COASTS

Coastal Publication No. 1

Renewable Resources Information Series

JENS C. SORENSEN • SCOTT T. McCREARY • MARC J. HERSHMAN
RESEARCH PLANNING INSTITUTE, INC.

In cooperation with NATIONAL PARK SERVICE — USDI, and U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

931-1209

Renewable Resources Information Series
Coastal Management Publication No. 1

INSTITUTIONAL ARRANGEMENTS FOR MANAGEMENT OF COASTAL RESOURCES

JENS C. SORENSEN
Massachusetts Institute of Technology

SCOTT T. McCREARY
Massachusetts Institute of Technology

MARC J. HERSHMAN
University of Washington

Prepared by
Research Planning Institute, Inc.
Columbia, South Carolina

004130

for

NATIONAL PARK SERVICE
U.S. Department of the Interior
and
U.S. Agency for International Development

000185

July 1984

The opinions, findings, conclusions, or recommendations expressed in this report are those of the authors and do not necessarily reflect the official view of the National Park Service or Agency for International Development.

Sorensen, Jens C.
Institutional arrangements for coastal resources management.

(Renewable resources information series. Coastal management publication No. 1.)
"Prepared by Research Planning Institute, Inc., Columbia, South Carolina for National Park Service, U.S. Department of the Interior, Washington, D.C."
Cover title: Institutional Arrangements for Management of Coastal Resources.
Bibliography
1) Coastal zone management--developing countries.
2) Natural resources--developing countries.

I. McCreary, Scott T.
II. Hershman, Marc J.
III. Research Planning Institute (Columbia, S.C.)
IV. United States. National Park Service.
V. Series.
VI. Title.
VII. Title: Institutional Arrangements for Management of Coastal Resources.

HT395.D44S67 1984; 333.91'7'091724; 84-17986 ISBN 0-931531-00-4

Available from: Research Planning Institute, Inc.
925 Gervais Street
Columbia, S.C., U.S.A. 29201

FOREWORD

Most countries recognize their coastal zones as distinct regions with resources that require special attention. Many have taken specific actions to conserve coastal resources and to manage coastal development. A few have created comprehensive nationwide coastal zone management programs that are fully integrated with other resource conservation and economic sector programs. There is a current trend among the coastal countries to move toward more comprehensive and integrated coastal programs. To explore the results of this trend, the authors have reviewed the literature on institutional arrangements for coastal zone management in 75 countries, with concentrated attention on 25 of them. In so doing, they have produced the most detailed analysis of the subject yet prepared.

This book is one in a series of publications being produced for the Agency for International Development (AID) by the National Park Service (NPS) to guide the planning and management for sustainable coastal development and for the conservation of coastal resources. In addition to this book produced by Research Planning Institute, Inc. (Contract No. CX-0001-2-0050) the series includes a casebook with eight case studies, a coastal development guidebook, and a condensed design aids booklet.

This coastal series is part of a wider publication and training partnership between AID and NPS under the "Natural Resources Expanded Information Base" project commenced in 1980 in response to worldwide critical need for improved approaches to integrated regional planning and project design. The project is producing publications on arid and semiarid rangelands and humid tropic systems as well as on coastal zones. The publications and training components are dedicated to strengthening the technical and institutional capabilities of developing countries in natural resources and environmental protection and to providing other international development assistance donors with ready access to practical information.

The goal of integrated planning is the preparation of a comprehensive plan in which the various development sectors have been assessed for their effects on the various resources in given geographic areas (of which the coastal area is one of the most distinctive). In a world of rapid population growth and diminishing natural resources, countries that fail to plan their economic development strategy in concert with resource conservation and environmental management may not be able to sustain progress in health, food, housing, energy, and other critical national needs. Each developing country needs to have a realistic plan for accommodating its share of the 100 billion people per year being added to the world's population. Such basic resources as fuel, water, fertile land, and fish stocks are already in short supply in many countries and their future prospects are in grave doubt.

While the presence of integrated planning and comprehensive management alone may not assure a sustained and ample yield from the coastal natural resources of any country, its absence will lead to their depletion. The opportunities for development based on excessive exploitation of coastal natural resources are rapidly fading. The future depends on development closely linked to resource conservation. In the coastal zone, the need for an enlightened approach is urgent.

As noted by the authors, coastal zone management is a relatively new field that has its own special phraseology and concepts. The authors define coastal zone as ". . . the interface or transition . . . that part of the land . . fected by its proximity to the sea and that part of the ocean affected by its proximity to the land . . . an area in which processes depending on the interaction between land and sea are most intense." They define coastal management as ". . . any governmental program established for the purpose of utilizing or conserving a coastal resource or environment . . . and is intended to include all types of governmental intervention." Further, ". . . the term implies that the governmental unit administering the program has distinguished a coastal area or zone as a geographic area apart--yet between--the ocean domain and the terrestrial or interior domain."

In producing the coastal publication series for AID, we realize that we have, at best, provided a foothold for natural resource aspects of the new and rapidly expanding field of coastal zone management. Much important work lies ahead in many of the technical areas. We particularly recognize the need to provide specific natural resource working materials for regional planners and economic development planners. Also, there is a need for advice on protection of life and property against storms and other coastal natural hazards. Equally important is advice to planners on the role for designated protected areas--reserves, parks, sanctuaries--in tourism enhancement, fish stock management, and critical area and species conservation. We hope the present series will provide a springboard for studies on these important matters.

Mr. Hugh Bell Muller directed the implementation of the "Expanded Information Base" project, and Mr. John Clark managed the coastal components. We are especially grateful to Mr. William Feldman, Ms. Molly Kux, and Mr. William Roseborough, of the Office of Forestry, Environment, and Natural Resources of the Bureau of Science and Technology, for their continuing encouragement and their patience.

Robert C. Milne
Chief, International Affairs
National Park Service
Washington, D.C.

PREFACE

This report presents the findings of an analysis of the governance of coasts and strategies for the management of renewable natural resources in coastal zones of the developing nations. It is a synthesis of literature from the developed and developing world along with interviews and the insights of peer reviewers.

We begin by presenting a series of technical terms and phrases now in common usage to prepare the reader for the analysis that follows. A series of typologies on differences and commonalities of coastal nations, coastal issues, institutional arrangements, and management strategies serves as an organizing device. The report reviews the experience of developed and developing nations in applying a series of eleven management strategies, and considers the advantages and disadvantages of each. Program evaluation is discussed as the last step in the process of developing an integrated and comprehensive coastal resources management program.

The report concludes with two sets of guidelines. The first set is offered to guide the work of international assistance organizations, while the second set gives suggestions for the creation of national coastal resources management programs.

A key finding of this report is that nations with one or more of the four identified coastal-dependent sectors have a strong incentive to pursue integrated coastal management. The four sectors are fisheries, tourism, mangrove forestry, and an economy vulnerable to coastal hazards.

A second key finding is that institutional arrangements and management strategies must be tailored to the needs of each individual coastal nation. They should reflect the geographic scope of issues, and the existing institutions, political traditions, and technical capabilities of a nation. Fortunately, the variety of available institutions and management strategies provides an array of useful choices for developing nations embarking on the management of renewable coastal resources and for international donor organizations that would support them.

The report was written for five audiences:

- government officials who administer coastal resources management programs, particularly those who now administer or may initiate integrated programs;
- officials in international assistance organizations who are concerned about the management of coastal resources;
- staff and members of non-governmental organizations that have a vested interest in the use of coastal resources and environments;

- environmental policy consultants who advise national and international organizations on coastal resources management;

- scientists and other academicians who conduct applied research on coastal resources and coastal environments.

