

1994

## Conservation and Management of Sri Lanka's Coastal Resources Through the Experience of Other Countries

K.W.P. Thilakaratna  
*University of Rhode Island*

Follow this and additional works at: [https://digitalcommons.uri.edu/ma\\_etds](https://digitalcommons.uri.edu/ma_etds)



Part of the [Environmental Health and Protection Commons](#), [Natural Resources and Conservation Commons](#), [Natural Resources Management and Policy Commons](#), and the [Oceanography and Atmospheric Sciences and Meteorology Commons](#)

---

### Recommended Citation

Thilakaratna, K.W.P., "Conservation and Management of Sri Lanka's Coastal Resources Through the Experience of Other Countries" (1994). *Theses and Major Papers*. Paper 286.  
[https://digitalcommons.uri.edu/ma\\_etds/286](https://digitalcommons.uri.edu/ma_etds/286)

This Major Paper is brought to you by the University of Rhode Island. It has been accepted for inclusion in Theses and Major Papers by an authorized administrator of DigitalCommons@URI. For more information, please contact [digitalcommons-group@uri.edu](mailto:digitalcommons-group@uri.edu). For permission to reuse copyrighted content, contact the author directly.

CONSERVATION AND MANAGEMENT OF SRI LANKA'S  
COASTAL RESOURCES THROUGH THE EXPERIENCE OF OTHER  
COUNTRIES

By

K.W.P Thilakaratna

A Major Paper Submitted in Partial  
Fulfillment of the Requirements for the Degree of  
Master of Marine Affairs

The University of Rhode Island

1994

**Master of Marine Affairs (MMA)**

Approved-

A handwritten signature in black ink, appearing to read 'Niels West', is written over a horizontal line. The signature is stylized and cursive.

**Major Professor Dr. Niels West**

**The University of Rhode Island**

**1994**

## **Acknowledgments**

I express my deep and sincere gratitude to my Major Professor Niels West for encouraging me to do a masters program after a short training program at The University of Rhode Island in 1989, and for his kind support and guidance towards the successful completion of my program. I would also like to express my sincere thanks to Professor Larry Juda, Chairman, and Professor Dennis Nixon of the Marine Affairs Department of URI.

I would like to extend a special thanks to Stephen Olsen, Lynne Hale, Brian Crawford, Mark DeMoranville, Lesley, Cindy, Michelle, Elizabeth and other staff members of the Coastal Resources Center at URI, and Alan White and Mervyn Wijeratne of the Sri Lanka Coastal Zone Management Project. My sincere thanks are also extended to S.R. Amarasinghe, former Director, Dianeetha Sadacharan, former Manager, B.S Kahawita, Director, R.A.D.B Samaranayake, Manager, and other staff members of the Coast Conservation Department in Sri Lanka for their contribution toward the success of my program. I would also like to thank USAID, without whose sponsorship I would have been unable to obtain my degree.

Furthermore, I would like to thank my friend Renuka of the Pharmacy Department at URI for the generous support she has given to me during my stay in the United States. Finally, I would like to thank my loving wife Vihara, daughter Dinara, and son Sithira, who have encouraged me in my studies at all times during the past year.

## **TABLE OF CONTENTS**

Acknowledgements.....	III
Table of Contents.....	IV
List of Tables.....	VII
List of Figures.....	VIII
Acronyms.....	IX

### Chapter - 1

#### **Sri Lanka's Effort in Coastal Management**

1.1 Historical Changes in the Coastal Region.....	1
1.2 Coastal Problems.....	4
1.3 Evolution of Coastal Legislation and Institutional Arrangements.....	6
1.4 The Coastal Zone Management Program.....	13

### Chapter - 2

#### **Prospects of an Effective Coastal Program**

2.1 Toward Better Management.....	23
2.2 Coastal Problems and Issues.....	24
2.3 Traditional Coastal Activities.....	30
2.4 Present and Future Coastal Development.....	34
2.5 Conservation and Enhancement of Coastal Resources.....	37
2.6 Legal and Institutional Initiatives.....	40
2.7 Public Awareness Programs.....	46

## Chapter - 3

### **Achieving Sustainable Development of Coastal Resources in Sri Lanka: Applying Lessons from Other Coastal Nations**

3.1 Developing and Introducing New Coastal Programs.....	49
3.2 Involving the Hierarchical Levels in Coastal Management.....	50
3.3 Coastal Jurisdictions, Institutional and Administrative Arrangements.....	56
3.4 Regulating Coastal Land Use.....	68
3.5 Protected or Special Area Management Approach.....	70
3.6 Involving the Public in Coastal Management.....	79

## Chapter - 4

### **The Challenge of Achieving Intended Outcomes**

4.1 Coastal Conservation and Socio-Economic Factors.....	88
4.2 Need for Coordination and Cross Linkages..	89
4.3 Baseline Data and Information.....	90
4.4 Weak Institutional Infrastructures.....	90
4.5 Trained Personnel and Training Facilities.....	91
4.6 Legislation and Policies.....	92
4.7 Inadequate Monitoring and Enforcement.....	93
4.8 Lack of Public Awareness.....	94
4.9 Public Participation in Coast Conservation	95

Chapter - 5

**Future Needs and Recommendations**

5.1 Legislation and Institutional Arrangements.....	97
5.2 Socio-Economic Development.....	98
5.3 Institutional Infrastructures.....	98
5.4 Monitoring and Enforcement.....	99
5.5 Coastal and Marine Resources.....	99
5.6 Research and Studies.....	100
5.7 Planning and Implementation.....	101
5.8 Environmental Education and Public Awareness.....	101
<b>References</b> .....	103

## LIST OF TABLES

Table 1-1	Government Budgetary Allocations.....	13
Table 1-2	Activities in the Coastal Zone for Which a Permit is Required.....	15
Table 1-3	Approved Coastal Development Applications (1983 - 1993).....	16
Table 1-4	Principal Government Agencies with Authority and Jurisdiction in Sri Lanka's Coastal Zone.....	22
Table 2-1	Major Coastal Issues and Their Causes in Sri Lanka.....	25
Table 2.2	Extent of Coastal Habitats of Sri Lanka (in Hectares).....	27
Table 3-1	Boundaries of the Coastal Zone in Selected Nations.....	57
Table 3-2	Some Divisions and Offices of the DEP in New Jersey.....	62
Table 3-3	University Degree Programs Offering a Specialization in Coastal Management.....	67
Table 3-4	Exclusion or Setback Zones.....	69



## LIST OF FIGURES

Figure 1-1	Sri Lanka's Territory.....	2
Figure 1-2	Sri Lanka's Important Coastal Areas.....	5
Figure 1-3	Coastal Zone of Sri Lanka.....	8
Figure 1-4	CCD's Organization Chart.....	12
Figure 2-1	Coastal Districts in Sri Lanka.....	28
Figure 3-1	Zoning Schemes Used in SAM.....	74
Figure 3-2	SAM Project in Sri Lanka.....	76
Figure 3-3	Use of Volunteer Monitoring Data in the United States of America.....	86

## Acronyms

CCA	-	Coast Conservation Act
CCD	-	Coast Conservation Department
CEA	-	Central Environment Authority
CRM	-	Coastal Resources Management
CZ	-	Coastal Zone
CZM	-	Coastal Zone Management
CZMA	-	Coastal Zone Management Act
CZMP	-	Coastal Zone Management Plan
DCC	-	Director Coast Conservation
DFAR	-	Department of Fisheries and Aquatic Resources
DWLC	-	Department of Wild Life Conservation
EIA	-	Environmental Impact Assessment
LHI	-	Lanka Hydraulic Institute
NARA	-	National Aquatic Resources Agency
NCR	-	National Coral Reef Strategy
NCS	-	National Conservation Strategy
NEA	-	National Environment Act
NGO	-	Non Governmental Organization
RI	-	Rhode Island
SAM	-	Special Area Management
US	-	United States
USAID	-	United States Agency for International Development

## Chapter-1

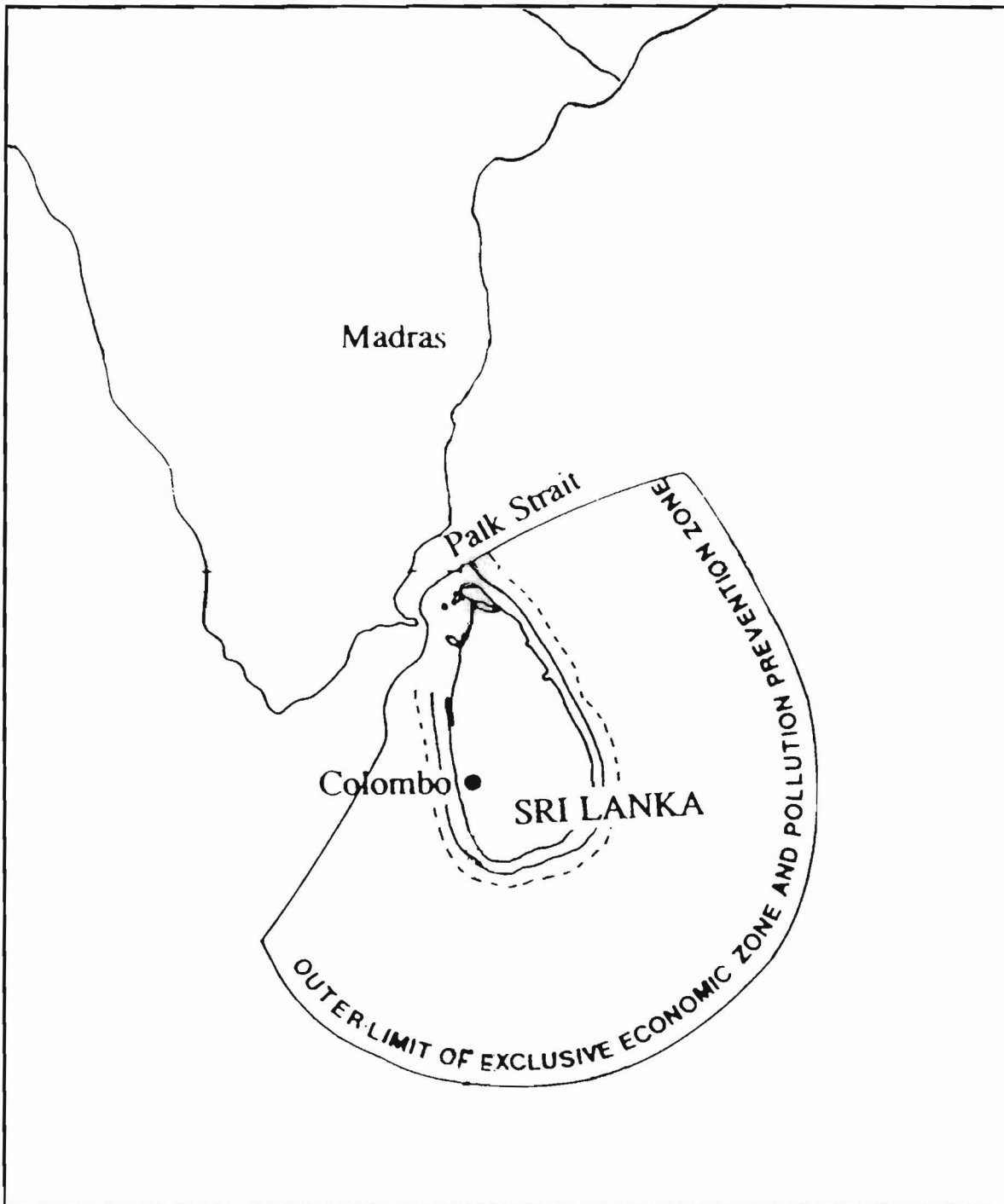
### Sri Lanka's Effort in Coastal Management

#### 1.1 Historical Changes in the Coastal Region:

Sri Lanka is a 66,000 square kilometer island nation situated in the Indian Ocean, and has a coastline of 1600 kilometers (Figure 1-1). The civilization of the country dates back more than twenty-five centuries. The first settlers concentrated in the inland areas of the country and the coastal sectors were primarily free of any stress conditions imposed by human settlements and activities. The coastal zone was considered a buffer from external invasion. Even though Greek and Arab traders passed through the country, as it is located in the East West sea lanes, they did not have any impact on the lifestyle of the people or on the condition of the coastal region. Thus, interest in coastal areas was minimal and the condition of the resources was not affected during most of this period.

However, after the 16th century, three nations, Portugal, the Netherlands and Great Britain, colonized Sri Lanka and made a considerable effort in developing coastal areas (Wickramaratna, 1985). They fortified the coastal areas and built canals and roads to provide access and communication between the coast and interior in order to fulfill their needs and interests. In addition, they

Figure 1-1: Sri Lanka's Territory



(Source: Olsen, et al. 1992.)

established anchorage and harbor facilities to export the country's natural resources. Coastal lands suitable for the cultivation of export crops, such as cinnamon, were developed. The indigenous population gradually started to migrate to coastal areas looking for job opportunities and a better living standard. As a result, population centers were established in the coastal areas and exploitation and degradation of coastal resources began. The construction of a coastal railway line and highway further accelerated changes in coastal areas.

Thus, during the period of foreign control, population growth along coastal areas started. However, after independence in 1948, the economic importance of the coastal areas had further intensified due to development of commercial and fishery harbors, transportation, communication, and recreational facilities. Opportunities in the public administration, industry, and education sectors were other main attractions. Development has been intense, particularly in the southern, southwestern, and western coastal areas. The economy of the country was strongly related to the coastline and its resources. With the introduction of international tourism in 1970, economic development of coastal areas increased further. In addition to the job opportunities provided by the industrial and commercial sectors, many people were engaged in other activities depending on coastal resources, including fishing and mining activities.

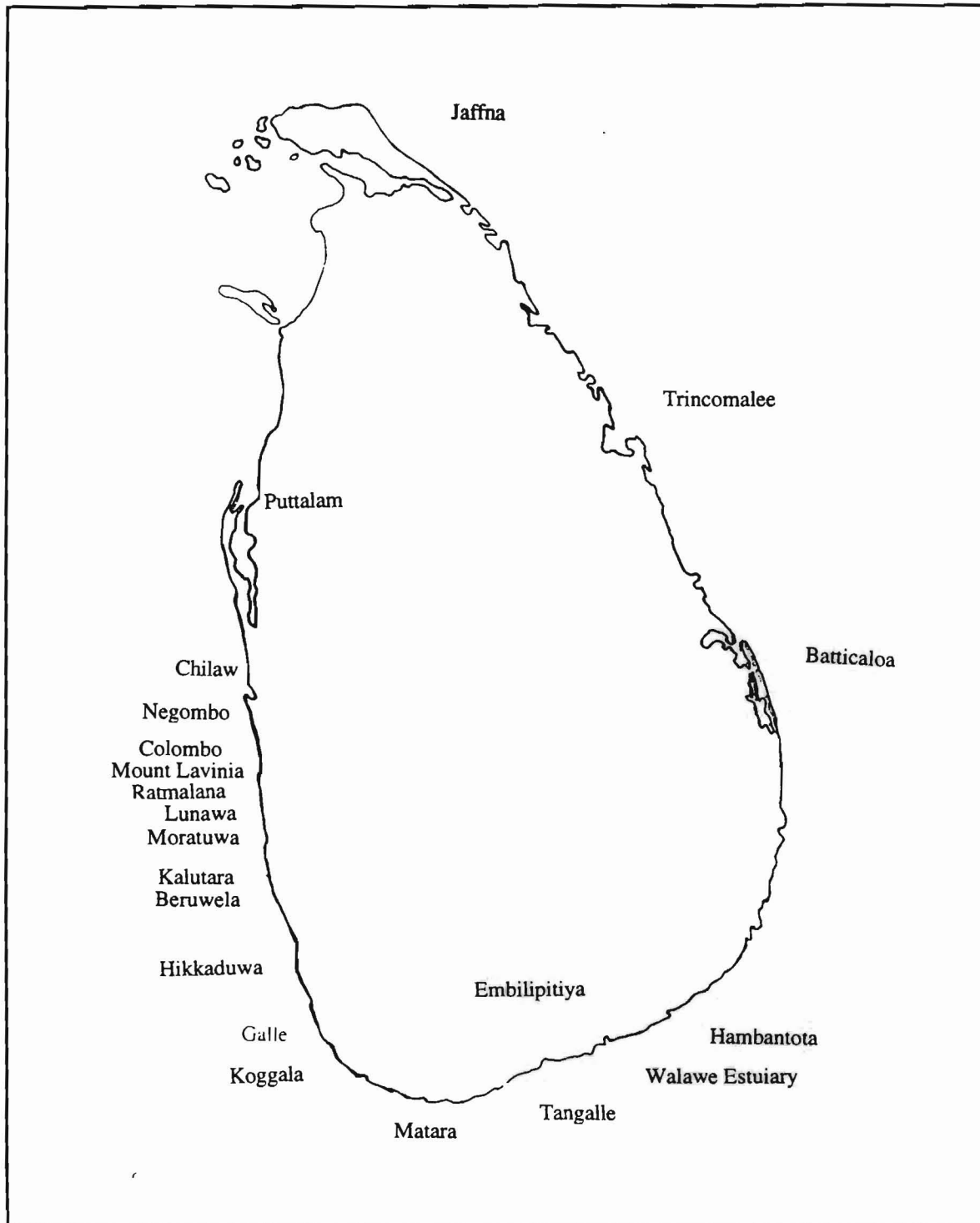
Today more than half the population of sixteen million live in the coastal districts which also contain two-thirds of the country's urbanized lands (CZMP, 1990). The increased population and economic activities in coastal areas imposed severe strains on coastal environmental resources.

