coastal zone (Davis, 1981; Davis and Pillsbury, 1983); commonly protected marine habitats such as reefs and barrier islands shield the shoreline and attendant structures from storm damage (Salm and Clark, 1984); and, they can be viewed as having intrinsic, absolute values (Pearsall, 1984).

Latin America contains a number of unusual or unique coastal or marine habitats that are protected by reserves; these include coral reefs, mangroves, lagoons, mudflats, and dune systems. Brazil and Colombia have made efforts to protect the large reef areas: The Abrolhos REEF Marine National Park, located some 80 km off the Brazilian coast, is an extensive area (6,000 square kilometers) protecting several reef (Robben, 1985; Wallauer, 1985), and Colombia's Corales del Rosario Natural National Park (17,000 hectares) represents a major effort to protect many coral reefs (INDERENA, 1984; Carr, 1984). These two parks are predominantly aquatic areas making them somewhat exceptional in this survey of marine protected areas in Latin America. Other marine reserves contributing to the protection of coral reefs include Colombia's Gorgona Natural National Park (INDERENA, 1984); Costa Rica's Cahuita National Park (Barney, 1973; MacFarland et al., 1984; Dubois and Hatziolos, 1982); the Bay Islands Marine National Park in Honduras (LaBastille, 1979); and the Smithsonian Tropical Research Institute's Galeta Marine Reserve in Panama (Cubit, 1985).

Mangroves have been components in the establishment of marine reserves in Latin America. Because of their important mangrove stands, the Piría-Gurupi and Maracá-Tipioca Ecological Stations in Brazil became part of a national system designed to protect representative ecosystems (Nogueira-Neto and Melo Carvalho, 1979). A number of Colombia's parks protect mangroves; they include Isla de Salamanca and Sanquianga National Nature Parks and Cienaga Grande de Santa Marta Sanctuary (INDERENA, 1984).

Venezuela offers an example of a marine reserve established because of the conservation values of a significant lagoon, the Laguna de Tacarigua National Park (Salm and Clark, 1984). Surinam's government created the Wia Wia Nature Reserve to protect a representative mudflat and its fauna (Lieveld, 1985). Per-

Dave —
Thanks for all
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Maynard

Marine and Coastal Protected Areas in Latin America: A Preliminary Assessment

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Abstract One approach to the management of coastal and marine areas is the establishment of protected areas (e.g., reserves, parks, sanctuaries). Under the general rubric of "marine reserves," this paper examines the Latin American experience with this strategy. A comprehensive table lists most, if not all, national or state declared parks or reserves. The table is organized by country. All Latin American nations have, to a varying extent, declared marine parks and protected areas. The authors review the sources or uses which have been "managed" by marine reserves, the management approaches, uses, and problem which have been identified in achieving management objectives. The authors conclude with observations about the potential future utility of marine reserves as a management approach for areas and resources of the coastal and littoral zones of Latin America.

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Introduction

This article[1] presents an assessment of the Latin American experience in protecting marine areas of special significance. The assessment is based on a review of existing literature and on correspondence with agencies or individuals involved with the establishment or operation of the identified marine reserves. Proposed sites have also been included. For simplicity, the term "marine reserve" will be used to signify all designations such as parks, sanctuaries, reserves, and similar approaches.

A second objective is to place the Latin American experience with marine reserves in global perspective. At the global level, marine reserves or protected areas were first created aproximately fifty years ago (Bjorklund, 1974; Allen, 1976; Powell, n.d.; Davis, 1981).[2] From the 1930s through the early 1960s marine reserves were created at a rather leisurely pace. In the late 1960s and early 1970s, this pace began to quicken as the importance of protecting ocean and coastal resources began to be widely recognized (Salm and Clark, 1984; IUCN, 1976; Houseal et al., 1985). With this enhanced appreciation of marine environments came an increased number of created or proposed marine marks, reserves, sanctuaries, research stations, and other protected areas. This article is intended to contribute to the record of marine reserves in Latin America.

As used here, the term "marine reserve" refers to protected areas that are completely submerged, such as a reef, or protected terrestrial areas containing or bordered by shorelines or estuaries. In the case of Latin America, Table 1 (which list all identified marine and coastal protected areas in the region) demonstrates that very few predominantly aquatic marine reserves exist in the region. The vast majority are coastal reserves with a marine component or boundary. This marine component varies in extent. It can be as small as the shoreline—a beach or coastal cliffs on the seaward border of the land reserve. It can include a band of water up to a specified distance, or extend seaward to include offshore islands or reefs.

This article is divided into four sections: (1) the specific reasons for establishing marine reserves in Latin America; (2) park

Kuna Forest Park Indian Reserve	CMC	60,000 ha			Food production; Indian reserve; science; tourism	Boundary disputes; resource jurisdiction disputes; road
Smithsonian Tropical Research Institute	PM	(Total reservation. 100 hat: scientific research only, 3 ha)		Some zoning, with strict collection rules	Scientific research, reef research; some tourism/recreation; military reservation of U.S. Navy	Disturbance of habitats by tourists and scientists; collectors
Galeta Marine Reserve						
Suriname						
Coppename River Mouth Nature Reserve	CMC	15,000 ha	Suriname Forest Service; Min. Natural Resources & Energy	Some zoning	Fishing, waterfowl hunting; coconut plantations, migratory birds	Pesticides; poaching
Galibi Nature Reserve	CMC		"		Sea turtles, water fowl, migratory birds	None reported
Wia Wia Nature Reserve	CMC	90,000 ha	"	Yes	Fishing; sea turtle protection; hunting	None reported
Venezuela						
Archipielago de Los Roques National Park	CMC	225,153 ha	Division of National Parks Min. of Agric.	Zoning under consideration		Transitory fishermen; illegally constructed house; 1 settlement
Estacion Cientifica Militar—Aves Island	SR		Defense Min.		Turtle nesting beaches; research	Poaching; tourism
Laguna de Tacarigua National Park	CMC 1980			Boundaries by convenience to exclude	Nursery site; fish spawning	Wetlands loss due to dredge & fill, dumping; siltation; external influences; & encroachment
Morrocoy National Park	CMC	32,090			Protection of reefs, seagrass beds, mangroves	

[1] Where this table has gaps, we were unable to acquire the necessary information. We would be grateful to anyone helping us to fill the voids in our information (or correcting any mistakes we have made).

[2] Designation refers to whether or not the marine reserve is coastal with a marine component (CMC) or primarily or entirely marine (PM). Date refers to date of establishment.