The report is the culmination of two cycles of review and comments on two complete drafts. The first draft was prepared as a discussion paper for a workshop attended by individuals experienced in international coastal management convened in November 1983, by the International Affairs Branch of the National Park Service in cooperation with the Science and Technology Office of the Agency for International Development. The comments generated by this meeting were incorporated into the second review draft. This second edition was selectively distributed nationally and internationally for review and comment by individuals who have engaged in international coastal resources management. Comments from the second draft have been incorporated into this final edition.

The many people who have contributed to the study by taking time to provide detailed comments on drafts include: John Clark, Daniel Finn, David Fluharty, Charles Getter, John Horberry, David Kinsey, Molly Kux, Crane Miller, James Mitchell, Renee Robin, Christine Rossell, Harvey Shapiro, Samuel Snedaker, Paul Templet, and Stella Vallejo. We are especially grateful to Niels West for his assistance in determining the sovereignty status of all coastal nations. At the early stages of this project Stella Vallejo and Random Dubois were particularly helpful in identifying and locating literature.

Research Planning Institute (RPI) administered this project. Charles Getter was very helpful as project manager and Roger Reed, the RPI comptroller, provided timely assistance to maintain the flow of support. Starnel Perez's graphics talents added considerably to the quality of several of the figures and tables. Beyond his role in reviewing the document, John Clark of the National Park Service(NPS) provided valuable advice, support and encouragement throughout the project as did Hugh Muller and Jeffrey Tschirley of NPS.

We thank Linda Vandegrift for her editorial assistance and Ruth Clarke for word processing the many iterations of this opus. Fran Smith, Susan Fortini, and Michael Mikowski also contributed substantially to the word processing effort.

Jens Sorensen
Scott McCreary
Marc Hershman
April 20, 1984

HOW TO USE THIS BOOK

The report begins by defining terminology commonly used by coastal resource managers and scholars to provide a foundation for the subject (Section 2). Differences and commonalities among coastal nations are discussed in Section 3. It is presumed that geographic, environmental, social and economic similarities and differences should guide the type of coastal management program a nation will choose to initiate. Section 4 delineates a process that most, if not all, nations have followed to initiate, develop and implement coastal resources management programs.

Two characteristics of every nation produce issues: scarcity of resources and competing values. This is the subject of Section 5 of this report. A companion appendix (Appendix B) presents a format for organizing a global issues index.

The means a nation uses to resolve coastal issues (i.e., to allocate scarce resources and competing values) are termed management strategies. Section 6 presents eleven management strategies, including critical area designation, shoreline exclusion zones, environmental impact assessment, special area management, and national land use planning. The advantages and disadvantages of each strategy are discussed here, and in Section 7.

The composite structure created by government and non-governmental organizations to allocate resources and values is termed the institutional arrangement. Section 7 presents an outline of institutional arrangements for the management of coastal resources and environments.

To complete the analytic cycle for coastal management, Section 8 presents a framework for program implementation and evaluation. This section poses a series of conditions which appear to contribute to successful program implementation. These implementation conditions have been derived from coastal programs in the developed world, and some have been validated in the developing world. Considerable support for the analysis was provided by the case studies that appear in a companion volume in this series--Coastal Publication No. 2, "The Coastal Casebook."

The report concludes with a series of guidelines presented in two categories: programmatic guidelines for international assistance organizations involved in integrated coastal resources management, and specific guidelines for design of national programs for management of renewable coastal resources.

As a result of attempting to address the diverse interests of these groups, we may have produced a document that is too technical and detailed for the purposes of some readers. For those wishing a concise overview of management strategies and governance arrangements, it may be useful to scan Sections 6 and 7 of the report.

CONTENTS

		Page
1.	INTRODUCTION	1
1.1	Objectives	1
1.2	Work Program	1
2.	CONCEPTS AND DEFINITIONS	3
2.1	Coastal Nations and Subnational Units	4
2.2	Coastal Management	5
2.3	Coastal Zone and Coastal Area	5
2.4	Shorelands and Coastal Uplands	7
2.5	Coastal Resources, Uses, and Environments	10
2.6	Coastal Systems	12
2.7	Coastal Sectoral Management or Planning	14
2.8	Integrated Planning	15
2.9	Coastal Zone Management and Integrated Coastal Resources Management	15
2.10	Ocean Management	17
3.	DIFFERENCES AND COMMONALITIES AMONG COASTAL NATIONS	18
3.1	Geographic Disparities	18
3.2	Coastal Resource Value	19
3.3	Concentration of Development and Population	22
3.4	Coastal-Oriented Nations	22
3.5	Level of Development	24
3.6	Existing or Potential Government Powers in the Coastal Zone	24
4.	EVOLUTION OF COASTAL ZONE MANAGEMENT FROM CONCEPT TO PRACTICE	27
4.1	Incipient Awareness (Stage 1)	27
4.2	Growing Awareness (Stage 2)	29
4.3	National Study (Stage 3)	29
4.4	New Program Creation (Stage 4)	30
4.5	Program Development, Implementation, and Evaluation (Stages 5 through 8)	31
5.	ISSUES	32
5.1	Global Issues Index	34
5.2	Impact Issues	35
5.3	Hazard Issues	36
5.4	Developmental Needs	37
5.5	Organizational Process Problems	38
5.6	National Listings	39
5.7	Surveying National Issues	39

Previous Page Blank

CONTENTS
(CONTINUED)

Page

6. MANAGEMENT STRATEGIES 41
6.1 National Economic Planning 43
6.2 Broad Scope Sectoral Planning 44
6.3 Regional Seas 47
6.4 Nationwide or Subnational Land Use Planning and Regulation ... 49
6.5 Special Area Plans or Regional Programs 53
6.6 Shoreline Exclusion or Restriction 56
6.7 Critical Area Protection or Exclusion 60
6.8 Environmental Impact Assessment 61
6.9 Advisory Guidelines 65
6.10 Acquisition Program 67
6.11 Coastal Atlas or Data Bank 69
6.12 Choosing Appropriate Strategies 73

7. GOVERNANCE ARRANGEMENTS 81
7.1 Complexity of the National Governance Arrangement 81
7.2 Need for Sectoral Integration 90
7.3 Need for Issue-Based Governance Analysis 92
7.4 Classification of Coastal Governance Arrangements 94
7.5 Non-Governmental Organizations 99
7.6 Alternative Administrative Arrangements 102

8. PROGRAM IMPLEMENTATION AND EVALUATION 104
8.1 Outcome and Process Assessments of Coastal Management Programs 106
8.2 Criteria to Assess Program Implementation 108
8.3 Clear and Consistent Policy Objectives 110
8.4 Good Theory and Information 111
8.5 Sufficient Jurisdiction and Authority 112
8.6 Good Implementation Structure 114
8.7 Staff Competence and Commitment 116
8.8 Maintaining the Program's Priority on the Public Agenda 117

9. GUIDELINES 118
9.1 Programmatic Guidelines for International Assistance 118
9.2 Guidelines for National Coastal Resources Management 120

10. REFERENCES 124

11. AUTHOR BIOGRAPHIES 143

APPENDIX A: DATA NEEDED TO ASSESS THE VALUE OF A NATION'S COASTAL RESOURCES 145

APPENDIX B: GLOBAL ISSUES INDEX 150

APPENDIX C: AN OUTLINE FOR DESCRIPTIONS OF COASTAL RESOURCES MANAGEMENT PROGRAMS 165

1. INTRODUCTION

1.1 Objectives

The objective of this report is to characterize the institutional arrangements that coastal nations and subnational units have used to conserve and develop their coastal resources and environments.

