Coastal Area Management in Sri Lanka*

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INTRODUCTION

There is growing interest in coastal area management among governmental and nongovernmental officials in developing countries. This interest is evident in the increasing number of management programs, in international financial assistance in support of such programs, and in national and international seminars, workshops, and training institutes devoted to various aspects of the topic.[1]

The idea of coastal management is both beguiling and elusive. Surely, we think, coasts should be managed, just as we seek to manage some human activities to protect air and water quality, to promote human health, or to insure the sustainability of renewable resources such as forests and fisheries. But what is the object of "management" in coastal management? Coasts are not a well-defined resource. They are places—physically dynamic edges between land and sea. They comprise numerous physiographic forms: dunes,

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1. At Coastal Zone '87, the fifth in a series of symposia on coastal and ocean management, 38 papers were presented on some aspect of coastal management as compared to six at Coastal Zone '80. The U.S. Agency for International Development is funding coastal planning efforts in Sri Lanka, Thailand, and Ecuador and participates in the ASEAN-USAID Coastal Resources Management Project. Several other industrialized countries are supporting aspects of coastal management in developing countries.

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deltas, beaches, bluffs, wetlands, and forests. They include a wide range of ecosystems. They serve as habitats for countless flora and fauna. They are the loci of an incredibly diverse range of human uses and activities which shape and mold the physical forms of the coasts and enhance or reduce their biological diversity.

Most coastal countries manage their coastal areas to some degree, although they vary greatly with regard to the number and types of coastal issues they address, the types of management strategies they employ, their intensity of management, and a host of other factors.[2] What emerges from analyses of existing coastal area programs is the recognition that the concept of coastal area management is somewhat elusive. There is no widely accepted blueprint for how to plan a management program. There are no "off-the-shelf" management program models that can be easily adapted and applied.[3] Each country (or other coastal jurisdiction) must carefully tailor its own program to include

1. an identification of specific coastal problems to be addressed;
2. an identification of priorities among these problems;
3. an analysis of specific processes which cause these problems;
4. an identification of specific management techniques (such as zoning or a permit system) designed to mitigate these problems;
5. a set of organizational arrangements and administrative processes for implementing a management program; and
6. the designation of a geographic area within which management will occur.[4]

As coastal area management program efforts proliferate around the world, these program elements are being addressed in a variety of ways. Among developing countries, however, few have gone as far as Sri Lanka in developing a coastal management program.

2. Jens C. Sorensen, Scott T. McCreary, and Marc J. Hershman, *Coasts: Institutional Arrangements for Management of Coastal Resources* (Washington, D.C.: National Park Service, 1984).

3. There are, to be sure, readily available guidelines for managing particular resources such as wetlands and mangroves. These guidelines, however, assume an institutional setting and a management program in which they can be applied. See, e.g., Samuel C. Snedaker and Charles D. Getter, *Coastal Resources Management Guidelines* (Washington, D.C.: National Park Service, 1985); Lawrence S. Hamilton and Samuel C. Snedaker, eds., *Handbook for Mangrove Area Management* (Honolulu: East-West Center, 1984).

4. James K. Mitchell, "Coastal Zone Management: A Comparative Analysis of National Programs," *Ocean Yearbook 3*, ed. Elisabeth Mann Borgese and Norton Ginsburg (Chicago: University of Chicago Press, 1982), pp. 258–319; Jens Sorensen and Aldo Brandini, "An Overview of Coastal Management Efforts in Latin America," *Coastal Management* 15 (1987): 1–25.

Sri Lanka enacted a Coast Conservation Act in September 1981,[5] and the law went into effect in October 1983. The law requires the Coast Conservation Department (CCD) to develop a Coastal Zone Management Plan (CZMP) within three years. This plan is to be based on a number of specific studies set forth in the Act. The Act mandates the establishment of an advisory council to assist the CCD in the process of plan preparation. In the interim period while the plan is being prepared, the Act stipulates that anyone proposing a development activity in the designated coastal zone must apply to the CCD for a permit. The coastal zone, as defined by the Act, includes an area from 2 km seaward to 300 m inland of the mean high-water line. The landward jurisdiction is somewhat greater for rivers, streams, lagoons, or other bodies of water connected to the sea.

In the years since the law was enacted the CCD has conducted a significant amount of research and has prepared a Master Plan for Coast Erosion Management (MPCEM) and a Coastal Zone Management Plan (CZMP). It has also issued 764 permits for development activities, organized seminars and workshops on several aspects of coastal management, and developed effective relationships with several agencies which have management responsibilities in coastal areas.

Sri Lanka has a strong and vigorous coastal management program. A detailed examination of Sri Lanka's program suggests that its strength and vigor are due in large part to (1) the strong coastal orientation of the country; (2) the widely shared agreement about what the coastal problems are, what the causes of the problems are, and to a lesser extent, what the appropriate roles of government are in dealing with the problems; (3) a law that provides a strong legal basis for management; (4) strong program leadership; (5) adequate political support for planning and management; and (6) an adaptive, incremental approach to the development of the planning and management program.

Some of the conditions that make for a strong management program in Sri Lanka were present before there was a Coast Conservation Act or any thought of a management program. The strong coastal orientation of the country, the population shifts to coastal areas of the south and southwest, and the increasing popular concern about coastal erosion all contributed to the context for a vigorous coastal management program. What makes the Sri Lanka case interesting and important for other developing countries, however, is that many of the conditions for effective coastal management were identified and refined during early planning and implementation of the program.

The case of the development of Sri Lanka's CZMP is not necessarily a blueprint for other developing countries. Nevertheless, it is interesting and

5. Parliament of the Democratic Socialist Republic of Sri Lanka, Coast Conservation Act No. 57 of 1981; hereafter referred to as "the Act" or cited as CCA.

perhaps instructive to see how the Sri Lankans constructed their program, the challenges they confronted (and continue to face), the alternatives they considered, the choices they made, and the consequences of those choices.

THE SETTING

Sri Lanka is an island country lying off the southern tip of India (fig. 1). It has a land area of 65,000 km^2 and a coastline of 1,562 km (probably more than 2,000 km if the coastlines of lagoons, bays, and inlets are added).[6] The coastline itself consists of a wide range of geomorphological features such as headlands, bays, lagoons, peninsulas, spits, bars, and islets. It encompasses a variety of tropical habitats including wetlands (about 120,000 ha); lagoons and estuaries (45 estuaries and 40 lagoons totaling about 42,000 ha); mangroves, salt marshes, and seagrass beds (the total extent of mangrove coverage is between 6,000 and 10,000 ha); coral reefs (about 50 linear km of major reefs); and coastal sand dunes, barrier beaches, and spits (sand dunes occur along about 312 km of the coastline).[7]

Sri Lanka's civilization dates back more than 25 centuries, but unlike most other island nations, the ancient inhabitants of the country made little use of the coastal lands. The country's centers of civilization were located in the mountainous interior with the coastal areas left primarily as a buffer against invasions from abroad. The island became familiar to Greek and Arab sailors in the second century A.D., but it was not until the arrival of the Portuguese in 1505 followed by the Dutch in 1658 and the British in 1796 that the coastal areas assumed greater significance for trade and defense. The colonists built forts and canals in coastal areas. Roads and railroads were later constructed by the British, often within close proximity to the shoreline. Trade became important and cultivation was begun in the coastal areas for export crops such as cinnamon.

In 1948 Sri Lanka gained its independence after nearly 400 years of continuous colonial rule. After independence, more and more people began to migrate to coastal areas to take advantage of economic and educational opportunities. Today more than half (54.3%) of Sri Lanka's population of just over 16 million live in coastal districts.[8] The southwestern coastal districts stretching from just north of Colombo to Galle constitute 15% of the total land area of the island, but more than 40% of the island's total population live in this area. Increasing population has led to greater housing densities in coastal areas (see table 1).[9] Temporary shelters are frequently constructed in

6. Government of Sri Lanka, *Second Interim Report of the Land Commission,* 1985, p. 2.
7. Ibid.
8. Ibid., p. 11.
9. Ibid., p. 13.