TABLE 1 continued

Location	Designation/date	Size	Management Authority	Management Plan	Uses	Problems or Disturbances
Mexico						
Isla Guadalupe	CMC 1978				Sea Turtles	
Isla del Golfo	CMC 1978					
Isla Rasa	CMC 1964					
Isla la Roqueta	CMC Proposed					
Arcos de Vallarta	CMC Proposed					
Isla Isabel	CMC 1980					
Lagunas de Chacahua	1937					
Sian Ka'an	CMC Proposed				Sample ecosystems, inc. marine; tourism; scientific values; of benefit to inhabitants; traditional migratory agriculture by & protection of indigenous peoples	Opening of Pan-American Highway; logging along borders; potential sea-level canal site; tourism. affecting indigenous peoples; cut and burn agriculture; livestock grazing
Arrecifes de Cozumel	PM 1980					
Tulum	1981					
El Pinacate	Proposed					
Isla Tiburon	CMC 1963					
Arrecifes la Blanquilla	PM Proposed					
Rio Lagartos	CMC 1979					
Rio Celestum	CMC 1979					
Dzilam de Bravo	Proposed					
Panama						
Bocas del Toro	Proposed					
Darien National Park (proposed)	CMC 1980		National Direction of Renewable Natural Resources, Min. Agriculture	Master Plan		

management arrangements and concerns; (3) problems associated with marine reserves in Latin America; and (4) a summary and conclusion on the efforts to protect marine and coastal resources and areas in Latin America.

Reasons for Marine Reserve Creation

In the general theoretical literature on the need for marine reserve creation, several categorical rationales (e.g., endangered species should be protected) are presented (Salm and Clark, 1984; Allen, 1976; Bjorklund, 1974; Polunin, 1983). As will be seen, several of these reasons have provided the impetus for creating or maintaining the region's marine reserves (See Table 1).

The great majority of Latin American marine reserves surveyed serve several objectives by their special status. For example, it is not unusual for a Latin American marine reserve to protect an important habitat as well as to provide access to sites suitable for marine-based recreation. With the elaboration on each of the various theoretical reasons for creation, we offer indicative examples from Latin America.

Protection of Unique Areas and Habitats

It can be argued that in essence "there is only one critical marine habitat, the sea itself" (Ray, 1976). Still, the greatest human pressure is exerted along the coast, where overfishing, pollution, mining, and general coastal development threaten fragile, often isolated ecosystems (Ray, 1976). The need to protect these marine habitats and resources has sparked the creation of reserves all over the world (Bjorklund, 1974; Davis, 1981).

A number of economic and noneconomic benefits are incurred with the protection of marine habitats. Reserves can provide a haven or recruitment area for numerous species (Odum, 1982; Davis and Pillsbury, 1983); a reserve may protect the sole representative of a disappearing or changing coastal ecosystem (Salm and Clark, 1984); they can serve as a standard against which to measure changes in unprotected portions of a rapidly changing

TABLE 1

Marine and Coastal Protected Areas in Latin America[1]

Location	Designation/date[2]	Size	Management Authority	Management Plan	Uses	Problems or Disturbances
Argentina						
Buenos Aires Provincial Reserves						
Isla Botiva Integrated Fish Reserve	CMC 1958	730 ha				
Fish Reserve of Pio Barca Grande	CMC 1958					
Isla Martin Garcia Park	CMC 1969	180 ha				
Ridera Norte Natural Refuge		14 ha	Fundacion Vida Silvestre & Municipality of San Isidro			
Punta Lara Integrated Reserve	CMC 1958	31 ha				
Bahia Samborombon Integrated Reserve	CMC 1982	9380 ha			Protection coastal marshes	
Montes Talares Forest Reserve	CMC 1937					
Chubut Provincial Reserves—Peninsula Valdes System			Chubut Direction Conservation Natural & Cultural Heritage		Protection of right whales	
Cabo dos Bahias-Camarones Nature Reserve	CMC	1183 ha	"		Magellan penguins	
Ensenama de San Lorenzo	CMC					
Caleta Valdes Reserve	CMC 1977				Protect sea lions & sea elephants	
Isla de los Pajaros	CMC 1968	2 ha	" "		Nesting area; tourism; science	Tourism
Punta Loma Nature Reserve	CMC 1986	1707 ha	"		Sea lion colony, tourism, science	Tourism
Punta Piramides Nature Reserve	CMC		"		Sea lions	
Punta Norte Nature Reserve	CMC 1968		"		Sea elephant breeding area; science; tourism	Tourism
Tortuguero National Park	CMC 1970	18,000 ha	"	No zoning yet	Research; major Caribbean turtle nesting ground (Atlantic Green Turtle) and manatee habitat	None reported, though there are small communities within park
Ecuador						
Galapagos National Park	CMC 1959	7,800 mi.[2]	National Park Service, Min. of Agriculture	5 zones	Tourism; some agriculture; fishing, scientific research	Rapid growth of settlements, increasing tourism; lack of marine protection; introduced species
Galapagos Marine Biological Reserve	PM 1986		"			
Machalilla National Park	CMC 1979	46,683 ha (includes islands)	"	None yet	Protection of minimally altered marine forms; marine turtle nesting beaches; archeological research	Settlement; archeological excavations; private ownership of land; farming & fishing; socio-economic problems
Guatemala						
Biotope Monterrico Multiple Use Area	CMC Proposed				Wetlands protection	
Punta de Manabique National Park	CMC Proposed					
Honduras						
Bay Islands Marine National Park	CMC				Coral reef protection	
Rio Platono	CMC					
Roatan Marine National Park	PM Proposed	10,000 ha (approx.)	RENARE (Renewable Natural Resource Division), Min. of Agriculture	None	Coral reef protection, tourism, indigenous culture; turtles	Turtle harvests
Mexico						
Cabo San Lucas Underwater Refuge	PM					Tourists
Isla Contoy Turtle Santuary					Green turtle nesting area	
Grey Whale Sanctuaries: Ojo de Liebre/ Guerrero Negro San Ignacio	PM 1979		Subsecretaria de Pesca	Yes	Tourism (whale-watching); research; breeding lagoon, endangered species protection	Incursions by private vessels; illegal fishing lack of enforcement, management; possibility of oil development; tourism