### **1.2 Coastal Problems:**

Before the 1960s, natural factors were the primary factors influencing changes to the coastal environment. The southwest monsoon created an intense wave climate along the southwest and east coast. The northeast monsoon attacked the coastline with less intensity. Changes in rivers' courses and storm surges affected the stability and productivity of the coastal zone. Hence, nature maintained its own dynamic equilibrium with relatively few socio-economic impacts.

However, during the past few centuries, the problems gradually emerged in the coastal areas of the country. The beginning of these coastal problems dates back to human intervention with the coastal environment. These problems were more intense in Colombo, Galle, Kalutara, and Negombo in comparison to undeveloped areas (See Figure 1-2). Coastal erosion was the first highly visible coastal problem in Sri Lanka. Other problems emerged later. (These issues will be discussed in Chapter 2). It also shows a wide range of variation regionally and locally with regard to coastal resources and uses.

Figure 1-2: Sri Lanka's Important Coastal Areas



(Source: Survey Department in Sri Lanka, 1990)

### **1.3 Evolution of Coastal Legislation and Institutional Arrangements:**

Prior to 1978, there was no proper authority or mechanism to address coastal issues. Some authorities dealt with coastal problems in an ad hoc manner if it was of particular interest to them. For example, the Department of Railway and Highway protected railway lines and roads respectively at the time of coastal erosion. Sometimes, improper coastal protection measures contributed to accelerated erosion problems in adjacent areas and resulted in many other coastal problems, such as limiting public access, user conflicts, etc. In some instances, the structures built by the private sector to protect properties further intensified these problems. As a result of this, the requirement of a management mechanism and adoption of legislation to address coastal issues became increasingly important.

Legislation specifically adopted to deal with coastal problems did not exist in Sri Lanka until 1980. Some land use planning to control development within coastal areas was enacted prior to this. These provisions had not taken into account the dynamic nature and environmental characteristics of sensitive coastal areas. There were many other acts and ordinances in Sri Lanka that covered several aspects of coastal management (Amarasinghe and Wickramaratna, 1985). The provisions that are applicable to coastal zone management were incidental and not sufficient for this task. In

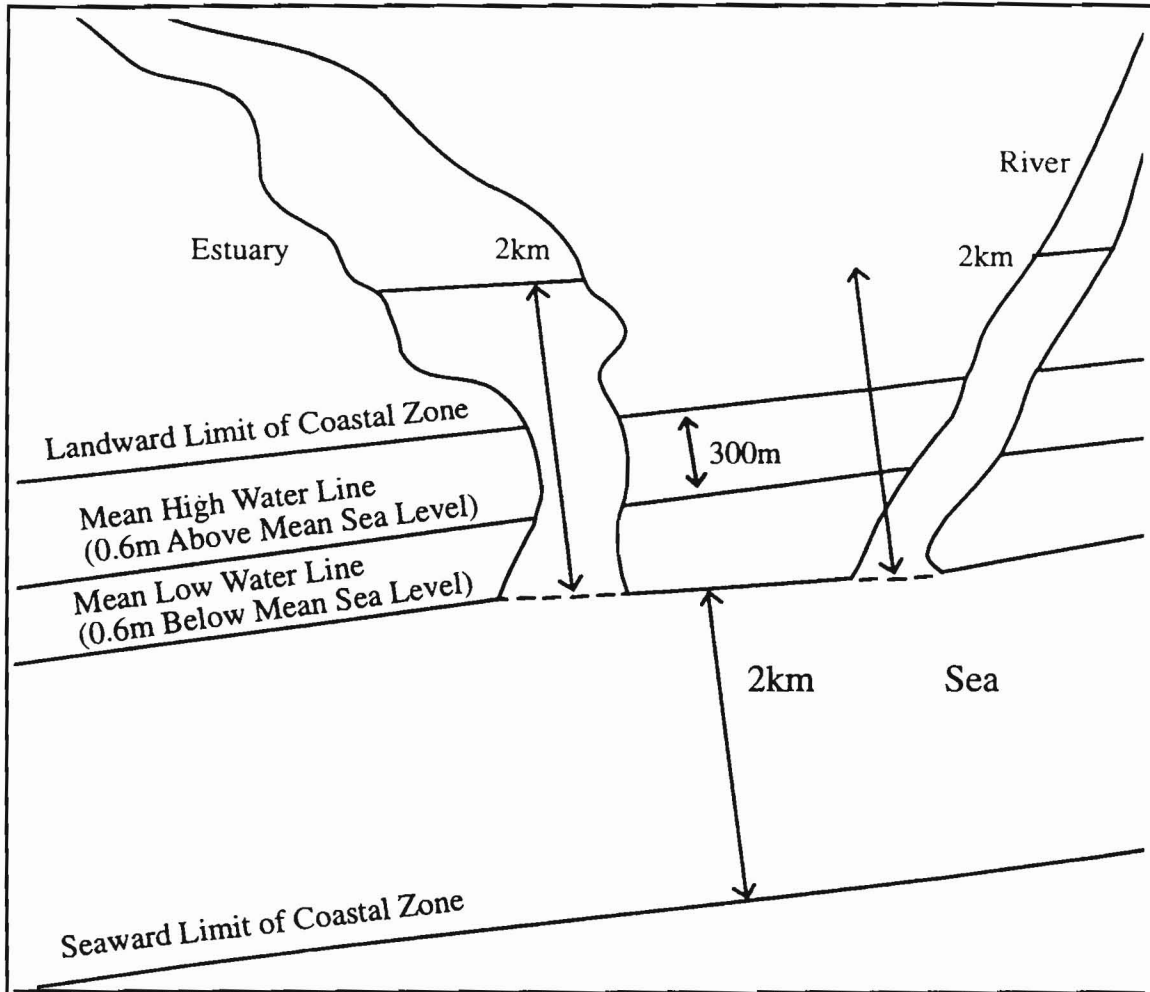


addition, authority for the implementation of these laws was under a wide range of governmental institutions established for various purposes. The incidental provisions sometimes created conflicts and overlapping jurisdictions among such agencies.

The increasing coastal problems continued to occur with the degradation and exploitation of coastal resources. Realizing the need for a more comprehensive approach to coastal management, the Sri Lanka government enacted the Coast Conservation Act (CCA) No 57 in 1981 (CCA, 1981). The CCA required the establishment of the Coast Conservation Department (CCD) whose objective is to implement the national coastal management program. The basic foundation of coastal management which can be seen today is based on the CCA. The major management initiatives of the CCA towards the sustainable development of Sri Lanka's coastal resources are as follows:

- (1) Establishment of CCD and advisory council;
- (2) Defining the coastal zone for the purpose of administrative regulation (Figure 1-3) and a regulatory system covering all development activities in the coastal zone;
- (3) Conducting coastal zone surveys and research in collaboration with relevant agencies and to prepare a comprehensive Coastal Zone Management Plan (CZMP) on the basis of the results;
- (4) Environmental Impact Assessment/Statement (EIA/EIS) procedure for large development activities which could cause considerable impacts in the coastal zone; and
- (5) Decentralization of powers and duties of the Director Coast Conservation to the Government Agents.

**Figure 1-3: Coastal Zone of Sri Lanka**



The "Coastal Zone" is defined in the CCA as

"That area lying within a limit of 300 m landwards of the Mean High Water Line and a limit of 2 km seawards of the Mean Low Water Line and in the case of rivers, streams, lagoons or any other water connected to the sea either permanently or periodically, the landward boundary shall extend to a limit of 2 km measured perpendicular to the straight base line drawn between the natural entrance point thereof and shall include water of such rivers, streams and lagoons or any other body of water so connected to the sea."

(Source: CZMP, 1990)

### **Institutional Arrangements and Structures:**

The first attempt of the government to approach coastal management was the establishment of the Coast Protection Unit under the Colombo Port Commission in 1963. The main role of this unit was to seek an engineering solution to combat coastal erosion which was one of the major issues at that time. In 1978, a Coast Conservation Division was established in the Ministry of Fisheries and all responsibilities of handling coast conservation matters were given to this division. The Coast Conservation Division was upgraded to the Coast Conservation Department in 1984 under the direction of the CCA. Although the Coast Protection Unit had originated as an erosion control agency, the CCD has evolved into a coastal resources management agency.

The CCD has jurisdiction to administer and implement provisions over some specific activities as directed by the CCA. It includes the implementation of a coastal permit procedure, regulation of coastal development activities and design and implementation of coast protection schemes and beach nourishment projects. In addition, policy formulation, planning and implementation, conducting research and surveys and coordinating activities of other relevant government agencies with regard to coast conservation matters are some of the important current responsibilities of the CCD.

Although there is provision in the CCA for the delegation of powers and functions to district governments, the proper decentralization of function did not occur until

1991. Recently, the authority of issuing minor coastal development permits has been given to local authorities under the Provincial Council Act. This act is intended to decentralize some of the activities to local agencies. Activities for which local authorities can issue permits include dwelling units with floor area less than 1,000 square feet, sand mining permits of less than 2 m<sup>3</sup> from designated locations, and small-scale commercial buildings. Other functions in relation to coastal management remain unchanged and still fall within the jurisdiction of the CCD.

**Coast Conservation Advisory Council:**

The establishment of a Coast Conservation Advisory Council in Sri Lanka is another important event under the CCA. This advisory council has a membership of 14 drawn from various departments, ministries, universities, non-government agencies, and the fishing community as required by the CCA. However, the majority of the members of the Council have been selected from the government sectors with only two NGOs from outside government and none from the general public. The Advisory Council plays an important role in advising the Minister of Ports and Shipping, who is the responsible minister for the CCD and to whom the DCC reports. Functions of the council include reviewing the Coastal Zone Management Plan, EIAs, and variance applications for coastal developments.

One of the key elements of Sri Lanka's coastal management program is the representation of members in the Advisory Council from many of the agencies with responsibilities for coastal zone management and development. In addition to the permanent members of the Council, some observers are permitted to attend regular meetings when agenda items are of particular relevance to them. This has provided additional incentives to build coordination and minimize conflicts over activities in the coastal zone.

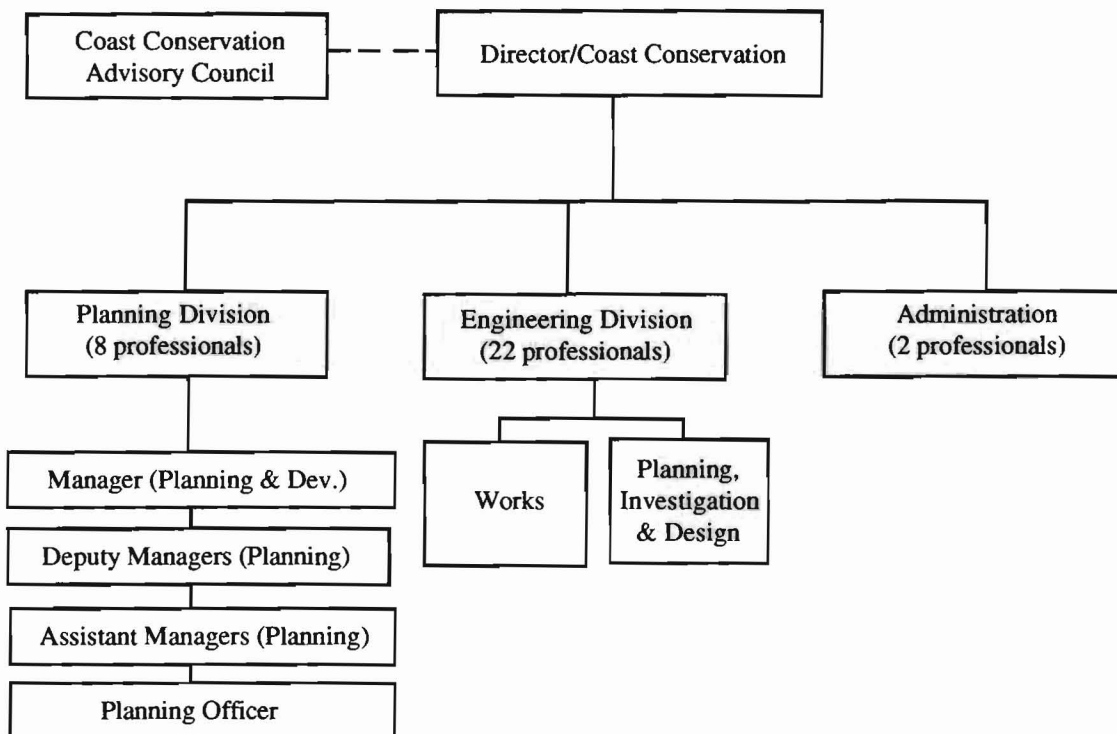
**Institutional Infrastructures:**

The CCD's institutional framework is currently inadequate in supportive services. The organizational structure shows that a large portion of the CCD which comprised the engineering division and planning and management divisions is small (Figure 1-4). Although the organization chart indicates eight professionals in the planning division, only four professionals carry out duties of that division. At present, the lack of planning staff is one of the major problems faced by the CCD in implementing the coastal management program.

At present, CCD obtains financial support from both government allocations and foreign donor agencies. Table 1-1 reflects the budgetary allocation for coastal management programs from 1986 to 1990. In addition, there are some

financial allocations under the decentralized budget for coastal erosion management, and expenditures by other government agencies for research and surveys.

**Figure 1-4: CCD's Organization Chart**



(Source: Hale and Kumin, 1992)

**Table 1-1: Government Budgetary Allocations**

(Rs. 50 = 1 Dollar)

	1986-1990 (Capital)	
Coastal Zone Management		
Planning		
Administration of the permit system		
Research and Studies		
Education, Information etc.		
Consolidated Funds	Rs.	7 m.
USAID Funds	Rs.	15 m.
<b>TOTAL</b>	<b>Rs.</b>	<b>23 m.</b>
Coastal Erosion Management		
Consolidated Funds	Rs.	39 m.
DANIDA aid (stage 1)	Rs.	320 m.
DANIDA aid (stage 2)	Rs.	380 m.
W. German Aid	Rs.	70 m.
<b>TOTAL</b>	<b>Rs.</b>	<b>809 m.</b>

(Source: CZMP, 1990.)

In contrast to the small government budgetary allocations, foreign funds that are provided by the US, Germany, and Denmark, play an important role in the coastal management initiatives of Sri Lanka.

#### **1.4 The Coastal Zone Management Program:**

The CZMP is the first attempt to address coastal issues in a coordinated and comprehensive manner. The legal framework was provided by the CCA and Coast Conservation Regulation, No 1 of 1983, which is the implementation authorization published in the form of a gazette notification

(CZMP, 1990). One of the major concerns that arose during the preparation of the plan was to fill the jurisdictional and policy gaps in the existing management systems. These gaps were caused by the overlapping and conflicting jurisdiction of a substantial number of agencies with coastal jurisdictions. The CZMP was prepared based on an analysis of coastal problems and on the basis of surveys and research carried out by the CCD in cooperation with other agencies.

The CZMP focused on highly visible coastal problems which have resulted in significant economic and social losses in coastal areas. The following are the major coastal issues addressed by the Plan:

- (1) Coastal erosion;
- (2) Degradation and depletion of natural coastal habitats; and
- (3) Loss and degradation of archeological, historical, and cultural sites and recreational and scenic areas of the coastal zone (CZMP, 1990).

Thus, the preparation of the CZMP is based on a problem-oriented approach, rather than on a conservation initiative. The CCA requires periodic revision of the national CZMP, complemented by a Coastal Erosion Master Plan. The implementation actions of CZMP include regulation, direct development, research, coordination, education, and plan and policy development (CZMP, 1990). However, at the present time, the permit system for development activities within the coastal zone has become a primary mechanism for the implementation of Sri Lanka's coastal management program.



### **Permit Regulatory System in Sri Lanka:**

Under the CCA, a permit is required for all development activities that are likely to alter the physical nature of the coastal zone (CCA, 1981). Fishing, cultivation of crops, silviculture, and coast protection works carried out by CCD, have all been exempted from permit requirements. The activities for which a permit is required are summarized in Table 1-2.

**Table 1-2: Activities in the Coastal Zone for Which a Permit is Required**

- \* Residential, commercial and industrial structures  
other structures
- \* Shoreline protection structures, harbors and  
navigational channels
- \* Recreational structures
- \* Public roads, bridges, railway lines and pipe lines
- \* Sewage treatment facilities, waste disposal and  
waste water discharge facilities
- \* Aquaculture facilities
- \* Dredging, filling, grading and mining activities
- \* Removal of sand and seashells
- \* Removal of vegetation and breaching of sand bars
- \* Removal of coral for research purposes

(Source: CZMP, 1990)

Since 1983, when the permit system was implemented, a considerable number of permits have been approved by the CCD. The distribution of permits according to the year and development activity is shown in Table 1-3. During the past few years the Department has approved 95% of the total number of application requests. One complicating factor is the absence of proper records with respect to noncompliance with current regulations.

**Table 1-3: Approved Coastal Development Applications (1983 - 1993)**

Year	Houses	Sand	Hotels	Misc	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	100	60	3	12	175
1988	108	82	2	37	229
1989	97	63	0	18	178
1990	95	274	7	30	406
1991	94	73	7	41	215
1992	227	75	22	70	294
1993	80	37	10	37	164

(Source: Adopted from Olsen, et al. 1992.)

In addition, there are some activities which significantly affect the ability to achieve management objectives. Prohibited development activities within the coastal zone include:

- (1) Removal of coral except for research purposes;
- (2) Mining of sand other than from designated areas;

- (3) Any developments within 200 meters of designated archeological sites; and
- (4) Development activities that will significantly affect the quality of designated natural areas of exceptional value (CZMP, 1990).

