COASTAL PROTECTED AREAS IN MÉXICO: A MANAGEMENT ASSESSMENT

by

ELENA CHAVARRIA

RESEARCH REPORT

Submitted to

Marine Resource Management Program
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Elena Chavarría
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LIST OF ABBREVIATIONS

CIQRO	Centro de Investigaciones de Quintana Roo (Quintana Roo's Center for Research)
IMERNAR	Instituto Mexicano de Recursos Naturales Renovables (Mexican Institute of Renewable Natural Resources)
INEGI	Instituto Nacional de Estadística, Geografía e Informática (Institute of National Statistics, Geography and Computer)
PCA	Protected Coastal Area
PLANADE	Plan Nacional de Desarrollo (National Plan of Development)
PNE	Programa Nacional de Ecología (National Program of Ecology)
SAHOP	Secretaría de Asentamientos Humanos y Obras Públicas (Ministry of Human Settlements and Public Works)
SAG	Secretaría de Agricultura y Ganadería (Ministry of Agriculture and Cattle-Growth)
SARH	Secretaría de Agricultura y Recursos Hidráulicos (Ministry of Agriculture and Hydraulic Resources)
SECTUR	Secretaría de Turismo (Ministry of Tourism)
SEDUE	Secretaría de Desarrollo Urbano y Ecología (Ministry of Urban Development and Ecology)
SEPES	Secretaría de Pesca (Ministry of Fisheries)
SPP	Secretaría de Programación y Presupuesto (Ministry of Budget and Programming)
SINAP	Sistema Nacional de Areas Naturales Protegidas (National System of Protected Natural Areas)
ZFMT	Zona Federal Marítimo Terrestre (Federal Maritime Land Zone)

1 INTRODUCTION

It is generally acknowledged that marine environments are in jeopardy. Pollution abounds, overfishing is prevalent, some coastal areas are overdeveloped, and there continues to be losses in the biological productivity of many regions (Ray and Dasmann, 1976). Along the coasts of México this situation is persistent (Yañez-Arancibia, 1982; Merino, 1987; PNE, 1984). Within the last six years, a systems approach has been utilized by México's Ministry of Urban Development and Ecology in conceptualizing and planning for natural protected areas (PNE, 1984). No longer are planners and managers concerned solely with sectoral planning and single resource protection; a broader perspective, involving sustained use, ecosystem management and integration of regional priorities is replacing this narrow view.

However, there is evidence that in México management efforts for protected coastal areas are inadequately coordinated. Silva and Desilvestre (1986), Sorensen and Brandini (1987), and Salm and Clark (1984), contend that the principal need in México today is for improving the management of existing protected coastal areas rather than continuing to emphasize all-out national development. The same authors indicate that the state of these areas should be closely examined and that alternative management measures should be studied.

Mexican environmental policy, as a distinct body of law specifically involving protection of coastal areas, draws on loose legal antecedents from the late 1960's and early 1970's (Chávez, 1979; Vargas, 1984). The present conceptual strategy used by the Mexican government to manage protected coastal areas is based on more integrated and well-synthesized ecological or whole systems planning. In order to accomplish a set of goals, proponents of this perspective base specific management concepts on a thorough understanding of the ecology of coastal systems (Odum, 1976; Miller, 1980), and stress that the system of protected coastal areas can not be drawn up and implemented in a

vacuum; it must be viewed within the larger framework of economic and social coastal management and development.

Objectives

The primary objective of this study is to assess the Mexican experience in managing coastal natural areas. The assessment is based on the categories, uses, objectives, and political elements of Mexican protected coastal areas and governmental efforts to develop and manage these areas. Specific problems within each protected coastal area will not be addressed here; such an undertaking is beyond the scope of this study.

The second objective is to place the Mexican experience with coastal protected areas within a global perspective. The evolution of specifically coastal-oriented management efforts on natural protected areas in México will be presented, and compared to other nations when appropriate. Problems common to the management of these areas worldwide as well as in México will be discussed. It is intended that this brief presentation will stimulate thought, discussion and future action in the broad framework for management planning of protected coastal areas in México.

For the sake of simplicity, the term "protected areas" will be used to signify all existing designations such as national and regional parks, sanctuaries, ecological and biosphere reserves, underwater refuges, and natural monuments.

2 GEOGRAPHY

Given the amount of coastline relative to the area of the country itself, México, much like other countries with a high ratio of coastline to land mass, would be expected to exhibit a strong tradition of economic and cultural coastal development (Merino,

1987). In combination with a variety of morphological features and climatic zones, the 10,000 km of coast line (500,000 km2 of continental shelf, 1,600,000 hectares of estuarine areas, and approximately 12,500 km2 of coastal lagoons), contribute to a rich variety of coastal environments. However, economic and cultural coastal development in México has not been strong in the past. The reasons for this will be dealt within a historical context later.

Coastal Regions of México

For the purpose of this study, the classification system developed by Merino (1987), will be utilized. Based on gross environmental characteristics and the main kinds of coastal resources or uses, México is divided into 7 regions, 3 on the Pacific coast and 4 on the Atlantic (Figure 1, Appendix 1).

In all 7 coastal regions, lagoons are a common and important feature. Lankford (1977), reports the existence of more than 125 coastal lagoons along the Mexican coast, covering an area of 12,300 km2 (Yañez-Arancibia, 1982). The importance of coastal lagoons can be appreciated if one realizes that the 12,500 km2 area is equivalent to a hypothetical strip of land 1.25 kilometers wide, extending along the entire Mexican coastline.

The Pacific Coast

Region I, the outer coast of Baja California, supports highly productive open-water fisheries; anchovies and sardines in the north and tuna in the south. Coastal land ecosystems in this region are characteristically desert with extreme temperature ranges. The landscape of Baja California is very attractive to U.S. tourists (Bosselman, 1978), but fisheries remain the critical economic base for this region. The lack of environmental impact assessment, particularly on saline intrusion into coastal lagoons has led to substantial reduction in the quality of coastal ecosystems (PNE, 1984).

Region 2 includes the area south of Cape Corrientes to the border of Guatemala. Narrow continental shelves, together with low river discharge, normally keep the waters of this region clear blue, with low biological productivity. Spectacular coastal rock formations, long beaches, and tropical vegetation create settings of great tourist value which are being exploited by such resort cities as Acapulco, Manzanillo, Zihuatanejo, and Ixtapa. Petrochemical products from the industrial complexes of Lázaro Cárdenas and Salina Cruz are beginning to adversely affect the commercial fisheries and tourist value of this region (PNE, 1984). Although not scientifically documented, these towns are beginning to show symptoms of domestic or industrial pollution (PNE, 1984).

