

PN-PAW-731  
49286

CRMP Technical Report 1



# THE MANAGEMENT OF COASTAL HABITATS IN SRI LANKA

REPORT OF A WORKSHOP, MAY 12—15, 1986, COLOMBO, SRI LANKA

## International Coastal Resources Management Project

The University of Rhode Island  
The Sri Lanka Coast Conservation Department  
The Sri Lanka Foundation Institute

The four major goals of the AID/URI Coastal Resources Management Project (CRMP) are: 1) to apply, as appropriate, existing experience in coastal resources management to developing countries; 2) to assist three developing nations in the design and implementation of integrated coastal resources management programs; 3) to advance the state-of-the-art of coastal resources management in developing countries; and 4) to build URI's capability to assist developing nations with coastal resources management.

The CRMP will work with the cooperating pilot countries to:

- develop procedures for the assessment of the impacts of coastal development proposals
- develop institutional and technical solutions for resource use conflicts
- support research to better understand the issues that affect the condition and use of coastal ecosystems
- improve the capabilities of in-country professional staff to plan for and manage coastal development

The countries selected for pilot projects are Ecuador, Sri Lanka and, Thailand.

The AID/URI Coastal Resources Management Project is funded by the Office of Forestry, Environment and Natural Resources, Bureau of Science and Technology, U. S. Agency for International Development through a Cooperative Agreement with the International Center for Marine Resource Development, at The University of Rhodes Island.

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Cooperative Agreement: LAC-5518-A-00-5054-00

# THE MANAGEMENT OF COASTAL HABITATS IN SRI LANKA

REPORT OF A WORKSHOP HELD AT THE SRI LANKA FOUNDATION INSTITUTE  
MAY 1986

Sponsored by  
The Sri Lanka Coast Conservation Department  
The University of Rhode Island in co-operation with USAID  
The Sri Lanka Foundation Institute

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## **ABSTRACT**

A Workshop on the Management of Coastal Habitats in Sri Lanka was held at the Sri Lanka Foundation Institute from 12th May to 15th May 1986.

The purpose of the Workshop was to define management objectives, identify management issues and set priorities for research and management initiatives for six coastal habitat types.

Coastal habitats were defined to include coral reefs, estuaries and lagoons, seagrass beds, salt marshes, mangroves, barrier beaches, spits and dunes.

The findings of the Workshop will be incorporated in the Sri Lanka Coastal Zone Management Plan which is being prepared by the Coast Conservation Department.

## INTRODUCTION

The Coast Conservation Department (CCD) is required by Act No. 57 of 1981, to prepare a Coastal Zone Management Plan (CZMP) for Sri Lanka by October 1986. The management of coastal habitats is an important element of that plan. During the last year, the CCD has embarked on a process to develop co-ordinated management strategies for these habitats. Coastal habitats were initially defined to include coral reefs, estuaries, lagoons, mangroves, salt marshes, seagrass beds, coastal sand dunes, barrier beaches and barrier spits. A report synthesizing available information on these habitats specific to Sri Lanka, and priorities for management and research was prepared as a background for the Workshop. This report<sup>1</sup> is available from the CCD in Colombo and the University of Rhode Island in the USA. In addition, coastal habitats were mapped on scale 1:63360 using available aerial photography and detailed maps by the Lanka Hydraulic Institute in collaboration with the Centre for Remote Sensing of the Survey Department. A summary map (1:253,340 scale) was available for reference during the Workshop. These maps can be viewed at the CCD office.

### Workshop Organization

Workshop objectives were :

- (1) To review management objectives for each coastal habitat type;
- (2) To review and rank the major management issues for each habitat type;
- (3) To identify the research that will be most helpful in understanding how to better manage each habitat;
- (4) To identify on-going management efforts and research; and
- (5) To identify the management initiatives that can be implemented immediately or in the near future.

The Workshop Agenda is found in Appendix 1; a list of Workshop participants in Appendix 2. The inaugural Session was held in the main Auditorium of the Sri Lanka Foundation Institute and the Technical Sessions in a Committee Room at the same venue. Forty-nine participants representing governmental agencies concerned with the management of coastal habitats and non-governmental organizations concerned with environmental conservation attended the workshop. The Inaugural Session on May 12th morning was attended by the workshop participants and special invitees. The text of the speeches delivered at the inaugural are included in Appendix 3. The addresses provide background on coastal management in Sri Lanka and the AID/URI Project.

Six Technical Sessions followed during the period 12th to 14th May 1986. Technical Sessions used a facilitated workshop format. All participants received advance copies of the synthesis report and the workshop relied heavily on this information as a starting point. Technical sessions verified and expanded upon its findings. Each session began with the brief presentation by Dr. Samarakoon on the ecology and uses being made of the habitat types to be discussed.

1. J.I. Samarakoon and L. Pinto. 1986. Synthesis Report for Information on Coastal Habitats In Sri Lanka.

## **Acknowledgements**

The idea for having a Workshop on Coastal Habitat Management in Sri Lanka was conceived during discussions between CCD, USAID and URI on the assistance to be provided to CCD under the AID/URI Coastal Resources Management Project (CRMP).

The Workshop was co-sponsored by the Coast Conservation Department, The AID/URI Coastal Resources Management Project and the Sri Lanka Foundation Institute.

The assistance rendered by the Director and staff of the Sri Lanka Foundation Institute is acknowledged with gratitude.

The efforts of Dr. J. I. Samarakoon of the Department of Zoology, University of Kelaniya and Dr. Leonard Pinto of the Department of Zoology, Open University of Sri Lanka who prepared the background document were central to the success of the workshop. Mr. Stephen Olsen, URI/CRMP Project Director, provided valuable assistance in workshop design and direction. Dr. G. K. Lowry, Associate Professor, Department of Urban and Regional Planning, University of Hawaii, facilitated the technical sessions; CCD staff and CRMP In-Country staff made all workshop arrangements. All of these individuals were essential in making this workshop a success.

Our special thanks go out to all workshop participants for their attendance at the workshop and contributions during its deliberations, to Mr. W. M. A. Wijeratna Banda, the Secretary of the Ministry of Fisheries, and Hon. Festus Perera, Minister of Fisheries for their addresses at the Workshop's Inaugural Sessions.