TABLE 1 continued

Location	Designation/date	Size	Management Authority	Management Plan	Uses	Problems or Disturbances
Costa Rica						
Bolanos Island Wildlife Refuge		5 ha	National Park Service, Min. Agriculture	None	Bird nesting site	
Cabo Blanco Strict Scientific Reserve	CMC 1963	1,172 ha	"	None	Sample tropical dry forest w/marine environment; science research	
Cahuita National Park	CMC 1970	1,700 ha (600 ha marine)	Dept. of Nat'l Parks, Min. of Agriculture	Zoning not yet applied	Extensive fringing reefs; lagoon; representative coral & great diversity; turtles; tourism (50,000 visitors in '81); diving hiking, fishing	Production of coconuts, banana & cocoa; human pressures; nonpayment for lands taken; damage of coral reef due to siltation from construction erosion; subsidence of beach
Corcovado National Park	CMC	36,000 ha			Protection of mangroves & seagrass	Siltation from gold mining
Isla del Cano Natural Reserve (Proposed)					Major example of Pacific coral ecology	Difficult access
Islas de Guayabo, Negritos and Pajaros Reserve	1973				Nesting sites for frigate birds, brown boobies & brown pelicans; Guayabo is strict preserve only monitoring and research permitted	
Manuel Antonio National Park	CMC 1972	1,400 ha	"	None yet	Coral encrusted rock reef; several islands; recreation & tourism; some fishing	Pollution from agriculture; processing plant;-sedimentation; small size; lack of adequate management
Santa Rosa National Park	CMC 1971	9,900 ha	"	Proposed: 5 zones	Turtle nesting beaches; rare species; tourism (mostly outside coastal zone); science, research; historically important	Turtle egg predation
Punta Tombo Nature Nature Reserve	CMC	210 ha	"		Magellan penguins	
San Jose Gulf Marine Park	PM		"		Right whale breeding site	
Rio Negro Provincial Reserves						
Punta Bermeja Nature Reserve	CMC 1971	280 ha			Protect Sea lions	Hunting
Isolute Lobos Reserve	CMC 1977	800 ha			Protects sea lions and birds	
Santa Cruz Provincial Reserves						
Cabo Blanco Natural Reserve	CMC 1977				Protects sea lions	
Rio de Puerto Deseado Natural Reserve	CMC 1977	10,000 ha			Conservation of fish species and Magellaneic Penguins, and tourism	
Bahia Laura Natural Reserve	PM 1977				Protect algae, park & penguin populations	
Tierra del Fuego National Park	CMC 1960	63,000 ha	Servicio Parques Nacionales	2 zones	Tourism	None reported
Belize						
Barrier Reef	PM Proposed					
Half Moon Caye Natural Monument	CMC 1982			Not yet prepared	Tourism; science	Armed poaching; tourism, rats (threat to boobies); lack of enforcement
Brazil						
Abrolhos Bank National Park	PM 1983	6,000 km^2	Instituto Desenvolvimento Forestal	Not yet prepared	Research only; for protection of endemics and coral reefs	Lack of financial support, dredging, bla: overfishing, oil pollution; geographical boundaries, not ecological, so needs of unrecognized; fishermen displaced
Atol dos Rocas Biological Reserve	PM 1979					
Cabo Orange National Park	CMC 1980	619,000 ha			Protection of Amazon	

TABLE 1 continued

Location	Designation/date	Size	Management Authority	Management Plan	Uses	Problems or Disturbances
Brazil						
Fozdo Sao Francisco Ecological Station	CMC	3,000 ha	SEMA (Executive Secretariat for the Environment) Min. Interior	Yes	Fishing; research on marine life and coastal vegetation; turtle nesting beaches	Manatee poachers, human occupation of turtle beaches
Jureia Ecological Reserve	1980	30,000 ha	Nuclebras	None, yet plan has been proposed	Some fishing; research	Small population, including a small settlement agency buildings and activities
Dos Lencois Maranhenses National Park	PM					
Maraca-Tipioca Ecological Station	CMC 1977	70,000 ha	SEMA	Yes		Remote, difficult access for vehicles
Piria-Gurupi Ecological Station	CMC 1977	3,000 ha	"	Yes	Fishing; research on marine life and coastal vegetation	
Serra do Tabuleira State Park	CMC				Protects mangroves and seagrasses	
Taim Ecological Station	CMC	32,000 ha	"		Representative ecosystem, research	Crossed by major road
Chile						
Fray Jorge National Park	CMC	6,845 ha	CONAF (National Forest Corporation) Dept. of Concervation of the Environment			
Juan Fernandez National Park	CMC 1935	18,300 ha	"		Some tourism; fishing, lobstering	Introduced species, plant and animal erosion, lack of legislation, admin. agency has other concerns
Rapa Nui (Easter Island)	CMC 1935	6,800 ha	"		Tourism; Archeology	Jurisdiction, lack of legislation, admin. agency has other concerns impacts from tourism
Colombia						
Corales del Rosario Natural National Park	MP 1977	17,8000 ha	INDERENA (Institute for the Development of Renewable Natural Resources) Min. of Agriculture		Some tourism; some fisheries; numerous habitats; archeology	Reductions in freshwater inputs; urban & tourist development; intense use on some islands; dynamiting; spearfishing; poaching
Los Flamencos Sanctuary	CMC 1977	7,000 ha	"		Protects flamingos	Flamingos endangered by natural hazards; poaching of eggs and young for food and adults for export; habitat being reduced due to external industrial development
Isla de Gorgona Natural National Park	CMC 1983	49,200 ha	"		Archeology; 2 islands & surrounding marine area, including reefs; sea birds, marine turtles, rich reef habitat	Subsidence in some areas due to 1980 earthquake; "ecological disequilibrium" due to small size
Isla de Salamanca Natural National Park	CMC 1964	21,000 ha	"	Zoning	Scientific research (13,000 ha), tourism, boating, picknicking, camping; archeology; turtle sanctuary	Illegal fishing, oyster gathering; taking of iguana eggs; some illegal settlements; erosion; rising salinity in marshes due to highway construction, with resulting loss of mangroves; disturbance from power transmission lines
Sanquianga Natural National Park	CMC 1977	80,000 ha	"		Of great cultural and archeological interest; possibly some settlements; representative sample mangroves	No problems cited
Tayrona Natural National Park	CMC 1964	11,600 ha	"	5 zones	Tourism, camping; scientific research; archeology; numerour habitats; environmental education; turtle sanctuary	Highway construction; some poorly planned tourist development; some poaching; dynamiting of reefs for fish; settlements

haps the most impressive example of protected dunes are the Dos Lencois Maharenses of Brazil. These cover many hectares along a deserted stretch of the northern Brazilian coast (Perron, 1984; Jorge Padua and Quintão, 1984).