Region 3 encompasses the east coast of Baja California. The lack of fresh water in Baja California determines that human settlements in Region 3 are scarce and associated mainly with tourism (Loreto, Los Cabos, La Paz), or mineral extraction (Santa Rosalía, La Paz). Region 4 includes the densely populated continental coast of the Gulf of California. Important fishing ports like Guaymas, Mazatlán, Yavaros, Puerto Peñasco, and Topolobampo rely on the high fertility of this side of the Gulf. This marine productivity is induced by coastal upwelling and river discharges from the Magdalena, Sonora, Yaqui, Papigochic, Bavisque, Fuerte, and Sinaloa Rivers. Highly productive irrigated farmlands are located on the coastal plain of this region. The diversion of river water, agricultural drainage, and urban pollution all contribute to negative effects on coastal fisheries, specially nursery areas for shrimp (Merino, 1987).

The Atlantic Coast

The nation's widest continental shelves (up to 140 nautical miles wide) are found in the Gulf of México. Associated with these shelves are exploitable oil fields. Ports and coastal cities like Tampico, Tuxpan, Poza Rica, Coatzacoalcos, and Ciudad del Carmen have developed around oil extraction, refining, or transportation. Upwelling in the Yucatán channel, high river discharge, and abundant coastal lagoons all contribute to a

strong fishery in the Gulf of México. The conflict between fishing interests and oil development is the critical current economic issue on the Gulf coast, particularly in the Campeche Bank area (Ojeda, 1985; Secretaría de Pesca, 1985; Secretaría de Pesca, 1986).

A division of the Atlantic coast into two regions is suggested by Merino (1987), using Laguna Términos (see Figure 1, Appendix 1) as a dividing point. West of this point is Region 5; numerous rivers support large farms and ranches as well as large metropolitan areas in this region. Decreased volume, increased pollution, and episodic flooding in coastal rivers have adversely affected coastal waters (PNE, 1984).

Region 6, in contrast to Region 5, has few rivers. Both regions share oil and fisheries resources and the consequent conflicts. The lack of fresh water and arable land, as well as the high percentage of wetlands has historically limited population growth in this region.

Region 7 includes the eastern coasts of the Yucatán Peninsula from Cape Catoche south to the international boundary with Belize. Karstic carbonate formations distinguish this part of the peninsula's geology. The absence of river discharge keeps Caribbean waters clear, and relatively unproductive. High clarity and warm water temperatures have contributed to the formation of a coralline barrier reef along the very narrow continental shelf that borders the entire coast of the region. Fine white carbonate sands and numerous coastal archaeological sites also contribute to the attractiveness of this region for tourism.

3 HISTORIC CONTEXT

Historical patterns of land use and habitation explain the unusual lack of coastal population and hence coastal orientation in México. A focus on inland economic activities distinguishes both the pre-Hispanic and Hispanic periods. Skilled native engineers produced the complex system of aqueducts, canals and reservoirs characteristic of pre-Hispanic times. Excluding the Mayan culture, which was located in the Yucatán area, all 16 remaining native civilizations were situated well inland at the time of the Spanish conquest (García, 1986). The lack of coastal population, the harsh coastal climate, disease and preoccupation with mineral interests influenced the conqueror's inland movement and occupation (Días, 1955). The bulk of population density has remained in these inland areas; only 12.7% of the current population resides in 126 coastal communities within the 7 coastal regions described in the previous section. It is interesting to note, then, that the population distribution has been relatively sparse in the coastal regions.

The protection of Mexican coastal areas was influenced by events which happened near the beginning of the 20th century. The initial impetus arose from legislation aimed specifically at the protection of terrestrial coastal areas: the "Zona Federal Maritímo Terrestre (ZFMT). Mexican law inherited the concept of coasts and beaches as a public trust and property of the nation from the Spanish Crown. This public trust concept was articulated vaguely in the Independence Act of 1821. The public trust concept was eventually formulated in the National Constitution of 1917, the main document upon which the ZFMT and other legislation is founded. Article 27 of the 1917 Constitution clearly states that waters of the territorial seas, interior waters, lagoons, lakes, and rivers are all property of the Nation. In regard to offshore and submerged lands, the Article states that "the Nation has direct dominion over all the resources of the continental shelf and sea bottom around the islands. "Land gained" from the sea and other water bodies are also included as property of the Nation. Public trust and land

concepts are reaffirmed and extended in modern legislation, mainly through the Ley General de Bienes de la Nación (General Law on National Welfare and Public Trust, 1917). This domestically generated attention to protection of the coastal environment was reinforced by events in the international arena as well.

Within three decades after the first U.S. national park was created, México established Bosque del Desierto de los Leones (1899) near México City, as its first natural protected area (Beltrán, 1974).

At the beginning of this century, forestry engineer Miguel Angel de Quevedo urged the government to designate a wider variety of natural protected areas. His knowledge and interest led him to key administrative and political positions in the administration of Lázaro Cárdenas (1935-1940). Under de Quevedo's influence, 82 natural protected areas were designated, each classified as a national park, forestry reserve or protected forestry zone (González and Sánchez, 1961). The first protected coastal area designated as a national park, was Lagunas de Chacahua, during this period (1937) (González and Sánchez, 1961).

Laudable as the designation of numerous natural reserves may have been, there was no concomitant protective legislation. De Quevedo made a modest start with Paragraph V of the Second Law of Forestry of 1934 of the Mexican Constitution (Sosa, 1968). In it, de Quevedo called for protection of forests within any of the existing categories of natural reserves (Chávez, 1979).

In 1958, a meeting of the International Union for the Conservation of Nature and Natural Resources (IUCN) was held. Dr. Harold Coolidge, the delegate from the United States, proposed the creation of an International Commission on National Parks in order to support studies of these areas throughout the world, and to promote the concept of protection of natural areas, the notion of conservation, or, if warranted, the wise use of resources within a protected area. Dr. Enrique Beltrán, pioneer conservationist and leading Mexican biologist, was designated to represent México on that commission. The

"friendly coercion" utilized by the United Nations to force México, as well as other member nations, to adopt the somewhat nebulous term "conservation" left México with a less than clear understanding of how to incorporate this concept into management objectives (González and Sánchez, 1961; Miller, 1980; Vargas, 1984).

In 1961, under the direction of Dr. Beltrán, the Mexican Institute of Renewable Natural Resources (IMERNAR), conducted several studies on the status of natural protected areas at that time, addressing the need for a redefinition according to their objectives, recreation facilities, flora and fauna, outstanding characteristics, and technical requirements (González and Sánchez, 1961). Based on the classification system developed by Bourdelle in 1947 (Bourdelle, 1956), these areas were assigned to the following categories: national park, national reserve, natural monument, and pristine region reserves. The administration of these redesignated natural protected areas was removed from the Agriculture and Cattle-Growth Ministry (SAG) and allocated among 4 Federal agencies (Vargas, 1984); remaining there until the administration of President de la Madrid (1982-1988).

Although Luis Echeverría Alvarez did not include coastal protection concerns in his 1970 presidential campaign, after his election his administration became receptive to these incipient demands for global environmental protection. Two laws were enacted in 1971 addressing public health and pollution prevention and control matters. However, the new laws only gave a measure of enforcement power to the governing agencies; intended to control "environmental threats and hazards," the wording of the Laws was nevertheless too vague to encourage strict enforcement of policies (Chávez, 1979; Vargas, 1984).