Besides these guidelines, setbacks measured from the permanent vegetation line or coastal features are required and depend on the type of development activity proposed. Permit decisions for issuing or denying a permit basically depend on several criteria adopted in the CZMP. If the developments are in accordance with setback guidelines, CZM policies, and national standards, and are not otherwise prohibited, the permits are generally granted.

If permits are denied, developers can apply for variances. The variance appeal should be made in writing and addressed to the Secretary of the Ministry of Ports and Shipping which is the responsible Ministry for the CCD. If the development activity will not result in any environmental impacts or use conflicts or will cause the applicant undue hardship, such variances will be granted by the DCC only on the recommendation of the Coast Conservation Advisory Council.

An EIA can be required by the CCD for development activities when they are considered to have significant coastal impacts. However, under the (amended) Environmental Protection Act, EIA regulations were revised in 1988 to manage the impacts caused by all large development activities (NEA, 1988). The Central Environment Authority (CEA) became the lead agency for the implementation of EIA regulations.

However, the CCD is still responsible for conducting EIAs in the coastal zone in accordance with the guidelines set forth by the CEA. At present, the CEA regulates EIAs outside the jurisdiction of CCD.

The 1981 CCA did not specifically deal with the coral mining problem. During this period coral mining was allowed by the CCD. However, because of the impacts to the coastal environment the CCD began to ban coral mining. Mining has continued especially in the southern and southwest coastal sectors as authorities failed to take action. During the early 1980s, the CCD had a number of discussions with politicians and other authorities representing the affected areas in an effort to provide alternative employment for coral miners. Owing to these discussions, the CCD was able to provide some alternative employment in the agricultural, fishing, and industrial sectors. These efforts seem to be top down approaches rather than bottom up initiatives. CCD's unsuccessful effort led to the preparation of an amended legislation and regulations in an effort to strengthen the government's enforcement powers.

The Amended CCA enacted in 1988 makes coral mining, collecting, processing, storing, burning, and transportation illegal, thus providing additional enforcement powers to both the CCD and the police. Furthermore, in 1990, renewed efforts were undertaken with the active involvement of the Southern Provincial Council to provide alternative employment and to strengthen enforcement by police officers. Under this

program, all lime kilns in the coastal zone have been removed except in one area of Rekawa. No attempts have been made in this area to provide alternative livelihoods for coral miners.

**Monitoring and Enforcement:**

Monitoring activities to ensure compliance with permit conditions are carried out by periodic visits of CCD staff. On occasion, the developers are requested to submit the report of surveys, tests or a certificate of conformity from a nominated authority such as the Urban Development Authority or Ceylon Tourist Board. Other coastal changes, such as erosion, habitat changes and mining are monitored by the CCD staff through surveys and tests carried out with the collaboration of other agencies including the National Aquatic Resources Agency (NARA), Department of Surveys and Lanka Hydraulic Institute (LHI).

Enforcement authority in relation to unauthorized developments and prohibited activities has been given to CCD officers and police authorities. At present, CCD regular staff are responsible for issuing demolition orders for unauthorized structures and carrying out demolition procedures. Apart from a few instances these enforcement operations have generally been ineffective.

### **Current Non-Regulatory Approaches of the CCD:**

The CCD also deals with the construction of coast protection structures such as revetments, groins, and offshore breakwaters. A considerable proportion of the annual budget is spent on such developments. Foreign funding has played a major role for the construction of these structures during the past several years. In 1991, CCD initiated a pilot marine park project in Matara under the German Technical Assistance Program. Several agencies, including the Southern Provincial Council and Matara Municipal Council were involved in this program. The United States Agency for International Development (USAID) provides a considerable amount of financial assistance in formulating coastal policy and strengthening the capacities of agencies, including the CCD, with coastal environmental jurisdiction.

The CCD has recently accelerated and expanded environmental education activities in the form of school and non-formal programs. Under these activities, the CCD has initiated a program with the collaboration of the National Institute of Education which is responsible for developing a coastal management school curriculum. Non-formal programs have been undertaken through a wide variety of activities including sign boards, posters, exhibitions, mass media, and contests. On several occasions, CCD has conducted exhibitions and seminars with the involvement of other agencies, including the CEA, Department of Wild Life

Conservation (DWLC), Department of Fisheries and Aquatic Resources (DFAR), and NGO groups.

There are many government agencies with authority and jurisdiction over some coastal resources, activities and developments in the coastal zone. Table 1-4 summarizes the responsibilities of some of the important agencies. In addition to the CCA and CZMP, the CCD's Advisory Council, Special Area Management (SAM) Projects, and the EIA process are the three most important components which make up the country's coastal initiatives. This is complemented by interagency scoping committees which review applications for proposed projects.

At times, programs of other agencies which have not directly addressed coastal issues have contributed to the enhancement of the coastal environment. For example, several municipalities have constructed sewage outfall facilities with the assistance of the Water Supply and Drainage Board. Similarly, the CEA exercises national jurisdiction over pollution, including pollution in coastal areas. This is exercised through environmental standards and permit regulations.

Although Sri Lanka's coastal management program has a history of 15 years, it is viewed as a successful effort among developing nations. Sri Lanka has still a long way to go before it achieves its ultimate goal.

**Table 1-4: Principal Government Agencies with Authority and Jurisdiction in Sri Lanka's Coastal Zone**

*Thirty-two government agencies have jurisdiction over coastal areas and resources in Sri Lanka. Responsibilities of key agencies are summarized as follows:*

- **Coast Conservation Department (CCD):** Planning, development, and regulatory jurisdiction from 2 km seaward to 300 meters landward of mean high water, with extended authority where inland water bodies meet the sea. Responsible for building shoreline protection structures. Issues permits for coastal development activities on the basis of their location, impact on the coastal zone, and applicable policies of the Coastal Zone Management Plan.
- **Central Environmental Authority (CEA):** Principal coordinating agency for environment-related activities. Carries out environmental and educational programs. Establishes national environmental standards. Responsible for preparing a National Conservation Strategy, and overseeing Sri Lanka's environmental impact assessment process.
- **Urban Development Authority (UDA):** Planning and regulatory authority over building specifications within one kilometer of the coastline. Develops land use plans for coastal settlements experiencing rapid growth.
- **Ceylon Tourist Board:** Planning authority for tourist facilities and development.
- **Ministry of Fisheries and Aquatic Resources:** Management authority over fishery resources and the development of the fishery industry.
- **Ceylon Fisheries Harbors Corporation:** Responsible for fishery harbor development.
- **Ports Authority:** Supervises port development and management.
- **National Drainage and Water Supply Board:** Responsible for drinking water and sewer facilities.
- **Greater Colombo Economic Commission (GCEC):** Fosters economic development of the country by promoting foreign investment within the Republic.

(Source: Hale, and Kumin, 1992.)



## Chapter 2

### Prospects of an Effective Coastal Program

#### 2.1 Toward Better Management:

Since the implementation in 1981 of Sri Lanka's coastal management program, several sectors have experienced achievements as well as failures. As mentioned in the previous chapter, the first-generation national program deals with some of the highly visible coastal problems. Today, Sri Lanka is preparing a second-generation program which is intended to address coastal issues that were not addressed under the initial coastal management initiatives.

The success of future planning efforts depends on the ability to deal with traditional coastal activities and on the way of addressing current economic development programs. Management approaches that are adopted after careful analysis of all factors may help to build both political and public support. Implementation of management initiatives can be supported by strengthening institutions, administrations, legal and jurisdictional arrangements. In addition, public participation and involvement in all stages of management efforts, from planning to implementation, has become one of the key factors in successful coastal management. This participation can be achieved through sound public awareness programs. Coastal management professionals in Sri Lanka, including the author of this document, would like to see the

outcomes described in this chapter achieved through a successful coastal resources management program. Intended outcomes for Sri Lanka's future coastal program will be discussed under the following headings:

- \* Current coastal problems and issues
- \* Traditional coastal activities and uses
- \* Present and future coastal development
- \* Conservation and enhancement of the coastal environment
- \* Legal and institutional initiatives
- \* Awareness of the coastal environment.

## **2.2 Coastal Problems and Issues:**

As discussed in Chapter One, many coastal problems have emerged due to incompatible uses of coastal resources. Table 2-1 shows some of the major coastal issues and their causes. These problems have become significant because of their impact on coastal properties, infrastructures, resources and activities. Therefore the resolution of these coastal problems should be one of the major goals of an effective coastal program.

### **Coastal Erosion:**

The private and public costs of coastal erosion are enormous. The impacts of coastal erosion are severe along the western and southwestern coasts of Sri Lanka.

**Table 2-1: Major Coastal Issues and Their Causes in Sri Lanka**

<u>Major Issues/Problems</u>	<u>Causes and Activities</u>
(1) Coastal erosion	River and beach sand mining, Coral mining, Shore front development, Removal of coastal vegetation.
(2) Degradation of coastal habitats	Tourism, industrial and residential development, Agriculture and mariculture, Coral/sand mining and dredging Pollution and sediments.
(3) Decreasing fish yield	Dredging, Filling of wetlands, Coral and sand mining, Agriculture development and fertilizer, Pollution (sewage/toxic) Over fishing, Flood control and agriculture development.
(4) Pollution	Dredging and mining, Sewage disposal, Shipping and harbors, Industrial development.
(5) Access to the shore line and visual access	Residential and tourism development, Industrial development.
(6) Degradation of archeological, historic and scenic areas	Residential and tourism development.

The total net loss of land ranges between 300-500 m<sup>2</sup>/year. From 45 to 50 percent of the country's coastline is subject to coastal erosion (CZMP, 1990). Millions of rupees are spent annually to cope with erosion-related property losses and coastal erosion. The primary means of combating coastal erosion has been to construct revetments and groins. Coral and sand mining remove the natural barriers that reduce coastal erosion. Most of Sri Lanka's coastline is retreating as a result of human activities.

It is important to introduce appropriate techniques that are cost effective to manage human activities that cause coastal erosion. Some of these approaches are discussed further in this chapter under the headings of coral and sand mining, coastal protection and enhancing the environment.

**Loss and Degradation of Coastal Habitats and Archaeological, Historic, and Scenic Areas:**

Sri Lanka's coastal region consists of a diversity of valuable coastal habitats and important archaeological, historic and scenic areas. The coast supports fisheries, recreation and education, and provides buffers against erosion.

Most of Sri Lanka's coastal habitats, including mangrove forests, salt marshes, wetlands, sea grass beds, and estuaries, are located outside the coastal zone and face the threat of direct and indirect human influences. Table 2-1 indicates the extent of such coastal habitats by district.

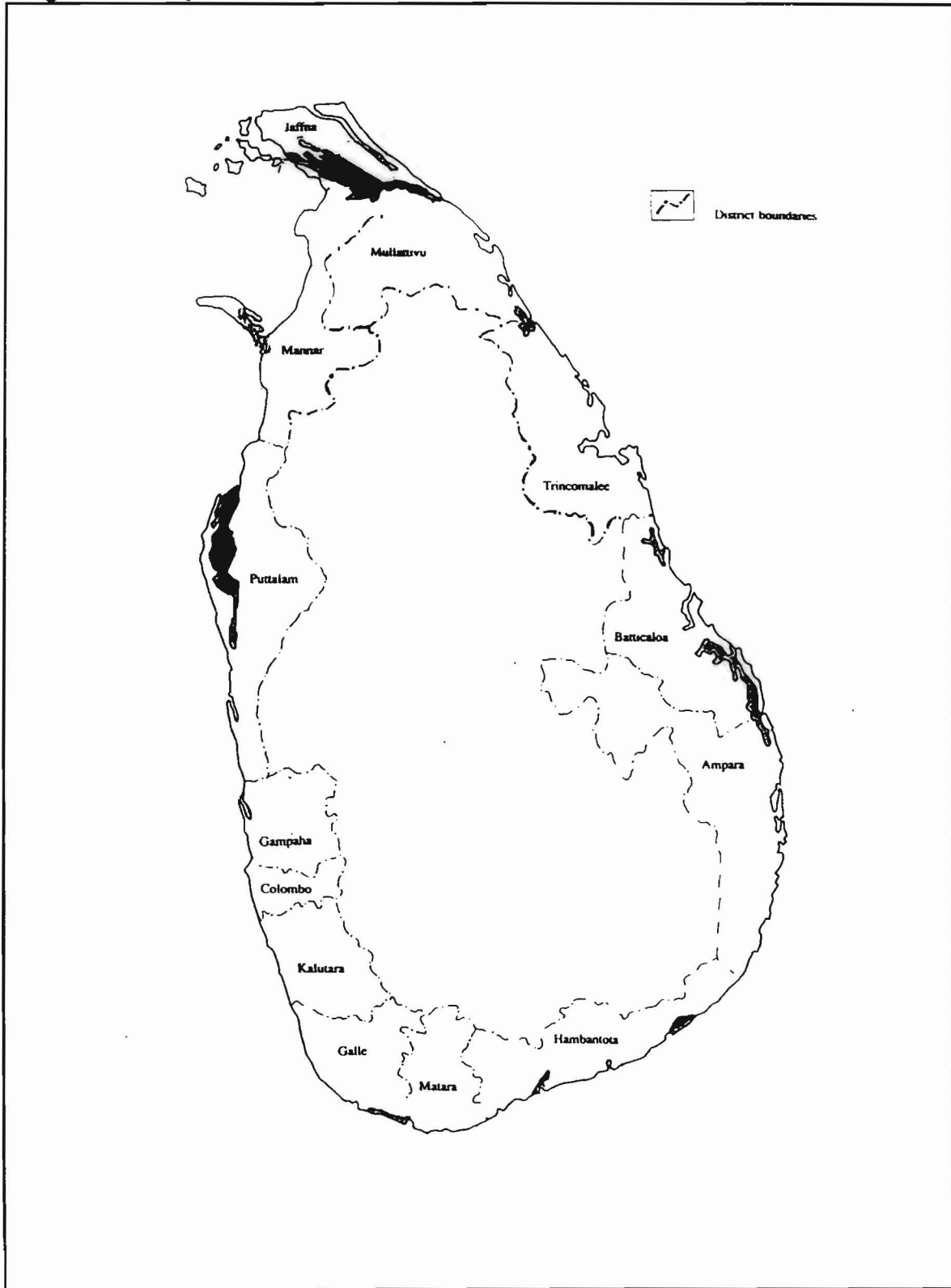
**Table 2-2: Extent of Coastal Habitats of Sri Lanka  
(in Hectares)**

<b>District</b>	<b>Mangroves</b>	<b>Marshes</b>	<b>Beaches</b>	<b>Estuaries</b>	<b>Dunes</b>
Colombo	39	-	112	-	-
Gampaha	313	497	207	3342	-
Puttalam	3210	3461	2772	39119	2689
Mannar	874	5179	912	3828	1458
Kilinochchi	770	4975	420	11917	509
Jaffna	2276	4963	1103	45525	2145
Mullative	428	517	864	9233	-
Trincomalee	2043	1401	671	18317	-
Batticaloa	1303	2196	1489	13682	-
Ampara	100	127	1398	7235	357
Hambantota	576	318	1099	4488	444
Matara	7	-	191	-	-
Galle	238	185	485	1144	-
Kalutara	12	-	77	87	4
<b>Total</b>	<b>12189</b>	<b>23819</b>	<b>11800</b>	<b>158017</b>	<b>7606</b>

(Source- adopted from CZMP, 1990.)

Figure 2-1 indicates the location of each district indicated in the above Table. At the same time, archaeological, historic and scenic areas provide opportunities for cultural and recreational activities particularly important to the tourism industry. The main causes of degradation of these valuable resources are the increasing pressure of population and the need for expanding settlements and industrial development.

**Figure 2-1; Coastal Districts in Sri Lanka**



(Source: Olsen, et. al. 1992)

Although the CZMP is capable of dealing with some conservation initiatives, the preservation of such sites outside the coastal zone has become a problem. Sometimes the CCD regulatory system becomes ineffective in managing such activities because of increasing noncompliance and lack of enforcement. Everyone interested in coastal management would like to see important coastal habitats, scenic and recreational coastal areas preserved for the long-term benefit of the nation.

Conservation and enhancement of these valuable resources has become an important factor in sustainable development. Goals can be achieved by developing awareness and regulations.

#### **Coastal Pollution:**

Industrial development, coastal tourism and urbanization are major contributions of coastal pollution. In some areas, beaches are used as garbage and sewage discharge dumps. In addition, oil discharge from fishing boats and recreational boats have also contributed to the degradation of the beach environment. As a result, some beach sectors have been severely polluted and are unsuitable for many activities. These conditions have affected marine life, including coral, fish and sea grasses. Therefore, control of coastal pollution has become an important feature in the coastal program. However, the CCD and other agencies, including the CEA, have failed to manage the activities that are affecting

coastal pollution. It is important to adopt initiatives to identify all sources of coastal pollution and manage these sources in a sustainable manner.

### **Public and Visual Access to the Shore:**

Maintaining public and visual access are important for coastal management initiatives. Coastal developments have often limited access to the shoreline which have led to user conflicts.

Sri Lanka's beaches are recognized as state lands and common properties of the public under the CCA. Hence, no person or organization can claim ownership of them. However, there are some instances in which individuals, especially hotel owners, have constructed fences and other illegal structures around their properties. The absence of legal action by the CCD to demolish such structures has exacerbated user conflicts. In order to reduce such conflicts it may be necessary to strengthen future legal actions.