An institutional arrangement is defined as the composite of laws, customs, organizations and management strategies established by society to allocate scarce resources and competing values for a social purpose, such as to manage a nation's coastal resources and environments. Over time every coastal nation has established its own institutional arrangement for managing coastal resources and environments.

The initial focus of the analysis was the applicability of integrated management of coastal resources -- as currently practiced by a number of governments -- to developing coastal nations. The scope of the analysis, however, was soon broadened to assess the management of coastal resources in all coastal nations. This expanded scope was deemed necessary to achieve three purposes:

- guide the choice of coastal management strategies and institutional arrangements for the design and implementation of coastal resources management;
- comparatively assess the full range of national and subnational approaches to coastal resources management;
- propose a format for organizing information so as to facilitate information exchange.

Although the scope of analysis was expanded, the general audience remains the same: those interested in managing the renewable resources of coasts of developing countries.

1.2 Work Program

The primary task of the work program was the identification and review of the literature describing coastal resources management approaches and environmental management in developing nations. The literature review was supplemented by interviews conducted with individuals who have had international experience in coastal resources management. No case studies were conducted for this analysis nor were any visits made to coastal nations. However, the authors have traveled extensively in both developed and developing coastal nations on previous research and consulting projects.

Three documents examined in the literature review were invaluable sources of information on coastal resources management programs in many

nations. The documents are: United Nations Ocean Economics and Technology Branch, Coastal Area Management and Development, James Mitchell, "Coastal Zone Management: a Comparative Analysis of National Programs," and the report of AID's five nation site visit to assess the potential for coastal resources management. These three documents are referred to respectively as "UNOETB, 1982;" "Mitchell, 1982;" and Kinsey and Sondheimer, 1984.

2. CONCEPTS AND DEFINITIONS

Because coastal zone management is a broad new field, there is no general agreement about the appropriate use or meaning of common phrases and terms. Semantic confusion often clouds discussion of more substantive matters. A number of terms are used interchangeably in the literature to describe the general activity of managing a coastal region, area, use, or resource. These include coastal management, coastal resource management, coastal area management and development, coastal zone management, and coastal zone resource management. In general these terms are not carefully defined or distinguished from one another, nor are the "resources" or "environments" that they manage well defined.

Given the global scope of coastal zone and exclusive economic zone management and the discussion of new governance arrangements, it is essential to clarify terms at the outset. This section identifies and reviews some key concepts and definitions to establish a foundation for the analyses and findings presented in later sections.

To acquaint the audience with terms in a logical order, the discussion begins with "coastal nations and subnational units" and "coastal management," then defines the natural areas and systems under consideration, and concludes with the specific management and planning terms.

Ten frequently used terms are defined in this section. They are:

- coastal nations and subnational units;
- coastal management;
- coastal zone and coastal area;
- shorelands and coastal uplands;
- coastal resources, uses, and environments;
- coastal systems;
- coastal sectoral management, or planning;
- integrated planning;
- coastal zone management program and integrated coastal resource management;
- ocean management.

2.1 Coastal Nations and Subnational Units

We address four general categories of government authority which permit the establishment of an autonomous coastal management program. They are:

- independent nations (referred to as sovereign states in the international law and political science literature);
- semi-sovereign nations, colonies, or dependencies;
- subnational units such as provinces, prefectures, or states empowered by the national constitution to undertake certain government functions, such as land use management;
- subnational regional authorities established by legislative action or executive order.

The four distinctions were made to identify how many units of government there are in the world with the potential legal authority and resources to launch an integrated program for coastal resources management. According to the U.S. State Department's recent publication, Status of the World's Nations, the independence of Brunei this year increased the number of independent coastal (or ocean bordering) nations to 136 (U.S. State Department, 1983). Since the publication also enumerates 30 landlocked nations, eighty-two percent of the world's independent nations border on the ocean or an ocean connected sea (e.g., Black Sea, Mediterranean Sea, Baltic Sea, Red Sea, and the Persian or Arabian Gulf). It is also noteworthy that forty of the ocean or sea bordering independent nations are small islands (e.g., Nauru, Barbados) or large islands (e.g., Papua New Guinea or Japan). This means that thirty percent of the world's independent nations are situated on large or small islands.

The State Department publication also enumerates "dependencies and areas of special sovereignty." It appears that forty coastal semi-sovereign states have both sufficient resources and population size to be self governing -- at least to the extent that the metropolitan nation could have granted them the statutory authority to establish their own coastal or ocean management program. Examples are Bermuda, Hong Kong, and St. Christopher-Nevis. Of these forty semi-sovereign coastal states, only five are not situated on islands.

Several nations' constitutions delegate authority for specific government functions to the subnational level. Examples are the United States, Canada, Australia, and Malaysia. These nations have respectively 32, 8, 7, and 13 subnational units of government with authority to create an autonomous coastal management program. Finally, coastal nations or subnational units have the authority to establish by legislation regional entities to carry out coastal management programs. Examples are

Australia's Port Phillip Authority and the San Francisco Bay Conservation and Development Commission (California, U.S.A.).

In sum, the number of government units in the world that have the legal authority to establish independent coastal management programs considerably exceeds the number of independent states. Taking into account the combination of 136 sovereign coastal nations, up to forty semi-sovereign states, national subunits which are constitutionally autonomous, and regional authorities; on a world wide basis the potential exists for creation of well over two hundred and perhaps two hundred and fifty distinct coastal management programs.

2.2 Coastal Management

Coastal management refers to any governmental program established for the purpose of utilizing or conserving a coastal resource or environment. It is the broadest of the terms and is intended to include all types of governmental intervention in a society. Use of the term implies that the governmental unit administering the program has distinguished a coastal zone as a geographic area apart from -- yet between -- the ocean domain and the terrestrial or interior domain. The resources and/or environments being managed define the geographic extent of the coastal area or zone. The coastal management program can address just one type of resource -- such as coastal fisheries -- or one type of environment -- such as tidal wetlands. It is more common, however, for a coastal management program to include several types of resources and environments.

2.3 Coastal Zone and Coastal Area

The image evoked when the term "coastal" is used varies considerably. To some it connotes fish and wildlife, to others beaches and dunes, and to still others broad reaches of land and water. There is agreement, however, that the term coastal conveys the notion of a land-ocean (or estuary) interface. The land-ocean interface has two principal axes -- one axis is parallel to the shoreline (or longshore) and the other axis is perpendicular to the shore (or cross shore). For the longshore axis relatively little controversy arises as to the definition, since it does not typically cross environmental system boundaries -- with exception of watershed systems. By contrast, there is considerable discussion about the cross shore axis. There is general consensus that the cross shore axis profiles a coastal zone of transition between the ocean (or estuary) environment and the terrestrial or inland environment.

The coastal zone is commonly refered to as the interface or transition space between two environmental domains, the land and the sea. It has been defined as that part of the land affected by its proximity to the sea and that part of the ocean affected by its proximity to the land (U.S. Commission on Marine Science, Engineering, and Resources, 1968). It is an area in which processes depending on the interaction between land and sea are most intense. One lengthy definition combines demographic, ecologic, functional, and geographical considerations:

> The coastal zone is the band of dry land and adjacent ocean space (water and submerged land) in which land ecology and use directly affect ocean space ecology, and vice versa. The coastal zone is a band of variable width which borders the continents, the inland seas, and the Great Lakes. Functionally, it is the broad interface between land and water where production, consumption, and exchange processes occur at high rates of intensity. Ecologically, it is an area of dynamic biogeochemical activity but with limited capacity for supporting various forms of human use. Geographically, the landward boundary of the coastal zone is necessarily vague. The oceans may affect climate far inland from the sea. Ocean salt penetrates estuaries to various extents, depending largely upon geometry of the estuary and river flow, and the ocean tides may extend even farther upstream than the salt penetration. Pollutants added even to the freshwater part of a river ultimately reach the sea after passing through the estuary (Ketchum, 1972).