In 1982, the Environmental Protection Law, based on the Mexican Constitution of 1917, substantially reinforced the earlier laws (Vargas, 1984). Among its principal additions were new chapters addressing problems of marine ecosystem protection and recognition of more restrictive uses within some of the existing protected coastal areas.

As a result of this law, several protected coastal areas (Punta Cancún, Ría Celestum, and Ría Lagartos) were designated "ecological reserves."

By the end of López Portillo's administration in 1982, however, policy on protection of environments remained low on the administration's active policy agenda. Despite the laws attached to the protected coastal areas, professional observers were labelling the environmental legislation of López Portillo's administration a failure (Fuentes, 1985). Most telling was the fact that, excepting references in the planning documents mentioned above, environmental policy was never mentioned in the president's major policy speeches, nor actively promoted at the national level. Instead, middle-level government planners, university researchers, and professional organizations, most of them centered in México City, were the principal proponents of environmental policy during this period. During the de la Madrid administration (1982-88), there was a substantial departure from the priorities of past administrations concerning the environment, and several innovations were introduced which contrast impressively with the Mexican government's historically unrestrained commitment to rapid industrialization. Indeed, few knowledgeable observers had previously held out much prospect for the development of an effective environmental policy in México. Recent environmental laws enacted between 1970 and 1980 and revision of environmental quality regulations in 1988 strengthened Mexican environmental policy.

Virtually every coastal state within the Mexican Republic has, or is proposing, at least one protected coastal area that falls under the national broad definition of "natural protected area" (Fig. 1; Tables 1,2,3 and 4, Appendix 1). With these actions, México has reached a critical level of awareness necessary for future effective coastal protected area management. Even though México's history of conservation and protection efforts is a long one, with a high number of designated natural protected areas, it is important to note that the recognition of coastal areas as needing coherent and unique management objectives has only very recently occurred (Silva and Desilvestre, 1986). Unfortunately,

the popular action now occurring over coastal protection issues is largely an ad hoc protest rather than a systematic, well-organized movement.

4 PROTECTED COASTAL AREAS IMPLEMENTATION

The structural arrangements whereby protected coastal areas are managed and administered in México is based on a national level of authority. The management of these areas depends upon a centralized form of government, and is characterized by a strong federal programme with delegation of staff and resources directly from the Ministry of Urban Development and Ecology (SEDUE), on all matters.

Agencies

Under the de la Madrid administration, the Mexican government underwent a sweeping reorganization that led to the creation of new agencies and strengthening or elimination of old ones. Government agencies involved in protected coastal areas in one way or another have increased, but the Ministry of Urban Development and Ecology (SEDUE), established in 1982, has overall jurisdiction. SEDUE's central office is in México City, with an state office in each of the Mexican states. The jurisdictional mandates of SEDUE related to protected coastal areas are environmental regulations, creation and management of parks and reserves, and control over the ZFMT. SEDUE is responsible for issuing license permits and base agreements, and regulating fish and game and cultural activities within protected coastal areas (PNE, 1984).

Upon its creation in 1983, SEDUE embarked on the preparation of a National System of Natural Protected Areas (SINAP), structuring five categories of natural protected areas, based on the classification proposed by the International Union for the Conservation of Nature (PNE, 1984).

Despite the consolidation of authority, administration of natural protected areas by SEDUE has remained fragmented. Subsidiary functions were delegated to three additional governmental agencies, all of which can instigate single agency or multiple agency research projects. The object of these studies was to provide better quality data in order to facilitate more in depth policies and objectives for protected coastal areas. The three additional federal ministries with certain powers over coastal protected areas are the Ministry of Fisheries (SEPES), the Ministry of Tourism (SECTUR), and the Ministry of Budget and Programming (SPP); the last of which is responsible for the approval of budgets of all three ministries. These ministries, the level of government to which they belong, and the main powers and functions they have, relative to the protected coastal areas, are shown in Table 5 (Appendix 1).

México, and many other Latin American countries, uses sectoral planning to manage various coastal resources or activities. Sectoral planning is an expression of single-purpose thinking, and is made up of separate efforts to coordinate the gathering, analysis, planning and implementation, by different sectors of the national economy to promote development. In reference to coastal management, sectoral planning is primarily utilized for ports, fisheries, tourism, oil and gas development, and protection of natural areas. While several of the new reforms proposed in the National Program of Ecology, which are related to coastal development are novel and entail much coordination in planning and implementation, but many jurisdictional and operational ambiguities remain to be reconciled in practice due to the structure of this sectoral planning strategy that fails to integrate the plans of related sectors into a whole (Vernon, 1963).

SEDUE's legal definition of a natural protected area is: "A form of land tenancy established with the primary purpose of producing public benefits to the nation through the conservation of useful, potentially useful, and endangered resources (PNE, 1984). Laws specifically governing natural protected areas today are also administered by SEDUE. Although SEDUE, SEPES and SECTUR are responsible for enforcing

environmental laws, compliance is low because of limited funds for adequate enforcement personnel.

Legal Framework

México has adopted general legislation on protected areas but without specific provisions for coastal environments. Under present conditions, protection of coastal areas is established by special decree or impulsive enactment which has usually resulted in uneven and erratic legislation. For example, the decree for the Cabo San Lucas Underwater Sanctuary is based on the Fisheries Law. Another law applicable to protected coastal areas is the Environmental Impact Law. The potential role of this law, in protected coastal areas, is in its amendments of requiring governmental and private organizations, to undertake an environmental impact assessment of any proposed development projects prior to their implementation, to evaluate possible impacts on the environment.

The new amendments to the federal law of Environmental Protection of 1988 make this law more comprehensive in scope and sensitive to México's recent emphasis on economic development. In this law, environmental issues, framed in the language of "ecology," extend to virtually every facet of human interaction with the natural environment; language specific to coastal issues is also included (Mumme, Bath and Assetto, 1988).

Article 49 of the General Law on the National Welfare, establishing the ZFMT Law, is another part of the legal framework used in environmental protection. The law states that a strip of land including all of the intertidal zone plus the 20 adjacent meters inland; cliffs or rocky shores, and the 20 meters inland adjacent to the first free point on the top, are to be designated public property, not to be bought or owned by any private parties (SAHOP, 1982). This concept of "property of common use" is equivalent to the

American concept of public trust lands, and includes seashore waters, fisheries, and river banks (Merino, 1987).

A National Program of Ecology including environmental protection throughout the coastal zone, has been implemented by the newly created SEDUE. However, this program consists of general pronouncements, and does not include specific actions. Although the National Program of Ecology 1983-1988 is an important first step, more precise implementation programs are needed for protected coastal areas.

National Program of Ecology 1983-1988

A National Program of Ecology was prepared by the federal government to be implemented by the recently organized SEDUE. This program, addressing the preservation of coastal natural areas and their resources, is the product of some broadly defined objectives pertaining to environmental protection within the National Plan of Development (PLANADE) for 1983-1988. The Plan is the current planning framework for all government actions in the area of development.