# TECHNICAL SESSIONS

## COMMON CONCERNS

Although the workshop focussed on issues specific to each of the eight habitat types identified in the Samarakoon and Pinto report, workshop participants concluded that the following general themes emerge as centrally important for all areas:

- (1) Coastal habitats are important, in their natural state, for flood protection and drainage. Their rapid degradation and destruction in Sri Lanka are significantly increasing the risk and costs brought by flooding and erosion in coastal areas;
- (2) Coastal habitats not discussed at the workshop, notably mudflats and sandstone reefs, should be recognized in the Coastal Zone Management Plan;
- (3) Several of the most potentially destructive human activities in coastal habitats, notably sand and coral mining and mangrove clearing are economically important in certain locations and among some groups. Efforts to manage these activities should be based on an understanding of the social and economic implications for resource users, their families and the industries they supply. As part of the planning process to design mechanisms to manage these activities, the views and suggestions of those involved in the mining industry should be solicited;
- (4) Efforts to control mining and other often destructive resource use practices by means of regulatory prohibitions should be considered as only one possible management technique. Other suggested techniques include changing the status of sand and coral from common property resources to community property. This would emphasize self-management and community management for the sustainable use of those resources. Charging royalties for the mining of coral and sand was also discussed.
- (5) The importance of careful attention to plan and programme implementation was continually stressed. Several participants noted that too little attention was given to the programmatic requirements for successful implementation; and
- (6) The successful implementation of coastal resources management requires that people understand what is important about the resource to be managed, what management means, why management is being undertaken and what the consequences of poor management are. Public education therefore must be a crucial element of all management programmes.

## **SESSION I – CORAL REEFS**

### **Management Objectives**

The objectives for management are:

- (1) To preserve reefs as unique living resources and part of Sri Lanka's natural heritage;
- (2) To preserve reefs as a buffer against coastal erosion;
- (3) To maintain reefs as a scientific, educational and tourist resource; and
- (4) To ensure that removal of reef organisms, such as aquarium fish, does not exceed sustainable levels.

The basic theme is, "To preserve coral reefs where possible."

The next steps are:

- (1) To develop guidelines and/or standards for reviewing development proposals that will affect coral reefs; and
- (2) To set geographic boundaries for reefs selected for preservation.

### **Management Issues**

A number of management issues and causes of reef degradation in addition to those listed in the Samarakoon and Pinto Report were suggested. The group concluded that the following are the priority causes of habitat degradation:

- (1) Lack of public awareness of the effects of human activities on reefs;
- (2) Coral mining;
- (3) Collection of reef fauna and corals;
- (4) Sedimentation and freshwater inflow;
- (5) Water pollution (including sewage and oil from ships);
- (6) Crown-of-thorns starfish;
- (7) Trampling and anchor damage;
- (8) Destructive fishing practices (dynamiting and bottom set nets); and
- (9) Blasting of reefs for navigation.

Discussion focussed primarily on the mining problem and the difficulties of implementing the existing ban on coral mining in the coastal zone. It was agreed that enforcement must be designed and carried out at the local level with full support – specifically including financial support – from the Central Government. Participants also stressed that an enforcement strategy must be a package that includes public education, monitoring, enforcement by local authorities, and a re-settlement/re-employment plan for displaced workers. The CCD plan contains all these elements and the regulations by which the package plan would be

implemented have been approved by the Cabinet and are now before Parliament.

It was suggested that, from an implementation perspective, focussing attention on coral miners may not be the best strategy. The basic causes of coral mining are the demand for lime by the construction industry and agriculture, and the need for employment in the small area where coral mining is active. Several participants were concerned that those who finance and organize mining will continue to do so even if the current miners are re-settled or given alternative employment. This suggests that an alternative management strategy should be considered that would reduce the demand for coral lime. Greater attention should be given to encouraging production of lime from miocene limestone and dolomite, solving the problem of the high magnesium content of dolomite lime, and covering the costs of importing lime and/or subsidizing the market price. CCD-sponsored studies are under way at the University of Peradeniya to investigate these matters.

### Management Priorities

Management priorities were clustered into four topics:

- (1) Enforcement of the mining ban;
- (2) Public education;
- (3) Controls over collection of aquarium fish, other reef fauna and corals; and
- (4) A zoning scheme for reefs that identifies areas for preservation and establishes various categories of allowable uses for other reef areas.

A marine sanctuary has been declared in Hikkaduwa. Other coral reefs have been suggested for protection including Unawatuna, Polhena, Great Basses, Little Basses, Pigeon Island and Vandeloos Bay.

The National Aquatic Resources Agency (NARA) has concentrated its research and mapping efforts on coral reefs at several sites on the south and west coasts. It is also developing a detailed management plan for the Hikkaduwa sanctuary.

### Information and Research Needs

- (1) A coral mining industry profile was completed by the CCD in 1985. It is being combined with the on-going research at the University of Peradeniya to produce a short White Paper on alternative approaches to solving the coral mining problem.
- (2) Impacts of collecting fish and other organisms from coral reefs need to be defined. It was noted that many of the organisms collected for export are collected from sandstone reefs as well as coral reefs.

Information is needed to:

- (a) Document the size of the collection industry; and
- (b) Assess its impacts --particularly on endangered species.

NARA is investigating how a breeding programme can replace the need for collection in the field. At present, however, this project is focussed on fresh water species.

- (3) Criteria for developing a coral reef zoning scheme including allowable and prohibited activities must be developed.
- (4) While sedimentation of coral reefs is believed to be a significant problem in Sri Lanka, little information is available. An assessment of the magnitude of this problem and its likely causes would be useful.
- (5) Information is available to demonstrate the cause/effect relationship between reef breaking and shoreline erosion. A short paper should be prepared demonstrating and documenting this relationship to serve as the basis for educational materials.
- (6) Separate assessments should be made of the usefulness and practicality of artificial reefs for (a) mitigating the effects of reef degradation; (b) as fish habitats; and (c) for shore protection.

It was noted that research and management initiatives should address sandstone reefs and coral reefs separately.

## SESSION 2 – ESTUARIES AND LAGOONS

The discussion combined these habitats into a single category although it was recognized that there are some important differences in management objectives, issues and research/management priorities among basin estuaries, riverine estuaries and lagoons.

### Management Objectives

The objectives common to all estuaries and lagoons are :

- (1) To maintain fishery habitat;
- (2) To ensure that outlet alterations do not contribute to coastal erosion;
- (3) To maintain and, where possible, restore water quality;
- (4) To limit sand mining to sustainable levels;
- (5) To protect recreational values; and
- (6) To ensure that habitat utilization for waste disposal, human settlement and anchorage do not conflict with 1–5 above.

### Management Issues

The Workshop participants concluded that the following issues were the priorities in basin estuaries and lagoons:

- (1) Water pollution: The relative importance of the following parameters varies from site to site:
  - domestic sewage
  - industrial effluents
  - agricultural runoff
  - garbage
  - waste fuel

A second closely related major concern is impacts caused by changes in the quality and timing of freshwater inflows.

- (2) Encroachment by human settlements: It was noted that in Negombo Lagoon, encroachment is occurring at the mouth of the estuary which is the place where impacts on the lagoon's ecology will be greatest.
- (3) Loss of fishery habitat: This is caused primarily by encroachment, pollution, and destructive fishing practices. A recent development of particular concern is the collection of polychaete worms which is causing the destruction of seagrass beds in Negombo Lagoon.
- (4) Siltation: This is caused primarily by poor land management practices in the estuaries' watersheds.
- (5) Overfishing: This is exacerbated by the continuing use of destructive fishing techniques that have been banned by law.