Invariably, "estuary" or "estuarine zone" is used in connection with or as part of the definition of the coastal zone. The term "estuarine zone" means:

> An environment system consisting of an estuary and those transitional areas which are consistently influenced or affected by water from an estuary such as, but not limited to, salt marshes, coastal and inter-tidal areas, bays, harbors, lagoons, inshore waters, and channels, and the term "estuary" means all or part of a navigable or interstate river or stream or other body of water having unimpaired natural connection with the open sea and within which the sea water is measurably diluted with fresh water derived from land drainage (U.S. Department of Interior, 1970).

Given the environmental, resource, and governmental differences among coastal nations and subnational units, there is considerable variety in the selection of boundaries to delineate both seaward and inland extent of the coastal zone. For example, the inland definitions of the coastal zone range from those that include entire watersheds to those that comprise only the immediate strip of shoreline adjacent to the water. Ideally, a coastal nation or subnational unit should set the boundaries of the coastal zone as far inland and seaward as necessary to achieve the objectives of the management program. Since the problems and opportunities that motivate the creation of a coastal zone management program vary considerably from one unit of government to another, the selection of coastal zone boundaries would also be expected to exhibit considerable variation among coastal nations as well as among subnational units.

Small island nations or subnational units present a specific problem in setting the inland boundary of the coastal zone or area. In a companion case study on island ecosystems, small islands are defined as environmental units that do not have an "interior hinterland or central core area that is essentially distant from the sea" (Island Ecosystems Case Study). The companion study concluded that approximately 10,000 square kilometers --

about the size of Jamaica -- is the breakpoint between small and large islands. For islands less than one thousand square kilometers "there is no point that is more than approximatly one hours drive from the sea," and therefore one could argue that the entire island is a coastal zone. Coastal zone management on small islands is essentially synonymous with nation-wide or subunit-wide resource management.

Figure 2.1 displays seven distinct coastal zone boundary types. Some of these are now being used by coastal nations or subnational units -- while others are potential boundaries. At one extreme (Type 1) the broadest coastal zone can encompass an area extending from the oceanward limit of the two-hundred-nautical-mile exclusive economic zone to the inland limit of marine climate influence and/or the inland extent of coastal watersheds. (See Section 2.10 for a discussion of the Exclusive Economic Zone). At the other extreme, the narrowest coastal zone may be limited to an area extending from some arbitrary distance (inland of the territorial sea) to the inland limit of the shorelands (Type 7). Each of the seven boundary types is summarized in the key to Figure 2.1.

In this report the term "coastal area", refers to a geographic space that has not been defined as a zone. In other words, in coastal areas the inland and ocean boundaries to the zone have not necessarily been set or approximated. Use of the term merely indicates that there is a national -- or subnational -- recognition that a distinct transitional environment exists between the ocean and terrestrial domains.

2.4 Shorelands and Coastal Uplands

Within many coastal zones, a further geographic subdivision is made for land immediately inland from the highest tideline, often called the shorelands zone. Shorelands are the inland portion of the coastal zone where the inland connection to the shoreline and coastal waters is most apparent. In nearly all cases, the seaward limit is mean high water.

The inland extent of the shorelands varies from program to program. Several criteria are used to define the immediate and apparent connection to the coastline, depending on the public purpose the shoreland zone is intended to address. The following five criteria are a synthesis of standards drawn from U.S. coastal states' programs, Australian states' programs, and U.K. programs.

- For public access, easy walking distance to the shore -- usually 300 to 500 meters -- is often the key determinant. A longshore dimension is often included, to provide for lateral access along the shore.

- Hazard avoidance programs are often established in reference to bluffs, floodprone areas, or areas with historic landslides.

- Protection of sensitive habitats, such as

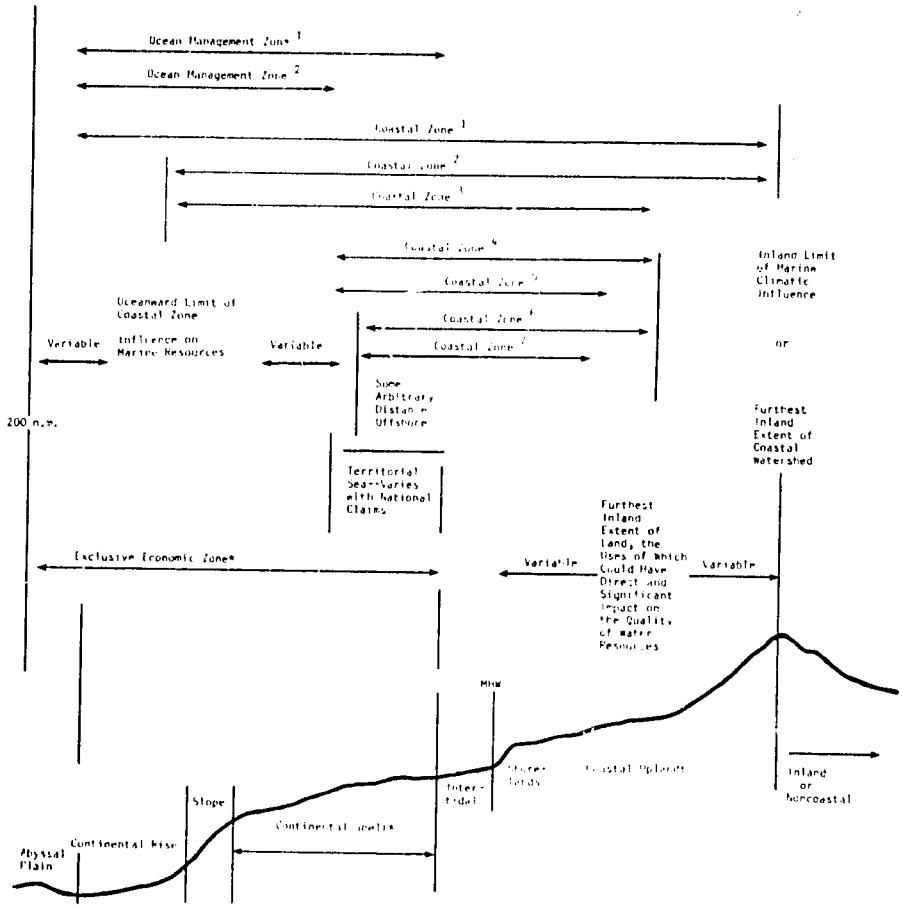


Figure 2.1. Relationship of coastal zone and ocean management zone to coastal environments and ecosystems.

KEY:

Coastal Zone Boundary Type	Inland Limit of Coastal Zone	Outer Ocean Boundary of Coastal Zone
1	Inland limit of watershed or climatic influence	200 nautical miles; boundary of exclusive economic zone (EEZ)
2	Inland limit of watershed or climatic influence	Oceanward limit of coastal zone influence on marine resources
3	Inland limit of land uses which have a direct input on coastal resources	Oceanward limit of coastal zone influence on marine resources
4	Inland limit of land uses which have a direct impact on coastal resources	Oceanward limit of territorial sea
5	Inland extent of shorelands	Territorial sea
6	Inland extent of land uses which have a direct effect	Arbitrary distance, landward of territorial sea
7	Inland extent of shorelands	Arbitrary distance, landward of the territorial sea

*In several areas of the world, the continental shelf extends beyond 200 n.m. In these situations, the oceanward boundary of the national jurisdictional claims can be the outer edge of the continental margin.