### **2.3 Traditional Coastal Activities:**

The primary traditional coastal activities are fisheries, agriculture, mining, and the coconut husk retting and processing industry. Although some of these have impacted the coastal environment, many activities are important to the future development of the country's coastal region. Thus coastal programs that support traditional, nondestructive coastal uses are important.



### **Coastal Fisheries:**

Fisheries is the main economic activity in the coastal zone. There are currently about 80,000 people actively involved in coastal fisheries and another 30,000 employed in ancillary industries (Olsen et al., 1992). In addition to the job opportunities provided in this sector, fisheries is significant because of incoming foreign exchange. Sometimes traditional fishing activities are the focal center of attraction for tourism. As a result, Sri Lanka's government has made coastal fisheries one of the country's development priorities. The introduction of modern technologies and new gears has raised the question of conservation of the coastal environment. For example, dynamite fishing, trawling practices, and operation of disco nets have greatly affected coastal habitats. At the present time the government and the Department of Fisheries and Aquatic Resources have launched programs to encourage and develop fishing rather than adopt strategies for long term management. Furthermore, unplanned fishing practices have led to overexploitation of some varieties of fish. The most heavily exploited fisheries are in near shore areas within 40 km of the coast. This exploitation is indicated by a decline in catch per unit effort (cue) for many inshore stocks (Olsen. et al., 1992). Sometimes there have been conflicts between traditional and more modern fisheries. As a result, traditional fishing activities no longer occur in some areas. Beruwala and Mount

Lavinia are a few examples to explain such changes. In turn such changes may affect the tourism industry. Coastal agencies would like to see continuation of both traditional and modern fishing.

### **Coastal Agriculture:**

Agriculture in coastal areas is primarily based on coconut and cinnamon growing and rice paddies. About 400,000 acres of coconut are currently under cultivation in the coastal region (Lowry and Wickramaratna, 1987). These products play an important role in the country's economy, as well as in the socio-economic conditions of the people. However, development programs in coastal areas have resulted in declining agriculture due to unavailability of land and to changing patterns of employment.

### **Coral Mining:**

Coral is the principal source of lime for the country's construction industry. Historically only inland relic reefs were mined, but the expansion of the building industry led to the mining of live coral reefs and the collection of coral debris from the beach. Coral mining provides 1,200 direct and 4,700 indirect jobs along the southwest coast where most mining occurs (Hale and Kumin, 1992). Coral is not the only available source of lime in the country. Crystalline limestone, dolomite, and Miocene limestone, found in the inland areas, are other possible sources (Herath, 1991).

Coral mining was not a banned activity under the CCA in 1981. However, with the realization of the impacts and damage to the coastal environment due to coral mining, the CCD initiated action to ban coral mining and associated activities under the amended CCA (Amended CCA, 1989). This decision disappointed not only coral miners, but also local politicians, as this has been a traditional industry. However, the benefits associated with the coral industry are low in comparison to the damage caused to the coral reefs. In comparison to the total population in the country, only a few people benefited by this industry. Thus, there is no need for the government to promote coral mining.

To meet current demand for lime for the construction industry, it may be necessary to promote the manufacture of lime from other sources. This changeover will be eased to a certain extent by finding suitable alternative employment for coral miners and members of their families.

#### **Coastal and Inland Sand Mining:**

Sand mining is another important traditional activity, both in the coastal zone and in upland rivers. At present, beach sand is not generally used in building construction because of the low quality due to salt. Large quantities of river sand are mined to meet construction demands as it can be used without any additional processing. However, illegal sand mining continues in some beach sectors, including Panadura, Lunawa, and Mount Lavinia (Figure 1-2).

Realizing the need for sand for development purposes, the CCD has identified some areas in the coastal zone where limited sand mining can be allowed. Although sand mining is permitted in limited quantities both in rivers and estuaries, it has resulted in starved beaches in some locations. In the interest of refurbishing these beaches the CCD would like to see further beach sand mining stop. To replace these supplies, alternative sources of sand will have to be found.

**Coconut Husk Retting:**

Coconut husk retting is a process to get coconut fibers from husks, which results in the discharge of toxic substances, including organic matter and sulfur. This local industry has been in existence for several centuries and has been providing a livelihood for large numbers of people in the southern and southwestern coastal sectors. The availability of alternative livelihoods for those engaged in the industry, and finding ways to obtain coconut fibers without degradation to the coastal environment, will be difficult.

**2.4 Present and Future Coastal Development:**

There are other sectors important in the development of the country's economy. Coastal tourism and industrial development have become major sources of income and employment during the past few years. These industries may significantly impact the coastal environment. The

establishment of tourism and industrial facilities should be located so as not to impact the coastal environment.

**Coastal Tourism Industry:**

The development of tourism has become one of the government's priorities, due to its potential to provide foreign exchange and to provide employment opportunities. Today, the tourism industry ranks second in terms of foreign exchange earnings and employs over 100,000 people (Olsen, et al., 1990). To accommodate increasing demands for tourist facilities, a large number of hotel rooms and ancillary facilities have been constructed with many built in coastal areas.

Such developments have resulted in the loss of public access to beaches and local recreational opportunities, the degradation of coastal habitats, and increased sewage and solid waste pollution. Sometimes the coastal structures built to protect the properties of hotels have severely increased erosion in adjacent coastal areas. It is expected that these problems will be reduced once a coastal program has been implemented.

At present, government's efforts to promote tourism have sometimes led to conflicts over CCD management policies and government decisions. Many proposals for hotel projects and expansions of existing facilities are planned in setback zones or prohibited areas, and are supported by the Ceylon Tourist Board (CTB). This agency is the official government

agency responsible for tourism promotion. After such proposals are rejected by the CCD, they return to the CCD advisory council in the form of variance requests. As a result, during the past few years, the advisory council's major role has been the review of hotel projects. Such a situation can be avoided only through education and coordination of these agencies

### **Industrial Development:**

Other major types of development currently undertaken in coastal areas are the manufacturing industries supported by the expansion of harbor and port facilities. Today, 90 percent of large industries are located in the coastal region (Olsen, et al., 1992). Most of them are located within the greater Colombo area, where the government promotes the establishment of industries through foreign investments. The current government promotion of the industrial sector has become significant mainly because of the job opportunities associated with these developments.

At present, the major problem associated with the industrial sector is effluent discharge including waste and toxic materials, dye and oil. The lack of financial opportunities and technology has greatly affected the establishment of individual treatment facilities. The abatement of pollution under appropriate initiatives supported by effective monitoring and enforcement will help to overcome these problems. Sometimes large industrial

developments and irrigation projects outside the coastal zone have affected the coastal environment. Expanded coastal jurisdictions and regulations, including EIA practices may help to overcome such situations.

**Other Coastal Developments:**

Aquaculture, ornamental fish collection, and mining of beach minerals such as limonite and garnet have also become important features in some coastal sectors, many of which are supported by government because of the potential to provide local income and employment opportunities.

These activities have also affected the stability of the coastal region. For example, aquaculture development has contributed to the destruction of mangrove and salt marsh areas, and ornamental fish collection has resulted in the destruction of coral reefs. Although existing rules, regulations and policies are capable of handling these situations, implementation and enforcement of such initiatives has become a problem. Application of suitable initiatives such as strengthening institutional arrangements and environmental education programs will help to avoid these environmental problems and management difficulties.

**2.5 Conservation and Enhancement of Coastal Resources:**

Conservation and utilization of coastal resources will help to provide continuous and long term benefits. The national CZMP provides common direction to manage the

nation's coastal resources. However it does not take a comprehensive approach, since it deals with few aspects of coastal management. The introduction of coastal environment conservation strategies, including special area management, local planning, and similar programs will result in better allocation of resources with fewer conflicts.

**Sustainable Limits:**

The continuous utilization of some coastal resources is hampered by destructive procedures and overexploitation. Such situations are especially prevalent in the fisheries sector and have contributed to the decline of catch in some areas. Similarly, sand has been mined in quantities exceeding the natural replenishment rate, making supplies unavailable on a sustainable basis. These situations could be overcome only through the adoption of proper resource management strategies.

**Managing Specific Resources and Locations:**

At present, there are many specific locations where special attention should be given to management of such resources as coral reefs, sea turtle nesting areas, reefs frequented by marine mammals, fish, recreational beaches, and historically important places. In addition to broad national level coastal programs, integrated planning for specific resources and locations may help the future development and conservation of the coastal environment.



**Coastal Protection:**

At present, some coastal protection structures have greatly affected the activities and uses of beaches. For example, recreation and fishing are impacted by limited space on beaches. In addition, some coastal protection activities have accelerated erosion in adjacent beach sectors. Consequently, a coastal management program should work to avoid such situations by promoting other effective coast protection techniques, including beach nourishment, an example of which took place in Negombo (see Figure 1-2).

The Coastal Erosion Management Plan has identified areas where coastal protection structures should be built. However, this plan may not be able to deal with management problems because it is based entirely on technical information with no public input. Future programs should incorporate both technical information and public input to ensure a greater chance of success.

**Enhancing the Environment:**

The CCD's efforts to conserve and enhance the coastal region mainly involve "hard" solutions, such as revetment, groins, and offshore breakwaters, complemented by sand nourishment. However, such programs in combination with the construction of artificial reefs, may help prevent or reduce erosion. A considerable number of coastal protection

measures have been undertaken by the CCD with the assistance of foreign donor agencies.

Although there are waste treatment facilities servicing some industries and hotels, many establishments do not treat their effluent. No sewage treatment facilities exist for urban areas, including Colombo, where sewage is discharged to the Kelani River and to the ocean (Baldwin, 1991). An improvement of the coastal environment is essential if the country expects to develop its tourist industry further.

The implementation of cost-effective and acceptable initiatives is essential. One of the major obstacles to implementing such "hard" coast protection initiatives is high construction costs. Although several "soft" solutions and enhancement initiatives, such as planting of coastal vegetation, have been undertaken with the support of the Forest Department and an NGO group at Chilaw, some of them have not been successful due to improper maintenance and lack of public involvement. The Beruwela and Koggala coastal planting programs were initiated by the CCD in 1991 with the assistance of the Forest Department. The absence of maintenance and lack of public involvement has hampered these programs. However, mangrove planting programs initiated with the assistance of NGO groups in Chilaw have been successful.

## **2.6 Legal and Institutional Initiatives:**

An effective coastal program will not succeed in the absence of proper legal and institutional arrangements.

Although some important legal and institutional initiatives exist in Sri Lanka, they are not capable of dealing with every aspect of coastal management. Improved coastal management mechanisms go hand in hand with legal and jurisdictional responsibilities.

**Coastal Zone:**

Present legislation was adopted primarily to manage development activities within the coastal zone but it does not address other coastal issues. Sometimes development activities in inland areas have greatly influenced the coastal environment. A better management strategy would be to extend some of the planning efforts to inland areas.

**Development Activities and Facilities:**

Some coastal activities, which do not fall into the category of development activities, have significantly affected the resources and the stability of the coastal environment. For example, nonpoint source pollution and changes in uses of buildings can damage the coastal environment. The nonpoint source pollution caused by agriculture practices and discharges of mechanized fishing vessels are problems in some coastal areas of the country including Negombo (Figure 1-2). To combat these impacts it may be useful to extend the regulatory regime to activities

impacting the coastal environment even if such activities are not located in the coastal zone as defined.

**EIA Procedures:**

The EIA procedure adopted under the CCA authorized the DCC to call for an EIA for any development activity in the coastal zone that could affect the stability of the coastal environment. Thus, the CCD had the discretionary ability and power, through the EIA process, to control and mitigate any environmental impact caused by development activities in the coastal zone. However, the amended NEA empowers the CEA to prepare EIA guidelines on an island wide basis and direct project approving agencies to call for EIAs according to these guidelines. As a result, the CCD has become a project approving agency which should follow the guidelines of the CEA to call for EIAs in the coastal zone. This procedure is required to prepare an EIA for specific types of developments. Therefore, the CCD's independent decision making power to call for EIAs in coastal development has been lost. This failure may lead to some coastal problems, including cumulative impacts in the future. Public participation procedures call for both written and verbal comments in accordance with gazette notifications. Public input into, and consensus for, proposed projects is likely to increase in the future and may include public hearings.

**Critical Coastal Lands:**

In Sri Lanka, coastal lands are the property of either government or the private sector where the controlling authority over government coastal land falls under the divisional secretaries. Many such coastal lands, including sand dunes, salt marshes, and wetlands have been encroached upon by private parties and developed to varying degrees and for a wide range of activities. If a mechanism could be established to acquire government or private land for coastal conservation purposes, it may help to conserve critical and sensitive coastal habitats.

**Active Advisory Mechanisms:**

The nomination of members to the advisory council is directed by the CCA. The majority of council members are government administrative officers instead of representatives from the general public. The general public's participation in coastal conservation matters is limited. This has resulted in an efficient interagency coordination among government departments albeit to the exclusion of the public whom they serve. The advisory council includes three representatives from NGOs, who play an active part in the decision-making process, and are often more active in comparison to other members of the council. A general conclusion calls for the appointment of more members from the general public and other interested stakeholder groups to the advisory council. Many decisions on variance requests are

made by the advisory council members on the basis of information provided by the CCD planning staff. The availability of a sound mechanism for providing direct recommendations to the advisory council by the CCD planning staff might also be more effective.

**Coordination:**

As mentioned in Chapter One, the responsibility of managing coastal resources is vested in a number of different agencies. Coordination of these sectors is important and will be further enhanced by the adoption of coordinating procedures among different agencies. The specific agencies involved include the CCD, DFAR, DWLC and NARA.

**Involving the Provincial/Local Levels in Coastal Management:**

Sri Lanka's coastal management program is based on a centralized permitting system, although recently some functions have been decentralized to the divisional secretaries. Expected outcomes have not yet been achieved. The difficulty confronting local authorities has led to inefficiencies in the country's coastal management efforts. In addition to decentralizing minor permits, other functions are handled by the Colombo office of the CCD. As a result, coastal developers tend to consult the CCD head office for

every other coastal matter. Most of the decisions affecting coastal issues are issued through the national office.

The adoption of local-level and provincial-level coastal planning does not exist in Sri Lanka at present, except for the SAM planning currently in progress in Hikkaduwa and Rekawa (Figure 1-2). It is expected that in the future, coastal management will increasingly be managed and implemented at the local level with oversight responsibility remaining with the CCD.

**Monitoring Initiatives:**

The CCD and other coastal agencies have not given priority to coastal monitoring initiatives, except in relation to wave and shoreline changes. This work is conducted with the assistance of other agencies such as the Department of Surveys, Lanka Hydraulic Institute, and donor agencies. Successful management can be achieved through the monitoring of environmental changes. The purpose of such initiatives is to improve future planning and minimize inconsistencies in management programs. It may also reduce the number of legal actions against violators.

**University Coastal Management Programs and Curriculums:**

One of the major problems of the CCD and other coastal agencies is the lack of staff and personnel for the implementation of successful management programs, which has

hampered many coastal initiatives. The availability of staff and skilled resource personnel in the agencies will lead to faster implementation of approved management initiatives.

At present, the universities in Sri Lanka do not conduct programs in coastal management. Another expected outcome under a country-wide coastal management initiative is the creation of coastal management-oriented courses in the universities. It is expected that such initiatives will be implemented in collaboration with agencies such as the CCD, NARA, and DFAR. These courses will significantly help to train coastal professionals.

## **2.7 Public Awareness Programs:**

Public awareness has become an important feature in conserving coastal environments. Increased public awareness can be expected once training and education programs have been developed. In addition, this also plays an important role in obtaining support for coastal management programs.

CCD's awareness programs take place in various forums, such as newspapers, radio and television programs, and seminars and exhibitions. The introduction of coastal resources management to primary education and science curricula, where the topic is not included at present, may be useful in building strong public awareness. These initiatives may work better than traditional management strategies.



**Compliance with Management Initiatives:**

Increasing compliance with coastal laws and programs will help agencies to save resources. A considerable number of coastal communities are still unaware of the requirement for obtaining a coastal permit when preparing for development activities in the coastal zone. This is especially the case in rural communities and has resulted in continued CZM regulatory violations. Increasing public understanding of the importance of coastal resources should eventually result in greater compliance with a lower adverse impact on coastal resources.

**Public Participation:**

Public participation in coastal management efforts is not very widespread. In theory, public participation should occur during plan development, plan implementation, monitoring and enforcement. Initiatives intended to increase public participation are cost-effective and may greatly benefit both developed and developing nations. Programs focusing on obtaining public involvement in the decision making process may be an important conservation initiative under the auspices of the country's coastal management programs.

**Local and NGO Programs:**

Sri Lanka's experience is poor with regard to supporting activities of the NGOs and other communities. Although there

are several NGOs working in Sri Lanka, their support for coastal programs is limited because of lack of coordination and lack of funds.

The intended outcomes/goals outlined in this chapter can be achieved only through carefully adopted collaborative management strategies and procedures. Sri Lanka's coastal management professionals in the future would like to see and achieve an improved coastal environment for the benefit of the nation. Chapter three discusses some of the important management strategies that can be applied to achieve the management goals discussed here.

### Chapter 3

## Achieving Sustainable Development of Coastal Resources in Sri Lanka: Applying Lessons from Other Coastal Nations

### 3.1 Developing and Introducing New Coastal Programs:

Lessons from other coastal nations may be used as a basis for improving the prospects for Sri Lanka's coastal management. Due to the country's current economic situation, it is not possible to apply every successful program to Sri Lanka. Sometimes the experiences of other nations could be applied to improve present programs or start new initiatives. Based on past experience, it appears that the success of any program depends on the following factors:

- (1) Management techniques should not hamper the government's present policies and programs, which are focused on the economic and social development of the country.
- (2) A program should not adversely affect the lifestyle and should be acceptable to the majority of people. This in turn will help to build public support for coastal management initiatives.
- (3) A program should be able to achieve the consensus of public and other agencies involved in coastal management in order to minimize use conflicts that might arise under new situations.
- (4) A program should be capable of providing benefits to coastal users to achieve the support of both government and the public.