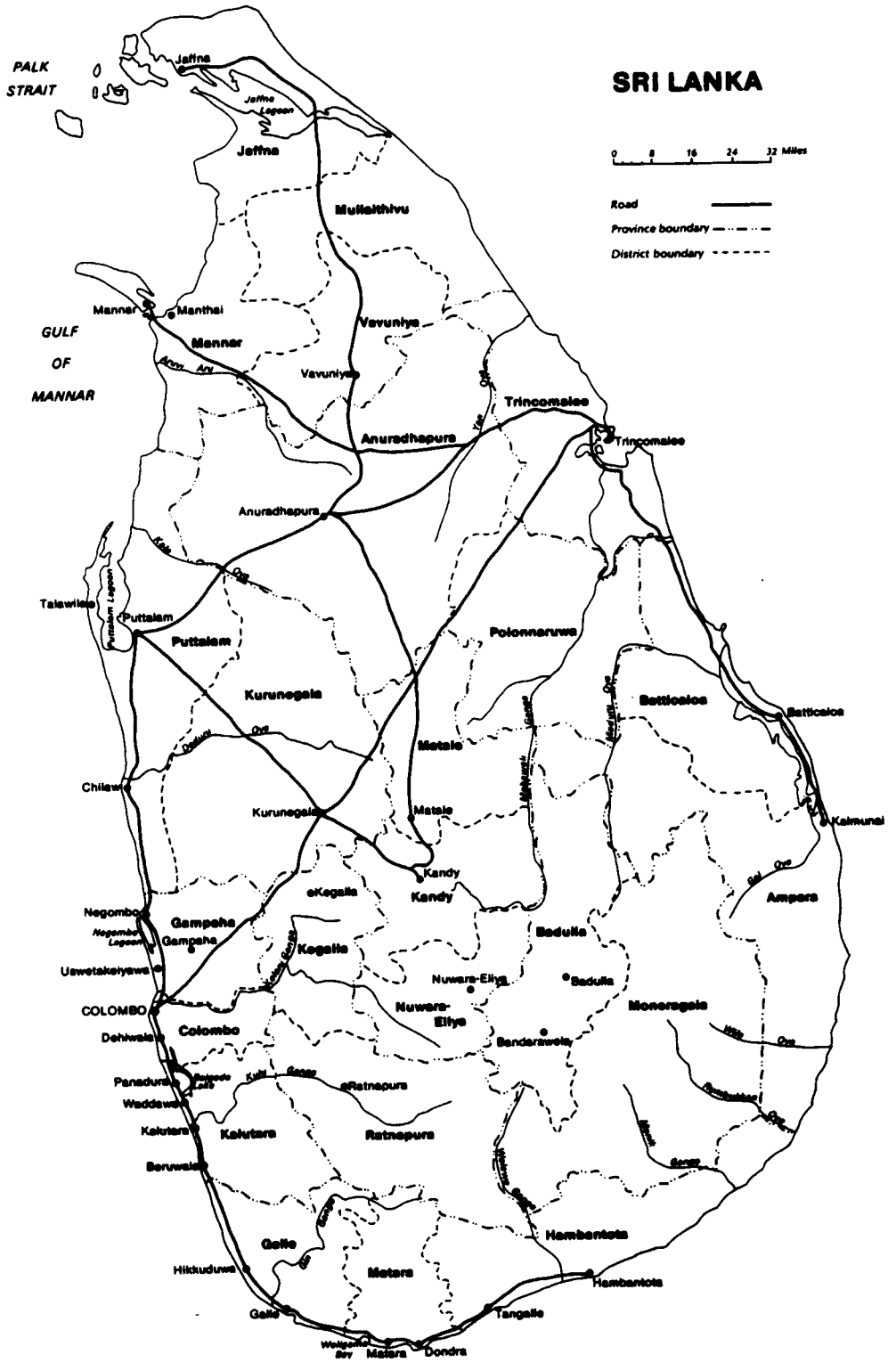

FIG. 1.—Sri Lanka. This map has been compiled from various sources. (Drawn by Pi-Wei Lan.)

TABLE 1.—SRI LANKA COASTAL POPULATION DATA

District	Length of Coast (km)	1981 Population (000s)	Population Density (km^2)	Average No. of Persons/km Coast
Colombo	31.2	1,698.3	2,604	54,381
Gampaha	34.6	1,389.3	993	33,907
Kalutara	34.3	827.5	515	24,123
Galle	79.3	814.6	487	10,675
Matara	51.2	644.2	517	12,583
Hambantota	145.5	424.1	163	2,915
Jaffna	336.6	831.1	401	2,468
Mannar	173.4	106.9	53	617
Mullaithivu	66.8	77.5	39	1,160
Batticaloa	120.6	330.9	134	2,744
Ampara	118.0	338.8	86	3,295
Trincomalee	83.9	256.8	98	1,952
Puttalam	241.3	493.3	166	2,044

SOURCE.—Government of Sri Lanka, *Second Interim Report of the Land Commission* (1986).

the back beach areas and even on the beaches. These shelters are without sanitary facilities, thus creating local problems of fecal pollution.

The primary coastal uses are fishing, agriculture, tourism, housing, and public facilities. Fishing is the main economic activity in the coastal zone. There are currently about 78,000 people actively involved in coastal fishing.[10] They support a total population of about 330,000 people.[11] These people are distributed among 371 fishing centers and 969 fishing villages. Some of the fishermen fish the eastern and northern coasts during the southwest monsoon (from April to August) and the southern and western coasts during the northwest monsoon (from December to the end of March).

The Sri Lankan government has made coastal fisheries one of their primary development priorities. The government has provided subsidies for boats and engines and developed marketing, harbor, and anchorage facilities. Training and extension programs have also been provided. In 1986, there were about 14,000 nonmechanized fishing craft. However, most of the fish (just over 14,000 mt) were being harvested by 9,600 mechanized craft and fiberglass boats and the 2,700 3.5 mt vessels with inboard engines.[12]

There are 10 fishing harbors in Sri Lanka which are used primarily by the larger fishing vessels. Most of the traditional craft and fiberglass boats are beach-landed in close proximity to the fishing villages. In addition, beach sites are needed for a number of ancillary activities including drying of fish that are not marketed fresh, mending of nets, and repair of boats. Beach sites are

10. Dianeetha Sadacharan and Kem Lowry, "Managing Coastal Fisheries Conflicts in Sri Lanka" (paper delivered at Coastal Zone '87, Seattle, 1987).
11. Ibid., p. 2.
12. Ibid.

also used for the construction of temporary huts and storage facilities for migrant fishermen.

Agricultural crops in coastal areas are primarily coconuts and paddy. About 400,000 acres of coconut are currently under cultivation in coastal areas.[13] Most of the coconut cultivation is by small landowners.

Tourism, which was once one of the fastest growing sectors, has been in a steep decline in recent years. Total tourist arrivals for 1986 were 230,106, the lowest number of tourists since 1978 and a decline of 43% since 1982, the peak year for tourism.[14] Tourism earnings in 1986 were down 54% from the peak year of 1982.[15] In 1986, tourism employed 20,000 people directly and approximately 28,000 people in ancillary services.[16] The increase in civil strife in the north and east of the country since 1983 is the major cause of the decline of tourism. Several hotels in the east and north have closed completely, as have some in the Hill Country. Hotel occupancy rates throughout the country averaged 33% in 1986, a slight increase over 1985 which was attributable to the closing of some hotels rather than an increase in tourism.[17] Occupancy rates along the southwest coast where most of the coastal tourist facilities are located were slightly above average, but several hotels were totally or partially closed. Occupancy rates were moderate in Colombo, which, with the opening of a Hilton in July 1987, has just over 2,000 "five-star" hotel rooms.

COASTAL RESOURCE MANAGEMENT PROBLEMS

Coastal issues are usually described in one of four ways:

1. as land or water uses, such as dredging, that degrade or deplete coastal resources;
2. as the adverse consequences of particular land or water uses;
3. as conflicts over coastal resource allocation, such as whether a particular coastal site should be used for a hotel or for a public park; or
4. as failures of public management, such as poor enforcement of laws regulating construction in flood hazard zones.