The primary management issues for riverine estuaries were identified as the following:

- (1) Water pollution: As with basin estuaries and lagoons, the relative importance of the sources of pollution listed above varies from site to site.
- (2) The long-term impacts of dams: Dams have been built, or are being planned for all the major rivers in Sri Lanka. The impacts of dams on water quality, fisheries, and sediment supply are likely to be very significant but are poorly understood.
- (3) Sand mining: This is concentrated in and around the mouths of the major riverine estuaries. Exploitation rates are estimated to be above the sustainable yield in some estuaries, and this is contributing to severe erosion along adjacent coastlines.
- (4) Understanding the impacts of induced alterations: The ecology of riverine estuaries is strongly influenced by the natural processes of bar formation near their mouths. Understanding the impacts of induced alterations to these bars is therefore important for management.

#### Management Priorities

Management priorities are parallel to the research priorities discussed in the section that follows. Workshop participants therefore did not feel it worthwhile to set priorities for the following list:

- (1) Implement a zoning scheme;
- (2) Designate and enforce no-build zones surrounding the estuaries;
- (3) Control destructive activities particularly encroachment into estuaries by filling, destructive fishing practices, removal of vegetation and discharge of pollutants;
- (4) Prohibit sand mining in excess of sustainable levels; and
- (5) Prohibit collection of polychaete worms from estuaries.

#### Information and Research Needs

- (1) The highest priority is to develop a classification scheme for all estuaries based upon existing and potential patterns of use. This process should identify both those estuaries that require priority attention because they are pristine and can still be protected from mis-use and degradation as well as those that are heavily stressed but can be improved by management measures. This assessment should also identify those estuaries that should be considered for special Area Management Plans;
- (2) Ecological histories should be prepared for estuaries that are identified as priorities for preparation of detailed Area Management Plans. These histories should trace long-term trends in their condition and use and place current management patterns in their historical and socio-economic context. Particular emphasis should be given to the identification of traditional management practices that may be incorporated into management schemes;

- (3) The relative importance and impacts of specific pollutants on fishery resources should be investigated;
- (4) A research priority for riverine estuaries is to determine sustainable levels for sand extraction. Alternative sources for sand must also be identified at the national level;
- (5) A study should be made to identify existing governmental authorities over estuaries and the human activities that directly affect them. The emphasis should be upon identifying jurisdictional gaps and overlaps; and
- (6) Literature pertaining to estuarine resources and management in Sri Lanka should be collected. A data bank of information pertaining to estuarine resources and their management should be considered. The system selected should be capable of easy updating.

The following on-going research is particularly applicable to the priorities listed above. NARA and the Central Environmental Authority (CEA) through the Ceylon Institute of Scientific and Industrial Research (CISIR), are monitoring pollution levels and primary productivity in some major estuaries. NARA is also conducting an assessment of shellfish resources in selected estuaries and potential for aquaculture in, and areas adjacent to, Sri Lanka's estuaries. The Inland Fisheries Division of the Ministry of Fisheries is conducting experimental aquaculture projects in selected estuaries and lagoons. The Ministry of Fisheries is framing regulations for Negombo and Puttalam Lagoons and Kala Oya estuary with the objective of protecting traditional fishing methods and rights. The Department of Irrigation has long-term records for freshwater river flows into the nation's major estuaries.

## **SESSION 3 – SEAGRASS BEDS**

### **Management Objectives**

The primary management objective is to minimize adverse impacts of human activities on seagrass beds because of their importance as habitat for fish, habitat for dugong and turtles, an important link with other ecosystems, such as reefs, and a feature which helps to minimize coastal erosion.

### **Management Issues**

Relatively little is known about the extent or ecology of seagrass beds in Sri Lanka. Activities presenting potential threats to seagrass beds include:

- (1) Use of destructive types of fishing gear such as bottom trawling and drag net fisheries;
- (2) Destruction due to digging for polychaetes (Negombo);
- (3) Smothering of seagrass due to siltation and sedimentation; and
- (4) Fouling and loss of seagrass due to eutrophication.

### **Management Priorities**

The following management initiatives were discussed and agencies which could implement them were identified:

- (1) Regulations banning all methods of fishing other than beach seine fishing within 2 km from the shore in 'madel warayas' already exist. Further restrictions on use of certain kinds of fishing gear may also be desirable (Ministry of Fisheries);
- (2) Identification and mapping priority sites for grassbed preservation. This activity would be most appropriately done by NARA and the Department of Wildlife Conservation (DWLC);
- (3) DWLC has proposed a marine park bordering Wilpattu National Park. The marine park's primary objective would be to protect the dugong. An impediment to declaring this marine park has been the inability to arrive at a satisfactory solution as to how to accommodate existing fisheries;
- (4) Assess dugong and turtle population trends. This activity could be most effectively done jointly by DWLC, NARA and the Ministry of Fisheries;
- (5) Grant Fishery Officers powers of enforcement under the Fauna and Flora Protection Ordinance; and
- (6) Adopt a management strategy to involve private interests in protecting turtles. Since complete bans on existing activities are nearly impossible to enforce, different approaches were discussed, including the controlled exploitation of resources, such as turtle eggs.

## Information and Research Needs

Despite the probable importance of seagrass habitat, less is known about this ecosystem type than any of the others discussed in the workshop. Little is known about how human activities affect the grasses and the fauna they support. Extensive research has been conducted on seagrass beds in other countries. The functional aspects of seagrass beds could be extrapolated from this research to Sri Lanka in the short term. Research needs were identified and ranked in order of priority as follows:

- (1) Map the location and extent of seagrass beds;
- (2) Verify and document their role as a necessary habitat, especially for endangered species such as the dugong and turtle;
- (3) Identify the function of the seagrass beds as an interface or link between other habitats;
- (4) Find out which factors or activities promote the growth of seagrass beds and to what extent various human activities are stressful or destructive; and
- (5) Collect information on the extent that seagrass beds are crucial to the support of commercial fisheries, such as *beche-de-mer*.

## SESSION 4 – SALT MARSHES

### Management Objectives

- (1) To preserve marshes as an important habitat for waterfowl;
- (2) To maintain the presence of salt marshes when they are an important buffer which protects coastal settlements from flooding during storm tides or wind, and/or where the marshes may help to protect an estuary or lagoon from chemical pollution in runoff from land; and
- (3) To maintain successful multiple uses of salt marshes, including (1) and (2) above, as well as for grazing by cattle, and as a source of seedfish for small-scale fish farmers.

### Management Issues

The major pressures contributing to the loss or degradation of coastal marshes appear to be:

- (1) Overgrazing of marsh vegetation by cattle;
- (2) Conversion of marshes to aquaculture ponds; and
- (3) Conversion of marshes to salt pans.

