and protection of coastal and marine areas and resources. The process is designed to overcome the fragmentation inherent in both the sectoral management approach and the splits in jurisdiction among levels of government at the land-water interface.
6. Ecological Zoning Programmes (Programas de Ordenamiento Ecológico del Territorio–OET) are policy tools used to promote environmental protection and the sustainable use of natural resources through a rational spatial allocation of economically productive activities, by defining land and water use regulations, which apply to all government agencies at the federal, State and municipal levels (Bezaury-Creel, 2005).
7. In Spanish: Departamento Autónomo Forestal y de Caza y Pesca
8. Mexico's terrestrial territory: 196,437,500 ha (INEGI 2007)
9. Mexico's territorial sea (12 nautical miles): 20,900,000 ha (INEGI 2007)
10. Mexico's continental shelf: 39,460,300 ha (INEGI 2007)
11. Mexico's EEZ: 314,992,000 ha (INEGI 2007)
12. An *ejido* is a Mexican group of peasants collectively farming a piece of land under a system supported by the State.
13. Cooperatives have a union-like structure in which individual fishermen (mostly small-scale) get together to obtain credits, governmental subsidies and protect monetary and labour rights. Frequently fishermen in cooperatives are owners of their own gear and crafts and most of them have a varying but low income from fishing (Hernandéz and Kempton, 2003).
14. Exchange rate: 2004–MXN 11.53/US$1.00

15. Operating in coastal waters up to three nautical miles from the coast, employing small vessels up to 10 metres long (CONAPESCA, 2007).
16. Operating in coastal and oceanic waters, including outside Mexico's territorial sea and exclusive economic zone (200 nautical miles), employing large vessels bigger than 10 metres long (CONAPESCA, 2007).
17. Ten of these MPAs had already been mentioned by the key informants as having resulted from the initiative of local communities.
18. In Spanish: Programa Equidad de Género, Medio Ambiente y Sustentabilidad 2002-2006.
19. In Spanish: Programa Especial Hacia la Igualdad de Género y la Sustentabilidad Ambiental 2007-2012.
20. In Spanish: Instituto Nacional de las Mujeres.
21. Jesus, A 2007, Follow-up on the local implementation of an MPA in the small fishing village of San Felipe, Yucatan: environmental changes and community-based management issues, M Sc thesis, Universidade do Algarve, Faculdade de Ciências do Mar e do Ambiente, Portugal.
22. San Felipe is a small fishing village with about 1,825 inhabitants on the northeast coast of Yucatan (see Figure 7).
23. After two years of negotiations with the SEMARNAP and the SECOL trying to get one of these government agencies to officially recognize the area that was decreed as a municipal marine reserve named Actam Chuleb in 1997.
24. The State government and the municipalities may enter into these partnership arrangements alone or in coordination with the appropriate federal authorities.
25. An important three-year multidisciplinary research project was carried out in San Felipe focusing on the community-based management of the Actam Chuleb MPA, funded by IDRC.
26. Social capital can be defined as the features of a social organization that facilitate collaboration and cooperation for mutual benefit, such as networks, norms and social trust (Putnam, 1995).
27. This case study was undertaken by Eugenio A Aragón Noriega of Centro de Investigaciones Biológicas del Noroeste, S C–Unidad Sonora, México. Email: aaragon04@cibnor.mx
28. Ph D student from the Universidad Autónoma de Baja California Sur, México. Email: mlagunas@uabcs.mx
29. Researchers from the Departamento de Ecología Humana, CINVESTAV-Mérida, México. Email: jfraga@mda.cinvestav.mx; necheverria@mda.cinvestav.mx

30. Ph D student from El Colegio de la Frontera Sur, Campeche, México. Email: mlrosale@yahoo.com

31. M Sc student from the Departamento de Ecología Humana, CINVESTAV-Mérida, México. Email: dbuitrat@mda.cinvestav.mx

32. Participatory research is a cyclic, ongoing process of research, reflection and action, which seeks to include local people in designing the research, gathering information, analyzing data and taking action. It aims to empower community members through the valorization of local knowledge and by providing local people with the opportunity to learn new skills and contribute to the research process (Landon and Langill, 1998).

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APPENDIX

QUESTIONNAIRE SENT VIA E-MAIL TO KEY INFORMANTS

COASTAL AND MARINE PROTECTED AREAS IN MEXICO

(Whenever you wish, feel free to illustrate your answer with case study examples.)