Most coastal management programs are intended to both prevent adverse impacts on coastal resources and to allocate coastal uses or sites in ways regarded as most likely to promote national development objectives. The mix

13. Sunimal Fernando et al., *Sri Lanka: Perspectives of the Coastal Zone,* Marga Institute, no. 16 (Colombo, 1978).
14. Central Bank of Sri Lanka, *Annual Report* (Colombo, 1986), p. 95.
15. Ibid.
16. Ibid.
17. Ibid. The CTB is not approving new hotels, but hotel applications received prior to this ban are still being reviewed.

of prevention and development objectives and the emphasis given to each varies from country to country (and frequently within regions of any particular country). In Sri Lanka, the primary emphasis of coastal management efforts is preventive. The CCD has taken the lead in efforts to reduce coastal erosion in particular. Other agencies are primarily responsible for promoting particular coastal uses for economic development, such as aquaculture. CCD officials view their role in these allocative issues as seeking to harmonize development objectives with coastal resource conservation through collaboration with agencies with development missions.

In the discussion that follows, the primary emphasis is the specific coastal conditions that CCD seeks to prevent or minimize; namely coastal erosion, habitat destruction, loss of scenic and recreational resources, and loss of historic and cultural resources.

Erosion

Coastal erosion is a severe problem in Sri Lanka that results in damage to or loss of houses, hotels, and other coastal structures, undermines roads, contributes to the loss or degradation of valuable land, and disrupts fishing, shipping, recreation, and other activities. In economic terms, the public and private costs of erosion are enormous. Millions of rupees are spent annually to cope with losses imposed by coastal erosion.

Impacts of coastal erosion are most severe along Sri Lanka's west and southwest coasts. It has been estimated that along the western coastal segment extending about 500 km from the Jaffna Peninsula in the north to Weligama Bay in the south about 175,000 to 285,000 m^2 of coastal land are lost to erosion each year.[18] Of this amount about 145,000 m^2 are lost annually from the 137 km coastal segment that extends from the mouth of the Kelani River (just north of Colombo) to Talawila (Kalpitya Peninsula).[19]

Coastal erosion in Sri Lanka results from the natural action of waves and currents and from a variety of human activities, most notably ill-designed coastal structures, the construction of hotels and other buildings too near the shoreline, and sand and coral mining. It is also exacerbated by the removal of coastal vegetation and reef breaking to create navigation channels.

Coastal erosion is widely recognized as a major problem and strong governmental involvement in coping with erosion is not only tolerated, but expected. During the southwest monsoon it is common to see pictures of washed-out coastal roads and similar effects of coastal erosion in the daily papers

18. Government of Sri Lanka, *Sri Lanka Coastal Zone Management Plan* (Colombo: Coast Conservation Department, January 1987), p. 32; hereafter referred to as Sri Lanka CZMP.

19. Ibid.

along with strong editorial demands for action. However, to most Sri Lankans, erosion control is associated with "hard solutions"—groins, revetments, and breakwaters. It is quite common for villagers and hotel owners to lobby their representatives in Parliament or the minister of fisheries (within whose ministry the CCD is located) for additional protection in the form of revetments or other engineering interventions.

Ill-designed Coastal Erosion Protection Structures

Historically, the approach of the Public Works Department, the Water Supply and Drainage Board, and the Colombo Port Commission (and later the CCD) to erosion control was primarily reactive. Structures were frequently built in response to public pressures to deal with an immediate erosion problem that threatened property. Some of these structures were built without sufficient understanding of the local coastal dynamics so that the "solution" to an erosion problem in one area sometimes resulted in substantial erosion or accretion elsewhere. The problem of ill-designed coastal erosion control structures was compounded by increased political demands for new fishing harbors or for breakwaters that would provide protected anchorages for fishing vessels. Such harbors and breakwaters often contributed to erosion problems.

One example of ill-designed coastal works is a long groin constructed to stabilize the outlet of the Panadura River. The primary objective of the groin was to insure that the mouth of the river would remain open as an outlet to Bolgoda Lake and to prevent the periodic flooding of adjacent paddy land. A secondary objective was to provide access for fishing boats into the river for mooring. These objectives were achieved, but the groin caused serious erosion north of the river. The groin has blocked littoral supplies of sand to the entire coastline from Egodauyane to Ratmalana. Numerous houses have been washed away, and the beaches at Egodauyane and Lunawa have disappeared. The main coastal railway in this area continues to exist only because of major revetments.

An even more dramatic example occurred when construction of a breakwater was begun at Wellamankara, north of Negombo, as part of a project to build a fishing harbor along this straight portion of coast. The breakwater resulted in such severe erosion that an entire fishing village north of the breakwater was eventually washed away. Further erosion was prevented only by removing the breakwater at a cost exceeding that of the original construction.

Building Construction in Erosion-prone Areas

Until recently, Sri Lankans did not use beaches for recreational purposes.[20] Homes were built away from the shore to avoid the corrosive effects of sea

20. H. J. M. Wickremeratne, "Environmental Problems of the Coastal Zone in Sri Lanka," *Economic Review* 10 (May 1985): 8–16.

spray. Beach land was used for burial grounds and for temporary huts for fishermen. When tourism began to boom in the sixties, many small and large hotels and other facilities were sited very close to the beach. Although setback lines were delineated in 1978 by the CCD, the Ceylon Tourist Board (CTB), and the Urban Development Authority (UDA), many hotels built prior to that time are located on sites threatened by progressive erosion. Hotel owners have built expensive revetments to control the erosion that threatens the foundations of their hotels. Such structures are particularly evident at Negombo, Hikkaduwa, and Beruwala.

Coral and Sand Mining

Coral is mined as an inexpensive source of lime for construction and other purposes. A recent survey by the CCD revealed that about 1,225 people were involved in coral mining along the southwest coast where most mining occurs.[21] Of these, only about 13% were actually directly employed in mining coral from the reefs. The rest were picking up coral on the shore, mining in back beach areas, working in the lime kilns, or were engaged in other activities associated with producing lime from coral. At the time of the survey, about 3,500 people were directly or indirectly economically dependent on lime production.[22] Mining reefs for coral is generally recognized as contributing to coastal erosion (reefs reduce the energy of waves which might otherwise increase erosion). Even miners agree that coral mining contributes to erosion.[23] It is, however, relatively lucrative. For the 4 months a year that miners work they receive about Rs. 2,000 per month (about US$80) which is comparable to the wages received by management personnel in civil service. Even if miners did not work the rest of the year—and most do—their annual income from mining would be greater than that of most laborers.

Sand is mined from river mouths and dunes for construction purposes. In some areas such as the Kelani River, sand is being mined at rates far greater than can be replenished naturally. Low sand dunes along the coast in the Uswetakeiyawa area have been heavily mined, contributing to instability of the entire beach area.

A survey conducted by the People's Bank for the CCD along the south and southwest coast revealed that about 1,700 people were mining sand in river mouths.[24] These miners supported an additional 5,700 people.[25] Per capita income varied by area. Miners made as little as US$1 per day and as

21. Anil Premeratne, "Socio-economic Survey of Those Engaged in the Coral Mining Industry in the Southwestern Coastal Areas" (Colombo: Coast Conservation Department, 1984, unpublished report).

22. Ibid.

23. Ibid.

24. Lal de Alwis, *A Census of the Exploitation of Sand and Seashell Resources in the Coastal Zone of Sri Lanka* (Colombo: People's Bank Research Department, 1985), p. 39.

25. Ibid.

much as US$6 per day.[26] Unlike coral mining, sand mining is widely distributed along the coast.

Depletion and Degradation of Coastal Habitats

A second major consequence of the population shifts to coastal areas in Sri Lanka is the increased rate of depletion and degradation of coastal habitats. Coastal habitats perform a number of vital natural functions. Perhaps the most important of these functions in Sri Lanka are the roles these habitats play in controlling coastal flooding and supplying a cheap, accessible source of food.

Coastal habitats are lost or damaged by a wide range of activities including discharge of raw or poorly treated sewage, dredging and filling, discharge of industrial effluents, erosion, overfishing, and similar activities. Specific threats to particular habitats are outlined below.

Mangroves

Mangroves occur in a narrow intertidal belt in Sri Lanka that rarely exceeds 1 km landward from the mean low-water tidal level. Estimates of mangrove cover range from a low of 6,000 ha to a high of 12,000 ha which amounts to between 5%–10% of the country's sheltered tidal habitats.[27]

Mangroves are threatened by both domestic and commercial extraction for firewood and housing material. Mangrove areas are also being converted for agriculture, such as coconut and paddy cultivation, and for aquaculture.