Illegal hunting for migrant waterfowl is reaching an intensity in certain locations so that it threatens the value of the marshes as habitats. Some concern was also expressed about the possible exploitation of marsh vegetation (*Salicornia* and *Sueda*) for export.

### Management Priorities

- (1) The distribution and extent of marshes in Sri Lanka should be mapped;
- (2) A rating system should be established to classify the values of different marsh areas for storm protection, pollution buffer, bird habitat grazing, seedfish production, etc. This system could then be used to decide on the granting of permits for conversion of marsh to other uses, including mangrove reforestation;
- (3) The ownership of salt marsh areas is often unclear. Therefore, their status as public, private or corporate land needs to be established; and
- (4) In some areas, salt marshes have developed on sites formerly occupied by mangroves. Criteria which can be used to decide if it is best to replant mangroves or preserve the area as salt marshes should be developed.

### Information and Research Needs

- (1) Identify areas which sustain the production of seedfish, especially milkfish (*Chanos chanos*) fry and brine shrimp (*Artemia salina*) eggs;
- (2) Study the impacts of conversion of salt marshes to aquaculture ponds; and
- (3) Study the environmental conditions and natural processes which enhance the propagation of salt marshes.

## SESSION 5 – MANGROVES

### Management Objectives

The underlying management objectives should be to preserve and where possible, restore mangroves. Other management objectives are:

- (1) To conserve mangroves as an important habitat for wildlife, a nursery for fish and as a nutrient trap;
- (2) To conserve mangroves for erosion control and as a buffer from cyclone damage;
- (3) To conserve mangroves for their aesthetic values and interest to tourists, and
- (4) To promote sustainable levels of mangrove use and where appropriate, protect traditional use practices.

### Management Issues

The over-riding concern is that mangroves are being rapidly destroyed and degraded by a variety of practices and processes, including:

- (1) Over-harvesting, particularly, by organized fuel wood extractors;
- (2) Filling and other land reclamation practices;
- (3) Changes to salinity regimes and tidal flow patterns;
- (4) Conversion to paddy and aquaculture ponds;
- (5) Rapid siltation that is often aggravated by aquaculture practices;
- (6) Dune migration; and
- (7) Industrial pollutants and waste oil disposal.

Such degradation of mangroves has adverse impacts on fisheries, and sustained availability of building materials and fuel wood. It also results in the loss of valuable habitat for a variety of fish and wildlife species.

It was noted that in areas where coral mining is active, mangrove destruction is also a major issue since mangrove wood is used as a fuel for the lime kilns. Thus, in these two areas, two important habitats are being destroyed simultaneously.

### Management Priorities

The following management initiatives were considered to be immediately appropriate for several governmental agencies and non-governmental organizations:

- (1) A public education and participation programme (Natural Resources, Energy and Science Authority (NARESA), Universities, NARA, CCD, etc.);

- (2) Establishing minimum buffer zones for new development in mangrove areas (CCD);
- (3) Designation of selected sites for preservation (Forest Department); and
- (4) Consideration of a moratorium on further construction of aquaculture ponds in mangrove areas until the impacts and success of existing ponds are evaluated (CCD, Ministry of Fisheries).

#### **Information and Research Needs**

More attention and research funds are being directed to mangroves than any other coastal habitat type in Sri Lanka. The following on-going or recently completed research projects were identified:

- (1) Mapping – the CCD has completed island-wide mapping from available aerial photography. NARESA and the National Mangrove Commission (NATMANCOM) are engaged in a more detailed mapping effort, which includes ground-truthing along the west coast. Detailed information on mangrove quality and zonation is being collected in the Negombo and Kalpitiya areas;
- (2) Detailed studies in mangrove taxonomy and productivity are under way;
- (3) NARA has completed a bibliography on mangroves in Sri Lanka;
- (4) A study is being made by NARA of the socio-economic aspects of mangrove use and the identification of management problems;
- (5) A site specific study is underway on the impacts of pollutants – particularly heavy metals – on benthic organisms associated with mangroves; and
- (6) Basic research on the biology of mangroves is being conducted at the University of Colombo.

In the light of the research already on-going or planned, workshop participants identified the following priorities for management-oriented research :

- (1) Development of guidelines or standards for evaluating the impacts of development projects in mangrove areas;
- (2) Identification of priority sites for preservation;
- (3) Development of localized schemes for sustainable levels of mixed use of mangrove resources;
- (4) Development of a policy to address the often conflicting goals of mangrove protection and promotion of aquaculture;
- (5) Assessment of the impacts of dams on mangrove resources; and
- (6) Identification of sites for mangrove restoration and encouragement of nurseries and silviculture practices that will support the maintenance and restoration of mangroves.

## **SESSION 6 – BARRIER BEACHES, SPITS AND DUNES**

The major objectives of the management programme are:

- (1) To minimize erosion of beaches, spits and dunes;
- (2) To minimize loss of vegetation cover;
- (3) To protect open space and aesthetic values for residents and tourists;
- (4) To protect habitats;
- (5) To ensure that sand mining does not contribute to erosion; and
- (6) To ensure that agriculture uses do not contribute to erosion.

### **Management Issues**

Barrier beaches, spits and dunes are used for landing of fishing craft, drying and repairing fishing gear, drying fish, recreation and housing. They are also used as a source of sand and ilmenite.

The major threat to barrier beaches, spits and dunes is erosion. Erosion is caused primarily by wind, waves and currents, but it is aggravated by a number of human activities including:

- (1) Sand and ilmenite mining;
- (2) Poorly sited buildings;
- (3) Removal of vegetation;
- (4) Poorly designed (or located) coast protection works;
- (5) Poorly designed fishery harbours;
- (6) Poor inlet management; and
- (7) Coral mining.

In addition to these erosion-related activities, barrier beaches, spits and dune habitats are threatened by faecal pollution in areas where there are temporary or permanent human settlements or where hotel operators are illegally discharging raw sewage. Increased coastal development has also resulted in greatly reduced public access to beaches in several areas.

### **Management Priorities**

Priorities identified by the CCD are:

- (1) Sand mining is a "development activity" as defined in the Coast Conservation Act and therefore, requires a permit from the CCD. However, permit systems alone are insufficient. Locating alternative sources of sand should be undertaken as a matter of priority;

- (2) Building location in the coastal zone is regulated by the CCD as well as by other agencies. Upon completion of the Coastal Zone Management Plan, the location of buildings in the coastal zone will be further regulated by a variable setback line designed to ensure that new construction does not interfere with nor be impacted by natural coastal erosion processes;
- (3) Site preparation for development, including removal of vegetation, requires a CCD permit. Other types of vegetation removal need to be regulated ;
- (4) All schemes of work for coast protection must be implemented within the framework of the Master Plan for Coastal Erosion Management. Guidelines have been developed to ensure that emergency works are not undertaken in ways or areas that would have adverse impacts on adjacent coastlines. These guidelines should be strictly adhered to;
- (5) The construction of fishery harbours and other maritime structures should be undertaken only after comprehensive investigations and an evaluation of their impacts;
- (6) Better inlet management is required. Current practice in most instances is restricted to periodic cutting of sand bars in response to requests by local authorities. Inlets which need to be managed need to be studied and optimal management systems identified;
- (7) Better enforcement of the existing coral mining ban. Coral mining is prohibited under the Coast Conservation Act, but the prohibition is not yet fully enforced; and
- (8) Regulation of faecal pollution, which is unregulated in some areas.