- (5) If traditional coastal activities are affected by a particular initiative, it has to be followed by more effective incentive programs.
- (6) A program should be economically feasible.

The main purpose of this chapter is to identify and discuss suitable programs and tools that could be introduced to reach the objectives of the coastal program.

### **3.2 Involving the Hierarchical Levels in Coastal Management:**

Sri Lanka's primary governmental hierarchical levels are national, provincial (state), and local. As discussed in Chapter 2, the coastal management program is a national-level effort including planning and implementation. The responsibility of issuing minor permits, however, rests with local divisional secretariats. The successful efforts of several coastal nations can be applied to Sri Lanka for the purpose of devolving an effective decentralized coastal program.

#### **The United States Coastal Program:**

In the United States, coastal programs have to be formulated by each participating state, as directed by the Coastal Zone Management Act (CZMA) of 1972. The purpose of the Act was to protect and preserve threatened coastal resources, and manage coastal resources comprehensively in

order to resolve user conflicts and promote sustainable development. There are several important features of US national coastal management efforts as directed by the CZMA. The Act does not specifically require coastal states to adopt state-level CZM plans. The responsibility of preparing such plans is voluntary, and the final decision rests with each state. For example, the states of Texas, Georgia, Illinois and Indiana do not have coastal programs, although all of these states are recognizing their involvement in coastal management efforts (CZMA, 1990). The federal government provides matching funds under section 305 for planning purposes and section 306 if states develop the approved programs in accordance with national objectives and standards. In addition, the federal government must approve the states' plans and also periodically evaluate the states' programs.

By its obligation to approve the states' plans, the federal government retains authority to ensure that the goals and standards of the programs will meet national objectives. However, these programs have to be formulated by states in order to integrate local needs and incorporate active involvement of local authorities. Coastal states have more power than the federal government to implement and control development within their respective coastal jurisdictions. This in turn has minimized conflicts between federal and state governments.

The US federal government authorizes coastal states to select different approaches listed below in order to achieve the intended goals of coastal management:

- (1) Coastal states are responsible for planning and implementation. For example, Rhode Island's program is completely carried out by Coastal Resources Management Council, which is the responsible agency for coastal management at the state level.
- (2) Local implementation is in accordance with standards set by the states. In this case, the states adopt the plans, which are implemented by local authorities. One example is the state of Washington's program, which provides local municipalities with exclusive control.
- (3) States review and approve development plans, projects, and regulations prepared by local government. California's coastal program reflects such an approach, giving full responsibility to local levels (Archer, 1988).

As a result of the flexibility of the Act, a variety of different institutional approaches have evolved on both the state and local levels.

In comparison to the US coastal program, Sri Lanka's program reflects a wide range of differences in planning and implementing of its initiatives. Sri Lanka's coastal program has been adopted to address common coastal issues in the country and does not place any emphasis on addressing specific problems at either the provincial or local levels. It does not deal with local priorities and local needs. Initiation of such approaches in Sri Lanka will greatly help to achieve the objectives of its management efforts. The consistency of a national program with provincial level programs is another important aspect that can be applied to Sri Lanka in order to fulfill the requirement of local

interests. For example, there have been some national level programs, especially hotel projects, that failed to get the support of local authorities. Such problems will not arise if similar initiatives are included under Sri Lanka's program. In addition to planning, the decentralized US coastal management system provides an effective implementation mechanism by involving state and local-level authorities in order to fulfill coastal management objectives. The adoption of national level funding and a supporting program for provincial governments would encourage these governments to get actively involved in coastal management. The effectiveness of CCD's present decentralized effort has failed due to the unavailability of financial and other supporting initiatives. Some US coastal states have not participated in coastal management efforts due to introduction of a clause in the CZMA for voluntary participation. This is a disadvantage in comparison to the current Sri Lanka national program because it helps to protect the entire coast.

**California's Coastal Management Program:**

California's coastal management program provides an example of another important aspect of coastal management. California's coastal program is decentralized to include planning and implementation at the local level. Local coastal councils adopt plans in order to implement the state's program. The state is responsible for approving

local plans in accordance with federally accepted state objectives and policies. The effectiveness and success of California's program rests primarily on several objectives. First, the main task of the local coastal councils and staffs is to deal with coastal programs. Second, these councils receive funds and other support from state government, which in turn is provided by the federal government under the CZM Act (Grenell, 1991).

At present, Sri Lanka's minor permit procedure is not successful because of the unavailability of separate institutional structures and staff to handle local coastal programs. The cumbersome duties vested with divisional secretariats and their staffs have hampered CCD's decentralized minor permit procedure. The adoption of a separate institutional structure and working staff characteristic of California's program will significantly help Sri Lanka to expand and improve the permitting procedure. In addition, it will help to achieve other intended outcomes, including planning, monitoring, and enforcement.

**New Zealand Coastal Management Program:**

A new approach for coastal management is provided by the Resource Management Act enacted by New Zealand in 1991 (CZMIP, 1991). It empowers all three government levels, (national, regional, and local) to participate in coastal management programs. At the national level, the program is



responsible for carrying out functions, with the coordination and assistance of regional and local-level authorities, as directed by the Act.

Broad policy formation and decision making on issues of major significance for the coast or nation as a whole are carried out at the national level. This is achieved through the coordination of various sectors such as fisheries, agriculture, and wildlife.

The management of coastal waters and land-use planning is the responsibility of regional-level government. Regional authorities have greater powers to develop and implement plans.

Local levels are involved in the preparation and adoption of detailed coastal land-use plans and are obligated to coordinate with regional and national authorities.

Sri Lanka's national-level (CCD) program, including broad policy formation and adoption, is similar to New Zealand's effort. Currently, regional or local-level coastal waters and land-use planning patterns have not been included under Sri Lanka's coastal program. However, the regional and local-level involvement under New Zealand's and USA's programs could be used in Sri Lanka. This would extend management efforts to regional and local levels and involve their participation in coastal management. Application of such approaches as an extension of existing coastal programs will help to achieve the national government's objectives to manage its coastal resources and environment. The success of

such initiatives depends on the institutional arrangements and availability of financial and staff resources under each local agency.

### **3.3 Coastal Jurisdictions, Institutional and Administrative Arrangements**

#### **Defining the Coastal Zone:**

The demarcation of coastal boundaries for regulatory and planning purposes shows a wide variation among coastal nations that have already adopted coastal programs. Table 3-1 shows some of the coastal boundaries adopted for the purpose of achieving their coastal management objectives.

In reviewing the selection of inland and seaward boundaries, it appears the boundaries have been based on (A) the nature of coastal problems, (B) the magnitude of coastal issues, (C) conservation objectives, and (D) capabilities of relevant agencies.

The United States' CZMA specifically defines the seaward boundary of the coastal zone, giving authority to coastal states to delineate their inland boundaries in order to achieve state management objectives and policies.

Rhode Island's program, for permit purposes, defines its inland boundary as that extending 200 feet inland from shoreline features (Olsen and Seavey, 1990). The boundary of New Jersey's coastal program and regulatory jurisdiction

**Table 3-1: Boundaries of the Coastal Zone in Selected Nations**

Country	Inland boundary	Ocean boundary
Sri Lanka	300 meters from MHT	2 km from MLT
Rhode Island	200 feet from shore line features	3 NM from the CB
California	variable line depending on the issue	3 NM from the CB
Brazil	2 km from MHT	12 km from the MHT
Washington State Planning	Inland boundary of coastal counties.	3 NM from the CB
Regulation	200 ft from MHT	3 NM from the CB
Spain	500 meters from highest storm or tide line	12 NM (limit of territorial waters)
South Australia	100 meters from MHT	3 NM from the CB
Costa Rica	200 meters from MHT	MLT
New Jersey	variable line depending on the issue	3 NM from the CB

CB - coastal base line

NM - nautical mile

MHT - mean high tide

MLT - mean low tide

(Source: Adapted from Sorensen and McCreary, 1990.)

varies by region. Included in the coastal zone are all tidal waters of the state, including bays and oceans, and a strip of land ranging from 100 feet to 500 feet inland of the mean high water line. New Jersey's upland coastal boundary extends from 1 mile to up to 20 miles to include about 20 percent of the land area of the state (Kinsey, 1991).

Hawaii's coastal zone includes the state's ocean waters and its entire land area, excluding forest reserves (Ohta, 1991). Similarly, the coastal zones of both Guam and the Northern Mariana Islands include the territories' entire land area (Archer, 1988).

As mentioned in Chapter 1, Sri Lanka's coastal zone is a narrow strip covering some of the coastal and marine resources of the country. Although the preservation and conservation of coastal resources, including coastal habitats, is one of the priorities of Sri Lanka's program, the delineation of coastal boundaries does not help to achieve these objectives. Therefore, the delineation of coastal boundaries, such as those used in Rhode Island and New Jersey have become a primary requirement. However, the approach of designating whole land areas and territories, as done in some island states, could not possibly be applied to Sri Lanka, due to its large geographic area. The success of expanding the jurisdiction areas for Sri Lanka's coastal program depends on several factors, including the availability of technical and planning staff and other infrastructural facilities.

The definition of coastal counties as boundaries of the coastal zone for planning purposes is another important approach that could be applied to Sri Lanka's coastal management program. Sri Lanka's program has focused its planning and management initiatives on the legally defined coastal zone. However, Sri Lanka's second-generation coastal management effort – which is on its way to the planning stage – includes the land areas of coastal divisional secretariats for coastal planning purposes.

**Management of Activities that Affect Coastal Resources:**

Many coastal activities, as well as some inland activities, affect the coastal environment and its resources. One of the important features of Rhode Island's program is jurisdiction over the control of specific actions that pose considerable impacts to the coastal environment, in addition to defined coastal activities (Olsen and Lee, 1991). For example, sewage treatment facilities and petroleum processing plants within the state come under the jurisdiction of the coastal program.

Introduction of such approaches to Sri Lanka's coastal program will benefit the conservation of the coastal environment and protect its resources from adverse impacts posed by major inland activities and developments. There have been several incidents in the past few years where hydropower projects, dams, major industries, and aquaculture

facilities have been built with adverse impacts on the coastal environment. Such situations might not have happened had the CCD been empowered to regulate major activities outside the coastal zone.

New Jersey's coastal permit program has been more successful in managing coastal facilities (Kinsey, 1991). This program deals with regulating coastal facilities other than development activities (which is the primary aspect of Sri Lanka's program). Under New Jersey's program, all coastal facilities, including production, manufacturing, operations, and storage have been included in the permit program. Thus, it has become an effective mechanism to address coastal uses in addition to development. For example, in Sri Lanka there are many occasions in which current residential houses in the coastal zone have been converted to tourist hotels, restaurants, and industries, etc. The CCD has failed to manage such situations under present legal authority. The expansion of the definition of development activities to include coastal facilities may help to avoid such circumstances in the future.

**Effective Environmental Impact Assessment Procedures:**

Many coastal nations have initiated EIA practices for projects that significantly impact coastal resources and the environment. Such impact assessment processes are complemented by public participation and commitments to provide policy makers with the information to ensure that

adverse impacts resulting from the project are known and dealt with in terms of mitigation and monitoring.

Furthermore, EIA procedure has often sought consensus and minimization of conflicts between stakeholders (Sorensen and West, 1992). One of the strategies used for obtaining public input is conducting public hearings, in addition to soliciting written public comments.

Although an EIA procedure has been used in some coastal developments in Sri Lanka, it has not been effective. Until recently, the requirement of EIA for coastal developments was entirely the CCD's decision. However, at present, neither the CCD nor CEA use public hearings in assessing project proposals under the EIA or any other planning processes. Introduction of public hearings as a tool of getting public input in the EIA process may help to minimize socio-environmental impacts and user conflicts, as well as promote consensus for proposed coastal projects.

Other obstacles include avoidance of CCD requirements by the location of developments outside the coastal zone or designing projects that are not required to meet EIA requirements. The call for EIA is further hampered by the lack of CCD personnel. The CEA also faces similar problems with respect to the EIA process.

#### **Institutional Arrangements:**

Sometimes institutional arrangements play a major role in implementing and enforcing coastal programs. New Jersey's

coastal program attempts to achieve coastal management objectives by organizing agencies under one organization, the Department of Environmental Protection (DEP). This department includes a number of different offices, divisions, and bureaus (Bonsall, 1977). Table 3-2 shows some of the important divisions and offices in relation to coastal programs.

**Table 3-2: Some Divisions and Offices of the DEP in New Jersey**

Divisions	Offices
Marine services	Shore protection, Marine law enforcement, Wetland management, Riparian land management, Coastal zone management
Water resources	Water pollution control, monitoring, enforcement element, Flood plain management element
Fish, Game and Shellfish	Fisheries management bureau, Wildlife management
Green areas and recreation	

(Source: Adopted by Bonsall, 1977)

The location of various agencies – including fisheries, wetland, and coastal management – under higher authority may sometimes be helpful in the implementation of more coordinated management efforts. However, the creation of such a structure is difficult because of staff requirements



and facilities. In 1988, there were approximately 3,000 employees in the DEP (DEP, Annual Report, 1988). New Jersey's approach has resulted in coordination and effective implementation and enforcement within coastal management agencies.

Application of such institutional arrangement approaches for the Sri Lanka coastal program may prove helpful in addressing some coastal issues that have resulted from placing coast-related agencies under different ministries. The consolidation of coastal agencies in one ministry may help to (a) build interagency coordination, (b) minimize policy conflicts, and (c) implement effective management.

In addition to the above advantages, establishment of various sections within this ministry—such as enforcement and monitoring—may help to avoid difficulties that some agencies now face due to lack of staff and other resources. However, such approaches may create some problems due to large organization structure and complicated administrative system.

#### **Creation of an Interministerial Council:**

An interministerial council for coastal resources management can also provide a means for solving coastal issues in a coordinated manner. Such councils can be formed for the purpose of helping broad policy making or providing advice to a central agency. For example, Indonesia and the Philippines have each organized interministerial councils to formulate broad coastal policies (Sorensen and McCreary,

1991). In Thailand, there is an interministerial committee, formed under the prime minister, to guide the Eastern Seaboard Development Program - which comprises five subcommittees headed by ministers (Sorensen and McCreary, 1991). Sri Lanka's interministerial committee, the Advisory Council, is headed either by the prime minister or by another minister. Its main role is to provide advice to the CCD and the minister who is in charge of the CCD. The CCD's Advisory Council is not involved in broad policy-making decisions.

The formation of an interministerial committee comprising ministers and higher officers will help to solve some coastal issues, especially with respect to coral mining problems. Such initiatives - through the involvement of ministers and higher officers of the relevant ministries - can effectively influence the incentive and alternative livelihood programs for coral miners. At present, the CCD Advisory Council is not capable of influencing such initiatives directly because higher officers from the ministries are not represented.

Some coastal states in the United States have established state-level councils or departments that write and coordinate coastal matters with both the federal government and local communities. For example, Rhode Island's Coastal Resources Management Council (CRMC) is composed of 17 members, the majority of whom are elected state and local government members (Olsen and Seavey 1990).

The duties and power of CRMC's executive director are determined by the council.

In contrast, the majority of CCD's Advisory Council members are government administrative officers, rather than technically qualified staff and representatives from NGOs. Their active participation in coast conservation matters is limited, due to their institutional allegiances. When compared to the composition of Sri Lanka's CCD advisory council, Rhode Island's council provides a better opportunity to involve stakeholders in coastal matters and tends to reduce the tendency for bureaucratic decisions. In addition, the arrangement of CRMC helps to minimize conflicts among stakeholders and may promote consensus and coordination. The formulation of such approaches would strengthen the CCD's Council by including members of the public.

The State of California has taken a different approach to solve coastal use problems that could not be solved through regulation. In addition to the California Coastal Commission, which is the council responsible for developing and implementing the provision of the Act, there is the California Coastal Conservancy (CCC), which is charged with non-regulatory aspects. The CCC is empowered to help implement projects, to create public access to the beach, preserve coastal lands, etc. Establishment of a similar conservancy in addition to the CCD Advisory Council will significantly help to promote and improve other non-

regulatory measures that are more essential to Sri Lanka at present. For example, for the past few years it has been apparent that the coral mining problem could not be solved through a regulatory approach. It is equally important to help involve the public and to develop the domestic and international political support for coastal management through non-regulatory measures.

**Strengthening of professional capacities:**

The availability of coastal professionals plays an important role in formulating and implementing coastal programs. Realizing the need for qualified professionals in coastal management, many countries have initiated short- and long-term coastal education and/or training programs with the assistance of universities and other coastal institutes. Table 3-3 shows some universities and institutions currently conducting coastal programs. Such initiatives may help to develop coastal professionals to strengthen coastal programs. However, at present, Sri Lanka's universities and other institutes do not conduct programs that lead to post-graduate degrees. Although there is one environmental science program in the University of Colombo, it does not help to promote coastal management. As a result, the departments involved in coastal management have to rely on foreign universities and institutions to train their officers, usually through donor funded programs.