Seagrass Beds

Seagrass beds are productive habitats for fish, dugong, and turtles. They support more than half the country's nearshore fishery production.[28] They also help minimize coastal erosion. The most extensive seagrass beds extend from the Dutch Bay north of Kalpitiya to the Jaffna Lagoon and from Mannar to Rameswaram.

Threats to seagrass beds include use of destructive types of fishing gear, such as bottom trawling and drag net fisheries, destruction due to digging for polychaetes, smothering of seagrass by siltation and sedimentation, and eutrophication.

Coral Reefs

Coral reefs are scattered around the coasts of Sri Lanka. They provide an essential habitat to fish and help dissipate the energy of waves during the monsoon seasons.

26. Ibid., p. 42.
27. Sri Lanka CZMP, p. 73.
28. Ibid., p. 79.

Reefs are threatened by the mining activities already described and by blasting for navigation channels. In some areas, particularly the south and southwest coasts, collection of aquarium fish and coral, trampling and anchor damage, and sewage and oil discharge from ships are major threats. Coral reefs are also threatened by sedimentation and by freshwater inflow, particularly in offshore areas near irrigation works. Destructive fishing practices, such as dynamiting, are also a threat.

Salt Marshes

Salt marshes in Sri Lanka consist of salt-tolerant plant species growing in sandy or muddy coastal flats. They are more prevalent in the drier regions of the country, particularly in the north and northwest from Pullikulam to Manthai. Salt marshes are significant waterfowl habitats. Thousands of migratory birds, including some rare species, are reported to stop in Sri Lankan marshes during their winter migrations.[29] Salt marshes also serve as a buffer from coastal flooding during storm tides as well as grazing lands for cattle.

The major threats to salt marshes are overgrazing of cattle, conversion to salt pans and conversion to aquaculture ponds.

Lagoons and Estuaries

Lagoons and estuaries are among the most productive of all coastal waters. An abundance of fin fish and shellfish flourish in these waters. In addition, they serve the special needs of migrating nearshore and oceanic species that require shallow protected habitats for breeding or as sanctuary for their larval stages. There are about 45 estuaries and 40 lagoons that occur along the coastline of Sri Lanka.[30]

Lagoons and estuaries—and the productive source of fish protein they provide—are threatened by urban encroachment, pollutants of various kinds, siltation, and overfishing. Urban development such as that occurring around Negombo Lagoon has resulted in the degradation of several lagoons. Domestic sewage, garbage, and waste fuel are major causes of the decline in productivity of lagoons near urban areas. Industrial effluents, agricultural runoff, and increased sedimentation from poor upstream land and water management schemes are also contributing factors. Finally, harmful fishing practices, such as the collection of polycheate worms for broodstock feed for shrimp hatcheries are destroying portions of the habitat in the Negombo Lagoon.

29. Ibid., p. 81.

30. J. I. Smarakoon and L. Pinto, *Synthesis Report for Information on Coastal Habitats in Sri Lanka* (Colombo: Coast Conservation Department, 1986).

Loss of Archaeological, Historic, and Cultural Monuments and Sites; Loss of Recreational and Scenic Areas

Sri Lanka's coastal areas contain numerous archaeological, historic and cultural sites and monuments of significance. Archaeological sites include those at Bundala where test excavations reveal valuable data on prehistoric man in Sri Lanka, dating back more than 27,000 years.[31] Historic sites and monuments which are more than 50 years old include Buddhist monasteries, Hindu kovils, Christian churches, parks, rest houses, and even shipwrecks.

Land and water uses and activities associated with urbanization, and in some cases, agriculture, threaten to alter permanently or destroy archaeological, historic, and cultural resources, and to alter or reduce scenic and recreational sites, or access to sites. In the case of archaeological and historic resources in particular, these activities make collection of scientific information and preservation of valuable remains difficult or impossible.

INSTITUTIONAL SETTING

Sri Lanka has a form of government based on aspects of the British, French, and United States systems. A new constitution[32] adopted in 1978 replaced the British-type parliamentary system with a new system in which a president is elected for a fixed 6-year term. Under the president is a cabinet of ministers comprised of the heads of 18 ministries. The chief executive officer of each ministry is a secretary. Ministries are further subdivided into departments, divisions, state corporations, and boards. Sri Lanka is divided into 24 administrative districts. The government agent, appointed by the central government, is the principal state officer responsible for coordinating district activities.

As is the case in most countries, legal authority for managing natural systems generally and coastal areas in particular is highly fragmented. In 1977, more than 50 different laws dealt with some aspects of natural systems management in Sri Lanka.[33] Today the number is even greater. In coastal areas, 32 different governmental agencies have jurisdiction over the primary uses and activities affecting coastal resources and coastal areas.[34]

31. Sri Lanka CZMP, p. 94.
32. *Constitution of the Democratic Republic of Sri Lanka* (1978).
33. W. D. Ailapperuma, *Country Monograph on Institutional and Legislative Framework on Environment: Sri Lanka* (Bangkok: UN ESCAP, 1983), p. 17.
34. Anil Premeratne, "Jurisdictions of the Institutions Concerned with the Development Activities in the Coastal Zone" (Colombo: Coast Conservation Department Draft Report, 1987), p. 114.

The primary agency designated as responsible for coordinating these disparate regulatory, developmental and planning activites is the Central Environmental Authority (CEA). The CEA was established by the National Environment Act No. 47 of 1980. The CEA has no regulatory authority. Its mandate is to conduct studies, prepare environmental standards, conduct educational and training programs and "increase environmental awareness." Coordination was intended to occur by means of monthly meetings of the Environmental Council composed of the representatives of the 18 ministries and three representatives of nongovernmental organizations. In practice, the CEA has played a useful, but somewhat limited coordinative role. It has played the lead role in the preparation of a National Environmental Strategy, a general statement of natural systems management problems and policies in Sri Lanka. It is preparing legislation and guidelines for implementing environmental impact assessments for major projects. With regard to coastal area management in particular, it will serve as the lead agency in a proposed national sand study designed to identify the sustainable limits of sand extraction for several major rivers. It has also developed interim industrial pollution standards. Finally, it has convened several interministerial meetings designed to develop consistent government policy with regard to aquaculture development generally and the location of several specific aquaculture projects in coastal areas.

In coastal areas, two agencies, the CCD and the UDA, have the most comprehensive management authority affecting development activities. The CCD, which is located within the Ministry of Fisheries, has planning, development and regulatory responsibilities. The Coast Conservation Act[35] requires the CCD to prepare a CZMP.[36] The draft plan has been completed and is currently being reviewed by other government agencies and the public prior to formal submission to the Council of Ministers. The CCD is also responsible for design and construction of coastal erosion protection works and for approving all privately constructed works. It also regulates all development activities in the designated coastal zone. Development activities include construction of houses and other buildings, mining of sand or minerals, dredging and filling, land reclamation, and other activities. More than 750 permits for development activities have been issued since the Act went into effect in 1983.

The UDA established by the Urban Development Authority Act No. 41 of 1978 also has substantial planning and regulatory authority in coastal areas. The UDA Act designated all areas within 1 km of the coastline as "urban areas" subject to the planning and regulatory requirements of the Act. Detailed land use plans are being developed for some rapidly growing towns in

35. Parliament of the Democratic Socialist Republic of Sri Lanka (n. 5 above).
36. Ibid.

coastal areas such as Hikkaduwa. In addition, all building construction within coastal areas requires a permit from the UDA. (Authority for the issuance of permits for minor activities such as the construction of houses has been delegated to local authorities.) In practice this overlap of authority with CCD's permit system is not as duplicative as it appears because the two agencies emphasize different aspects of the development process. The CCD puts more emphasis on the location of the development in relation to the shoreline.

The CTB regulates distribution of tourist facilities in coastal areas and, working with the CCD and UDA, designates areas in the coastal zone for tourist development. The Tourist Development Act No. 14 of 1968 allows the CTB to offer tax concessions, liquor permits, and tax-free imports to hotels located, constructed, and operated consistent with CTB guidelines.