In addition to these, the workshop participants suggested the following management activities:

- (1) The total ban on coral mining should be reconsidered if it cannot be enforced;
- (2) Re-vegetation of coastal dunes should be undertaken to promote dune stabilisation and conservation;
- (3) Re-location of coastal dwellers should be promoted in some areas. Where re-location is difficult, settlement expansion should be contained;
- (4) Methods should be sought to minimize beach pollution. A majority of workshop participants stated that hotels, in particular, should be subject to stricter controls by Ceylon Tourist Board, UDA and CCD. Jurisdictional problems for addressing pollution problems should be examined; and
- (5) Public education should be a priority.

There was some discussion about whether traditional coastal activities, such as fishing, should take precedence over other uses. Several participants agreed that such conflicts can be addressed on a case-by-case basis.

## Information and Research Needs

Several research activities were identified that could assist in the major management needs that were discussed:

- (1) A national sand study which would identify potential sites where sand could be mined without adverse erosion impacts. This will be undertaken by CEA and CCD;
- (2) A coastal profiling programme that would provide time-series information on seasonal and long-term coastline changes;
- (3) A study of beach uses at a scale appropriate for management purposes;
- (4) A study of sand bar formation and inlet stability with emphasis on environmental impacts on lagoons;
- (5) An inventory of offshore sand resources;
- (6) A study of sediment transport in rivers;
- (7) A national study of waves, winds and currents. (CCD is currently conducting wave studies at some locations);
- (8) Sediment samples in beach systems. (CCD is currently collecting samples at selected sites);
- (9) A study of turtle nesting habitats; and
- (10) Identification of optimal types of vegetation for stabilization of dunes and beaches. (A study is currently being done by Colombo University.)

## P R O G R A M M E

## MAY 12 INAUGURAL SESSION

- 9.30 – 9.40 a.m. – Inauguration of Workshop
- 9.40 – 9.50 a.m. – Address by Dr. L. P. Medis,  
Sri Lanka Foundation Institute
- 9.50 – 10.00 a.m. – Address by Mr. S. R. Amarasinghe,  
Director, Coast Conservation Department
- 10.00 – 10.10 a.m. – Address by Hon. Festus Perera,  
Minister of Fisheries
- 10.10 – 10.20 a.m. – Address by Mr. W. M. A. Wijeratna Banda,  
Acting Secretary, Ministry of Fisheries
- 10.20 – 10.30 a.m. – Address by Mr. Eric Loken,  
USAID
- 10.30 – 10.40 a.m. – Address by Mr. S. Olsen,  
Director, Coastal Resources Centre,  
University of Rhode Island
- 10.40 – 11.10 a.m. – T e a
- 11.10 – 11.55 a.m. -- An Example of Applied Research for Coastal  
Management. A Special Area Plan for Rhode  
Island's Lagoons.  
Mr. S. Olsen and Ms. Virginia Lee,  
University of Rhode Island,  
Coastal Resources Centre
- 11.55 – 12.25 p.m. -- Review of Available Information on  
Sri Lanka's Coastal Natural Habitats.  
Dr. J. I. Samarakoon,  
University of Kelaniya
- 12.30 -- 1.45 p.m. – L u n c h
- Luncheon speech – Meshing Research Science  
with Management Policy.  
Professor Scott Nixon,  
University of Rhode Island,  
Graduate School of Oceanography.

## WORKING SESSIONS

- 1.45 – 4.15 p.m. – Working Session I – Coral Reefs

**MAY 13**

- 9.00 – 12.00 noon – Working Session II –  
Estuaries, Lagoons and Seagrass Beds
- 12.00 – 1.00 p.m. – L u n c h
- 1.00 – 4.00 p.m. – Working Session III –  
Mangroves and Salt Marshes

**MAY 14**

- 9.00 – 12.00 noon – Working Session IV –  
Barrier Beaches, Sand Spits and Dunes
- 12.00 – 1.00 p.m. – L u n c h
- 1.00 – 4.00 p.m. – Drafting of Report

**MAY 15 CLOSING SESSION**

- 9.30 a.m. – Presentation of Workshop Findings
- 10.00 a.m. – Discussion
- 11.00 a.m. – Workshop Concludes

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## Inaugural Session Addresses

Address by

**Dr. L. P. Medis**  
Director, Sri Lanka Television Training Institute

It is my privilege on behalf of the Sri Lanka Foundation Institute to extend a warm welcome to the Hon'ble Festus Perera, Minister of Fisheries who has graciously accepted our invitation to inaugurate the workshop on Management of Coastal Habitats in Sri Lanka. Permit me to also welcome the other distinguished persons at this table, the distinguished invitees present at this ceremony and the workshop participants.

With the onset of the monsoon and the effect of the sea on our coast, the mass media has focussed attention on the need to protect our coast. I have noted the measures taken by the Coast Conservation Department of the Ministry of Fisheries to provide protection to our coasts. In fact, I am informed that the Department has a major programme with foreign funding to achieve this end. This workshop, however, proposes to go a little further than coast protection, since it raises the question of coastal resources management to prevent degradation of the coastal environment. As a starting point, it focusses on important types of coastal habitats which appear to be threatened by development activities conducted by man. We at the Sri Lanka Foundation Institute are, therefore, pleased to be associated with the Department of Coast Conservation, the University of Rhode Island and USAID in organising this workshop which shall address this important issue. We believe, the theme "Management of Coastal Habitats" most appropriate and opportune.

This workshop will provide a forum for subject matter specialists and persons concerned with preservation of the quality of the environment to discuss the issues related to coastal habitat management. I am happy to note that key government agencies as well as non-governmental agencies are represented. It is hoped that consensus will be reached on the management objectives, the research needs, and most important of all, the action programme.

In conclusion, may I thank the Hon'ble Minister for taking time off from his onerous duties to inaugurate the workshop. I am sure he will, in his address, set the tone for meaningful deliberations. I wish the participants and the workshop all success.

Address by  
**Mr. S. R. Amarasinghe**  
Director, Coast Conservation

Thank you very much for accepting our invitation, and being present at the inauguration of this workshop on Coastal Habitat Management. The workshop's main objective is to reach consensus on the appropriate policies for management of coastal habitats. We have, therefore, assembled a group of specialists from all concerned agencies to sit together over the next three days and discuss, from different points of view, the best strategies for management of our Coastal Habitats.