1) In your opinion, does the establishment of marine protected areas (MPAs) in Mexico result from any kind of integrated coastal management strategy?

   a) Yes

   b) No

2) Considering the establishment of MPAs in Mexico nowadays, what are the main:

   a) Benefits _____

   b) Problems _____

   c) Conflicts of interests _____

3) Considering those MPAs in Mexico that have a management plan, how would you classify the observed level of compliance with the MPA administrative rules and applicable legal framework?

   a) High

   b) Medium

   c) Low

4) In your opinion, which are the major weaknesses of law enforcement mechanisms used in the Mexican MPAs?

5) How can these weaknesses be overcome?

6) In your opinion, in the Mexican context, what are the current impacts of MPAs on the following coastal economic activities:

   a) Fisheries _____

   b) Aquaculture _____

   c) Tourism _____

   d) Urban development _____

7) In Mexico, to what extent and how do fisheries managements and MPA managements coordinate with each other?

8) In the Mexican context, what is the role played by local stakeholders (e.g. fishermen, fisherwomen, fish traders, tourist guides, community organization, etc.) in the:

   a) Establishment of MPAs _____

   b) Development of management plans (including zoning) _____

   c) Management of MPAs (including monitoring and patrolling) _____

9) In your opinion, are there any MPAs in Mexico in which the traditional knowledge of the local stakeholders might be determinant for its management?

   a) Yes Which one (s)? _____

   b) No

10) In your opinion, is it relevant for the management of Mexican MPAs to combine, in an effective way, the scientific knowledge with the traditional knowledge?

   a) Yes Why? _____

   b) No Why? _____

11) Please characterize the mechanisms currently used in Mexico to promote MPA management decentralization from federal and State governments, and encourage participation of local authorities and stakeholders in the decision-making processes.

12) What is the importance given to gender issues in the decentralization mechanisms currently used?

13) Do you consider that women should be involved in the management of MPAs?

   a) Yes Give examples _____

   b) No Why? _____

14) Do you know any MPA in Mexico that has resulted from the initiative of local communities?

a) Yes Which one(s)? _____

b) No

15) Do you think that MPAs being locally managed might work effectively in the conservation of natural resources?

a) Yes Why? _____

b) No Why? _____

16) According to your experience and knowledge, please characterize Mexican co-management experiences.

17) In your opinion, what are the main challenges faced by the Mexican government to increase the efficiency of its MPAs?

GENERAL COMMENTS _____

Personal Information, please mark the corresponding option(s):

Sex:

a) F
b) M

Age range:

a) 20-30
b) 31-40
c) 41-50
d) 51-60
e) 61-70
f) 71-80

Profession:

a) Researcher
b) NGO member
c) Member of a governmental agency
d) Manager of an MPA
e) Member of a donor agency
f) Other

SAMUDRA Monograph

Coastal and Marine Protected Areas in Mexico

This study on marine protected areas (MPAs) in Mexico relies on a variety of data sources as well as the authors' longstanding field experience, particularly in the Yucatan Peninsula, to analyze the design, establishment and operation of protected areas. It discusses two case studies of MPAs in detail and summarizes the findings from four others, focusing primarily on the role played by local communities in managing coastal and marine resources. The study also draws on the perspective of key informants, namely, Mexican experts on coastal and ocean management issues, including government officials, decisionmakers, researchers, members of non-governmental organizations (NGOs), and consultants.

The study aims to provide an overview of how local stakeholders are engaged in the conservation of natural resources, how their livelihoods are affected by the establishment of protected areas and what their interests are. All case studies have been developed from an ethnographic perspective–using the observations of participants, focus groups, and semi-structured and structured interviews and questionnaires. The study finds that while MPAs can protect biodiversity and regulate and promote the sustainable use of coastal and marine resources, Mexico is not making optimum use of them, mainly due to the lack of financial resources, personnel and infrastructure.

This publication will be useful for researchers, NGOs, policymakers and anyone else interested in issues relating to fisheries, biodiversity, communities and livelihoods.

ICSF

ICSF is an international NGO working on issues that concern fishworkers the world over. It is in status with the Economic and Social Council of the UN and is on ILO's Special List of Non-Governmental International Organizations. It also has Liaison Status with FAO. As a global network of community organizers, teachers, technicians, researchers and scientists, ICSF's activities encompass monitoring and research, exchange and training, campaigns and action, as well as communications.

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