The National Program of Ecology (1983-1988) is the first Mexican governmental publication that reviews natural protected areas in a systems approach. This document has gone far in recognizing the value of protected coastal areas; however it does not consider coastal protection as a specific planning element. Among the ecological priorities mentioned in the program which are related to protection of coastal areas, are:

1. To restore highly altered or polluted coastal ecosystems.

2. To increase areas within the National territory to be protected by decree.

3. To redistribute a percentage of protected areas according to the representativeness of the principal terrestrial and marine ecosystems.

4. To promote recycling and technical, administrative and financial efficiency in waste water discharge.

5. To promote the increase in population of endangered and threatened species.

6. To avoid over-exploitation of crustaceans.

7. To apply the Environmental Impact Procedure to all projects that may cause regional ecological impact, particularly tourism, ports, urbanization and industry.

8. To prevent and control pollution of marine ecosystems by solid wastes.

9. To observe and monitor populations of marine wildlife, marine mammals and endemic fish.

10. To look for productive alternatives in coastal and marine ecosystems according to their potential.

11. To elaborate a National Catalog on aquatic fauna and flora.

12. To elaborate a National Catalog on aquatic environments (PNE, 1984).

From the perspective of Mumme et al., (1988), the National Program of Ecology is simply a "list of good intentions" lacking serious commitment to protection of coastal areas, because the Program does not have implementation included.

IMPLEMENTATION PROBLEMS

Up to this point, it has been demonstrated that México has established a broad variety of natural protected areas. Within that system of natural protected areas, some coastal protected areas have been set aside, but the government has not recognized them as aspects of the environment with distinctive enough characteristics to deserve a specific set of management imperatives. The legal precedent for the control and use of terrestrial development in México is extensive, but there is no such precedent for coastal areas (Megank, 1979). Several factors contribute to the lack of such protective measures. Among them, the complex interaction of environmental and socio-cultural factors as well as weaknesses within the bureaucratic structures that administer natural protected areas have only recently begun to be addressed by the Mexican government and interested populace (Merino, 1987, Miller, 1980; Silva and Desilvestre, 1986, PNE, 1984; PLANADE, 1983). The following sections will address some of these issues in greater

detail. Also included are some alternatives developed by other nations in addressing similar issues.

Socio-cultural Background

According to the 1980 National Census (INEGI, 1980), only 12.7% of México's total population is distributed among the existing 126 coastal municipalities. The mean population density of México's coastal states is 28 inhabitants per square kilometer, while this value almost doubles to 48 for the non-coastal states. Of the 17 coastal states, only 3 have their capitals on the coast. These statistics provide an indication of the relative lack of importance México's coastal areas, compared to inland development, in the everyday life of Mexican citizens.

Recalling previous mention of pre-Hispanic and Hispanic settlement patterns, one can begin to understand the continued lack of coastal orientation by Mexican citizens. The great Aztec empire, as well as the majority of all other prehispanic cultures, preferred the higher quality soils and more available water of inland México. Habitation of México's coastlines was supported almost exclusively by fishing (Días, 1955).

Land Tenure and some International Alternatives

The concept of "ejidos," a traditional land use pattern in México, has complicated the issue of coastal protection. In the early 1900's, the revolutionary Emiliano Zapata, urged rural citizens (and the federal government) to allow the rural population the agricultural use of México's public lands (Fuentes, 1985). These rural inhabitants, ejidatarios, used the land to graze, farm and build homes on. In the early 1920's laws were enacted enabling the federal government to expropriate lands held by ejidatarios or private owners for any purpose considered to benefit the whole nation rather than only the ejidatarios. The government maintained that the land would be put to such "higher" uses as mining, oil and gas extraction, and in some cases, even environmental protection.

This expropriation requires an obligatory payment by the federal government to owners (ejidatarios) for their land, or for the use of their land for other purposes than those assignable by them. The supporting legislation for this expropriation is based on the Forestry Law (Ley Forestal) and its amendments, the Expropriation Law (Ley de Expropiación), the Federal Law on Land Reform (Ley Federal de Reforma Agraria), and the Federal Law on Environmental Protection (Ley Federal de Protección al Ambiente). The government has a period of ten years to carry out this type of transaction.

This kind of "payment" arrangement may lead to serious social problems for the owners. In most of the cases the government pays the owner for the rights or sometimes simply takes those rights away. When ownership does not change, the owner loses some of the rights which are normally associated with ownership such as the right to use the land, or to hunt, to fish or to develop the property (Chávez, 1979). "Ejidos" represent a problem when there is a need for a protected coastal area to be established on this particular kind of land tenure.

France operates an acquisition program dedicated to "carrying out" a land policy for coastal protection, with the aim of "respecting the natural landscape and ecological balance" (Sorensen, McCreary and Hershman, 1984). Its Coastal Conservatoire may enter into covenants with individuals to secure protection of the shoreline. A similar approach could be applied in México to the cases of ejidos and private owners.

British experience with land acquired in order to achieve overall coastal protection dates back to 1895, when the National Trust for Places of Historic Interests accomplished its first acquisition of the coastal cliffs at Dinas Oleu (Sorensen et al., 1984). In 1965, Enterprise Neptune was launched: a campaign aimed at fund raising, with the intention of acquiring coastal property to be included in existing federally protected zones (Chapman, 1974 and Shapiro, 1984). England's National Trust program has served as an effective model for similar citizen-oriented efforts in New Zealand and Japan (Sorensen et al., 1984), and could be implemented in México.

In other cases, coastal land acquisition programs have helped to restore degraded natural areas and return them to uses that give higher priority to environmental values. The California Coastal Conservancy has been involved in acquiring land in order to improve access to the coast, as well as stream and wetland restoration (California Coastal Conservancy, 1983).

There has been a tendency to assume, however, that a problem is solved once an acquisition transaction is complete. For example, the Mexican land acquisition project which subsequently led to the establishment of Lagunas de Chacahua National Park in 1937, put under public trust critical wetland and estuarine habitats. However, the objectives were undermined by poor land use practices on the surrounding watershed (Vargas, 1984).

Land tenure in México, remains a volatile issue, concerned with an individual's rights of previous occupancy vs. the government's right to expropriate the land on the basis of "greater good" motives.

Exclusion Zones

The usefulness of the ZFMT in providing a legal basis for thorough protection of coastal areas has been shown to be limited, due primarily to the narrow width of its zone of protection -only 20 meters- and that only on land. Adequate control of most coastal ecosystems realistically requires an area much wider than 20 meters, with the need to aim for jurisdiction over not only an appropriate amount of ground, but a comparable amount of water.

The governments of Australia (Cullen, 1982), Greece and USSR (Snedaker and Getter, 1985), for example, have defined a much wider area of exclusive or restricted use: 400 meters, 500 meters and 3 kilometers respectively.