The Coast Conservation Department is mandated by law to prepare a National Coastal Zone Management Plan. We have decided that the preparation of this Plan, will be on an incremental basis. This Plan we have called the First Generation Plan, and it is due to be finalised by October this year. It will focus on eight key issues, of which Critical Coastal Habitats is one. At present there is very little in-depth information available on coastal habitats. A synthesis of all available information has been prepared, and the workshop attempts to make maximum use of this information to draw up management guidelines, and to prepare an agreed research agenda for the immediate future. The workshop will also focus on identifying the appropriate institutions that will carry out the research agenda.

We have identified eight types of Coastal Habitats which will be addressed during this workshop. They are --

Coral Reefs,  
Estuaries,  
Lagoons,  
Mangroves,  
Seagrass Beds,  
Salt Marshes,  
Coastal Sand dunes, and  
Barrier Beaches and Spits.

The synthesis of information on these habitat types has been made available to the workshop participants. The available information is perhaps not as detailed as we would desire, and only partially oriented towards management. Non-availability of comprehensive information is a problem that all resource managers have to contend with and a fact of life that we have to live with. Resource managers have to adopt a pragmatic approach and make the best use of available information. At the same time available funds should be directed towards problem-oriented research. Our major policy issues at this stage, are focussed on formulating flexible interim management strategies, which will be embodied in the First Generation Coastal Zone Management Plan.

These policy issues are to :

- (1) Designate habitats and natural features, for preservation;
- (2) Designate habitats and natural features, where activities causing adverse impacts will be minimised;
- (3) Identify habitats, where development activities can be undertaken, without serious resource degradation, or, depletion; and

- (4) Identify research tasks, that will assist the preparation of special area management plans, and additional policy requirements.

The habitats that have been identified involve an extent of approximately 242,000 hectares. Some of these habitats, even to-date, exist in their natural state, and do not require specific management. But we have to ensure that their future peripheral development will be so planned as to ensure their sustenance will not be harmed. Some habitats, such as lagoons and beaches, are heavily exploited, and their management is today a matter of major concern.

Many national and local level agencies have jurisdiction over these habitats. The Coast Conservation Department's role in regard to these habitats is primarily one of co-ordination. Its responsibility is mainly one of conflict resolution. In resolving the conflicts brought about by sectoral development demands, the Coast Conservation Department has to ensure that such development will not be at the cost of environmental degradation or depletion. This is an extremely difficult function due to the pressure of sectoral interests. It is for this reason that we have planned this workshop on a multi-agency and multi-sectoral basis. We need the assistance, co-operation and willing participation of scientists and planners, and of all agencies that are concerned with the management of these habitats. We are indeed encouraged by the response we have had so far. Several non-governmental organisations such as volunteer environmental groups, are also participating in this workshop. We place great emphasis, and value, on the role they are performing in environmental management in this country.

We also acknowledge with gratitude the assistance rendered by the University of Rhode Island and USAID in Sri Lanka's Coastal Zone Management planning efforts. This workshop has been made possible by the co-operative efforts of the University of Rhode Island and the Coast Conservation Department, supported by USAID funding. We are happy to have with us, for the duration of this workshop, several internationally recognised authorities on habitat management, and we look forward to their contributions to our deliberations.

About forty key scientists and managers from governmental and non-governmental organisations will be participating in the workshop. They are the most knowledgeable persons in this country on the present status of the coastal habitats that are being addressed. We are confident that their presence, and contributions, will assure the success of this workshop.

Thank you very much.

Address by

**Mr. W. M. A. Wijeratna Banda**  
Acting Secretary  
Ministry of Fisheries

I consider it a privilege to be present at the inauguration of the Workshop on Coastal Habitat Management which is being held in order to prepare strategies for the management of coastal habitats, and for the inclusion of such strategies, in the Coastal Zone Management Plan. It is a requirement of the Coast Conservation Act that this Management Plan be prepared by the Coast Conservation Department before the end of this year.

Although my association with the Coast Conservation Programme has been rather short, I have, in my capacity as Chairman of the Coast Conservation Advisory Council been closely involved with aspects of coastal zone management. I have also been exposed to some of the difficulties of implementation when inquiring into appeals made to me in terms of the Act against the refusal of applications for permits by the Coast Conservation Department.

The Coast Conservation Act which was passed in Parliament in September, 1981, was brought into operation with effect from 1st October 1983, with the gazetting of the Regulations under the Act. The Act itself is somewhat different to other legislative enactments in that it is not only regulatory but also has a heavy bias towards management of coastal resources. The Act specifies that a National Coastal Zone Management Plan be prepared by the Coast Conservation Department within a period of three years from its operative date. Thus the Management Plan should be ready by the end of September 1986 at the latest. The Act also instituted a Coast Conservation Advisory Council comprised of senior officers of most of the Ministries and Heads of Departments of other Governmental agencies that have an interest in coastal development. It also provides for representation by voluntary organisations and universities. The object of this Advisory Council is to ensure that sectoral development interests of various government agencies are taken into account and that any use conflicts are resolved for the purposes of the Coastal Plan. Hence the Act includes provision to ensure that the Management Plan will be nationally accepted. The Management Plan would therefore provide a framework for the planning of development within the coastal zone in a manner consonant with the needs for sustaining, and where possible improving the environmental quality of the coastal zone. In order to provide the necessary data-base for the preparation of the Management Plan, the Act makes it mandatory for the Department of Coast Conservation to carry out surveys of the coastal zone and to inventorise coastal resources. The Management Plan itself would provide guidelines for the preparation of development activities within the coastal zone as well as for the preservation of areas of special environmental significance. This is indeed a mandate which is difficult for any one agency to fulfill. I am personally aware that the Coast Conservation Department is working with considerable difficulties resulting from the inadequacy of manpower and financial resources. It is however heartening to note that in conducting most of these surveys the Department has made extensive use of specialist manpower resources available in our universities. At present there are more than 50 researchers working in the field on various investigations which are being carried out to provide information for the Management Plan. This, I consider, a very laudable effort as it makes optimum use of the limited resources available while providing an opportunity for university researchers to be closely associated with this national programme. I congratulate

the Coast Conservation Department and its officials who have also been remarkably successful in mobilising both local and international support for this programme.

The Coast Conservation Department has also been implementing a permit procedure as stipulated in the Act. Some difficulties have arisen from the requirements of the Coast Conservation Act which are not always readily understood by individual developers. At times, developers fail to comprehend why they should obtain approval prior to investing their own money in development projects. Nevertheless, the need for some control definitely exists as any development activity in one particular site in the coastal zone may have serious adverse impacts on the adjoining areas. Some of the resource use practices which have been traditionally accepted have caused serious problems on the sustainability of our coastal environment. Everyone of us is aware of the problems imposed by uncontrolled coral mining, sand mining and the construction of buildings in close proximity to the coastline without paying due regard to the inherent instability of such areas. We are all very familiar with the problem of coast erosion.