- -

Figure 2.1. (Continued)

wetlands, unstabilized dunes (those not stabilized by woody vegetation).

- Water quality protection is achieved through setbacks for installation of septic tanks, and zones to keep natural vegetation along shores and banks -- both to control erosion and to retain the natural filtering capabilities of this vegetation. In this case the first tier of lots inland from the shore may be a logical shoreland boundary.

- Visual protection of the coast is often accomplished with a shoreland zone defined in reference to the first public road paralleling the shore. Retention of natural vegetation along the shoreline is often a key element of such programs.

Exclusion zones and their applications are described in more detail in the section on management strategies (Section 6). Given the apparent ocean and land connection, shorelands are usually designated to provide government with greater authority to intervene than for inland components of the coastal zone. As shown in Section 6, shoreland exclusion zones often use a fixed inland limit average of about 100 meters. A number of programs have drawn the inland limit of the coastal zone at the shorelands/uplands boundary.

Coastal uplands are defined as the area between the landward extent of the shorelands and the inland extent of land, the use of which could have a direct and significant impact on the quality of coast resources (See Figure 2.1). In many cases -- particularly in small watersheds -- coastal uplands extend to the inland boundary of the watershed. In other cases -- where coastal mountain ridges are parallel and proximate to the coasts -- coastal uplands extend to these ridgelines. Such a topographic configuration not only produces drainage patterns that affect the coast, but also usually is the inland barrier to marine climate penetration. Activities that often generate impacts in coastal uplands include road construction, new land clearance and development, agriculture, and logging (see Coastal Watersheds Case Study).

2.5 Coastal Resources, Uses, and Environments

Within all coastal areas or zones, there are coastal resources, coastal uses, and coastal environments. A coastal resource is usually defined as a natural -- often renewable -- commodity, the existence of which depends on the coast, or the commodity's value(s) to society is appreciably enhanced by its location within the coastal zone. Sometimes man made features such as scenic coastal villages are included in the definition of coastal resources.

Using the definition given above, the products of agriculture or forestry practiced near the shore are not coastal resources unless they

achieve substantial production advantages from conditions associated with their coastal location. Similarly, land with a view of the ocean or within easy pedestrian access of the coastline can be considered a coastal resource since its value as property is usually enhanced by these attributes.

The types of natural or man-made features that fit the meaning of a coastal resource can be very broad indeed, as illustrated by the definition of coastal resources given by the California Coastal Plan (California Coastal Zone Conservation Commission, 1975).

Coastal resources can be divided into several overlapping categories:

- Natural resources - e.g., agricultural and lands, coastal waters, beaches, clean air.

- Marine resources - e.g., coastal waters, kelp beds, salt marshes, tidepools, islets and offshore rocks, anadromous fisheries.

- Coastal land resources - e.g., watersheds, freshwater supplies, agricultural land, open space, bluffs, dunes, wildlife, natural habitat areas.

- Productive resources - e.g., aquacultural areas, gravel deposits, agricultural and timber lands, petroleum resources.

- Manmade resources - coastal communities and neighborhoods with particular cultural, historical, architectural, and aesthetic qualities. These towns and neighborhoods are characterized by orientation to the water, usually a small scale of development, pedestrian use, diversity of development and activities, public attention and use of facilities, distinct architectural character, historical significance, or ethnic or cultural characteristics sufficient to yield a sense of coastal identity and differentiation from nearby areas.

- Historical and prehistorical resources - e.g., recognized historical landmarks, outstanding architectural landmarks, Indian burial sites and shell mounds, plant and animal fossils.

- Recreational and scenic resources - e.g., beaches, coastal streams, marinas, SCUBA diving areas, scenic coastal roads, and other land and water areas with the potential for providing significant recreational use for the public.

- Educational and scientific resources - e.g., marine life refuges, rare and endangered species habitat, primitive areas, tidepools, wetlands.

The listing includes what many have termed coastal environments -- such as watersheds, bluffs, dunes, islets, tidepools, salt marshes. Coastal environments are natural and manmade physical conditions that are either specific to the coastal zone (e.g., estuaries) or whose characteristic is significantly determined by its coastal location (e.g., fishing villages).

The two terms are interconnected since the capacity of coastal resources to provide social utility is directly dependent on the conditions of the coastal environment. For purposes of policy-making, it is not important to draw a distinction between coastal resources and coastal environments. In this report, the term "coastal resources" is used in its broad sense to include coastal environments.

It should be also noted that developing nations will be most concerned with those coastal resources of direct economic or social value to its citizens. It is expected that the visual and recreational resources of the coastal zone will be of lesser concern to developing nations unless coastal tourism is either an important economic sector or has the potential of growing into an important economic sector.

Coastal use refers to the utilization of coastal resources for economic, aesthetic, recreational, scientific or educational purposes. Use may be either consumptive or non-consumptive. The distinction between coastal dependent uses and non-coastal dependent uses is one of the cornerstones of most integrated coastal resources management programs. A coastal dependent use requires an immediate coastal site to be able to function at all. Examples are fishing, mariculture, port facilities, offshore oil extraction, boat works, and marinas. An economic utility argument can be made to support the policy that coastal dependent uses should not be pre-empted or precluded from shoreline or offshore location by non-coastal dependent uses (such as residential development).

2.6 Coastal Systems

One of the most distinctive and challenging characteristics of the coastal zone is the aggregation of environmental and physical systems in a relatively compact area. In fact, the coastal zone has been defined by this aggregation of systems. At least nine major systems that affect coastal management are evident: (1) estuary circulation systems, (2) ocean basins, (3) longshore circulation cells, (4) estuary watersheds, (5) large scale marine geomorphic units, (6) air basins, (7) sport, commercial and other valuable species, (8) viewsheds, and (9) public services. Of the nine systems, four are specific to the coastal zone: large scale marine geomorphic units, estuary circulation systems, ocean basins, and longshore circulation cells. Five systems have hydrologic dynamics as the interconnecting mechanism. A recognition that these nine systems are the principal mechanisms that interconnect the coastal zone through impact networks has to become a cornerstone of coastal zone management.

Nine coastal systems and some of the major issues they pose for coastal management are:

- o Large scale geomorphic units

  - the formation, growth, and decay of barrier islands, coral reefs, atolls, and oceanic volcanic islands, coastal erosion and deposition.

- o Estuary watersheds

  - ground water or surface water pollution, estuary water quality, and effects on biota;

  - ground or stream water flows, estuary and wetlands salinity, and effects on biota;

  - land use practices, run off, stream water flows, and stream or estuary flooding;

  - stream sediment loads, estuary sedimentation, and effects on biota;

  - stream sediment loads and deposition of beach materials on estuary or open coast shore (and then into the system of longshore circulation cells).

- o Estuary circulation systems

  - direct discharge of wastewater into coastal waters from all sources, estuary water quality, and effects on biota.

- o Ocean basins

  - direct discharge of wastewater, oil, solid waste from all sources, quality of ocean waters and sediments, and effects on biota;

  - estuary pollution, quality of ocean waters and sediments, and effects on biota.

- o Longshore circulation cells, coastal erosion and deposition

  - control of coastal erosion and erosion-accretion dynamics with littoral circulation cells.

- o Air basins

  - atmospheric emissions from all sources, ambient air quality, effects on biota, and human health.