Protection of Threatened or Endangered Species

Ethical, philosophical, economic, and long-term practical considerations regarding the protection of endangered marine species and genetic diversity have greatly influenced the creation of reserves (Oldfield, 1984). Although endemism is unusual in marine environments, overfishing and habitat loss have caused reductions in certain populations, with concomitant loss of genetic diversity (Polunin, 1983; Salm and Clark, 1984). Further, the role of a single species in the "economy of the seas" is often unknown; the species' disappearance can alter that "economy" in unforeseen ways, and disrupt stable ecosystems (Ray, 1976; Allen, 1976; Frazer, 1985; Polunin, 1983; Odum, 1982; Salm and Clark, 1984; Davis and Pillsbury, 1983; McNeely and Miller, 1983).[3]

Latin American governments have responded to an increasing awareness of the critical roles played by species in maintaining ecosytems stability by establishing several marine reserves extending protection to reptiles, mammals and birds.[4] Sea turtles are apparently the group most frequently protected by marine reserves in Latin America. In virtually every case, this protection takes the form of beaches designated as nesting refuges. There are some examples, however, of attempts to extend protection some distance offshore (Carr, 1984). Among the countries with or proposing marine reserves for the protection of marine turtles are Belize (Carr, 1984), Costa Rica (Barney, 1973; IUNC, 1975; du Saussay, 1983; MacFarland et al., 1984), Ecuador (Ponce Salazar and Huber, 1982; Ponce Salazar, 1984), Panama (LaBastille, 1979; Carr, 1984), Brazil (Nogueira-Neto and Melo Carvalho, 1979), Surinam (Lieveld, 1985), Mexico (Carr, 1984), Colombia (Carr, 1984; INDERENA, 1984), and Venezuela (Carr, 1984; Sievers, 1983; Gomez, Carredano, 1980). As for other reptiles, protection of the endemic marine iguana has been advanced as one rationale

for establishing a marine reserve in the Galápagos archipelago (Broadus et al., 1984).

The protection of a variety of birds has, likewise, been an objective in establishing a number of marine reserves. In Surinam, two marine reserves (Galibi and Coppename River Mouth) protect waterfowl and migratory birds (Lieveld, 1985). Costa Rica's Islas de Guayabo, Negritos, and Pájaros Biological Reserves provide protected nesting sites for sea birds such as frigate birds, brown pelicans, and boobies (LaBastille, 1979). Nesting boobies were also an important consideration in establishing Belize's Half Moon Caye National Park. Other examples can be found in Table 1.

Major efforts have also been made to protect marine mammals. Latin America has whale sanctuaries in Mexico and Argentina. Mexico designated lagoons—Ojo de Liebre, Guerrero Negro, and San Ignacio—in Baja California Sur as sanctuaries for breeding gray whales (Swartz, 1985). In Argentina's Chubut Province, the reserves of Peninsula Valdez and San José Gulf provide a protected area for the largest remaining population of right whales in the world (Natenzon, 1985; Argentina, 1984) and incidentally provide protection for other marine mammals, such as sea lions and elephant seals (Roundtree, 1985; Luti, 1984).

Outdoor Recreation and/or Tourism.

As with terrestrial parks and reserves, it is not uncommon for a marine reserve to be established to serve the related uses of recreation and tourism. Globally, a significant portion of tourism and recreation is directed toward the marine environment. Marine reserves thus focus such activities on the very resources they may be designed to protect (Olwig, 1980; Mehlert, 1983) because of visitor impacts on access roads and camp grounds, and the making of litter, waste, and graffiti (Wilkes, 1977; Pearsall, 1984). However, with proper management, education, and interpretation (Meganck, 1978; Robinson, 1976), tourism and recreation can be placed in a "symbiotic relationship" (Budowski, 1976) with marine reserves.

Visitors are exposed to a reserve in a number of ways. The

impediments, expressed the opinion that their national governments (further activities by provincial or local governments were thought unlikely) were concerned about marine resource protection.

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more traditional methods include bathing, boating, and fishing (Robinson, 1976). Interpretive activities that enhance enjoyment of the reserve include guided and self-guided hikes along the shore or trails and motorboat and glass-bottom boat tours (Robinson, 1976). However, many marine reserve managers have come up with innovative approaches to facilitate the exploration and/or observation of underwater environments and their inhabitants. One approach is the "underwater trail" such as can be found in the Virgin Islands National Park (Gebhart, 1983) and in the John Pennekamp Park in Florida (Florida, Department of Natural Resources, 1983; Vail, 1984). To enhance the experience of those diving in the marine reserves, these trails, using underwater signs, direct divers and snorkelers to interesting vantage points or indicate special features or biotic specimens (Robinson, 1976).

Even though these innovative approaches, e.g., underwater trails, do not yet exist in Latin America, although they have been proposed for Costa Rica's Manuel Antonio National Park (Dubois and Hatziolos, 1982), this should not be interpreted to mean that underwater tourism and/or recreation is not a feature of marine reserves management in Latin America. Rather, it is not as formal and perhaps as a result not as accessible as it is in other parts of the world. There are, in fact, several marine reserves in Latin America which attract visitors because of the opportunities, usually in association with reefs or other submerged formations, they provide for underwater activities.

A prime example is Costa Rica's Manuel Antonio National Park on the Pacific coast. The primary motivation for the creation of Manuel Antonio was to protect its valuable recreational assets for the people of Costa Rica. To prevent development that would have excluded the public, national legislation created this park in 1968 (MacFarland et al., 1984). Facilities have been constructed to enhance further the Park's four pristine beaches. The marine area has great potential for scuba diving and snorkeling, as park waters include several coral-encrusted rock reefs, pinnacles, and sunken vessels (MacFarland et al., 1984; LaBastille, 1979; Dubois and Hatziolos, 1982).

Tayrona Natural National Park, located on Colombia's Carib-

bean coast, can also be said to have been created for the purposes of tourism and recreation. Unlike Manuel Antonio, however, Tayrona was created to meet the recreational needs of foreigners from the nearby tourist center of Santa Maria (Knecht et al., 1984; INVEMAR, 1983; Meganck, 1978).

A growing segment of the international tourist trade might best be referred to as "nature" or "adventure" tourism (Budowski, 1976; Papson, 1979). Essentially this term refers to those tourists who visit a location because of its unique and/or scientifically important flora and fauna. Though it was not originally established for the purposes of tourism, Ecuador's Galápagos National Park is fast becoming one of the most popular destinations for nature or adventure tourism with 18,000 to 25,000 visitors per year (Ecuador, 1981; Garcés et al., 1984). This pressure led the Ecuadorian government to establish, in May of 1986, a marine biological reserve in the aquatic area of the archipelago.