This workshop will be concentrating on another aspect, which is the management of coastal habitats. Habitats such as lagoons, and estuaries in the more populated areas have been degraded, and we are today facing serious problems regarding their management. Certain habitats, which exist to this day in their natural condition, may face the same threat unless we plan for the future. Many agencies have sectoral interests over coastal habitats. The Coast Conservation Act vests the responsibility for co-ordinating such sectoral interests and specifying guidelines so that any utilisation of coastal resources would be carried out in an environmentally sustainable manner.

It is for this reason that the Coast Conservation Department has gathered together scientists from a wide spectrum of agencies to participate in this workshop and to contribute their specialised knowledge towards the preparation of initial management guidelines for coastal habitats. The Coast Conservation Department has come across several problems as regards some of the provisions of the Act in the preparation of the Management Plan and the implementation of permit procedures. One of the problems on which the Coast Conservation Advisory Council has focussed its attention is the very definition of the coastal zone itself. The narrow area defined as the coastal zone makes it difficult to look at coastal resource units, such as lagoons, estuaries and wetlands, in their entirety. Some amendments to the Act have already been decided upon, and others are being studied at present. The results of this workshop in identifying coastal habitats which require immediate management would assist us in deciding on the nature of the amendments to the Act which may have to be made in the near future.

The Coast Conservation Department has very rightly decided, with the approval of the Coast Conservation Advisory Council, that it would adopt an incremental approach towards the preparation of the Management Plan. The First Generation Plan, which will hopefully be prepared before long, will lay greater emphasis on the management of activities rather than on the management of resources. Action will subsequently be taken to focus more attention on the management of resources. This is necessary, and in fact, I believe, that the workshop is a first step towards moving in this direction. The workshop participants therefore have an important task to perform – a task which should provide direction for the future planning efforts of the Coast Conservation Department. I am happy to note that the assistance of some internationally recognised coastal resource managers have been mobilised by the Coast Conservation Department in this workshop. Their contribution would indeed be most welcome.

Most of the members of the Advisory Council will also be participating in this workshop. Although arduous duties and responsibilities have been imposed upon them by the official positions they hold, they did show great interest and enthusiasm to participate in this workshop when arrangements were discussed by the Advisory Council. This is a clear indication of the importance attached by the Advisory Council to this workshop and to the contributions of the workshop participants during the next few days.

In conclusion, I look forward to the results of this workshop, and wish you all success in your deliberations.

Address by  
**Hon'ble Festus Perera**  
Minister of Fisheries

It gives me great pleasure to be present at the inauguration of this workshop. The organisers have, for this workshop, brought together specialists in various aspects of management of the coastal environment. In the next four days they will, as stated by the Director of Coast Conservation, focus their attention on management strategies for coastal habitats. I believe that this is the first step in an integrated approach towards solving our coastal problems. It is therefore opportune at this time to speak on what I expect the Coast Conservation programme to achieve in the future and to review what has been achieved so far.

As most of you are aware, the emphasis prior to the establishment of the Coast Conservation programme in my Ministry, was on coast protection. The concept of coast protection, I felt, was a very narrow and restricted one, which drew attention away from the need to manage our coastal resources. It had connotations that the coast could be protected regardless of how unwisely we utilised its resources. It placed emphasis on protecting the coast from erosion. It did not address the cause for such erosion or propose measures to prevent deterioration of the quality of the coastal environment. Hence the change from protection to coast conservation.

The Coast Conservation Programme was established within the Ministry of Fisheries in 1978 on the basis of a request made by me to the Government. A special Division of the Ministry, namely, the Coast Conservation Division, was established to implement the programme. It was realised that existing legislation was weak and inoperative and that separate legislation should be formulated for coast conservation. This was one of the first tasks undertaken by the Division. A new Act, named, the Coast Conservation Act, was, therefore, drafted and passed by Parliament. The implementation of the Act commenced from 1st October 1983 on the basis of regulations gazetted for the purpose by me. The Secretary, in his address, briefed you on the provisions of this Act.

The Coast Conservation Division was, at my request, upgraded to the status of a fully fledged Department in January 1985. Hence, the programme has now been given the necessary administrative and legislative mandates. This alone I consider a major achievement particularly in view of the fact all of this has occurred within a short period of seven years. We have in place now, a nucleus of trained specialists who are tackling the challenge of improving our coastal environment. This is an arduous task, which requires the co-operation of all agencies involved in coastal development. It requires re-thinking and changing some of the traditional patterns of utilising coastal resources. As you are aware, sand and coral mining are two uses which urgently require vigorous control. However, laws alone cannot solve these problems. We have to mobilize public support and formulate plans for providing alternative employment to the large numbers of people who have been engaged in such extractive uses for generations. Surveys carried out by the Coast Conservation Department indicate that more than 2,000 people are presently engaged in sand mining alone, and that more than one million two hundred thousand cubes of sand are mined every year in the coastal zone. We have also to locate alternative supply sources of these materials so that the needs of the country are met.

Some of our coastal areas have very high population densities. The resource base in some of these areas cannot sustain such large numbers. Hence, we would have to evolve plans for re-settling some of them in other less populated areas.

Habitat management is a comparatively new concept in this country. We have traditionally adopted a viewpoint that nature is bountiful and able to replenish itself regardless of how we use natural resources. The folly of this attitude is brought home to us every day. Coast erosion, earthslips, floods and other so-called natural disasters are mainly a result of a lack of planning and management in resource exploitation. We need to be conscious of the limitations imposed by nature. Our coastal habitats are a natural resource that we must safeguard and, where possible, exploit in a rational manner.

This workshop I am informed, will evaluate problems associated with coastal habitats and evolve management strategies for their sustainable use. Over-exploitation of some habitats such as coastal lagoons is already causing serious concern. Hence, this workshop is a timely effort and one to which we attach great importance.

As Minister in charge of the subject of Coast Conservation, I would like to assure the participants that I await the findings of the workshop and shall take steps to ensure that the recommendations are implemented.

I wish the workshop all success.

Address by

**Mr. Eric Loken**

United States Agency for International Development

USAID has watched with interest attempts made by developed and developing countries to ensure the rational management of resources and to restore and enhance the quality of the environment. The United States has some experience in the design and implementation of resources management programmes. We would, therefore, like to share our experience with other countries, particularly those in the developing world. That is the major reason for our involvement in this programme here in Sri Lanka.

Coastal development has evolved in response to individual sectoral interests that plan independently and do not adequately consider the effects of one form of development activity on each other. In Sri Lanka, with growth of commerce and trade and concentration of activity in the maritime provinces, more intensive exploitation of coastal lands has taken place increasing the pressure on this valuable resource. Unmanaged growth of competing demands results in congestion, conflicts among uses and ultimately in the loss of the resource assets in the coastal zone. Planned and co-ordinated development together with an appraisal mechanism which will keep in mind the sustainable limits of the resource is the answer to this problem.