Other agencies have some regulatory authority in coastal areas. At the district level, government agents, the chief district officers, are responsible for issuing permits for buildings and huts, for forest development, and for other activities. They are also charged with various flood prevention activities such as clearing river outlets. There is at present only minimal coordination of government agents' activities with the CCD.

Control over domestic and industrial wastes in coastal areas is fragmented and weak. Large areas of the coast are unsewered, and even where sewer systems exist, sewage is frequently untreated. The National Water Supply and Drainage Board has constructed two major outfalls in the Colombo area which will reduce fecal pollution. In outlying areas cesspools, sewage pits, and open dumping are the practice. New construction requires a certificate from the local public health inspector regarding sewage disposal for the building but standards for disposal are weak and enforcement is lax. Some hotels release sewage and other waste into the ocean. Such practices are governed by the Marine Pollution Prevention Act No. 59 of 1981, but enforcement is a problem. A comparable situation exists with industrial wastes. The CEA is developing standards governing effluents, but standards and an enforcement system are not yet in place.

Several government agencies engage in significant development activities in coastal areas. The Ceylon Fisheries Harbors Corporation develops fisheries harbors, the National Salt Corporation develops salterns, the State Mines and Minerals Corporation mines mineral sands and gems, the Ports Authority builds ports, the National Water Supply and Drainage Board develops water and sewer facilities, the CCD builds erosion-protection structures, the Low Lying Areas Reclamation Board fills low-lying areas for development and the National Housing Development builds and subsidizes low-cost housing. Hence, one of the major tasks of coastal management is to insure that these government development activities are consistent with coastal policies.

These management problems are similar to those faced elsewhere. In 1977, for example, an analysis was conducted of the issues that motivated the

U.S. Coastal Zone Management Act.[37] Thirteen organizational problems were identified, among which were (1) lack of coordination among public agencies; (2) insufficient planning and regulatory authority; (3) insufficient data base and lack of information for decision making; (4) little understanding or knowledge about coastal ecosystems; and (5) resource decisions made primarily on the basis of economic considerations to the exclusion of ecological considerations.[38]

Developing a coastal management program requires program planners to identify the specific instances of these general problems and it requires developing strategies to deal with them. What are the specific interagency coordination problems in Sri Lanka? What should be done about them? Where is a lack of data impeding decision making? How can the data base be improved? In what instances is lack of sufficient legal authority an impediment to management? What changes in laws or guidelines would be required? It is these issues that Sri Lankan officials had to grapple with in developing a coastal management plan.

IMPLEMENTATION OF THE PERMIT SYSTEM

During the period from 1983, when the Coast Conservation Act went into effect, until 1987, the Planning and Development Branch of the CCD has been involved in two main activities: development of the CZMP and implementation of the interim permit system. This section covers the implementation of the permit system.

The Act requires that anyone proposing to engage in a "development activity" within the designated coastal zone acquire a permit from the Director of Coast Conservation. A "development activity" is defined as "any activity likely to alter the physical nature of the Coastal Zone in any way, and includes the construction of buildings and works, the deposit of wastes or other materials from outfalls, vessels or by other means, the removal of sand, coral, shells, natural vegetation, seagrass or other substances, dredging and filling, land reclamation and mining or drilling for minerals, but does not include fishing."[39]

The Act specifies that "no permit shall be issued by the Director . . . unless

37. E. Englander, J. Feldman, and M. Hershman, "Coastal Zone Problems: A Basis for Evaluation," *Coastal Zone Management Journal* 3 (1977): 217–36.

38. Englander also cites lack of clearly stated goals, lack of state and local government funds to manage the coastal zone adequately, primitive analytical tools and predictive methodologies, dominance of short-term management over long-range planning, complex, conflicting and confusing laws, little awareness of or concern with coastal problems, lack of properly trained and educated management personnel, limited public participation in decision making.

39. CCA, pt. 5, 42.

the proposed development activity . . . is consistent with the Coastal Zone Management Plan and any regulations made to give effect to such plan" and "will not otherwise have any adverse effect on the stability, productivity and environmental quality of the Coastal Zone."[40]

While the plan was being prepared during the period between 1983 and 1987, the CCD relied on regulations issued formally by the minister of fisheries to determine whether a permit should be issued. According to these regulations, development activities are not to (1) infringe on public access to the beach; (2) result in the discharge of "unacceptable levels of effluents or toxic substances"; (3) reduce the quality of beaches or affect their preservation; (4) dislocate any existing fishing activity; (5) "affect the ecosystem where such development activity is located in or adjacent to an area declared a marine sanctuary"; (6) be located or sited in a place of religious worship; or (7) be located in recreational areas or wildlife habitats. Perhaps most important, the proposed development activity is to be "sited so as to allow an adequate buffer zone to accommodate the dynamics of coastal processes."[41]

Application Procedures

The application form simply requires the name and address of the applicant, the nature and location of the proposed development activity, existing uses and an indication of whether the area is subject to erosion and accretion. Applicants who have applied for other permits are also required to indicate these as well. Applicants for the construction of houses, hotels, and other structures must provide a design of the building foundation and three copies of a survey plan prepared by a licensed surveyor indicating the location of the activity relative to the high-water mark and the permanent vegetation line. Applicants for dumping or mining are required to provide an estimation of the volume of material to be removed or dumped, duration of such activity, and the method of removal or dumping as well as the location of the activity.

According to CCD staff, completed applications require approximately 3 weeks to review. A significant proportion of the applications, however, are not properly completed. Design drawings or survey plans are the two most common omissions delaying the completion of applications. A CCD staff member goes to the site of each permit application as part of the review process. In cases involving the construction of a small house, planning officers frequently help the applicant prepare a sketch plan of the site to accompany the application.

40. CCA, pt. 3, 15.

41. Regulations published in the *Gazette of the Democratic Socialist Republic of Sri Lanka,* no. 260/22, September 2, 1983.

TABLE 2.—APPROVED APPLICATIONS FOR COASTAL DEVELOPMENT PERMITS, 1983–87

Year	Houses	Sand Mining	Hotels	Miscellaneous	Total
1983	4	10	1	2	17
1984	33	72	0	0	105
1985	40	103	5	14	162
1986	206	87	2	10	305
1987[a]	100	60	3	12	175
Total	383	332	11	38	764

SOURCE.—Coast Conservation Department Permit Files.
[a]Up to June 1987.

Types of Development Activities

Since the coastal permit system went into effect in 1983, 764 permits have been approved. The distribution of permits among types of development activities is summarized in table 2.

As table 2 indicates, virtually all the approved applications were for houses and sand-mining operations. A district-by-district analysis reveals that although applications were approved in all districts, more than 80% of the applications approved were located in the west, southwest, and south coasts. The concentration of permit activity in these areas reflects both the distribution of development activity and, to a lesser extent, the limited ability of the CCD to effectively regulate the small amount of development activity that is occurring in the northern and eastern parts of the country under civil strife.

The CCD staff indicates that about 95% of all permit applications have been approved. The Planning and Development Branch staff has sought to exercise control over development activities by discouraging developers from proposing activities that are obviously inconsistent with the intent of the law, by attaching conditions to many of those applications they do approve, and by ordering the demolition of structures built without permits or not conforming to conditions that have been attached to the permit.

Impacts of the Permit System

It is difficult to tell how many noncomplying development activities have been prevented since the Act went into effect, although there is some anecdotal evidence that some such activities have been prevented. The department encourages applicants to discuss their proposed development activities prior to making formal application. Departmental staff say that some such consultations convince potential developers not to proceed. It should also be noted

that the narrowly defined coastal zone makes it possible for some impact-generating activities located just outside the 300 m zone to escape permit requirements.

By far the dominant technique for mitigating potentially adverse impacts has been to attach conditions to approved permits to bring them closer to compliance with the Act. Most conditions refer to the siting and sizing of structures. Hotel developers, in particular, try to build as close to the beach as possible, either in ignorance or indifference to the highly dynamic nature of the shoreline in Sri Lanka. The development of a hotel in Wadduwa is a case in point. The developer submitted plans that would have put portions of the hotel within a few meters of the ocean. The department approved the application, but attached several conditions, one of which would have required a setback from the shoreline of 30 m. The hotel developer appealed this condition to the minister of fisheries and, failing at that level, to the president, who upheld the condition. The developer complied with the setback requirement, but more than 12 m of beach has washed away since the hotel was completed. He has since appealed to the CCD to construct a revetment to protect his hotel, arguing that his compliance with the original setback condition entitles him to government-funded erosion protection.