There are several other Latin American nations with marine reserves which attract tourists to view natural features and/or organisms. These include Argentina (Roundtree, 1985; Luti, 1984; Conway, 1985), Belize (Weyer, 1982; Weyer, 1984; LaBastille, 1985), Mexico (Heffernan, 1977; Villa, 1985; Swartz, 1985), and Panama (Houseal et al., 1985). Other reserves in Latin America support the more traditional forms of marine recreation or tourism associated with Manuel Antonio or Tayrona. These are found in Colombia (IUCN, 1975), Costa Rica (Boza and Lemieux, 1978; Barney, 1973; IUCN, 1975) and Honduras (LaBastille, 1979).

Marine Scientific Research

Science has been a driving factor in the creation of some protected areas throughout the world. A coastal area, protected from deleterious influences such as pollution and heavy recreational boating, can provide scientists with a relatively pristine standard for the measurement of impacts on affected environments; such areas also provide scientists with the opportunity to study a representative portion of the original ecosystem (Salm and Clark, 1984; Dalheim, 1985; Helfrich, 1985). Social science can

In conclusion, it can be said that the management of coastal or ocean resources collectively referred to as marine reserves, is a reality in Latin America. Further, there is reason to hope, assuming financial problems are overcome, that the region's utilization of such reserves will expand in the future.[8]

Notes

1. As noted in the title, the survey is a preliminary one. A longer, more complete version will appear in *Manejo de Ambientes y Recursos Costeros en Latinoamerica,* to be published as a technical report by the Organization of American States. The authors would like to thank those who, through constructive criticism, have contributed to improvements in earlier versions of this article. These include Aldo Brandani, Jens Sorensen, John Clark, Judith Fenwick, James Broadus, Porter Hoagland, and two anonymous reviewers. Thanks also go to Ellen Gately for her time on the word processor. This final effort, however, must remain the responsibility of the authors. This article was prepared with funds from the Tinker Foundation, the U.S. Department of Commerce, Office of Sea Grant under Grant No. NA84-AA-D-00033 (E/L-1), and the J.N. Pew, Jr. Charitable Trust.

2. At least in terms that would be consistent with contemporary conceptualizations of the problem.

3. It has only recently been realized that marine turtles are significant in maintaining the ecological stability of coral reefs by controlling the number of sponges that prey on the coral (Frazer, 1985).

4. We recognize that corals are species, but we feel a principal value of protecting those species rests in protecting the environment they form, and thus that they are more appropriately treated as in our content habitat/environment rather than as protected species.

5. That is, we have demonstrated it to the extent to which the action of a nation-state to establish a marine reserve is an indication of perceived importance.

6. Meganck and Goebel (1979) report that Colombia has pursued a successful relocation strategy to deal with squatters in Isla de Salamanca and Tayrona.

7. This was first recounted to the authors by Capitan Ernesto Cajiao, Chairman of the Colombian Oceanographic Commission.

8. In the course of assembling the information for this article, the authors had the opportunity to communicate with a number of marine reserve managers and planners in Latin America. Without exception these marine reserve professionals, while acknowledging the financial

As Table 1 demonstrates, virtually every country in Latin America has, or has proposed, at least one marine or coastal area that falls under our broad definition of "marine reserve." We found this fact very heartening because it dispels the traditional conception that Latin Americans have always stood on their coastlines looking to the interior,[7] ignoring, by implication, the marine features of their countries. If this was true in the past, it is no longer the case.

This survey clearly shows that Latin American countries have not lagged behind in recognizing the value of marine reserves, and have established numerous reserves for a variety of reasons. In the early 1970s and down to the present there has been a great deal of activity in terms of marine reserves creation throughout the region. In some cases, examples from Latin America stand as models for the rest of the world. Costa Rica's extensive system of marine reserves, Colombia's many parks, and the initiative of Argentina's coastal provinces in establishing areas for the protection of endangered marine species immediately come to mind. In most instances, the marine reserves of Latin America are on a par with those of other regions. Even in those countries where national reserves are few or limited, strides are being taken to protect marine areas. Argentina at present has no national marine reserves, but its national park service hopes to extend its protection to Isla de los Estados (Natenzon, 1985), thus creating the country's first nationally protected marine area. Of Chile's national parks, several are coastal, but only one, Fray Jorge National Park, has a marine border; the country has put considerable effort into classifying marine areas and identifying possible sites of marine reserves (Castilla, 1977; Castro Poblete, 1985). Five marine parks have been proposed for Venezuela (Pannier, 1977). Thus, we should be optimistic.

Conversely, there is some cause for concern. The problems which plague marine reserves worldwide are present also in Latin America. Limited resources for implementation and/or enforcement have frequently impeded the environmental protection for which most reserves were created. Severe problems caused by the international debts burdening many Latin American countries will likely reduce further the resources available for marine reserve creation and management.

also benefit from and assist in the management of marine protected areas (Isakov and Nelson, 1978).

Scientific research is the predominant activity in several Latin American reserves. These include Costa Rica's Cabo Blanco Strict Biological Researve (Barney, 1973) and Brazil's Abrolhos Reef Marine National Park (Wallauer, 1985; Robben, 1985). In Colombia, certain segments of the Tayrona and Isla de Gorgona Natural National parks are set aside for scientific study (IUCN, 1975; Meganck, 1978). In Argentina scientific research has been an important concern for several of the nature reserves established by the province of Chubut (Luti, 1984). Brazil's Piría-Gurupi Ecological Station was explicitly established with the understanding that a portion of the research conducted there would be on marine life and coastal vegetation (Nogueira-Neto and Melo Carvalho, 1979). A final example is provided by the Galeta Marine Reserve of the Smithsonian Tropical Research Institute. Located on the Caribbean coast of Panama, Galeta provides a living laboratory for the study of coral reefs and other coastal and marine fauna and flora (LaBastille, 1979; Cubit, 1985).

Domestic and International Political Purposes and Pressures

Governments are sometimes pressured to create or maintain marine reserves for reasons or values that are not immediately related to the reserve. For example, a government might consider the establishment of a marine park if the designation improved its claims to sovereignty over a given area. Or it might formally recognize a marine reserve out of nationalistic pride. As Wetterberg and Meganck (1978) point out, "nationalism is a powerful force in South America and it can be used to gain support for national parks."