**Table 3-3: University Degree Programs Offering a Specialization in Coastal Management**

<u>University</u>	<u>Degree(s)</u>
Bournemouth Polytechnic	MSc (Coastal Zone Management)
Dalhousie University	Master's of Environmental Science Master's of Marine Management
Duke University	Master's of Environmental Management (with a specialization in coastal environmental management)
Florida Institute of Technology	MS ( Oceanography with an option in coastal zone management)
Nova University	MS (Ocean Science with a specialty in coastal zone management)
Oregon State University	MS (Marine Resources Management with a specialization in ocean and coastal resources management)
University of Delaware	Master's in Marine Policy and Ph.D. in Marine Studies
University of Massachusetts	Ph.D., MS (Environmental Science)
University of Miami	MMA, (Marine Affairs)
University of Newcastle Upon Tyne	MSc (Tropical Coastal Management)
University of North Carolina	Master's of Regional Planning
University of Rhode Island	MMA, MAMA (Marine Affairs)
University of West Florida	MPA (Political Science), MS (Biology)
University of Washington	MMA (Marine Affairs)
University of Technology, Sydney	Master of Science (CRM)

(Source: Crawford, et. al, 1993.)

The organization of coastal management programs in the universities – with the assistance of authorities such as CCD, NARA, DWLC, and DEAR – will help the country to overcome such situations. In addition, such programs can also be extended to develop research, monitoring and management programs. At present, only short-term training programs conducted by the authorities have led to increased capabilities and awareness of the coastal management field.

### **3.4 Regulating Coastal Land Use:**

#### **Exclusion or Setback Areas:**

Regulations on coastal land use have become an important mechanism for managing the coastal environment. The allocation of coastal lands for specific purposes – such as protected areas, and residential, commercial, industrial and tourist uses – is one of the strategies used in managing activities. Adoption of shoreline exclusion or setback zones also plays a major role in managing coastal problems, including coastal erosion, loss of public access, degradation of views and habitat protection. Figure 3-4 displays the extent of exclusion zone in several nations and states. A review of these exclusion and setback zones shows a wide range of uses in different cases. In the Philippines and Indonesia, such zones are established to protect mangroves (Sorensen and McCreary, 1991).

**Table 3-4: Exclusion or Setback Zones**

<u>Countries</u>	<u>Distance Inland from Shoreline *</u>
Ecuador	-- 8 m.
Hawaii	---- 40 ft.
Philippines	----- 20 m.
Mexico	----- 20 m.
Brazil	----- 33 m.
New Zealand	----- 66 ft.
Oregon	----- Permanent vegetation line
Costa Rica	----- 50 m.
Indonesia	----- 50 m.
France	----- 100 m.
Norway (no buildings)	----- 100 m.
Sweden (no buildings)	----- 100 m. (in some places to 300)
Greece	----- 500 m.
Denmark	----- 1-3 km.
USSR - Coast of the Black Sea	----- 3 km.
(exclusion of new factories)	

(Source: Sorensen and McCreary, 1990.)

\* Definition of shoreline varies, but it is usually the mean high tide. Most nations and states exempt coastal development installations such as harbor development and marinas.

There are two types of situations with respect to uses and activities in such areas: they may be completely banned, or they may be controlled by permits. In Sri Lanka, such setback zones play an important role in regulating coastal development activities. There is a wide range of variation, depending on activities and coastal sectors. However, Sri Lanka's coastal setbacks were established to address the coastal erosion problem. In addition, coastal dunes and sand spits are protected under setback criteria. Wetlands, estuaries, and lagoons could also benefit from this procedure.

### **3.5 Protected or Special Area Management Approach:**

Protected or special area management (SAM) is another approach that deals with management problems in relatively small, geographically well-defined areas. SAM techniques have been developed and effectively implemented by many countries to manage unique problems in which traditional methods may not be particularly useful.

Such approaches can also be applied to manage a wide range of specific areas or locations, including sanctuaries, wetlands, harbors, estuaries, and rivers.

### **Marine Sanctuaries and Estuary Programs:**

The U. S. Marine Protection, Research, and Sanctuaries Act of 1972 authorizes the Secretary of Commerce to designate National Marine Sanctuaries. Marine sanctuaries can be



considered one type of SAM, since the purpose of the SAM program is to preserve the site's potential recreational, ecological, historical, research, educational, or aesthetic qualities. Marine sanctuaries are an effort to conserve and manage such resources (Thorne et, al, 1991). By 1992, 13 sanctuaries had been designed around the country and are managed under a sanctuary managing staff within the Office of Coastal Resources Management. Activities and uses of sanctuaries are regulated in accordance with the objectives, utilizing a variety of techniques including zoning, restrictions, bans and limitations. Besides marine sanctuaries, the United States has also used other management models in an effort to conserve critical environments. Each of these are designated in accordance with the specific objectives under the programs.

The National Estuarine Research Reserve (NERR) and National Estuarine Programs (NEP) are two important programs in the United States for the management of estuaries of national significance. The NERR was established under the Coastal Zone Management Act in 1972 in order to preserve estuarine ecosystems, as well as to provide opportunities for research and education on the deteriorating condition of estuaries (West, 1994). It was assumed that this would help to develop methods that could be transferred to other estuaries not included under this program.

The NEP was established as a part of the Clean Water Act Amendments of 1987 for the purpose of restoring and

protecting major estuaries designated as critical national resources. The program establishes a process for analyzing these problems and for addressing appropriate solutions in specific locations.

In addition to these sanctuary and estuarine programs in the United States, there are other important initiatives for managing coastal resources, including national wildlife and refuge areas, programs under the National Park Service, historic national sites, etc.

Many marine sanctuaries have been established in Southeast Asia. Some have been designated, but have no financial, political, or management support, while others – such as Sumilon Island and Apo Island Marine Parks in Philippines – have been managed successfully with the active involvement of coastal communities (White, 1988). The main objective of establishing such sanctuaries in Southeast Asia is preservation of biotic and genetic diversity, protection of endangered species, management of fisheries and maintaining and restoring wild populations of fish and shrimp.

**Use Zones:**

Management options to regulate human impacts are formulated based on the issues of the individual sites. One of the important techniques in many SAM processes is the control of uses within the designated areas. This is accomplished by introducing different use zones. Figure 3-1

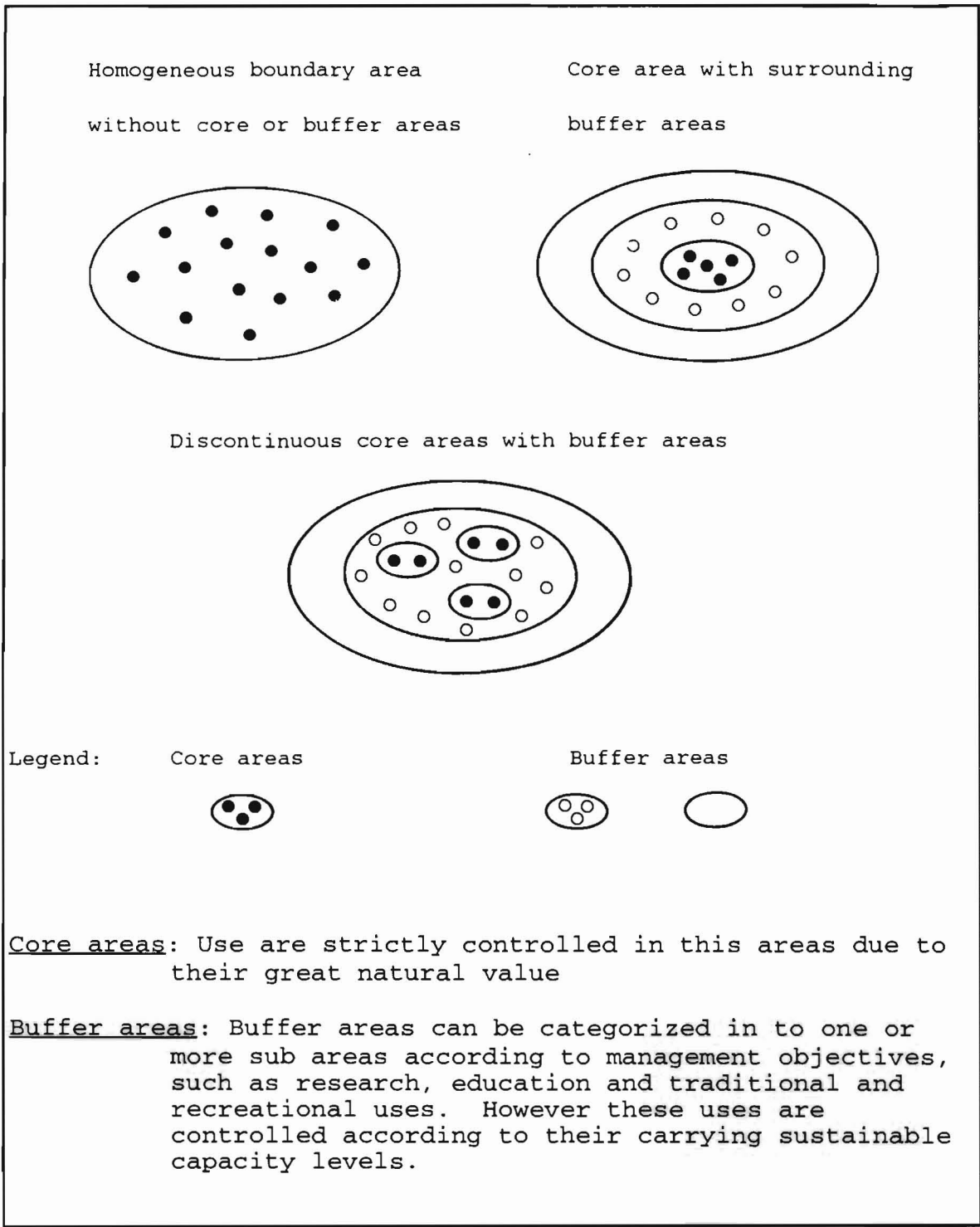
shows some of the zoning patterns that can be applied to control activities in SAM areas.

Usually, core areas have been designated in which activities are strictly controlled because of the great value of resources located within the core area (Salm, 1989). One or more buffer zones are commonly introduced to help preserve the integrity of the core area. For example, a buffer zone can be used for recreation and education, as long as these activities do not adversely impact the core area.

Carefully managed SAM areas or sanctuaries have contributed to the enhancement of the quality and status of the marine environment, including ecosystem productivity and biodiversity. For example, from 1977 to 1980, fish production increased considerably due to proper management of Sumilon Island Marine Park in the Philippines (White, 1988).

Application of sanctuary or estuarine management programs as a form of SAM may support the management and conservation of Sri Lanka's coastal resources. However, even though several sanctuaries, including Hikkaduwa, have been designated by the government, they have been limited to paper initiatives that were not followed up by an effective, implementable strategy. That was the major reason for failure.

**Figure 3-1: Zoning Schemes Used In SAM**



(Source - Adopted from Salm, 1989)

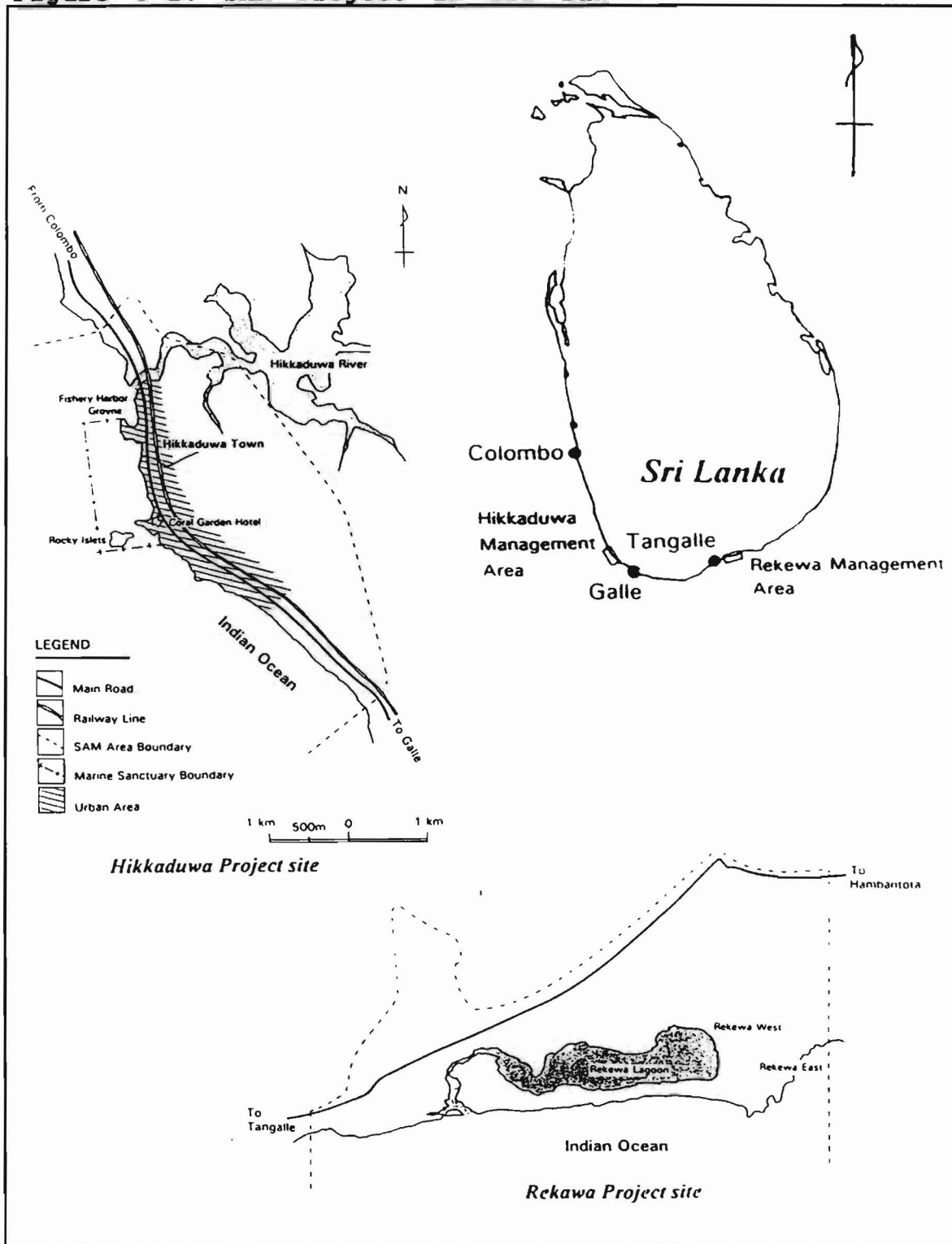
SAM planning approaches have recently been introduced to Hikkaduwa Marine Sanctuary and another coastal wetland located at Rekawa (Figure 3-2). There are many specific areas and locations where special attention is required to manage resources such as coral reefs, sea turtle nesting areas, recreational beaches, and historic places.

The establishment of a national-level managed sanctuary or estuary program that has sufficient authority may help to manage and conserve such important places in the coastal zone. In addition, improved management programs and strategies through a sanctuary program may help to control coral and sand mining problems in Sri Lanka. Charging of user or recreation fees in sanctuary areas might help to recover management expenses, which is a significant problem for many sites in many countries. These initiatives may promote a coordinated effort for scientific research, education, public awareness and sustainable coastal use.

**Conservation and Enhancement through Special Programs  
Sewage Treatment Facilities:**

In the United States, the discharging of untreated sewage or effluent to water bodies (including coastal waters) is controlled by the Clean Water Act of 1972 and the Water Quality Act of 1987 (Thorne et, al, 1991). These laws apply to all municipalities, industries, and vessels (including recreational and fishing vessels).

**Figure 3-2: SAM Project in Sri Lanka**



(Source: White and Samarakoon, 1994)

In order to achieve the objectives of this program, the US. Environmental Protection Agency (EPA) provides assistance to state and local governments to build or upgrade existing waste water treatment plants. This is an important approach to the maintenance and conservation of the quality of national waters. Furthermore, EPA deals with the preparation of comprehensive conservation management plans for estuaries of national significance through the NEP.

Although discharge of sewage or effluents to surface waters in Sri Lanka is prohibited by the Environment Protection Act, measures have not yet been taken to provide or assist municipalities or any other establishment in building waste or sewage treatment facilities. There are many coastal areas and lagoons that are adversely affected by such discharge. Initiation of a program to provide incentives and assist municipalities and individuals to build sewage treatment facilities may help to solve the pollution problem in coastal waters. Although the initial capital expenses may have to be borne by authorities, operating costs and other expenses can be generated through taxes. The building of treatment plants has become an important requirement in major tourist and industrial areas including Hikkaduwa, Negombo and Mount Lavinia ( See Figure 1-2).

#### **Artificial Reef Building:**

Artificial reef construction has become a major program to enhance fishing by increasing coastal diversity and

productivity. Other objectives include the improvement of degraded coastal habitats and the control of coastal erosion. The concept of artificial reefs originated in Japan after fishermen observed that the fishery was more productive in waters containing sunken ships (White, 1987). Japan, Malaysia, Singapore, Thailand, the Philippines and some US states - including North Carolina and Florida - have experience in initiating such programs (White, 1987). There are several important features of artificial reefs in relation to applicability and construction cost. Small-scale reef projects using waste materials such as tires, old car bodies, building rubble, and piles of rocks have been successful in developing countries, due to low material cost and minimal construction. Modern technologies using fiberglass and concrete structures would not be possible in these countries due to their high cost. The construction of artificial reefs may result in adverse impacts because of the kind of materials used and construction failures. Therefore, initiation of these programs should use environmentally sound practices, including proper planning and implementation.