Some of the permit conditions have been the result of a substantial amount of negotiation and technical analysis. A conflict between fishermen and hotel owners in Negombo (about 32 km north of Colombo) is a case in point.[42] Beginning in the 1970s rapid development of tourism in the Negombo area led to transformation of coastal land use patterns. More than half the hotels in the area were set back less than 15 m from the shoreline. Gradual erosion of the beach led some hotel owners to construct revetments. Fishermen found it increasingly difficult to beach their boats because of the revetments. Even where there were few revetments, the construction of boundary walls and other structures by the hotel owners made it difficult for the fishermen to find adequate space to draw their seine nets.

The fishermen made several protests to the minister of fisheries. The hotel owners argued that the structures were necessary to protect their investments. Failure to build structures would have resulted in a loss of beaches to everyone, including fishermen, they argued.

By 1985 the erosion problem was becoming so severe that there were numerous applications for protective structures. The CCD began to develop a more comprehensive plan for erosion management for the area. The minister of fisheries convened several meetings between the hotel owners, the fishermen and government representatives to work out a comprehensive erosion control program. The final settlement called for the CCD to construct four offshore breakwaters, two groins close to the Negombo Lagoon, and to provide 500,000 m^3 of sand nourishment to the beach. Hotel owners were al-

42. This case is reported in more detail in Sadacharan and Lowry (n. 10 above).

lowed to build structures in front of their hotels at their expense if the engineering designs of such structures were consistent with CCD guidelines and approved by CCD staff. The fishermen sought and won assurances that when they raised specific objections to individual structures the CCD staff and the minister of fisheries would undertake joint field inspections to try to develop specific mitigative measures.

Forced demolitions are another of the legal means of insuring compliance with the law. The law states that "no person should . . . erect or construct any unauthorized structure, house, hut, shed or other building on any part of the Coastal Zone."[43] Although there have been numerous workshops, newspaper accounts, films, poster contests, and other events publicizing the Act, not everyone knows about or bothers to comply with the provisions of the Act regarding structures. Numerous huts and sheds—as well as some guest houses and permanent residences—have been built in the coastal zone without a permit. Departmental officials have chosen not to enforce the laws with regard to squatter huts and fishing sheds because they are constructed from scrap boards and thatch and are therefore movable if threatened by beach retreat.

Permanent structures are a more difficult issue. During the period 1983–87, 266 unauthorized structures were reported to the CCD. Of this number, 236 have either been found to have been built prior to the Act, have been approved retroactively or have been voluntarily demolished.[44]

The actual number of voluntary demolitions has been small but important in establishing a precedent. One involved a man owning a slight strip of land between a revetment and the beach. He had constructed a thatched hut on the land which he used as a residence and bike repair shop. He subsequently built two brick walls for his house without a permit. When a demolition order was served he tore the walls down.

One demolition order has led to a lawsuit against the CCD. A restaurant was built partially within the 300 m zone. Department officials ordered a halt to construction, but the owner continued. He argued that construction had begun prior to the time the Act went into effect. Department officials disagreed and ordered the building to be demolished. The owner appealed to the minister of fisheries. The appeal was denied. The owner sued the department. A lower court found in favor of the department; the owner appealed, but subsequently withdrew the appeal. The CCD has drafted amendments to the Act that would clarify their authority in demolishing structures.

In short, the permit system has proved to be a useful mechanism for the CCD to exercise some control over the size and location of development activities relative to the shoreline. Attaching conditions to permits has also

43. CCA, pt. 3, 37.
44. Personal communication from CCD staff, June 1987.

proved to be an effective way to mitigate some of the impacts of development activities.

FRAMING THE MANAGEMENT PROGRAM

In addition to implementing the permit system, the staff of the Planning and Development Branch of CCD is responsible for developing a Coastal Zone Management Plan (CZMP).

The development of a CZMP involves several basic tasks, as noted previously, including the identification of specific problems to be addressed (or goals to be achieved), the identification of priorities, technical analysis of cause and effect relationships, identification of specific management techniques, the development of organizational and administrative relationships, and the designation of an area within which management will occur.

In Sri Lanka, the Act provides some guidance about where management is to occur; namely in the designated coastal area extending from 2 km seaward to roughly 300 m inland from the mean high-water mark. While the Act established a permit system for the short-term regulation of development activities in the coastal zone, it left open the question of what long-term management would consist of.

What the Act does do is prescribe in very general terms what the plan should include. Specifically, the Act requires guidelines for determining the "suitability" of various development activities in coastal areas, "proposals" for dealing with such things as land use, facilities, agriculture, and mining, and a program for dealing with coral miners and others whose activities are prohibited as a consequence of coastal activity regulation.

Just how difficult it would be to develop a management plan was not obvious to CCD officials when the law was being drafted. At that stage the 3-year planning period set forth in the Act seemed more than ample. As the law was about to go into effect, however, they began to realize how complex their task was. There were already many agencies managing various activities in coastal areas. What new role would CCD play? How should CCD's management build on or replace existing management activities? What should CCD seek to manage? What sorts of management tools should they use? More immediately, how was a management plan to be developed? What steps should be followed?

CCD officials began a search for planning and management models. With United Nations Development Programme (UNDP) funding, officials visited several U.S. coastal states and European countries engaged in coastal management. They attended international workshops on coastal management. They also arranged for foreign consultants to visit Sri Lanka to offer assistance.

While the initial international visits, seminars, and foreign consultancies

did not result in the identification of any obvious planning or management models, they were nevertheless useful in identifying what was not likely to be appropriate or successful in Sri Lanka. One consultant envisaged a much larger coastal zone and a much expanded planning and management role for CCD. Neither suggestion was acceptable to CCD officials. Each visit and seminar made them more aware of the special conditions and constraints around which a plan would have to be constructed; conditions and constraints such as limited staff, limited resources for management, limited public and governmental understanding and support of comprehensive coastal management, and a complex web of existing governmental activities in coastal areas. Sand and coral mining and other resource-exploitative activities undertaken by some of Sri Lanka's most economically marginal people were particular concerns of the CCD staff. If these activities were to be managed, the behavior of a great many people would have to be changed.

The discussion of suitable models for planning and management continued until 1984.[45] CCD planning staff recognized that there were many different ideas within and outside the agency about what coastal management means and what a coastal management plan should encompass: "To many, coast conservation meant coastal erosion control. To others it meant that the emphasis should be on the preservation of natural coastal features, such as coral reefs, mangroves, estuaries and lagoons. There were (and are) considerable differences of opinion about what management means, about how coastal management fits in with all the other laws and agency programmes that affect life in coastal areas and whether another new programme will further stifle the economic development activities that are essential for the well-being of the community."[46]

In 1984 CCD staff and a consultant prepared a draft statement of planning principles in order to provide a more focused basis for discussions about what the department should emphasize in its planning and management efforts.[47] These basic planning principles were widely circulated and discussed.

45. S. R. Amarasinghe, H. J. M. Wickremeratne, and G. K. Lowry, "Coastal Zone Management in Sri Lanka, 1978–1986," in *Coastal Zone '87* (New York: American Society of Civil Engineers, 1987), pp. 1995–2006.

46. Ibid., p. 2002.

47. The principles included such statements as the following: *(a)* The coastal zone is a fragile and vulnerable environment that requires integrated management of human activities that affect natural resources. *(b)* The coastal zone is the common heritage of the nation and every citizen has access to it. *(c)* The control, custody, and management of the coastal zone is vested in the state. *(d)* The state accepts responsibility to maintain, and when possible to improve the quality of the coastal zone by means of regulation, acquisition, investment or other strategies as may be consistent with the needs and interests of this and future generations. *(e)* In accepting responsibility for the management of the coastal zone, the state and its agents recognize that there are limits to that management responsibility. The coastal zone of Sri Lanka has ecologically vulnerable and inherently unstable areas, subject to natural processes as well as human

One Colombo newspaper printed them along with approving editorial comment. The revised principles were eventually debated and adopted by the Coast Conservation Advisory Council.