Nonconservation pressure to establish marine reserves can originate from unusual sources, including economic interests desiring to insulate their own activities from negative impacts or limitations imposed by others. The Juréia Ecological Reserve (Brazil) provides such an example. The area was expropriated by the Brazilian government in order to keep commercial and other

interests away from the proposed site of a nuclear power plant (Dov Por and Imperatriz-Fonseca, 1984); all other development was prohibited. As a result, a pristine area that includes a shoreline is very well protected except for the localized effects of the plant.

On occasion, government agencies can mobilize public support for conservation measures and thus pressure the central government. Tayrona Natural National Park in Colombia was established in 1964 to protect unspoiled beaches, bays, and other marine areas along with rich land habitats. These very attractions, however, caught the attention of the Colombian Tourism Corporation (COLTURISMO) in 1972. At that time COLTURISMO proposed the development, under its jurisdiction, of a multi-million dollar tourist complex (complete with deluxe, 20-story hotels, a golf course, restaurants, souvenir shops, etc.) inside the park. The natural resources agency which administers Colombia's parks, INDERENA, objected vehemently to the plan, resulting in "the classic example of the conservation vs. tourism interests" in South America (Meganck, 1978; Wetterberg and Meganck, 1978). INDERENA turned an interagency squabble into a national issue, and rallied enough public support to lead the President in 1976 to reject COLTURISMO's plans (Meganck, 1978).

Protection of Historical or Cultural Sites

The protection of areas of great historical or cultural value has also motivated the establishment of Latin American marine reserves. The first European settlements were concentrated along the shore. Earlier cultures also inhabited coastal areas and islands (Meganck and Ramdial, 1984; INDERENA, 1984). The remains of sunken vessels can yield intriguing archeological and historical data (Mehlert, 1983).

Several reserves have been created in order to protect these sites of historical and cultural interest. Perhaps the outstanding example is Rapa Nui National Park in Chile, which includes Easter Island. The Island was inhabited by Polynesians who sailed hundreds of miles to reach their destination, virtually the

chalilla National Park in Ecuador is one example (Sotomayer, 1985). Mexico's whale sanctuaries are somewhat better protected. Though there is no permanent staff in the sanctuaries (Swartz, 1985), officials from the Subsecretaría de Pesca monitor the research done in the lagoons and occasionally check to make sure all individuals using the area have the proper permits (Dalhelm, 1985). As a rule park budgets are almost universally small, inhibiting the purchase of such necessary equipment as patrol boats and gasoline (Putney, 1982; DuBois and Hatziolos, 1982; Oltremari and Fahrenkrog, 1979).

The Problem of Success

Tourism and recreation present reserve managers with a dilemma: on the one hand, these uses provide needed revenues and in some cases foreign exchange, and permit people to enjoy areas noted for their beauty, beaches, diving spots, etc.; on the other hand, tourism may damage the resource that the parks are designed to protect. The Galápagos Islands and Half Moon Caye in Belize exemplify this dilemma. For the people inhabiting the Galápagos Islands, agriculture and fisheries provide a little income, but tourism is seen as a bonanza by many (Broadus et al., 1984). However, problems due to excessive numbers of visitors have already arisen as the area cannot tolerate such large numbers. Half Moon Caye, until recently a pristine coral cay, has had trouble with visitors trampling vegetation, leaving behind trash, and causing other disturbances (Belize, n.d.; LaBastille, 1985).

Tourists, however, are not the only source of this problem. One of the major problems of the Galeta Marine Reserve (Panama), reported by Cubit (1985) and Helfrich (1985), are overzealous scientists who often invade unprotected locales to harvest illegally limited specimens because of their scientific importance.

Conclusions

The most interesting impression to emerge from this survey of marine reserves is the broad concern for the protection and management of marine and coastal resources in Latin America.

pesticides, enter the park via runoff from a palm oil processing plant and rice fields near the park (DuBois and Hatziolos, 1982).

Introduced Species

Human advances are usually accompanied by animal and/or plant advances. Purposely or inadvertently, settlements bring with them domesticated animals and plants as well as non-domestic species (most notably rats and mice). These can have a deleterious effect on a marine reserve (Salm and Clark, 1984).

Highly destructive introduced species, such as goats and rats, have caused great concern in the Galápagos National Park (Putney, 1982). Introduced species, especially herbivorous mammals, have threatened the endemic species of the Juan Fernandez Islands National Park of Chile (Perry, 1984).

Lack of Operational Resources

From a management perspective, insufficient resources are probably the major obstacle confronting marine reserves. Latin America, in general, suffers from a lack of financial support for protected areas. Limited resources are spread thinly over a variety of needs; conservation is merely one of a multitude of concerns. Lack of qualified personnel is frequently a problem; few organizations or institutions can provide adequate training for park staffs and pay is often too low to attract able individuals. In general, South America lacks legislation supporting reserves, this leading to spotty enforcement of conservation measures (Wetterberg and Meganck, 1978).

Perhaps the most significant aspect of insufficient funding is the low levels of enforcement it engenders. There are several reasons for this. First, inadequate numbers of enforcement personnel can be employed. Second, enforcement personnel cannot be adequately trained. Third, low levels of funding often equate with a low-level commitment to enforcement by the regulatory agency. And fourth, the general public cannot be educated in the importance of enforcement.

Several Latin American marine reserves have been reported to be suffering from inadequate enforcement of regulations. Ma-

easternmost extent of their migration (Diamond, 1985). The park protects the giant statues, remains of a megalithic culture, that have intrigued people all over the world. A number of Colombia's reserves, created to protect the remains of indigenous cultures, include Tayrona, Sanquianga, and, to a lesser degree, Isla de Salamanca and Isla de Gorgona National Natural parks (INDERENA, 1984; Meganck, 1978).

Other reserves protecting indigenous cultures include the Darien National Park and the Kuna Forest Park Indian Reserve (encompassing several offshore islands) of Panama (Houseal et al., 1985) and the Bay Islands Marine National Park in Honduras (LaBastille, 1979). The Kuna reserve is important not only as a preserve for the seafood-dependent Kuna culture but also as a protected area for previously unknown floral and faunal species (Houseal et al., 1985).

Management of Marine Reserves

If the rationale for establishment can be said to be policy formulation, then "management" should be loosely interpreted as the implementation strategies adopted for marine reserve "policies" in Latin America.

This section discusses the level of government holding jurisdiction, the position in the burearucracy of the responsible agency, the size of the marine reserve, and the use of zoning mechanisms.