Artificial reef construction may be useful to Sri Lanka in addressing problems of shoreline erosion and the degradation and depletion of coastal habitats. Because large-scale projects could be expensive, small-scale projects using inexpensive material may be more suitable at least until the CCD has gained the necessary experience. If proven successful, these programs may be extended to the private



sector, such as developers, under the proper guidance and approval of the CCD. Such initiatives make it possible for CCD staff to save the time and money associated with monitoring coast protection initiatives. Also, it may be possible to obtain the support of other agencies such as the DFAR, DWLC and NARA because of specific benefits these agencies derive from such projects.

#### **Installation of Mooring Buoys:**

The installation of mooring buoys adjacent to coral reefs and other fragile marine ecosystems is one successful strategy for managing human uses and minimizing impacts on habitats. Such programs exist in Thailand (Wells, 1993), Florida (Quirolo, 1994) and the US Virgin Islands, (Rogers, 1993).

Mooring buoy installation programs may be especially useful to Sri Lanka, in order to protect coral reefs and other fragile habitats from damage caused by anchoring of recreational vessels. These practices are concentrated along the south coast. These programs are cost-effective, socially and environmentally acceptable, and can be implemented through government organizations or NGOs.

#### **3.6 Involving the Public in Coastal Management:**

The involvement of the public – including communities, NGOs, and volunteers – has been successful in many coastal

programs. Examples that can be applied to Sri Lanka's coastal program are given below:

**Atlantic Coastal Action Program:**

Community initiatives are the focus of Canada's Atlantic Coastal Action Program (ACAP). This program is built upon a partnership between local organizations and the national government's Environment Canada, along with other national agencies and programs (Intercoast Network, 1993). Under the ACAP, Environment Canada provides technical, scientific, and financial support for local nonprofit organizations to enable them to form a joint effort of environmental organizations, governments, and other interest groups. Under these provisions local organizations are charged with developing a comprehensive plan. The extent to which these initiatives have been successful is dependent on the degree of local support, including – but not limited to – community workshops, water quality monitoring programs, community planning, and information sessions.

**Alaska Coastal Program:**

Alaska's coastal program reflects yet another approach in involving local residents in the various stages of the planning process. The policy of using local management plans – written by the local people and approved by the state Coastal Policy Council – is a common feature of Alaska's coastal program. The major factor in the success of the

program is the involvement of local residents in making decisions about the planing, use and protection of coastal resources. To reach consensus on coastal development, the involvement of local coastal districts at meetings has been essential (Caulfield, 1991).

Alaska's coastal program is an example of public participation in local-level planning. At present, no local public participation procedures are in place capable of involving local communities in the adoption of local coastal plans. Initiation of such strategies may help to prepare local coastal plans and promote public participation. This approach may also facilitate monitoring of coastal changes. Together, these efforts are likely to minimize user conflicts and promote conservation. Such local-level public organizing makes it possible to save staff time and resources, which is particularly urgent at present.

#### **Thailand's Community Programs:**

In Thailand, business communities are involved in coastal programs by providing educational materials, sign boards, posters, and by organizing media events and other public awareness programs. The Phuket Diving Association and the Rotary Club have both helped with the installation of mooring buoys (NCRS, 1991).

Gaining the support of such communities and organizations in Sri Lanka may be a great help to the CCD. At present, there are no efforts in securing such

initiatives. There are, however, many establishments - including hotels and paint industries - that could become involved in such programs. Cooperative programs would also benefit the business community by advertising them as 'green' (i.e. environmentally sensitive) and promoting its businesses. The benefits to the CCD and other coastal agencies is the savings in manpower as well as operational funds.

**Public Events and Awareness Building in Coastal Programs:**

The state of California has initiated a different type of program, named "Adopt-A-Beach", to promote conservation awareness among their citizens. This program provides an opportunity for people of all ages to take responsibility for creating a clean beach. As a part of this program, any group can contribute to adopt a local beach or coastal area for cleanup, restoration, or enhancement.

There is an annual cleanup day on which all involved parties get together to participate in this program. The NGOs, volunteers, and local communities play an important role in the success of these programs (Liebster, 1991). The organizers provide educational resources designed to promote awareness on cleanup and conservation.

The first annual statewide cleanup in 1985 drew 2,000 participants and resulted in the pick-up of 50,000 pounds of trash in a single day. In 1990, 16,000 volunteers

participated and removed 300,000 pound of trash from the beaches. This reflects the success of the program in the six years it has been in operation. The program is made possible by the participation of a full range of local, state, and federal offices and private organizations. Significant support and cooperation have also come from sponsoring agencies and organizations. California's "Adopt-A-Beach" program has helped to promote education, and empowered the general public by creating awareness, which has resulted in resource conservation as well as coordination among state agencies, organizations, and communities.

The state of Massachusetts has adopted a similar beach cleanup program, also with the participation of NGOs, local communities, and other interested groups.

The implementation of such beach cleanup programs in Sri Lanka may help to promote the awareness and concept of coastal resources conservation. Furthermore, it contributes to coordination with other agencies and interested groups. This can be achieved only by stimulating interest among the agencies.

Sometimes, awareness has led NGOs and volunteer groups to initiate environmental programs on their own. For example, in Singapore, three NGOs, Under Water Federation, Sport Divers, and the Singapore Yacht Club organized themselves to form a reef conservation committee with members of each of the three organizations. The objective was to examine the possibility of establishing a reef conservation

program (Chou 1991). One of the aims of the project was to educate sea sport enthusiasts in ways to enjoy their sports without destroying coral reefs. The project conducted a survey that completely covered 65 sites at 41 coral reefs in Singapore. The full report on the status of coral reefs is due to be submitted to the agencies for their consideration. Such initiatives are possible only through awareness of the coastal environment. The expansion of an awareness program can achieve similar benefits to Sri Lanka's coastal program.

In the US, some NGOs and Volunteer groups have organized festivals with exhibits, displays and seminars. These have been done with the collaboration of state and local agencies to promote awareness of conservation. The importance of such events depends mainly on the participation and involvement of local communities who are directly involved or responsible for the activities and uses of resources.

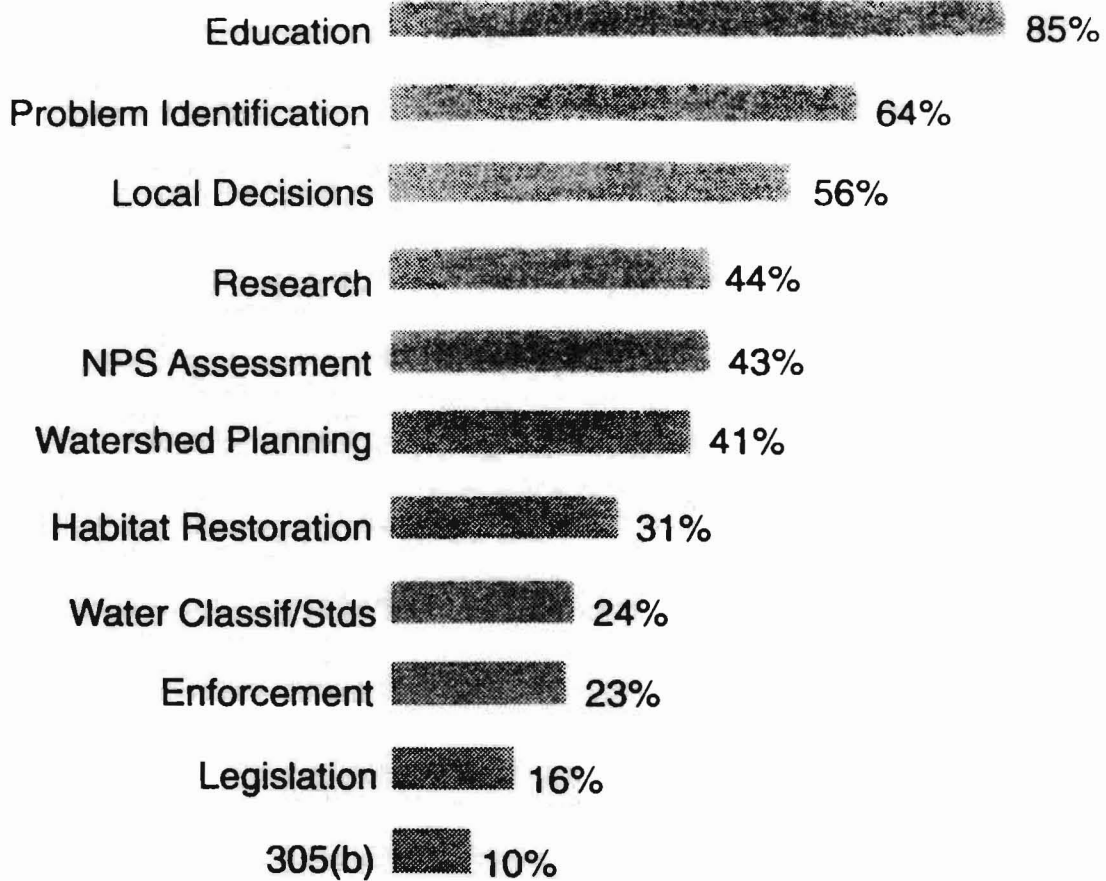
These types of programs could be important to Sri Lanka, as they would focus on actual resource users. Conducting similar beach or estuarine festivals in Sri Lanka may help to educate and promote awareness among target groups, including coral and sand miners. These programs may be suitable in areas where coral and sand mining and other human impacts are occurring. Such programs are feasible, effective, and acceptable in comparison to traditional methods which are generally focused toward the general public rather than specific target groups.

### **Volunteer Monitoring:**

In the United States, trained volunteers collect environmental data which is used to identify and correct coastal problems. This supplements monitoring carried out by several state environmental agencies. Today, thousands of volunteers are participating in monitoring programs nationwide and their data is increasingly accepted and widely used (The Volunteer Monitor, Spring, 1994). In 1993, the Environmental Protection Agency produced a directory of volunteer environmental monitoring programs. This directory listed 517 programs, representing 350,000 volunteers. These programs include monitoring of water quality, air quality, weather conditions, birds, fish, and other wildlife. According to a recent survey, the top three uses of volunteer data are education, problem identification, and local decision-making. Figure 3-3 shows the use of volunteer data based on the above survey.

Volunteer monitoring efforts have been cost-effective, allowing researchers and government agencies to expand their responsibilities. Volunteer monitoring has also provided numerous opportunities for public outreach and education. Most of the programs have paid only for the staff that coordinate the programs and for sampling equipment and sampling analysis. Funds are derived from organization dues and government grants. The following example demonstrates the cost-saving possibilities of using volunteers.

Figure 3-3: Use of Volunteer Monitoring Data in USA



*(Based on responses from 517 programs. Some programs' data are used in more than one way.)*

(Source - The Volunteer Monitor, Spring, 1994)



The River Rescue Program in Rhode Island uses volunteers to monitor 20 river stations in five rivers once a month for heavy metals, dissolved oxygen, pH, temperature, and hardness of water. Volunteers spend three hours a month collecting samples and are also responsible for some of the measurements in each river. This is accomplished by the contribution of 720 hours per year – the equivalent of \$14,000 per year at a wage of \$20 per hour (Kerr, 1994).

By contrast, in Sri Lanka's Coastal Management Program, the lack of environmental data has become a major problem for the implementation of sound coastal resources initiatives. The lack of resources – including trained personnel, financial and technical support – has significantly affected present coastal monitoring programs. The development of monitoring activities using volunteers and other NGO groups is one possible solution to monitor coastal resources. After organizing volunteer groups, training and other supporting facilities should be provided through the agencies. This can be done even with their present minimal resource capacities as these investments will more than repay the initial investment. These monitoring data can be used for a variety of purposes as indicated in Figure 3-3. Initiating a volunteer or similar monitoring program in Sri Lanka will help to implement a sound coastal program in the future.

## Chapter 4

### The Challenge of Achieving Intended Outcomes

#### 4.1 Coastal Conservation and Socio-Economic Factors:

Increasing population pressure and unemployment problems, which have resulted in poverty, have been identified as the main causes of degradation of coastal resources. Population pressure, especially in urban coastal areas, has led to an increased demand and utilization of coastal lands and resources to provide a reasonable standard of living within a very limited resource base. This in turn has led to several coastal and marine pollution problems.

Although the level of overall employment has increased in the past few years, it is still not sufficient to deal with unemployment problems. The unemployment problem and poverty have become major factors in illegal coral and sand mining in Sri Lanka. CCD's previous effort in providing alternative employment was primarily focused on self-employment, such as agriculture, fishing, core industry, etc. However, such programs were not directed toward providing government or private-sector job opportunities for those who are directly engaged in coral and sand mining activities. In general, there is a misconception among Sri Lankans that jobs may only be found in government and the private sector. As a result of this, the initiation of a self-employment opportunities program has not been effective or successful.

In addition, lack of educational standards and skills of the groups involved have affected the initiation of programs directed toward providing such alternatives.

The encroachment of coastal land and beaches is also an indication of poverty. Many people have constructed small dwelling units on the beach front. Although the CCD has initiated several programs with the DFAR and some local authorities to provide some alternative lands for these communities, there is yet no effective progress in managing these situations.

#### **4.2 Need for Coordination and Cross Linkages:**

As mentioned in Chapter One, in addition to the CCD there are many government agencies managing different sectors and developments in the coastal zone. One of the major constraints in the planning and implementation process has been the lack of strong coordination among coastal organizations, including the CCD. As a result, activities in one sector may affect the policies and programs of another. For example, some tourism development projects initiated by CTB have affected the policies and objectives of the coastal management programs. In addition, fisheries have suffered from the reclamation of coastal wetlands (including mangrove areas), lagoons, and estuaries; and from discharges of sewage and of industrial pollution. Further, there are some conflicts between the CCD and DFAR in relation to certain unauthorized fisheries sheds constructed on the beaches in

some coastal areas. Such situations may not have arisen had a strong coordination existed between the CCD and other agencies with decision making powers in coastal resources.

#### **4.3 Baseline Data and Information:**

Lack of adequate baseline data and information in many areas is another constraint to proper coastal planning. This data and information deficiency can only be rectified by additional research, surveys and studies conducted by the agencies. These efforts should be directed towards developing inventories – including distribution of coastal resources, followed by functions and management-oriented research dealing with planning and management.

Limited data and information on coastal erosion and other coastal resources and uses have been collected. However, this is as yet inadequate to implement a sound coastal planning and management initiative. As a result, coastal management initiatives – including ongoing SAM programs – have to be delayed until the necessary data and information have been collected and analyzed.

#### **4.4 Weak Institutional Infrastructures:**

The CCD is entrusted with the task of managing and regulating activities under the CCA, but it is not sufficiently staffed or funded. As discussed in Chapter One, there are at present only four professionals available in CCD's planning division. Although the CCD has initiated

action to increase the professional staff to 15 professionals, government recruitment procedures have hampered the request for more than four years. Since the department's budget is insufficient to meet the cost of implementation, many projects rely primarily on foreign funds provided by donor agencies including USAID, GTZ, etc. In addition, the institutional framework is also inadequate for support services such as clerical and secretarial assistance.

One of the reasons for the failures of CCD's decentralization effort is lack of staff in both the CCD and divisional secretariats. Apart from this, inadequate budgetary allocation and provision to maintain basic infrastructure and logistics have affected the implementation of regional (decentralized) coastal management programs.

The Police Department, which is the agency responsible for enforcing the law in relation to illegal coral and sand mining, is unable to undertake the enforcement of the regulation pertaining to illegal coral mining again due to inadequate funding and staff.

#### **4.5 Trained Personnel and Training Facilities:**

Lack of trained and experienced personnel at all levels is the most severe constraint to initiating and implementing coastal management activities. This has happened as a result of many experienced and trained personnel taking more remunerative employment abroad and in the private sector. In addition to the CCD, many coastal agencies – including the

DFAR, CEA, NARA, and DWLC, in addition to the universities and research institutes, suffer from a dearth of trained personnel.

Although there are some training institutes and facilities attached to several agencies, including the DFAR and DWLC, such facilities do not exist in the coastal management sector. The CCD sometimes conducts short-term training programs for national- and provincial-level officers. These courses are similarly hampered by a lack of budgetary allocations and qualified resource personnel.

The universities do not turn out graduate students with a background in coastal management. If they are touched upon at all they are addressed in different courses and do not provide a holistic understanding of coastal management. Although the University of Colombo offers a master's degree in environmental science, it does not offer concentration in coastal management initiatives. A lack of linkages among coastal agencies and universities has resulted in no domestically produced professionals in coastal management. While the CCD has conducted several coastal field studies with the assistance of some of the universities, lack of facilities and well trained personnel has been a major obstacle to increasing such studies.

#### **4.6 Legislation and Policies:**

The legislation initiative has failed to address several coastal issues which lie beyond the jurisdiction of the CCD

but which directly impact the coastal zone. For example, effluent discharged by the Embilipitiya paper mills factory has adversely effected Walawe river estuary and adjacent coastal areas. Similarly, there are occasions during which the CCD has failed to deal with some issues in the coastal zone – such as non-point source pollution, and the rehab and reuse of coastal buildings.

In addition to the CCD's jurisdiction, other agencies have responsibility for some activities impacting the coastal environment. For example, the DFAR implements fisheries laws; CEA, pollution and EIA legislation; and the DWLC, wildlife conservation legislation. The scattering of coastal jurisdiction within several agencies has become another obstacle to effective coastal management.

Many coastal management policies have addressed some highly visible coastal problems. However, lack of management policies for other coastal issues – such as the decline in fisheries, and oil pollution – has become a problem for an effective management program.

#### **4.7 Inadequate Monitoring and Enforcement:**

Lack of monitoring and enforcement procedures is another important constraint to achieving the intended goals of the coastal program. At present, the CCD staff do not have time to do all the things needed. For instance, monitoring and enforcement are not routinely addressed. As a result,

construction of unauthorized structures and illegal activities continue to occur in the coastal zone.