A second major issue confronting the CCD was how to organize the planning process. Department officials explicitly rejected detailed area-wide plans for selected coastal areas or a comprehensive plan for the entire coastal strip on the grounds that they did not have the resources for such an approach and that, in any case, such efforts might be duplicative of work already being done by the UDA. Instead they ultimately decided to organize planning and management efforts around a discrete set of highly visible coastal problems. One of the primary reasons this problem-focused approach was chosen was because it allowed the department to focus the technical analysis more efficiently. Costly inventory work, in particular, could be focused on those segments of the coastline where specific problems were most severe. Second, a first generation problem-focused approach, CCD officials felt, could be supplemented as conditions changed and new coastal problems emerged.

A second important rationale for the problem-focused approach was that this approach made it easier to mobilize support for management efforts. The visibility of specific coastal problems made it easier to argue for the need for government intervention and for greater interagency intervention. Finally, CCD officials chose the problem-focused approach because it provides a clearer, more easily understandable basis for evaluating program management efforts. It is easier to determine whether specific management techniques are mitigating the coastal conditions they are designed to address so that program modifications can be developed as required.

The CCD staff decided to emphasize four problems in the initial planning phase:

1. coastal erosion (caused by natural processes, sand and coral mining, improperly sited coastal works, loss of coastal vegetation, improperly sited coastal developments and related causes);
2. degradation or depletion of natural habitats and resources (caused by dredging, land reclamation practices, domestic and industrial pollution, over-exploitation of resources, etc.);
3. loss and degradation of historic, cultural and archaeological sites and monuments of significance (due to the construction of hotels and other development activities); and
4. loss of physical and visual access to the ocean (caused by siting of hotels and other facilities in ways that impede access).

These latter two problems were later combined for analysis.

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intervention. Not all impacts of natural processes can be controlled and such attempts may result in social, economic, and environmental costs that are prohibitive.

The Coastal Zone Management Plan (CZMP)

A 124-page CZMP was submitted to the minister of fisheries in January 1987. The plan is divided into six sections:

1. an introduction which describes the need for the plan, the scope of the plan, a definition of the coastal zone, and the major management mechanisms by which the plan will be implemented;
2. a section on the CCD regulatory system which describes the permit system in detail, shoreline setbacks, and the environmental impact statement requirements;
3. one section each on coastal erosion, coastal habitats, and historic, cultural, scenic, and recreational resources; and
4. a section on other management activities undertaken by the CCD such as land acquisition.

Each of the chapters on coastal problems contains:

1. a brief narrative on the nature, scope and severity of each problem;
2. identification of specific problem causes;
3. identification of objectives and policies for the management of each problem; and
4. the identification of specific management techniques to be employed.

The management techniques for each coastal problem are outlined below.

Erosion

The objectives and policies in the draft CZMP indicate that coastal erosion will be managed by a range of investment, regulatory, and research techniques. The activities contributing to coastal erosion and the mechanisms designed to manage them are outlined in table 3.

Natural factors such as waves and currents are the primary causes of coastal erosion. Improperly sited or poorly designed coastal protection works have contributed to the problem. The primary management mechanism will continue to be investment in coastal protection structures, although nonstructural techniques are increasingly emphasized. In 1985 the CCD began preparing a Master Plan for Coast Erosion Management (MPCEM) with funds provided by the Danish foreign assistance program. Each coastal segment was analyzed and priority areas for erosion-protection structures were identified. This internal plan is intended to guide investment in coastal protection for the next decade. An investment plan of Rs. 600 million has been developed, much of which will come from Danish and German foreign assistance. Current coastal works protect about 19%–22% of the erosion-prone shorelines

TABLE 3.—EROSION MANAGEMENT TECHNIQUES

Activity	Agency	Management Technique
Sand mining	CCD	Allowed by permit if consistent with guidelines
Coral mining	Police	Prohibited by law
Improperly sited or designed coastal erosion protection structures	CCD	Construction must be consistent with CEMP
Improperly sited coastal buildings	CCD	Construction must be outside variable shoreline setback line

and are valued at about US$7 million.[48] The structures planned according to the MPCEM would provide protection to about 155 km of shoreline. This would leave about 160–225 km of erosion-prone shoreline to natural processes.

The draft CZMP allows coastal protection structures funded by government agencies other than CCD or by private individuals provided they are consistent with CCD guidelines set forth in the CZMP.

The analysis in the MPCEM and the policies and objectives are explicitly designed to respond to one of the most persistent political problems the CCD faces; namely, the demand that coastal protection structures be constructed in response to every perceived erosion "crisis." Both plans are based on the assumption that not every segment of coastline can or should be protected from natural processes given the enormous costs involved. The MPCEM explicitly designates "no-build" zones where coastal protection structures would not be cost-effective. The CZMP does contain a policy, however, allowing for emergency coastal protection structures, provided such structures are not permanent.

Sand mining from the beaches, dunes, and river mouths has contributed to serious coastal erosion in the past. The CZMP regulates sand mining by permit "within sustainable limits." However, such mining must not "result in increased erosion, destabilization of sand dunes, or increased turbidity in the vicinity of coral reefs."[49] Mining is regulated at particular sites by quotas, stipulated mining schedules, setbacks, site rotation, and the imposition of monitoring schemes.

Coral mining is prohibited by law. The law has been enforced by the police along the southeast coast where coral mining was not a widespread activity. There has been relatively little police enforcement along the southwest coast, however, where mining activities are widespread. The police say they lack the authority to stop the mining unless they catch miners in the act of breaking the reef. Proposed amendments to the Act broaden the powers by

48. Sri Lanka CZMP, p. 51.
49. Sri Lanka CZMP, Policy 3.4.1.

making it illegal not only to mine the coral, but to operate a kiln or transport coral or lime made from coral.[50] Police would also have authority to seize coral or vehicles transporting illegally mined coral. The larger issue, however, is that neither the police nor the CCD is eager to enforce sanctions against the miners until economic alternatives for them can be found. The CZMP contains a policy mandating the development of an alternative employment program for the miners.[51] Relocation to areas irrigated by the Maheweli scheme, an integrated rural development program in the southwest, and subsidies for the provision of fishing craft have been discussed, but no final program has been developed.

The impact of coastal building on coastal erosion is regulated under the plan by a variable setback line. The coastline was divided into 61 segments and setback lines varying from 10–50 m were established for commercial and industrial buildings, tourist facilities and nonwater-dependent activities. The setbacks are enforced by means of the permit system for development activities.

The draft plan also mandates CCD to "conduct and support research on coastal processes relating to erosion and its control, including investigation into the feasibility of using vegetation to control erosion."[52]

Habitat Management

The CCD initiated work on the habitat management section of the plan by commissioning a paper on coastal habitats. Two Sri Lankan academics prepared a paper synthesizing information on each major type of coastal habitat—coral reefs; estuaries and lagoons; mangroves; seagrass beds; sand dunes, barrier beaches and spits; and salt marshes—and the human activities and uses that threaten each type.[53] They also identified gaps in information about each type of habitat.

The second major step in the planning process was to mobilize interest, awareness and participation among other agency staff, nongovernmental organizational officials and academics with jurisdictional responsibilities or strong personal interests in habitat management. CCD staff organized a 3-day workshop in Colombo in May 1986. The 49 invited participants took part in six technical sessions over the 3-day period. Each session focused on a single type of habitat. The objectives for each session were similar:

1. to review management objectives for each type of habitat;
2. to review and rank the major management issues for each habitat type;

50. The *Gazette of the Democratic Socialist Republic of Sri Lanka*, pt. 2, November 15, 1985, Coast Conservation Department (Amendment).
51. Sri Lanka CZMP, Policy 3.3.2.
52. Sri Lanka CZMP, Policy 3.2.4.
53. Samarakoon and Pinto (n. 30 above).

3. to identify the research that will be most helpful in understanding how to better manage each habitat;
4. to identify ongoing management efforts and research; and
5. to identify the management initiatives that can be implemented immediately or in the near future.

The participants shared information about the management efforts of their agencies, about gaps and overlaps they perceived in the existing management system and about what they perceived to be the primary management concerns and information needs for each type of habitat. This information was collected by CCD staff and compiled into a workshop report.[54] This report became the basis for the habitat section of the plan.