Level of Government

Level of government refers to the jurisdiction or jurisdictions—national, state (provincial), or local (municipal)—with management authority for marine reserves. Reserves on a state or provincial level can provide important supplements to the national system of protected areas (Carls and Ludeke, 1984).

Most reserves in Latin America are national. This is not surprising since most of the governments of the region are unitary (in distinction to less centralized federal) systems. The coastal provinces of Argentina provide exceptions to this rule (Merino,

S., 1986). For example, Chubut Province has established a system of marine reserves on Valdés Peninsula and in the Gulf of San José. Chubut's several marine reserves shelter right whales, sea elephants, sea lions, Magellan penguins, an other sea birds (Luti, 1984). Argentina's Rio Negro province has also established a provincial marine reserve (Brandani, 1985), as have the provinces of Buenos Aires and Santa Cruz (Merino, S., 1986).

Latin America would not appear likely to add to its list of provincial reserves: resources are few and problems too numerous even on the national level, where the ability to provide the former and deal with the latter seems greatest. Unfortunately this means that national efforts in marine reserves will not be augmented by lower levels of government.

Position in Bureaucracy

Position in the bureaucracy indicates the importance of a marine reserve to the Ministry or Department housing the agency or bureau responsible for managing such a marine reserve. We argue that this placement is an important consideration. For example, if a marine reserve is placed under the management authority of an agency that is oriented toward natural resource development, then the conservation objectives of the marine reserve are not likely to be enthusiastically pursued.

Marine reserves appear to share the same management structure as terrestrical reserves in Latin America. Authority usually remains in the hands of a single agency. Generally, a National Park Service is responsible for management of the parks; such an agency is usually part of a Forestry Service, which is, in turn, part of a Ministry of Agriculture. This pattern was found in Ecuador, Venezuela, Chile, and Costa Rica. Colombia shows a slight variation in the pattern. The park administrators were under the jurisdiction of a general natural resources agency, INDERENA, which, like the Forestry Services in the other countries, is an agency of the Ministry of Agriculture. However, the park service occupied a higher rung within its parent agency than its counterparts in other South American countries (Wetterberg and Meganck, 1978). A similar arrangement is found in

The most common occurrences of poaching involve the prohibited taking of turtles and their eggs, and has been reported at the Military Scientific Station (Aves Island, Venezuela), Corales de Rosario Natural National Park (Colombia), Bay Islands Marine National Park (Honduras), and the Wia Wia Nature Reserve (Surinam) (Carr, 1984; Lieveld, 1985).

A related problem is harvesting which utilizes destructive and/or prohibited methods. A most distressing example of this is found in the waters off Tayrona Natural National Park. Professional fishermen have reportedly used dynamite to increase their catches (INVEMAR, 1983). The use of explosives has also been noted as a problem for another Colombia's marine reserves, Corales de Rosario Natural National Park (Carr, 1984).

Existing Use Conflicts

Other economic activities inconsistent with the purpose of a given marine reserve have caused concern in a number of Latin American marine reserves. Again, restrictions, where previously there had been none, create resentment and in some cases open flaunting of regulations. Illegal fishing, for example, has been a problem in Mexico's gray whale sanctuaries (Perrin, 1985; Swartz, 1985), in Venezuela's Archipielago de las Rocas, and Colombia's Isla de Salamanca Natural National Park (IUCN, 1982).

Agricultural activities, within and beyond park boundaries, affect conservation efforts. Sometimes the effect is indirect, as for instance, by the building of a road to connect agricultural areas to port towns, as in the Galápagos Islands, or by the practice of slash-and-burn agriculture, which not only threatens the survival of tropical forests (Meganck and Goebel, 1979) but leads to severe erosion during the rainy season, with devastating downstream effects.

In other cases the effect is direct and may threaten to undermine the reasons for the reserve's creation. Pollution from pesticides, herbicides, and other chemicals used in agricultural and related activities poses the clearest threat. In Costa Rica's Parque Manuel Antonio, pollutants, including acids and

waterways within Costa Rica's Tortuguero National Park (Morris, P., 1983).

In numerous other instances, squatters, often indigenous peoples forced from their traditional environments by development, intrude on reserves. In Latin America, in particular, the settlement of unoccupied land is "a tradition, almost a right" (Meganck and Goebel, 1979). A major problem confronting Colombia's park system is the number of illegal settlers in its national parks.[6] Brazil's Fozdo São Francisco Ecological Station has been degraded by human habitations constructed on turtle beaches (Nogueira-Neto and Melo Carvalho, 1979). Marine reserves in El Salvador, Mexico, and Venezuela also face similar illegal habitation challenges (Meganck and Goebel, 1979). Likewise, Venezuela's Archipelago de los Roques National Park suffers from houses illegally constructed after the creation of the park (IUCN, 1982).

Other development pressures are more overt, such as the tourism plans for Tayrona and Galápagos (Meganck, 1978; Patrick, 1984) and the construction of roads through Colombia's Isla de Salamanca National Natural Park, which badly damaged the area's mangroves (INDERENA, 1984); and in Chile's Juan Fernandez Islands National Park road construction resulted in severe erosion of coastal cliffs (Perry, 1984). Darien National Park in Panama is also threatened by road construction (LaBastille, 1979; Houseal et al., 1985).

Poaching

Poaching, the illegal taking of animals and/or their eggs, has been a problem in several of the region's marine reserves. Moreover, in many areas there appears to be limited comprehension of the reasons for the harvest restrictions (Weyer, 1984). Thus, public education and management training are both necessary. In addition, the enforcement of regulations is difficult since poachers are often armed (Weyer, 1984). Poaching of booby eggs is a serious concern in Half Moon Caye National Park in Belize. Poaching in Colombia's Isla de Salamanca National Nature Park involves the illegal gathering of oysters and iguana eggs (IUCN, 1982).

Honduras, where the responsible agency is seated within RENARE, the natural resources division of the Ministry of Agriculture. Brazil offers a third agency pattern. The majority of its reserves are under the jurisdiction of the Federal Environmental Agency, SEMA, which is a part of the Ministry of the Interior (Dov Por and Imperatriz-Fonseca, 1984). Exceptions are made in some instances within Brazil, as in the case of the Juréia Ecological Reserve, which resides under the State Industry for Atomic Energy (NUCLEBRAS).