- o Populations of sport, commercial, and other valuable species

- degradation of coastal streams and habitat of anadromous fish populations;

- degradation of estuarine habitats and size of waterfowl, wildlife, and fish populations;

- harvesting of commercial or sport species and maintenance of a sustained yield population and food web.

o Viewsheds

- development in areas visible from the first public road parallel to the coast, public recreation areas, or tourist facilities;

- control of development in areas visible from major public use facilities;

- design guidelines for coastal development visible from recreation or tourism areas.

o Public service systems

- land use within sewage services district and capacity of sewage system;

- land use within water services district and capacity of watersupply system;

- land use within highway service area and highway congestion;

- land use and the ability to evacuate residents from storm hazard prone areas before the advent of hurricanes, typhoons, or tsunamis.

It is expected that developing coastal nations will be concerned with management of those coastal systems which have direct and significant effects on the national economy or society. For example, there would be lesser concern for coastal viewsheds except where coastal tourism exerts a strong economic interest.

2.7 Coastal Sectoral Management or Planning

Coastal sectoral management or planning connotes single use or highly targeted approaches. Sectoral planning is most often undertaken for ports, fisheries, tourism, oil and gas development, and wildlife. (Sectoral planning is discussed at greater length in the Sections 6 and 7).

International assistance agencies commonly use the term sectoral planning or management to describe a socio-economic development area. In the field of natural resources and environmental planning the most commonly conducted sectoral development programs are: agriculture, forestry, fisheries, energy, transportation, industrialization, urbanization, and public health and safety. In this report a number of these eight sectoral development areas are further divided into more specialized coastal components. For example transportation is divided into shipping, ports, and surface transportation. Table 7.1 presents a list of typical sectoral divisions in coastal zone management.

2.8 Integrated Planning

Integrated planning is designed to interrelate and jointly guide the activities of two or more sectors in planning and development. In the context of coastal zone management, integrated planning usually implies the programmatic goal is to balance and optimize environmental protection, public use, and economic development. Often, integration also assumes coordination between data gathering and analysis, plan-making, planning, implementation, and construction. The two most common expressions of integrated planning are national economic planning and land use planning, also known in some countries as town and country planning. (Both are discussed in Section 7.)

2.9 Coastal Zone Management and Integrated Coastal Resources Management

Coastal zone management is not a term that is well defined in the professional literature. There are two reasons for this definitional ambiguity: the vagueness of the term "coastal" and the vagueness of the term "management." "Management" as used in this report refers in a general sense to a deliberate, self-conscious effort to direct or control conditions and actions, without assuming that these efforts are successful. Coastal zone management refers to the integrated management of two or more coastal sectors within a defined region or zone. Coastal zone management typically is concerned with resolving conflicts among many coastal uses and determining the most appropriate use of coastal resources. The management program has an institutional identity derived from either its placement with one government agency or network of agencies.

Recently the term, "integrated coastal resources management", has been used as an alternative name for coastal zone management. This term appears to be particularly attractive to practitioners of international environmental policy since it highlights the concepts of integrated planning and resources management. The focus on resources management reflects the growing awareness among developing nations that renewable natural resources constitute foundation blocks needed to support the

construction of economic and social development programs. This view is exemplified by the 1979 report produced by AID on environmental and natural resource management in developing countries (U.S.AID, 1979).

> For the principally agricultural societies that predominate in developing countries, poverty and environmental degradation are in fact two manifestations of the same phenomenon: the unplanned, unmanaged impact of growing populations on a fragile natural resource base whose productivity is measurably diminishing in our own lifetime. If the material circumstances of the world's poorer people are ever to be improved over the long term, ways will have to be found to husband the fragile natural resources upon which their well being depends.

Generally the coastal zone, in comparison to inland environments, is more richly endowed with renewable natural resources; most notably productive fisheries, soil and forests as well as the recreational quality of coastal waters, beaches, and shorelands.

A coastal zone or integrated coastal resources management program has the following six attributes:

- It is initiated by government in response to very evident resource degradation and multiple use conflicts.
- It is distinct from a one-time project; it has continuity, and is usually a response to a legislative or executive mandate.
- Its geographical jurisdiction is specified. It has an inland and ocean boundary -- with the exception of small islands which usually only have an oceanward boundary; it is <u>not</u> only an ocean management program, but must have both shore and landward components.
- A specific set of objectives or issues is to be addressed or resolved by the program.
- It has an institutional identity -- it is identifiable as either an independent organization or a network of organizations linked together by functions and management strategies.
- It is characterized by the integration of two or more sectors, based on the recognition of the natural and public service systems which interconnect coastal uses and environments.

In this report the terms coastal zone management, coastal resources management and integrated coastal resources management are used

interchangeably. No distinction is made on shades of differences between the three terms.

2.10 Ocean Management

Ocean management involves national direction and control of "ocean space" including surface water, water column, seabed, and subseabed. The area covered by ocean management typically extends from the inland limit of national jurisdiction (usually mean high water) out to the ocean extent of its most seaward claim. The recently adopted Law of the Sea regime (LOS) provides that a coastal nation may claim an Exclusive Economic Zone (EEZ) of two hundred nautical miles in width. Many nations have adopted this zone as their seaward boundary for ocean management. Exceptions to the two hundred mile boundary are nations with geographic proximity to another of less than four hundred nautical miles. In this case, a midline determination of the seaward limit is commonly used.

Ocean management is usually a national enterprise and is often conducted as a multi-agency integration program. It tends to be multi-sectoral in scope. Issues of greatest concern include shipping, fisheries, mineral exploration and development, pollution control, and marine research. As noted in Section 7 on governance, agreement on the LOS regime has stimulated several initiatives for national ocean management. These may in turn promote coastal zone management programs as ocean concerns are felt along the land/ocean interface. This arrangement may then be transferred to coastal zone management. Sweden, Sri Lanka, and Brazil appear to exemplify this trend.

Figure 2.1 displays two types of ocean management zones. Type 1 extends from the seaward limit of the EEZ to mean high tide. A narrow zone is Type 2 which extends only from the seaward limit of the EEZ to the seaward limit of the territorial sea. The second type of boundary may be complemented by a coastal zone boundary extending to the territorial sea.

3. DIFFERENCES AND COMMONALITIES AMONG COASTAL NATIONS

Review of the literature reveals a number of geographic, environmental, social, and economic similarities and differences among coastal nations. These similarities and differences affect the likelihood that an integrated coastal resources management program will be created -- or will not be created -- in a given nation. A developing nation's coastal characteristics also suggest alternative governance arrangements and management strategies that might be utilized to establish a coastal program. (The question of transferability of governance arrangements and management strategies is addressed in Sections 6 and 7).

The six main characteristics that we have found useful in distinguishing a coastal nation's disposition to coastal resources management are presented in this section. The characteristics are:

- geography (dimensions of coastlines and ocean claims);
- coastal resource value (economic sectors, linked to the coast, which influence the value nations attach to coastal resources);
- concentration of development and population;
- coastal orientation;
- level of development
- existing or potential government powers in the coastal zone.

3.1 Geographic Disparities

One of the differences most evident between coastal nations is the amount of coastal and marine space each claims within its jurisdiction. Ocean Yearbook 3 (in its Appendix G) presents a table with three coastal or marine geographic measures for 155 sovereign nations and semi-sovereign states (Borgese and Ginsburg, 1982). The measures are:

- coastline in kilometers;
- coastline/area ratio (expressed as coastline in kilometers divided by total land area in km^2);
- hypothetical area encompassed by a boundary extending to the two hundred nautical mile exclusive economic zone or to the limits imposed by the exclusive economic zone of neighboring coastal nations.