Furthermore, the lack of monitoring and enforcing units in other relevant coastal agencies has aggravated the problem. Low priorities for enforcing coastal laws, lack of facilities, and political interference are some of the difficulties diminishing the effectiveness of the CCD effort. Such a situation can be seen especially in enforcement of laws on coral and sand mining.

#### **4.8 Lack of Public Awareness:**

One of the major constraints to achieving the intended goals of coast conservation is a lack of awareness among various levels of the public, including user groups and coastal communities. This in turn limits public participation in coast conservation matters. Sound conservation concepts can be introduced among user groups through increased awareness programs. At present, lack of such initiatives has resulted in destructive coastal uses – including dynamite fishing, coral mining, mangrove cutting, filling of lagoons, etc. In addition, awareness of coastal laws and regulations plays an important role in managing the coastal environment. Sometimes the low level of awareness has adversely affected local coastal areas due to lack of understanding between the officer charged with implementing the law and individuals and coastal communities who utilize



coastal resources. As a result, degradation continues in a number of coastal areas.

Another problem relates to political interference with the implementation of coastal programs. Sometimes this is due to lack of awareness of the dynamic nature of the coastal environment. An example of such interference occurs with the coral and sand mining issues discussed above. Other examples concern unauthorized construction activities.

#### **4.9 Public Participation in Coast Conservation:**

The coastal initiatives have not been able to achieve their desired objectives due to lack of public participation. The main reason for this failure has been the inability to mobilize the support and contribution of the public in planning and implementation of coastal initiatives. Public participation in coastal management provides better opportunities for identifying coastal issues important to the people, which should be included in management strategies. Sri Lanka's past experience shows that a major constraint has been lack of public participation in management initiatives. In addition, public involvement will help to build consensus and minimize conflicts in coastal programs. The promotion of public participation may help to remove such constraints to successful management.

In reviewing Sri Lanka's coastal management program, it appears that legislation and policies currently exist for the management of coastal resources and the coastal environment.

New legislation and policies are still required to strengthen weak areas. However, at present, the main problem is inadequate staffing and funding to implement the laws and regulations that already exist. The strengthening of other areas that influence the implementation of an effective management program may prove helpful to Sri Lanka in achieving the desired objectives of the coastal program.

## Chapter 5

### Future Needs and Recommendations

The future prospects for Sri Lanka's coastal program depend on both elimination of present constraints through appropriate initiatives, and on the introduction of new coastal management approaches. Based on a careful examination and analysis of Sri Lanka's program with other coastal management efforts, recommendations in the following areas are made:

- \* Legislation and institutional arrangements
- \* Socio-economic development
- \* Institutional infrastructures
- \* Monitoring and enforcement
- \* Coastal and marine resources
- \* Research and studies
- \* Planning and implementation
- \* Environmental education and public participation.

#### **5.1 Legislation and Institutional Arrangements:**

- (1) Coastal laws should be reviewed and revised in order to ensure that coastal resources and the coastal environment are not adversely affected by present development activities.
- (2) The authority and rules related to the selection of Coast Conservation Advisory Council members should be changed so that representation from the general public and NGO groups be included in the council. In addition to the Advisory Council, it is

necessary to establish a coastal conservancy to deal with non regulatory management approaches to coral and sand mining, coastal land acquisition, and alternative livelihoods.

- (3) The inclusion of a provision enabling the DCC to acquire coastal land, or the vesting of state land in the CCD, would facilitate the implementation of an effective management program.
- (4) The setting up of the main coastal-related agencies under one government ministry may prove helpful in achieving an effective coastal program. Therefore, it is advisable to set CCD, CEA, NARA, DFAR and DWLC under one ministry which deals with coastal resources.
- (5) It will also be beneficial to create district-level coast conservation sub offices, with planning and engineering staffs to facilitate an effective, decentralized coastal program.

## **5.2 Socio-Economic Development:**

- (1) Many incompatible coastal uses and activities have resulted in inadequate economic benefits to coastal communities. Therefore, it is important to create programs targeting the development of alternative livelihoods, possibly by creating a system of economic incentives. It is recommended that a higher interministerial council be established with representatives from these ministries with jurisdiction in coastal resources or activities. This council should be headed by the prime minister or minister of finance.
- (2) It is necessary to arrange local-level programs with local politicians and the private sector to provide alternative job facilities for coral and sand miners.
- (3) The CCD, with the active involvement of the Provincial Council and Divisional Secretariats, should implement programs to find alternative land for those living in vulnerable coastal areas.

## **5.3 Institutional Infrastructures:**

- (1) Adequate planning staff should be made available to the CCD for implementing the coastal management program - including both national and decentralized programs.

- (2) Extension services should be further developed, in order to give special training to develop new attitudes in coastal management. Other coastal agencies, as well as NGOs at the local level, should cooperate further with coastal extension programs.
- (3) Budgetary allocations should be increased further in order to make coastal programs more effective. Also, some financing should be provided to divisional secretariats through decentralized budgets, to meet the added expenses of a decentralized coastal management program.
- (4) The CCD's support services, including clerical and secretaries, should be further strengthened.

#### **5.4 Monitoring and Enforcement:**

- (1) It is recommended that a separate monitoring and enforcement unit be created within the CCD or in collaboration with other coastal agencies. At present, there are some enforcing units in the DWLC and Forest Department. Initiation of collaborative (joint) enforcement activities within these departments may enhance these services significantly.
- (2) Inadequate monitoring initiatives are one of the main constraints to an effective coastal management program. Therefore, it is recommended that appropriate actions be initiated to encourage and establish volunteer monitoring programs, with the support and guidance of CCD. This can be applied to get information related to unauthorized structures, coral mining, water quality, etc.
- (3) The CCD should facilitate training programs for local police officers who engage in coastal mining enforcement activities, in order to enable them to carry out their function more effectively. For example, local police stations do not have boats and other facilities to arrest coral miners who are engaged in these activities.

#### **5.5 Coastal and Marine Resources:**

- (1) Coastal areas of Sri Lanka include a wide variety of resources, such as coastal habitats, minerals, and living resources. However, at present there are neither enough data nor an atlas identifying critical coastal areas. The preparation of

resource inventories and an atlas is essential for identifying areas that require special attention.

- (2) There are some areas that require special attention due to their vulnerability or special value. It is necessary to identify such locations and adopt special management plans for their long-term benefit.
- (3) The coastal systems that do not come under the purview of coast conservation management – such as parts of estuaries and mangrove ecosystems and adjacent lands – should be identified as areas in need of management.
- (4) For the purpose of managing coastal fisheries, it is necessary to identify overexploited areas by species in coastal waters. On the basis of such results it is necessary to implement management techniques – including artificial reefs, prohibited areas, and seasonal restrictions – to enhance the fisheries of such areas. Such initiatives could be done as a collaborative coastal management effort of CCD, DFAR, and DWLC.
- (5) The CCD should strengthen their coastal reforestation program (including mangroves), with the assistance of Forest Department and NGO groups.
- (6) Coastal environment capacities must be identified in popular coastal areas, and building moratoria should be declared where necessary.

#### **5.6 Research and Studies:**

- (1) During the past few years, the CCD has conducted several studies on alternative sources for lime and sand. It is necessary to strengthen these initiatives further in order to adopt effective coral and sand mining management initiatives.
- (2) The CCD should initiate appropriate measures and strengthen existing programs to conduct coastal research with the assistance of other agencies, including NARA, NARESA, LHI, and universities. Research conducted with the universities may benefit both the universities and the resource agencies.
- (3) The library and research facilities in the CCD should be expanded in order to disseminate information among government departments, agencies,

NGOs, and international organizations. Such expanded facilities may provide motivation to private and public groups and agencies to engage in coastal research and programs.

#### **5.7 Planning and Implementation:**

- (1) Adoption of integrated local or provincial-level plans and implementation practices is becoming a more effective strategy for coastal management. Therefore, it is important to initiate steps to involve local and provincial authorities in both planning and implementation processes.
- (2) Incorporating procedures to obtain public input in various levels of the planning process, as well as in implementation, has had successful results in many coastal programs. The coastal agencies should make the necessary initiatives to gain the participation of the general public in the planning and implementation processes.

#### **5.8 Environmental Education and Public Awareness:**

- (1) Coastal environmental education curricula at the primary school and secondary school levels should be expanded through relevant subjects such as natural and social science. CCD's current program with the National Institute of Education mainly focuses on secondary school level social science curricula. There are no proper programs to introduce coastal environment concepts at the primary level. It is an essential requirement to introduce such concepts to primary education curricula.
- (2) There are some short-term experientially based training programs for social science teachers who in turn are involved in training schoolteachers. However, there are no proper programs to educate teachers in other relevant fields. Therefore, it is necessary to expand existing teacher training through workshops and training courses in coastal management at the teacher training colleges.
- (3) Develop and improve university courses that deal with the coastal environment by making them more specialized and area specific. In addition, it is necessary to initiate degree programs in coastal management or marine affairs, with a greater interaction between universities and concerned government departments.

- (4) The CCD and other coastal agencies should encourage NGOs and other government offices to provide informal education through lectures, workshops, and seminars.
- (5) The CCD should strengthen its media program through radio, television, and newspapers. For this purpose, it is necessary to arrange media conferences with concerned institutes.



## **References:**

Amarasinghe, S. R. and H. J. M. Wickramaratna. 1985. The Evolution and implementation of legislation for coastal management in a developing country - the Sri Lanka experience. *Economic Review, Coastal Zone Management*. People's Bank, Research Department, Head Office, Colombo 2, Sri Lanka.

Archer, H. J. 1988. *Coastal Management in the United States: A Selective Review and Summary*. Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Armstrong, J. et. al. 1974. *Coastal Zone Management, The Process of Program Development*. Coastal Zone Management Institute, Massachusetts.

Baldwin, M. F. 1991. *Natural Resources of Sri Lanka, Condition and Trends*. A report prepared for the Natural Resources, Energy and Science Authority of Sri Lanka. United States Agency for International Development, Colombo, Sri Lanka.

Banda, R. M. R. and P. Sarathchandra. 1991. *Study to Determine Strategies to Control Coral Mining in the South Western Coast*. Coast Conservation Department, Colombo, Sri Lanka.

Bonsall, S. 1977. State government and CZM. Coastal Note No. R-2. Department of Environmental Protection, New Jersey.

Caufield, J. 1991, The Alaska coastal management program. In: B. Needham (ed.), *Case Studies of Coastal Management, Experience from the U.S.* Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Central Environmental Authority. 1988. Sri Lanka National Conservation Strategy. Colombo 10, Sri Lanka.

Chou, L. M. A. 1991. Reef conservation project involving sport divers in Singapore. In: O. Magoon, et. al. *Coastal Zone '91 Conference Proceedings*. Volume 3. American Society of Civil Engineers, New York.

Chung, C. and L. P. Hildebrand. 1993. A multinational assessment of CZM in OECD countries. In: O. Magoon, et. al. *Coastal Zone '93 Conference Proceedings*. Volume 3. American Society of Civil Engineers, New York.

Coast Conservation Department. 1990. Coastal Zone Management Plan (CZMP). Colombo, Sri Lanka.

Coastal sweepers set to clean our coast. 1993. *Coastal Lines Newsletter*, September - October, 1993. Massachusetts Coastal Zone Management, Boston, Massachusetts.

Crawford, B., J. S. Cobb, and A. Friedman. 1993. *Building Capacity for Integrated Coastal Management in Developing Countries*. Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Grenell, P. 1991. A new framework for integrated coastal zone management. In: W.G. Domurat and H.W. Thomas. *The California Coastal Zone Experience*. American Society of Civil Engineers, New York.

H. R. 4030, A Bill to Improve Management of the Coastal Zone and Enhance Environment Protection of Coastal Zone Resources by Re-Authorizing and Amending the Coastal Zone Management Act of 1972. March, 22, 1990. Printed for the use of the Committee on Merchant Marine Fisheries, U.S. Government Printing Office, 1990.

H. R. 6956, H.R. 6979, Coastal Zone Management, Part 1, Coastal Zone Management Act Amended for 1980. April, 16, 1980, Serial No - 96 - 31, Printed for the use of Committee on Merchant Marine and Fisheries, U.S. Government Printing Office, 1980.

Hale, L. Z. and E. Kumin. 1992. *Implementing A Coastal Resources Management Policy: The Case of Prohibiting Coral Mining in Sri Lanka*. Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Herath, J. W. 1990. *The coral and shell industry of Sri Lanka*. Coast Conservation Department, Colombo, Sri Lanka.

*Intercoast Network, International Newsletter of Coastal Management*. Issue 19, Fall 1993. Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

International Institute for Environment and Development. *Natural Resources and Environmental Management at North American Universities, A Guide to Training Opportunities*. Washington, D.C.

Kerr, M. 1994. Personal communication.

Kinsey, D. N. 1991, New Jersey's strong state coastal regulation. In: B. Needham (ed.), *Case Studies of Coastal Management: Experience from the U.S.* Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Liebster, J. 1991. California's Adopt-a-Beach: More than just a cleanup. In: O. Magoon, et. al. *Coastal '91 Conference Proceedings*. Volume 3. American Society of Civil Engineers, New York.

Lowry, K. and D. Sadacharan, 1993. Coastal management in Sri Lanka. *Coastal Management in Tropical Asia, A Newsletter for Practitioners*. November, 1993. Coastal Resources Management Project, Colombo-3, Sri Lanka, pp. 1-8.

Lowry, K. and H. J. M. Wickramaratna. 1987. Coastal area management in Sri Lanka. Discussion Paper No. 4, November, 1987.

Needham, B. (ed.) 1991. *Case Studies of Coastal Zone Management: Experience from the U.S.* Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Olsen, S. and V. Lee. 1991, A management plan for a coastal ecosystem. In: B. Needham (ed.), *Case Studies of Coastal Management: Experience from the U.S.* Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Olsen, S. 1992. *Coastal 2000, A Resource Management Strategy for Sri Lanka's Coastal Region*. Coast Conservation Department, Coastal Resources Management Project, Colombo, Sri Lanka, and Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Olsen, S. and G. L. Seavey. 1990. The state of Rhode Island coastal resources management program, as amended. Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Organization for Economic Cooperation and Development. 1993. Coastal zone management integrated policies (CZMIP). France.

Parliament of the Democratic Socialist Republic of Sri Lanka. 1981. Coast Conservation Act, No 57 of 1981. Department of Government Printing, Colombo, Sri Lanka.

Parliament of the Democratic Socialist Republic of Sri Lanka. 1988. Coast Conservation Amendment Act, No. 64 of 1988. Department of Government Printing, Colombo, Sri Lanka.

Parliament of the Democratic Socialist Republic of Sri Lanka. 1980. National Environment Act, No. 47 of 1980. Department of Government Printing, Colombo, Sri Lanka.

Parliament of the Democratic Socialist Republic of Sri Lanka. 1988. National Environmental (Amendment) Act, No. 56 of 1988. Department of Government Printing, Colombo, Sri Lanka.

Salm, R. V. 1989. *Marine and coastal protected areas: a guide for planners and managers*. International Union for Conservation of Nature and Natural Resources, Gland, Switzerland.

Sorensen, J. C. and N. West. 1992. *A guide to impact assessment in coastal environments*. Coastal Resources Center, University of Rhode Island, Narragansett, Rhode Island.

Sorensen, J. C. and S. T. McCreary. 1990. *Coasts, institutional arrangements for managing coastal resources and environments*. Coastal Publication No. 1, revised second edition, National Park Service, United States Department of the Interior and U.S. Agency for International Development, Washington, DC.

Thailand Coastal Resources Management Project. 1993. *A National Coral Reef Strategy for Thailand. (NCRS)*. Volume 2, Policies and Action Plan, Thailand. Coastal Resources Center, Narragansett, Rhode Island.

Thailand Coastal Resources Management Project. 1991. *A National Coral Reef Strategy for Thailand (NCRS)*. Volume 1, Statement of Need, Thailand. Coastal Resources Center, Narragansett, Rhode Island. .

*The Volunteer Monitor*. 1994. Volume 6, No. 1, Spring, 1994. San Francisco.

Thorne-Miller, B., and J. Catena. 1991. *The Living Ocean, Understanding and Protecting Marine Biodiversity*. Oceanic Society of Friends of the Earth, U.S. Island Press, Washington, D. C.

Wells, S. M. 1993. Coral reef conservation and management, progress in South and Southeast Asian region. In: *Tropical Asia, A Newsletter for Practitioners*. November, 1993 Coastal Resources Management Project, Colombo-3, Sri Lanka, pp. 8-12.

West, N. 1994. MAF 461, Course Packet, University of Rhode Island, Fall, 1994. Rhode Island Book Company, Kingston, Rhode Island.

White, A. T. 1988. *Marine Parks and Reserves: Management of Coastal Areas in Southeast Asia*. International Center for Living Aquatic Resources Management, Manila, Philippines.

White, A. T. and J. I. Samarakoon, 1994. Special area management for coastal resources: a first for Sri Lanka. *Coastal Management in Tropical Asia, A Newsletter for Practitioners*. March, 1994. Coastal Resources Management Project, Colombo-3, Sri Lanka, pp. 20-24.

White, A. T. et. al. 1990. *Artificial Reefs for Marine Habitats Enhancement in Southeast Asia*. International Center for Living Aquatic Resources, Manila, Philippines.

Wickramaratna, H. J. M. 1985. Environment problems of the coastal zone of Sri Lanka. In: *Economic Review, Coastal Zone Management*. People's Bank, Research Department, Head Office, Colombo-2, Sri Lanka. pp. 8-16.