Sorensen and Brandini (1987) cited Costa Rica's federal zone of coastal administration as an illustration of the relative ease with which a developing nation has been able to strengthen restrictions on protected coastal areas on the basis of an already

existing, and generously defined, exclusion zone. In spite of the need for a wider federal coastal zone in México, an increase appears unlikely, since most of the adjacent lands are owned by private parties and groups whose interests may not coincide with those pertaining to coastal protection (Salm and Clark, 1984; Silva and Desilvestre, 1987).

Environmental Problems and Issues

Endangered Species Protection

Some important coastal wildlife habitats along the Gulf of México have been altered or destroyed, only to have their value recognized later (PNE, 1984). In a few cases there have been attempts to rehabilitate valuable habitats and to restore species populations. All along the Mexican coasts, sea turtles have been over-exploited for several decades (Secretaría de Pesca, 1984), but today these species are among the few most frequently controled in protected coastal areas. In virtually every case, however, this protection has been limited to beaches designated as nesting refuges. These attempts have proven costly and the rehabilitation period lengthy, particularly along the Caribbean coast (Carr, 1984; CIQRO, 1984). Decreasing numbers of waterfowl have also contributed to the establishment of a number of protected coastal areas in México (Silva and Desilvestre, 1987). Ría Celestum and Ría Lagartos, on the Yucatán coast and Isla Contoy and Sian Ka'an on the Caribbean coast provide protected nesting areas for sea birds such as frigate birds, brown pelicans, flamingos and sea gulls. Inventory at the outset of the 1980's showed severely depleted populations for each of these species (PNE, 1984).

Major efforts to protect marine mammals along the coastal waters of México, have resulted in the designation of Vizcaino-Ojo de Liebre, Guerrero Negro, and San Ignacio lagoons in Baja California Sur. These areas were predominantly the result of

international pressure on the Mexican government to designate these coastal areas as sanctuaries for breeding territories of gray whales (González and Sánchez, 1961).

Much money and effort have been invested by the United States in a collaborative program with México to protect the Kemp's ridley turtle (Lepidochelis kempi)(Salm and Clark, 1984). The annual contribution by the U.S. to this program is $300,000. The Mexican government contributes mainly enforcement manpower through its Fisheries and Navy ministries (Salm and Clark, 1984).

Pollution

No official government reports on the degree and type of pollution in Mexican coastal waters have been produced to date. However, symptoms of eutrophication and accretion are beginning to show along the important estuarine regions of Baja California, on the coast of the Pacific states of Guerrero and Oaxaca, in the Veracruz area on the Atlantic Coast, and in the state of Quintana Roo, on the Caribbean (PNE, 1984).

More than 82% of the total volume of industrial waste waters and 75% of all municipal effluents and sludge discharged along the Atlantic coast of México, enters the Gulf of México through the larger river systems: the Lerma-Santiago, Papaloapan, Grijalva and Usumacinta drainages.

The coastal waters of the Gulf of California are polluted as a result of large quantities of pesticides and fertilizers from the agricultural states of Sonora and Sinaloa (U.S. Congress, Office of Technology Assessment, 1987).

The National Program of Ecology, developed according to the National Plan of Development (1983-1988), recognizes the drastic effects of development on the coastal ecosystems (PNE, 1984). The program states that essentially all human settlements on the Mexican coasts utilize the sea or coastal water bodies as receptacles for a variety of wastes. Sewage disposal is inadequately executed particularly in such coastal cities as Coatzacoalcos, Tampico, Veracruz, on the Atlantic coast, and in Acapulco, Mazatlán and

Salina Cruz, on the Pacific Coast. Only 2% of the total volume of waste waters are considered to be receiving appropriate acceptable treatment (PNE, 1984).

In spite of the increasing and pervasive nature of this problem, no national survey has been conducted on the extent and consequences of coastal pollution (Merino, 1987). The absence of precise knowledge of pollutant levels, dispersion processes, and long term cumulative effects on coastal and marine ecosystems precludes further establishment of protected coastal areas, as aimed for in the National Plan of Development 1983-1988 (PLANADE, 1983). The only effort to establish protected coastal areas with a specific sanitation objective in mind is the ecological reserve of Cuenca del Rio Carbonera, with the main purpose of controling pollution by pesticides and fertilizers (PNE, 1984).

Tourism

The development of coastal-oriented tourism has enjoyed exceptionally strong government support over the last ten years. In 1982, approximately $370 million U.S., 93% of all federal investment in tourism, was directed to the coastal tourism resorts of Cancún in the Caribbean, and Ixtapa on the Pacific coast. Approximately 45 % of tourist activities in México occurs in the coastal zone (SAHOP, 1984b). Coastal tourism alone generated approximately 700 million dollars in revenue in 1985 (Bosselman, 1978).

The traditional methods of recreational uses of the coast in México include SCUBA diving, snorkeling, swimming, surfing, sunbathing, boating, and fishing. The natural appearance of the coast itself, the pulverized white sand beaches, coral reefs and archaeological sites of Cancun in the Mexican Caribbean, are currently the nation's central attraction for international tourists (Mathielson and Wall, 1982; Bosselman, 1978). Coastal tourism resorts in México have been established in some of the most pristine environments and few national attempts have been made to anticipate environmental changes, so that the carrying capacity of the newly created coastal resorts in México can be defined in terms of tourist numbers (Bosselman, 1978). On the other

hand, a growing segment of the international tourist trade referred to as "nature" or "adventure" tourists has brought more people who visit the Mexican coasts because of their unique and/or scientifically important flora and fauna (Budowski, 1976; Papson, 1979).

Lack of Research

Scientific research in the area of protected coastal areas in México has been very limited in the past. Currently only 15% of the total protected areas are the object of some type of research. It is clear these areas have not met the research and education goals set out in the National Program of Ecology. Scientific information critically needed for competent policy-making in coastal zone management in México is scarce. Institutions such as SEDUE, with a clear mandate to generate the needed information, are relatively young. The National Autonomous University of México, at the national level, and the Research Center of Quintana Roo, at the state level, are examples of institutions funding coastal research within protected coastal areas by several scientific disciplines. Because these institutions lack an extension service, there is, at best, limited dissemination of study objectives and project findings to the Mexican populace (PNE, 1984).

Existing coastal management and protection programs are based on assumptions that do not include valid ecological measurements and other data (Toledo and Carabias, 1983). The National Institute of Statistics, Geography and Information (INEGI), a component of the Secretaría de Programación y Presupuesto (SPP), has compiled demographic, social and economic statistics since the beginning of this decade, concentrating its efforts primary on inland issues; an ongoing ocean and coastal study by this institute remains to be completed (INEGI, 1980).

Political Climate and Management Agency Issues

México's economic dependency on foreign markets and investment is the critical determinant of whether or not environmental policies will be developed and implemented (Mumme, et al., 1988).