Table 3.1 lists the five nations with the highest and five nations with the lowest values for each of the three geographic dimensions. For the length dimension, Canada is by far the leader, with a coastline measuring over 90,000 kilometers; Indonesia is second with nearly 55,000 kilometers, and the USSR has a coastline just over 46,000 kilometers. At the other extreme, Monaco has a 4 kilometer coast, Gibraltar's is 12 kilometers, and the island nations of Nauru and Tuvalu each have a 24 kilometer coast.

In some cases a more meaningful measure of the importance of the coast to a nation is the ratio of coastline to total land area. As would be expected, small island nations or peninsula nations have the highest ratio. Nations with high ratios are likely to depend heavily on their coastal resources. Macao, the Maldives, Monaco and Gibraltar all have a coastline/area ratio ranging from 2.0 to 2.5. Conversely, large nations with short coastlines have a ratio of several orders of magnitude less. For Zaire, the ratio is 1 kilometer of coastline to every 10,000 square kilometers of land area. Low values are also indicated for Iraq, Jordan, Sudan and Algeria. Nations with low coastline/area ratios are not likely to depend heavily on coastal resources.

The U.S. leads in the category of exclusive economic zone (ocean area to two hundred nautical miles or to the limits imposed by other nation's EEZ) with a 2.2 million square kilometers claim. Australia has 1.8 million square kilometers claim, and Indonesia claims 1.57 million square kilometers.

The easy to measure quantity indicators presented by Table 3.1 can be indicative of the importance of the coast. In general, the presence of a high coast/land area ratio, a large coastline or a large exclusive economic zone are fairly good indicators of the potential existence and exploitation of coastal resources. The expected result is that the nation would accord high value to coastal and/or ocean resource management. However area, length or shoreline/area ratios are often not an accurate reflection of coastal zone value to the nation. For example, the polar ice pack renders much of Greenland's, Canada's, and the USSR's area and ocean claims unuseable for fishing, oil exploitation, and shipping. Similarly, in the tropics many island nations have very large ocean claims of relatively low fishery value due to sterility of the waters. In the Near East and North Africa the majority of the coastline borders hot barren deserts, creating an environment that precludes most types of coastal development.

3.2 Coastal Resource Value

The best measure of the coastal zone's importance to a nation is the quality or value of coastal resources within the nation's jurisdiction. The value that nations attach to coastal resources is directly related to the economic contribution of these resources. We find this economic contribution is typically expressed with four measures, which are useful for most economic sectors. These measures are:

Table 3.1: Geographic dimensions of selected coastal nations

GREATEST LENGTH OF COASTLINE	Coastline (km)	Coastline/ area ratio	Area to 200 nm (thousand sq km)
Canada	90,908	.0091	1,370.0
Indonesia	54,716	.0287	1,577.0
U.S.S.R.	46,670	.0021	1,309.0
Greenland	44,087	.0203	147.3
Australia	25,760	.0033	1,854.0
SHORTEST LENGTH OF COASTLINE			
Monaco	4	2.0	NA
Gibraltar	12	2.0	NA
Nauru	24	1.429	92.8
Tuvalu	24	.9231	211.5
Jordan	26	.0003	NA
HIGHEST COASTLINE/ AREA RATIO			
Macao	40	2.5	NA
Maldives	644	2.161	279.7
Monaco	4	2.0	NA
Gibralter	12	2.0	NA
Bermuda	103	1.9	NA
LOWEST COASTLINE/ AREA RATIO			
Zaire	37	.000	.3
Iraq	58	.0001	.2
Jordan	26	.0003	NA
Sudan	853	.0003	26.7
Algeria	1,183	.0005	NA
GREATEST EXCLUSIVE ECONOMIC ZONE			
U.S.A.	19,924	.0021	2,220.0
Australia	25,760	.0033	1,854.0
Indonesia	54,716	.0287	1,577.0
Canada	90,908	.0091	1,370.0
U.S.S.R.	46,670	.0021	1,309.0
SMALLEST EXCLUSIVE ECONOMIC ZONE			
Singapore	193	.3310	.1
Iraq	58	.0001	.2
Togo	56	.0010	.3
Zaire	37	.0000	.3
Belgium	63	.0021	.8

NA = Not available; no measure given.
(Source: Borgese and Ginsberg, 1982)

- monetary value of coastal resource production;
- export earnings of coastal resource production;
- number of people employed directly or indirectly by coastal resource uses;
- the cultural value of the coastal resource to serve dietary, religious or social needs.

To firmly establish these values for a series of developing countries, a review and analysis of statistical data would be required. Such a review and analysis is outside the scope of this report. However, Appendix A presents a series of tables listing the data that would be needed to derive quantitative indicators of coastal value for several sectors of the economy. An assessment of the availability of this data should be undertaken.

In 1980 a group of economists designed a conceptual and statistical model for calculating the aggregate value of ocean and coastal resources to the United States economy (Pontecorvo, et al., 1980). The economic information needed to make the calculations for Pontecorvo model was extracted from the available census and national income accounting system.

> Based on their model, the aggregate value of the U.S. ocean sector for 1972, the most recent year...data was available, [was] $30.6 billion, comparable to agriculture at $35.4 billion....since the total U.S. GNP for 1972 was $1,171.1 billion, the ocean and coastal sector contributed 2.6% of the total (Island Ecosystems Case Study).

According to a companion case study, the Pontecorvo model has been adapted and applied to other coastal nations (Island Ecosystems Case Study). The Dalhousie University Ocean Studies Program has calculated that ocean related activity accounts for 33% of St. Lucia's GNP in 1978, 32% of Antigua-Barbuda's GNP in 1981, and 30% of Grenada's GNP in 1982. The Pontecorvo model as adapted by Dalhousie provides a quantifiable means to compare and rank the relative economic importance of ocean and coastal resources among nations.

Fisheries, tourism, ports, and oil and gas extraction are the four sectors which best exemplify the value of coastal resources. Hard mineral extraction is a fifth sector where the value of coastal resources is manifested. Agriculture and forestry are two other sectors which may derive a production benefit from a coastal location. Certainly the forestry yields from mangroves represent an important economic sector in many countries. Coastal hazards do not represent a productive sector of the economy, but they can certainly exert a significant economic impact. Thus, a nation that has sustained economic loss due to flooding, wave damage, or shoreline erosion, may attach significant value to the proper management of coastal resources and processes. Control or reduction of environmental hazards is usually a component of the public health and safety sectoral development program.

Besides economic benefit or loss derived from the coast, another indicator of the value of coastal resources to a nation is government commitment to develop a particular sector of the economy that is coastal related. This might be evident in the creation of a special department for coastal management, a legislative or executive act, a plan for resource development, or allocation of funds to implement sector development plans.

3.3 Concentration of Development and Population

Another distinct measure of the importance of the coastal zone to a nation is the relative concentration of economic development and population. There is a positive correlation between an increase in coastal zone resource values and an increase in both the concentration of population and economic development -- but these three indicators can also be measured separately. Population growth and economic development can -- and do -- occur in the coastal zone without direct connection to coastal resources. Non-coastal related manufacturing and other basic industries commonly occur in the coastal zones, to take advantage of terrestrial resources, transportation and infrastructure networks, and easy to develop land.

In most coastal nations, national capitals and their surrounding metropolitan areas are within the zone that significantly and directly affects coastal resources. Admittedly these capitals and their metropolitan areas usually originated as the nation's major port, and owed their early development to port and related transportation functions. However, much of their subsequent growth -- for functions such as government and finance -- are not port related. The result is that the port economy is usually now a minor sector of the metropolitan region it spawned.