Size

The advent of biogeographic theory has highlighted the importance of size in the accomplishment of conservation goals and the determination of optimum size and distribution of reserves (Lewin, 1984; Salm and Clark, 1984). Biogeographic theory holds that the number of species a reserve or "island" saves and the rate at which extinctions occur are dependent on (1) the size of the reserve and (2) its distance from other natural areas which serve as sources of colonization (Diamond, 1975; Terborgh, 1976; Diamond, 1976; Whitcomb et al., 1976). Reserves are increasingly seen as "islands" in an "ocean" of intensive human uses that exert a downward pressure on size (Dasmann, 1984). The lack of financial and personnel resources, particularly in developing countries, does the same (Ray, 1976).

Marine reserves throughout the world range in size from a few hectares to 350,000 km^2. Likewise, Latin America has marine reserves representing a wide range of sizes. Venezuela's Archipielago los Roques National Park covers over 225,000 hectares (IUCN, 1982), posing a real challenge for management. The Galápagos Islands range over 45,000 square miles of (until recently) mostly unprotected waters. Of this total about 9,000 square miles are land areas (Perry, 1984), and the Park Service there is hard pressed to monitor the entire area, especially given tourist activities all over the archipelago (there are 16 islands and well over 42 islets—Perry, 1984), some of them quite far from the main group of islands (Putney, 1982)). Colombia's Corales del Rosario Natural National Park, although 17,800 hectares in size,

is experiencing pressure from the inhabited islands that are within the park but outside park jurisdiction, which ends at the shore (INDERENA, 1984). Toward the other extreme, Costa Rica's small Manuel Antonio National Park (1,400 ha.) is threatened by human activities just beyond its borders. These include sedimentation and pesticide intrusion from upland agriculture (DuBois and Hatziolos, 1982). Impacts of these external activities could severely damage the marine ecosystems the park was designed to protect. The smallest Latin American marine reserve we encountered is the Isla de Los Pájaros Nature Reserve. Covering only 2 hectares of shore and coastal cliffs, this Chubut Province (Argentina) reserve protects nesting sea birds (Luti, 1984).

Zoning Schemes

Not all activities in a reserve are compatible; recreation may interfere with scientific research; fishing (commercial or recreational) may prevent an area from restoring depleted fish stocks. Many uses hinder conservation goals. Proper zoning can permit extensive use of the protected area while furthering the goals of conservation (Salm and Clark, 1984; Cocks, 1984).

Zoning in Latin America is neither extensive nor elaborate. Most of the marine reserves examined had no zoning schemes, including such examples as Machalilla Park in Ecuador, all Costa Rica's parks, Venezuela's Isla de los Roques, and Brazil's Abrolhos Reef Marine National Park. Zoning plans have been proposed or are under review for a number of these areas, however.

A few parks do have zoning plans, most notably Colombia's Isla de Salamanca and Tayrona Natural National Parks. Tayrona has been divided into seven zones representing five dedicated uses (Cultural-Historic, Primitive Wilderness, General Recreation, Natural Recovery, and Intensive Use). Of these, Primitive Wilderness comprises the greatest portion of the park's 15,000 hectares (including 3,000 hectares of the Caribbean and its bottomlands) (Meganck, 1978). In Mexico's whale sanctuary at Ojo de Liebre a small number of licensed activities (e.g., whale

watching) are limited to half the protected lagoons. The other half is a nursery area only (Swartz, 1985). Elaborate zoning exists in the Galápagos National Park, which has various use areas, protection areas, and scientific research zones. The system, however, addresses the land area of the national park. A parallel system has yet to be developed for the recently announced Galápagos marine biological reserve.

A final example of zoning is presented by the Galeta Marine Reserve of the Smithsonian Tropical Research Institute. This Panamanian reserve (actually in the Canal Zone) has an "education zone" where nonscientific visitors are permitted, as well as zones were specimen collection by researchers is or is not permitted (Cubit, 1985).

Problems of Implementation

Up to this point we have demonstrated that Latin American countries have generally been aware of the importance of establishing marine reserves[5] and have designated areas for a variety of reasons. Unfortunately, the establishment of a marine reserve does not guarantee that it will fulfill the purposes for which it was created. Several such "problems of implementation" were identified during this survey. Generally, these problems and disturbances involve past or present human activities, and most are present in more than one reserve.

Development Pressures

One of the most basic of human activities is the establishing of settlements. It is not surprising, therefore, that settlements pose problems in a number of reserves. In some cases, in areas where existing settlements have been designated reserves, the small towns or villages remaining within the parks cause inevitable disturbances. For example, Ecuador's Machalilla National Park encloses a fishing village (Sotomayer, 1985). A fishing village indents the boundary of the Laguna de Tacarigua National Park in Venezuela (Salm and Clark, 1984). Isolated communities dot

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Postscript

Since this article was sent to press, we have obtained additional information on marine protected areas in Latin America. Specifically, we have received information on Chile and Peru.

A complete listing of marine protected areas in Chile would indicate that there are fifteen such areas which, besides their terrestrial elements, have a marine component of some interest. These fifteen are: 1) Pan de Azucar National Park (1986); 2) Fray Jorge National Park and Biosphere Reserve (1941); 3) Juan Fernandez Archipelago National Park and Biosphere Reserve (1935); 4) Rapa Nui National Park (1935); 5) Chiloe National Park (1983); 6) Guaytecas National Reserve (1938); 7) Isla Guamblin National Park (1967); 8) Isla Magdalena National Park (1983); 8) Laguna San Rafael National Park (1959); 10) Katalalixir National Reserve (1984); 11) Bernardo O'Higgins National Park (1969); 12) Alacalufes National Reserve (1969); 13) Los Pinguinos Nature Monument (1966); 14) Alberto de Agostini National Park (1965); and, 15) Cabo de Hornos National Park (1945). In additiion, there are three other protected area which contain marine components with apparently no marine

resources of special significance. These are: 1) Alerce Andino National Park (1983); 2) Queulat National Park (1982); and, 3) Cinco Hermanas Nature Monument (1964). (Castro 1986)

Peru has four marine protected areas. First, there is Paraces National Park which encompass some 335,000 ha including 90 kilometers of shoreline. It is reported that one problem in Paraces is a conflict between fishermen and the marine mammals protected by the park. A second Peruvian marine protected area in the Manglares Esteros de Tumbes Natural Reserve. This 6,000 ha reserve is threatened by mangrove conversion for shrimp ponds beyond its borders. Third is the 690,000 ha Laguna de Mejia Natural Reserve. Managers of this reserve are concerned about shrimp ponds being established nearby. The fourth marine protected area in Peru is the Estuario de Virrilo Natural Reserve (1,500 ha).

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