Since the national economic crisis in 1983, caused by the drop in oil prices, there has been little governmental investment in environmental problems. Expensive regulatory projects have been placed on hold (Fuentes, 1985), or at best have been viewed as "lagged responses" to the adverse environmental impacts of industrialization on society. Javelly-Girard, Secretary of SEDUE from 1983 to 1985, conceded as much in a news conference on 16 November 1984, in which he stated that SEDUE's budgetary constraints had severely limited its ability to implement environmental projects (Comercio Exterior, 1984; Vargas, 1984; Mumme et al., 1988). México's need to address what it considers to be more pressing domestic concerns precludes the development and implementation of those environmental policies that do exist.

The jurisdictional foundation for protected coastal area management in México lacks any real strength or means of implementation. The existing laws do not function within the context of an overriding objective or mandate for the protection of coastal areas, nor do they propose a specific day-to-day management approach for any of these areas, i.e., how it has to be done, when, and by whom (Vargas, 1984). The limited legislation concerning protected coastal areas contains little or no provision for the actual enforcement of protection measures.

Gray whales have been protected in México since 1979 through legal decrees. However, this measure has not been enough to insure effective protection, in part due to the lack of permanent staff in these sanctuaries (Silva and Desilvestre, 1986). Another example is Lagunas de Chacahua National Park. Even though this park has enjoyed total legal protection and ownership by the federal government since 1937, lack of on-the-

ground enforcement has contributed to such continuous abuses as human invasion, agricultural pressures, and illegal fishing (Silva and Desilvestre 1986; Vargas, 1984).

A group of hypotheses have been postulated that address the various bureaucratic impediments to the formulation and implementation of environmental policy. The Mexican writer José Fuentes Mares (1985), identified lack of information sources, bureaucratic politicization and weakness in the face of pressure from privileged parties and interest groups, administrative fragmentation, personal corruption, and discontinuous short-term policy development rather than long-term planning factors as affecting the development of regulatory policy. Illegal fishing, for example, has been a problem derived from personal corruption, which still persists in México's gray whale sanctuaries of Vizcaino/Ojo de Liebre and Guerrero Negro since their formal designation in the early 1970's (PESCA, 1984). Agricultural activities within, and contiguous to, reserve boundaries are the result of administrative fragmentation (Síntesis de Consulta Popular, 1983).

The coastal zone of México has not yet been given full recognition as a part of the environment with distinct characteristics, and deserving of an inclusive management strategy. Not even such political bodies as SEDUE and its attendant National Program of Ecology, have resulted in environmental concerns assuming greater importance on México's political agenda. Coastal protection interest remains misunderstood and poorly supported. Environmental policy has not gained a permanent place on the Mexican policy agenda. In order for coastal protection to receive the attention of future Mexican administrators, this interest must become a legitimate public demand.

Public participation in decision-making and public education are two more factors contributing to the complexity of managing protected coastal areas in México (Restrepo, 1976). The complex interaction of factors and activities that characterize coastal zones has not been appreciated by the Mexican government and population.

5 POSSIBILITIES FOR COMPREHENSIVE MANAGEMENT OF PROTECTED COASTAL AREAS IN MÉXICO

On a global scale, review of coastal protection efforts indicates that nations follow a very similar process in the evolution of their programs, from the initial awareness stage through to the program implementation and evaluation stages (Sorensen, et al., 1984). The first stage consist of incipient awareness, which usually entails national or state leaders becoming cognizant of coastal resource degradation, or extensive destruction from coastal hazards, such as wetlands filling, eutrophication of lagoons, and coastal erosion (Yañez-Arancibia, 1982). This growing awareness may be attributable to such external influences as travel to international conferences, or visits by representatives of international assistance agencies or environmental protection organizations (Sorensen and Brandini, 1987).

As shown in Table 6 (Appendix 1), the evolution of coastal management in Latin America demonstrates that most coastal nations in Latin America, including México, have at least, to some degree, achieved a level of incipient or growing awareness. The designation of protected areas is used by the majority of the countries in Latin America. The usual expressions of this approach are coastal or marine national parks or reserves (Silva and Desilvestre, 1986).

Many Latin American countries recognize their coastal zones as distinct regions with resources which require special attention. Some have taken specific actions to protect coastal resources and to manage coastal development; a few have created comprehensive nation-wide coastal zone management programs that have fully integrated coastal areas with nation-wide conservation objectives. Colombia, Costa Rica and Ecuador rank the highest in coastal area protection among all other Latin American countries (Sorensen and Brandini, 1987).

In a very few cases, major efforts have been made to include marine protected areas within particular national environmental legislation. Examples are New Zealand, which has enacted legislation specifically for marine areas with its Marine Reserves Act

of 1971 (Ballantine, 1987; Mitchell, 1987); and Trinidad and Tobago, with their Marine Areas Preservation and Enhancement Act of 1970 (Sorensen et al., 1984). In contrast, protected coastal areas in México are not viewed from a similarly integrated or systematic point of view, but instead are dealt with on a sector-by-sector basis.

A comparison made by Salm and Clark (1984) of international coastal area protection efforts, reveals a similar pattern of management strategies employed by nations or subnational units to implement their programs. The strategies selected are usually a reflection of two factors: 1), what the governance administrative and enforcement arrangement is presently doing to implement environmental or protection management programs, and 2), what is perceived as being successfully employed by other nations with analogous conditions (Miller, 1980).

6 RECOMMENDATIONS

The recent utilization of "comprehensive planning" in its various forms, has been an innovative and effective management tool in an increasing number of developed and developing nations which are supporting coastal zone protection programs.

Comprehensive planning for protected coastal areas in México must include three distinct but somewhat related types of tasks: government programs and policies, e.g., enactment of legal codes concerning coastal protected areas, the quality of coastal ecosystems, and the improvement of public participation.

Governmental programs and policies

The committment of the de la Madrid administration to environmental reform was a response to growing criticism of the policies of its presidential predecessors. The creation of SEDUE during this administration was a step toward coordination of the

management of all coastal protected areas. SEDUE's principal mandates centered on marine and coastal pollution abatement and the creation of new ecological reserves and sanctuaries.

The problem of enforcement is a persistent one, not only preventing administrators from upholding existing protection objectives, but also hindering successful implementation of new, more stringent measures. Improving surveillance capabilities, deputizing local officials as coastal wardens and soliciting regional participation are possible options. A deeper problem remains however; due to low salaries, lack of training and lack of motivation, many enforcement officials become susceptible to bribery and other forms of corrupt professional behavior (Vargas, 1984). Management policies for coastal protected areas have been stated. Their accomplishments will be successful only if public support exists. Citizens' awareness of both the issues involved and of the importance and complexity of those issues, is essential to ensuring that management decisions are suitable, realistic and effective.

Quality of coastal ecosystems

Promotion of scientific research

Scientific research is not a predominant activity in most of the coastal protected areas in México (Toledo and Carabias, 1983). Interdisciplinary studies could be funded by national and international grants from private associations like Amigos de Sian Ka'an (Friends of Sian Ka'an), and international conservation organizations like International Conservation, Nature Conservancy, and the World Wildlife Fund (CIQRO, 1984). Most likely research activities could provide substantial solutions and recommendations for ecology, fisheries, or general protected coastal areas management (PLANADE, 1983).