Unlike erosion, over which CCD has almost exclusive jurisdiction, habitat management requires some coordination and collective actions with other agencies. The CCD management role for the primary coastal habitats consists of several elements:

1. direct management of development activities, the effects of which might degrade or deplete valued habitats. Direct management occurs by means of the permit system;
2. the nomination of specific natural areas of exceptional value to be designated as conservation areas under the Fauna and Flora Protection Act;
3. cooperation with other governmental and nongovernmental agencies to develop protection and management plans for natural areas of exceptional value (e.g., CCD and the National Aquatic Resources Agency have collaborated in the development of a zoning plan governing uses in the Hikkaduwa Marine Sanctuary); and
4. sponsorship of habitat-related research and public education programs.

Archaeological, Historic, Cultural, Scenic, and Recreational Resources

Protection of archaeological, historic, and cultural monuments and sites and recreational and scenic areas is another new role for the CCD. In 1985 the CCD commissioned an inventory of coastal places of archaeological, historic and cultural significance and areas of scenic and recreational value.[55] The inventory was based on library research, interviews with specialists, reviews of maps and early illustrations, and field investigations.

Priorities were then established among the sites. The inventory identified

54. International Coastal Resources Management Project, *The Management of Coastal Habitats in Sri Lanka*, Report of a Workshop, May 12–15, 1986, CRMP Technical Report 1 (Colombo, Sri Lanka).

55. Coast Conservation Department Internal Report no. 9 (Colombo, 1985).

1. 26 sites in coastal areas of pure archaeological value and 65 sites that have cultural or historic significance as well as archaeological value (an example of a site of pure archaeological significance is Ussangoda and examples of sites with multiple values are the forts of Kalpitiya, Negombo, and Mannar);
2. 253 historic sites and monuments in coastal areas were identified of which 171 were given top priority for protection (e.g., Hindu kovils, Buddhist monasteries, and Christian churches as well as forts, harbors, and rest houses);
3. 253 sites and monuments of cultural significance were identified of which 34 were categorized as high priority (e.g., statues of Christian saints and Buddhist Devales dedicated to folk deities); and
4. 89 recreational and scenic sites (e.g., the beach at Mt. Lavinia).

Archaeological, historic, and cultural resource management usually involves three objectives: identification and analysis of such resources; information retention through salvage or preservation of remains; and restoration, interpretation, and display. The CCD funded identification and analysis. At present, the primary role is assisting in preservation. The primary technique for managing significant archaeological, historical, and cultural sites is to permit development activities only when they comply with the Archaeology Department guidelines. These guidelines prohibit development within 200 m of designated sites. These sites are designated in the plan. The CCD may also require modification of proposed developments. With regard to scenic and recreational sites, the plan requires that tourist hotels be located in areas designated for tourist development by the CCD, the CTB, and the UDA. The CCD also requires that public access to and along the shoreline not be impeded by recreational or tourist development.

CONCLUSION

It is too early to declare the Sri Lanka coastal management program a success, but there are enough program achievements to make the program worthy of close attention. A strong permit system has been in place for 3 years and is functioning reasonably well. A plan has been produced that directs governmental and private development activity in coastal areas. A substantial investment plan for coastal erosion protection structures has been developed. There is a small, but growing, constituency for coastal management. What these products will mean in terms of reduced erosion, improved habitat management, protection of scenic and recreational resources, and protection of cultural and historic resources is not yet clear.

Sri Lanka's achievements in developing a coastal management program can be traced to a number of factors. The shift in population to coastal areas

in the last 5 decades, particularly in the south and southwest, and the increasing threats to life and property by coastal erosion account for much of the initial interest and attention directed toward coastal management. The formation of a single government unit to deal with coastal management and the vigorous, professional leadership the agency has received since its inception are important factors in accounting for what has been accomplished.

What is perhaps most significant about the CCD's coastal management story is its continuing development from an erosion management agency to a coast conservation agency. The CCD could have continued to emphasize erosion protection to the exclusion of all other departmental goals and still be an important, growing agency. Instead, CCD officials took the riskier course of trying to develop a more comprehensive approach to coastal management—an approach in which erosion management was merely one element, albeit an important one.

What makes the CCD's effort to engage in more comprehensive coastal management risky was that they drafted the legislation mandating their expanded management role without clearly specified objectives for management, a full management staff, or even widespread agreement among key political elites that a more comprehensive approach was needed.

They created the conditions for a more comprehensive approach by adopting an explicit incremental, learning approach to management.[56] The learning approach was dictated in part by necessity. There were no management models that were obviously suited to the Sri Lanka situation. Second, the existing web of government agencies responsible for various aspects of coastal management, the small number of professional staff in CCD, and the relatively small budget required the department to work carefully to both identify an organizational niche and to develop a constituency for more comprehensive management.

The adaptive, learning approach had several features. First, CCD staff chose to focus on a relatively small number of coastal problems rather than the full range of potential concerns. Second, they engaged in an explicit learning-by-doing approach to the implementation of the coastal permit system. They developed an explicit strategy for dealing cooperatively if possible with small landowners and hotel developers and, when cooperation was not possible, they identified minimum conditions that had to be met. The development of the MPCEP was also based on more than 10 years experience in balancing political demands with engineering principles and budget realities.

A third feature of the learning approach was the emphasis on focusing technical analysis on questions that were important to management people making decisions about plans and permits. Rather than do extensive and costly inventory work based on scientific criteria, scarce planning funds were

56. David C. Korten, "Community Organization and Rural Development: A Learning Process Approach," *Public Administration Review* 40 (1980): 480–511.

spent on inventories and technical analyses of direct relevance to managers, such as the research effort cosponsored by CCD and the CEA to establish the amount of sustainable yields of sand from major rivers.

Another feature of the adaptive, learning approach taken by CCD has been the recognition that more comprehensive management would require coordination with other agencies which share legal responsibilities for coastal management. Formal and informal coordination linkages have been developed with some agencies. The CCD, the UDA, and the CTB formed linkages just after the Act was passed to identify coastal areas where tourist development should be encouraged and those where it should be discouraged. Formal linkages are still maintained by means of permit referrals, workshops and meetings. Informal information sharing occurs with a number of other areas. Major planning events, such as the habitat workshop, help provide the context within which specific interagency agreements and understandings can be developed.

Three factors, in particular, account for the successes of the incremental learning approach to date. The first is the competence and commitment of CCD's professional staff. CCD's highly energetic and motivated leadership and staff is typical of new agencies with a mission. Although the construction of coastal protection works and the processing of permits has become somewhat standardized, it is not yet totally routine. Moreover, permit staff also work on other planning and management tasks. Second, the credibility of the agency among the public and the political and bureaucratic elite makes it possible for CCD to engage in more experimentation in program development than other agencies might be allowed. CCD's strong record of professionalism in erosion management and its ability to attract international grants and loans to support its projects contributes to that credibility. Finally, the CCD's long record of being able to cope with crises and adjust to changing circumstances gives the staff confidence that they can meet the challenges of program development without an explicit model of the management agency they are becoming or a manual for organizational development. They have coped successfully in the past. They seem confident that they can continue to cope.

There are three primary tasks with which the CCD has to cope in the next phase of program development: the decentralization of the permit system; the development of special area management plans; and the development of specific interagency programs for habitat management. The work on decentralization has already begun. The department is developing procedures for having some types of permit applications reviewed at the local level. It is likely that some type of decentralized permit procedure will be tested in at least one district in early 1988.

Special area management plans are being considered for some natural habitats, but none has been developed by CCD to date. (The UDA has developed what might be thought of as a special area plan for Hikkuduwa.)

Finally, interagency programs for habitat management, in particular, are beginning to be developed. At present CCD issues permits for activities that affect habitats, but CCD officials hope to work with other agencies to develop a more coordinated effort to conserve mangroves, seagrass beds, reefs, lagoons, and other habitats.

For the longer run, the major question is whether the CCD staff can sustain the momentum and the commitment that has carried the department through the early years of planning and management. They have shown that a small, highly motivated group can mobilize the resources and energy required for program development. They now face the equally difficult challenge of program consolidation and implementation.