USAID has in co-operation with the University of Rhode Island agreed to undertake a pilot programme for coastal resources management over a five year period in three countries, Ecuador, Thailand and Sri Lanka. Among the activities identified to be carried out in Sri Lanka in 1986 is the Workshop on Coastal Habitat Management. The findings and recommendation of this workshop will be incorporated in the Coastal Zone Management Plan which is presently being formulated. The finalization of the Plan, scheduled for October 1986, together with a co-ordinated approach by the several agencies responsible for coastal resources management holds promise for the future.

Address by  
**Mr. Stephen Olsen**  
Director, AID/URI Coastal Resources Management Project.

Good morning, it is a great pleasure for me to be here.

I would like to begin by reviewing briefly the origins and the objectives of the international coastal resources management project of which I am the Director. The project is sponsored by the Office of Forestry, Environment and Natural Resources, Bureau of Science and Technology of the U.S. Agency for International Development (AID) in Washington. The University of Rhode Island was selected almost exactly one year ago to implement the project. This will be a five year effort in which we will work to assist three developing countries in establishing integrated coastal management programmes.

The countries selected for pilot programmes were selected by AID two years ago. Sri Lanka was a finalist because it has already come so far and, unlike the other finalists, already has coastal management legislation in place. In the Coast Conservation Department, Sri Lanka has a core of professionals who have already been through the fires of designing and then working to implement coastal resources management policies. Sri Lanka therefore offers us the opportunity to work with a programme well along in the process of putting the principles of resources management into practice. This contrasts with the second finalist, Ecuador, which has enormous problems to contend with, no national coastal management legislation, and very little experience in how principles can be translated into effective action. The Sri Lanka and Ecuador projects have both been launched during the first year. The third pilot will probably be in Thailand which, from a both the planning and implementation perspective is midway between Ecuador and Sri Lanka.

The project is based on two assumptions.

The first is that, from a global perspective, the need for integrated resources management is becoming more acute. By 1990, 75% of the world's human population will be concentrated in coastal areas and all evidence suggests that this proportion will increase.

This is bringing increased conflicts among activities and the degradation of the very resources that have attracted the migration. All round the world we see the decline of water quality, the over-exploitation of fishery resources in the world's naturally most productive ecosystems, acceleration of erosional processes in response to inappropriate construction practices and, most important of all, the failures of government to co-ordinate their efforts and effectively impose rational restraints over land use and the conflicts that arise when incompatible activities are placed shoulder to shoulder.

The second assumption is that the United States and some other countries have gained useful experience in the design and implementation of integrated coastal resources management. In my opinion, our failures outweigh our successes but one can learn as much from what has not worked as what has. It is my hope that through

projects such as this one we can expand our experience and learn more about how this fledging business should and can be done. I have spent the last fifteen years, working primarily with one state programme in the United States. It has been fifteen years in the trenches trying to put principles into practice and I am keenly aware of the difficulties.

When I review the experience in the U.S., and such countries as the U.K., Sweden, Holland and Sri Lanka, it seems to me that a number of common threads emerge.

The first is that there is no formula. Integrated coastal resources management is an attempt to manage ecosystems where man is the dominant animal. Managing people means managing the needs, the values and the aspirations of communities. This leads directly to politics, to education, to compromise and consensus building. A look at the mounting conflicts between people on planet earth today show us that we do not know how to manage ourselves as species very well.

It follows that we must accept that the problems of the coastal zone are not merely technical problems. In fact, the dominant issue for all new coastal management programmes has been institutional problems among agencies of government. Sorting out who is responsible for what, agreeing on the nature of the problems, their causes and acceptable courses of action, above all agreeing to co-operate in a common strategy is terribly difficult.

Although coastal management must be holistic in its approach no programme can do everything that needs to be done. If it is to succeed a programme must be designed to address a few well defined management issues. Nothing leads more quickly to a weak-kneed programme than the belief that it must be based on the inventory and assessment of everything and anything. At this workshop, I hope that we will avoid that all too familiar trap.

There is a key role for research in coastal management programmes. But here too it is a small subject of all the worthy science that will truly assist those attempting to formulate workable management strategies. Not only must we select out that research which will be most useful but we must be practical about what we can do with the limited time, money and skills available to us.

We must never lose sight of the fact that the purpose of all the planning, the research and the co-ordination is to implement management strategies. As my good friend Summa Amarasinghe often exhorts us "Action, Action". Yet it is unfortunately here that resources management programmes around the world are falling down. They are many reasons for this but one is because planners are usually not implementors.

With much blood, sweat and tears, people in central government may indeed agree on the nature of the problems and agree on a co-ordinated strategy. But then these planners pass the ball to another group – the implementors.

"What is this?" they ask.

"Why was I not consulted?"

"This is not practicable"

"I'm too busy"

"I don't have the resources to do this".

And over and over again the ball is dropped. The implementor may resist because they feel that the plan is not their plan. More importantly they too often are right – the plan or the policy – for a variety of reasons, simply is not implementable.

What can we do to avoid such a result ?

The answer lies precisely in the CCD's approach. Develop a management plan in increments. As each element is prepared attempt to implement it. This is often a shocking highly distressing experience but it is crucial. Only by experience will we learn what strategies, what plans, what regulations are indeed workable and effective. Second to what we are trying to do in the workshop – involve all those concerned in managing and examining coastal resources in the earliest stages of programme design.

Finally, in closing, let me say a few words about public education. This, in my opinion, must be a keystone of any integrated resources management programme. Those people most directly affected by our management strategies **must** understand **why** we are doing it and enough of them must actively support our efforts.

Education too must be a two-way street. We the planners, and the implementors must understand the attitudes and the beliefs of the people whose behaviour we are attempting to influence.

Articles in the press, T.V. programmes, school programmes, discussions and meetings at every level, University curricula, all must be considered when we assess how we can most effectively convey our message.

Coastal resources management programmes are for and about people. A management programme must earn their support if it is to be viable and fulfill its objective of making the small environments in which we live – our town, our village, that stretch of countryside that we consider home – a place that retains for our children all the qualities that we enjoy.

On behalf of the organisers of the workshop it is my pleasant duty to thank the Hon. Minister of Fisheries for gracing this occasion and inaugurating this workshop. I also thank the Hon. Deputy Minister and the Secretary of the Ministry of Fisheries, for being present here today. Mr. Loken, thank you for being present to represent the AID Mission. I am very very pleased at the response from the Government and non-government organisations as well as the scientific community to our invitation to the inauguration of the workshop. The level of participation indicates your commitment and concern for the issues involved. My thanks in particular to the Sri Lanka Foundation Institute for the excellent arrangements made for this workshop.

Finally, may I thank all you ladies and gentlemen for accepting our invitation and participating in this occasion.