Environmental conscience

According to Anderson (1980), the more pristine a coastal environment chosen for recreation, the more danger there is of negative impacts. In order to incorporate the objective of the creation and careful maintenance of protected coastal areas into coastal management (as put forth in the National Plan of Development), it is critical to raise public awareness and appreciation of high ecological quality environments in the first place. As a result of the proactive rather than reactive ecological planning emphasized by the administration of de la Madrid, it is likely that, at least in the long term, México will take the necessary action to shift focus to a more comprehensive management.

Public participation

Education

At any socio-economic and political level, education is an essential and continuous element in efforts to enhance motivation, interest, and understanding of the relevance of protected coastal areas. Interpretative activities designed to promote both informal environmental education, and actual enjoyment of pristine conditions within the environment, can constitute an innovative approach not yet utilized by Mexican protected coastal area management agencies (Restrepo 1976). Formal education should target local, urban and rural people, mainly those inhabiting contiguous areas, the managers and staff. The kind of educational process used to initiate awareness, and create positive attitudes and behaviors related to protection of coastal areas, must be based on motivation rather than coercion. The long term goal of education is to encourage all sectors within Mexican society to recognize benefits from protected coastal areas, and eventually to get them involved in the development of creative and effective management programs.

Land tenancy

In order to ensure continuous preservation, it is important that the conservation status of land within protected coastal areas not be affected by changes in ownership. Land stewardship by the central government, from the legal point of view, may be the optimum manner of achieving this end. Effective management within protected coastal areas can be done, by establishing these areas on land which is already government property, or through an organized effort over an extended period for systematic land purchase, as distinguished from a one-time acquisition project by acquiring or expropriating private land. Use of this tool has been promoted extensively in other nations, and sometimes funded by local coastal programs, as it has been with the U.S. Estuarine Sanctuary Program (Sorensen et al., 1984). It must be realized, however, that this may be an expensive operation which may also be politically volatile in México.

Development and implementation of a land acquisition program might be facilitated by the sparsely populated, rural and marginal agricultural character of the majority of México's coastline; certainly it would be one of the most administratively cost-effective of management strategies. Where land favored for protected coastal area status is communally owned, strong efforts would be needed to convince the local community of the value of a protected area, and would almost certainly require strong evidence of economic or other benefits for the local residents. Ideally, they might be persuaded to establish the area themselves within the framework of their own community; otherwise, unless a sustained flow of funds could be assured and earmarked for exclusive use in acquisitions, this strategy will not likely be effective.

7 CONCLUSIONS

The most interesting impression to emerge from this survey is the slight capability shown by the Mexican government for the management of protection coastal areas.

In the past, efforts to manage the coastal protected areas of México can be characterized as "ex post facto" rescue operations. The political delineation of these areas has been such that ethical, philosophical, economic, and long-term practical considerations regarding the protection of endangered coastal species and genetic diversity have only slightly influenced the government in the creation of protected coastal areas regardless of the presence of the most common threats to coastal environments: overfishing and habitat losses (PNE, 1984).

The success of protected coastal areas throughout the world has primarily depended on a genuine desire to establish them. It has only been through the combined efforts of government and citizens that anything significant in this field has been achieved (Salm and Clark, 1984).

The problems which plague successful development and administration of coastal protected areas worldwide, are also present in México: limited financial resources for management planning and implementation; lack of funding for adequate training of enforcement personnel; and state and municipal governments have not attained the level of awareness, needed to ensure ecologically sound coastal protection plan development and execution. This contrast is a reflection of the centralist organization of the federal government.

Protected coastal areas are not now a separate category in the general classification of natural protected areas in México. If they were designated as a distinct group, their unique management problems could be recognized. However, integrated management programs for coastal protected areas are likely to be established in México in the future as existing programs are implemented.

Evidence presented here indicates that advances in management strategies regarding coastal protected areas, might by achieved by modest incremental improvements in the governmental and legislative structures, and mainly in the motivation and public involvement within their implementation.

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APPENDIX 1

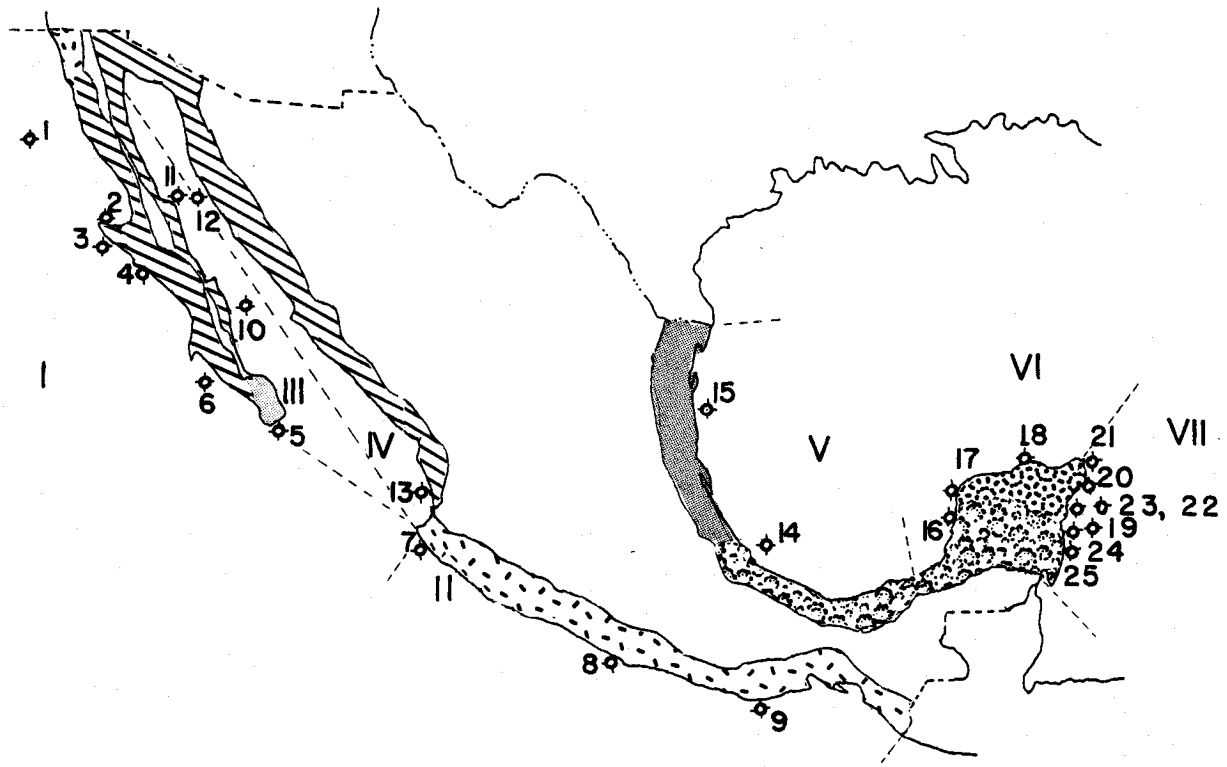

Figure 1. The Mexican coastal and marine areas, including regional divisions and Coastal Protected Areas (Merino, 1987; PNE, 1984). Regions are classified in terms of gross environmental characteristics and the main kind of coastal resources or uses.

Table 1 Protected Coastal Natural Areas in México for Region 1

Name, (Location)	Reason and Date of Legal Protection	Mgt Plan	Problems
REGION 1			
1 Isla Guadalupe National Park (Baja California)	Research; nesting area 1978	None	Incursions by private vessels illegal fishing total lack of enforcement and management.Pos-
2 Vizcaino / Ojo de Liebre Biosphere Reserve (Baja California)	Protection of Grey whales *	Not yet prepared	sibility of oil development; "
3 Guerrero Negro Grey Whale Sanctuary (Baja California)	Protection of Gray Whales 1979	Not yet prepared	"
4 San Ignacio Grey Whale Sanctuary (Baja California Sur)	Protection of Grey Whale 1979	Not yet prepared	"
5 Cabo San Lucas Underwater refuge (Baja California Sur)	Protection of Sea lions; tourism; research on marine life *	None	Rapid increase of tourism
6 Islas del Pacífico Ecological Reserve (Baja California Sur)	Research on island and surrounding marine area including sea birds	None	Not reported

*** In process.** Sources: PNE, 1984; Merino, 1987; Silva and Desilvestre,1986; Vargas, 1984; González and Sánchez, 1961.

Table 2 Protected Coastal Natural Areas in México for Regions 2, 3 and 4

Name, (Location)	Reason and Date of Legal Protection	Mgt Plan	Problems
REGION 2			
7 Arcos de Vallarta Natural Monument (Jalisco)	Protection of cliffs and rocky beaches *	None	Rapid increase of tourism
8 Isla la Roqueta National Park (Guerrero)	Tourism and recreation *	3 zones	Pollution
9 Lagunas de Chacahua National Park (Oaxaca)	Protection of lagoons and mangroves 1937	Zoning not yet	Agricultural pressures
REGION 3			
10 Islas del Golfo de California National Park (Baja California Sur)	Marine environment research 1978	None	Incursions by private vessels; illegal fishing; total lack of enforcement and management,possibility of oil development; tourism.
11 Isla Rasa National Park (Baja California)	Nesting sites for waterfowl 1964	None	
REGION 4			
12 Isla Tiburón Underwater Refuge (Sonora)	Sample desert shrub w/ marine environments 1963	None	Spearfishing
13 Isla Isabel National Park (Nayarit)	Major example of Pacific island ecosystem 1980	None	Not reported

* **In process.** Sources: PNE, 1984; Merino, 1987; Silva and Desilvestre,1986; Vargas, 1984; González and Sánchez, 1961.

Table 3 Protected Coastal Natural Areas in México for Regions 5 and 6

Name, (Location)	Reason and Date of Legal Protection	Mgt Plan	Problems
REGION 5 1/			
14 Arrecifes la Blanquilla Underwater Refuge (Veracruz)	Major example of coral ecology *	None	Transitory fishermen
15 Cuenca del Rio Carbonera Ecological Reserve (Tamaulipas)	Sanitation of estuarine environment	None	Not reported
REGION 6 1/			
16 Los Petenes Ecological Reserve (Campeche)	Protection of minimally altered wetlands *	None	Not reported
17 Ría Celestum Ecological Reserve (Campeche / Yucatán)	Protection of wetlands and flamingos 1979	None	Disturbance of habitats
18 Ría Lagartos Ecological Reserve (Yucatán)	Protection of wetlands and flamingos 1979	None	Disturbance of habitats

1/ After Miller (1983), as modified from the classification system proposed by the International Union for the Conservation of Nature (1980).

* **In process.** Sources: PNE, 1984; Merino, 1987; Silva and Desilvestre,1986; Vargas, 1984; González and Sánchez, 1961.

Table 4 Protected Coastal Natural Areas in México for Region 7

Name, (Location)	Reason and Date of Legal Protection	Mgt Plan	Problems
REGION 7 1/			
19 Arrecifes de Cozumel National Park (Quintana Roo)	Representative ecosystem research; protection 1980	None	Not reported
20 Arrecifes de Isla Mujeres Ecological Reserve (Quintana Roo)	Tourism *	None	Increasing tourism
21 Isla Contoy Turtle Sanctuary (Quintana Roo)	Green Turtle nesting area 1961	None	Disturbance of habitat by tourists; scientists
22 Punta Cancún Ecological Reserve (Quintana Roo)	Protection of waterfowl *	None	Total lack of protection; tourism development
23 Punta Nizuc Ecological Reserve (Quintana Roo)	Protection of mangrove, coral reef, beaches *	None	Increase tourist development
24 Sian Ka'an Biosphere Reserve (Quintana Roo)	Research; protection to pristine wetlands 1986	Boundaries jurisdiction	Resource disputes; slash and burn agri-culture.
25 Tulum National Park (Quintana Roo)	Archaeological interest 1981	None	Poorly planed tourist development

1/ After Miller (1983), as modified from the classification system proposed by the International Union for the Conservation of Nature (1980).

* **In process.** Sources: PNE, 1984; Merino, 1987; Silva and Desilvestre,1986; Vargas, 1984; González and Sánchez, 1961.

Table 5
Government Agencies with Powers over Protected Coastal Areas.

Government level	Government Agency	Abbreviation	English name	Attributes & Functions
Federal	Secretaría de Programación y Presupuesto	SPP	Ministry of Budget and Programming	Approval of budget and plans of other ministries.
Federal	Secretaría de Desarrollo Urbano y Ecología	SEDUE	Ministry of Urban Development and Ecology	Environment regulations creation and management of natural reserves and ZFMT control
Federal	Secretaría de Pesca	SEPES	Ministry of Fisheries	Fisheries regulation
Federal	Secretaría de Turismo	SECTUR	Ministry of Tourism	Develop plans in tourists areas
State	Gobiernos de los estados		State Governments	General plans definition of state priorities
Municipal	Gobierno Municipal		Municipal Governments	Local actions and powers

Source: Modified from Merino (1987).

Table 6 Evolution of Coastal Protection Programs in Latin America

	Incipient Awareness	Growing Awareness	National or state Study	New Program Creation	Program Implem.
Argentina	X		X	X	
Belize	X	X			
Brazil	X	X	Proposed national study	For Sao Paolo & Parana	
Chile	X	X			
Colombia	X	X	X	X	
Costa Rica	X	X	X	X	X
Ecuador	X	X	X	X	
El Salvador	X	X			
Fr. Guyana	?				
Guatemala	X				
Guyana	X				
Honduras	X				
México	X	X			
Nicaragua	X				
Panamá	X	X			
Perú	X				
Surinam	X				
Uruguay	X				
Venezuela	X	X			

Source: Sorensen and Brandini, 1987.