3.4 Coastal Oriented Nations

A number of indicators have been suggested to describe a nation's relationship to the coast: coastline length, coast-to-area ratio, size of ocean area claim, contribution of ocean and coastal resources to the national GNP, awareness of coastal hazards, institutional development for coastal related sectors, and concentration of development and population. Some of these are better indicators than others, but each at least suggests national interest. The composite of these factors is termed "coastal orientation."

Clearly, there are degrees of coastal orientation. At one extreme are the small island states or nations, such as Bermuda, the Maldives, the Seychelles, and Niue. In these nations, virtually no part of their environment is without coastal influence. At the other extreme are nations with a tiny fraction of coast land area and little coastal development of coastal resources. Examples of this second category are Jordan, Zaire, Sudan, Algeria, Iran and Iraq. A more precise accounting of coastal orientation could be derived from a data base organized around the indicators listed above. In the absence of this data, a descriptive

four-part typology has been created, and is outlined below.

(1) Small island nations. All are coastal oriented, given their large coast to land area, the strong dependence of their economies on coastal resources, concurrent lack of inland economic base, and the concentration of their population along the coast (this conclusion is supported by the Island Ecosystems Case Study).

(2) Large island nations. All are coastal oriented, but usually not to the same degree as small island nations. Large island nations almost always have capitals on the coast. These nations typically have a coastal or island resource base, and a more dispersed population. Coastal hazards are likely to be a strong concern. Sri Lanka, Japan, Great Britain, New Zealand, Indonesia, Cuba, Japan, Madagascar, and the Philippines fall into this category.

(3) Coastal oriented continental nations. These nations are often characterized by strong fishing, ports, tourist, or offshore oil and gas sectors. Most coastal oriented continental nations have a strong concentration of population and economic development on the coast. Often the major metropolitan area or the capital city are in the coastal zone. The United States, Nigeria, Senegal, Uruguay, Tanzania, Australia, Denmark, Sweden, and Ecuador are examples.

(4) The fourth category is made up of continental nations which are not coastal oriented. Economic development in these nations is directed at terrestrial resources in the interior, and the size of the coastal populations is less than that of the interior. The USSR, Kenya, Germany and Argentina are examples. Many continental nations have major ports (e.g., Poland, Belgium, Germany) and some have distant water fleets (e.g., USSR, Poland, Romania) but otherwise have relatively little involvement with the coastal zone.

The best test for characterizing a nation's coastal orientation would be to apply the Pontecorvo-Dalhousie model to all nations. However, even if the necessary economic data were available for all coastal nations -- which it isn't -- it appears that the time and effort required to make the calculations would make the endeavor prohibitively expensive.

It should be noted that the degree of coastal orientation can change quickly over time. One expectation is that international adoption of the 200-nautical-mile exclusive economic zone will produce an increasing coastal orientation of the nations reaping large additional ocean and continental shelf area. Also developing coastal nations could -- and have -- altered their orientation with a new multiple year national economic plan significantly changing the national investment in the coastal and ocean resources development. An example is Uruguay's decision to develop its rich offshore fisheries. In 1974 the annual tonnage fished amounted to 12,000 tons. An ambitious multiple year fisheries development plan has

increased the annual catch to 150,000 tons -- 85,000 tons of which are for export (Uruguay, Direccion Nacional de Relaciones Publicas, 1982).

3.5 Level of Development

International assistance organizations have made distinctions between developed and developing nations in order to establish strategies and priorities for providing technical and financial aid. Several criteria have been used, such as GNP, annual per capita income, extent and quality of infrastructure, literacy rates, and institutional capacity. An assessment of environmental management in developing countries used a three part typology, dividing the world into developed nations, middle income developing countries, and lower income developing countries (IIED, 1981).

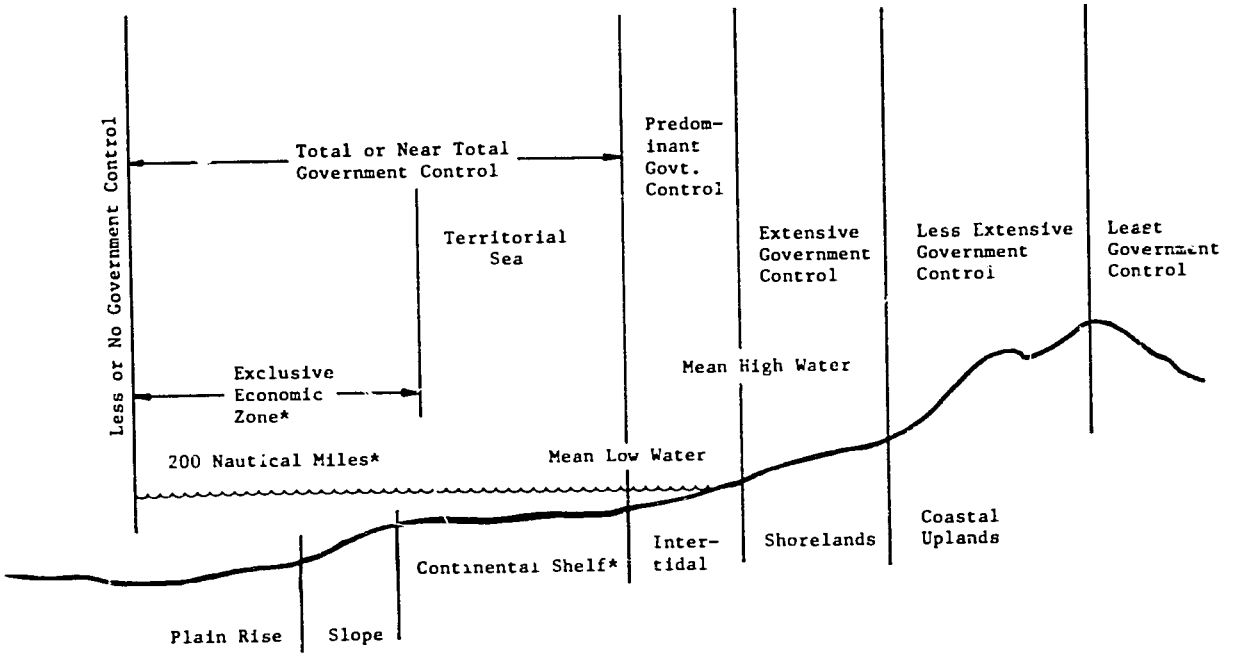
Developed nations have a per capita income per annum in excess of $1,000 and include 30% of the world's population (Riddell, 1981). The range of middle income nations is between $200 and $1,000. Fifteen percent of the global population inhabit the middle income nations. Fifty-five percent of the world's population inhabit the low income nations where the per capita income per annum is below $200. The income levels have been found to reflect fundamental differences in (1) financial resources (or income levels), (2) economic and social infrastructure, and (3) differences of available skills and knowledge (IIED, 1981). Some international government analysts have altered the hierarchy of income levels to create a discrete category for oil or mineral exporting nations which have surplus revenues but are otherwise not fully developed. Thus, the following four-part division is derived from the degree of development and surplus revenues:

- o developed or advanced income nations;
- o middle income developing nations;
- o developing nations with surplus oil or mineral revenues;
- o low income developing nations.

These levels of development represent another important determinant of the strategies and institutional arrangements available to nations establishing coastal management programs -- as discussed in Section 7.

3.6 Existing or Potential Government Powers in the Coastal Zone

The geographic scope and degree of control exercised by government authorities varies widely from nation to nation, but some general observations can be made, as illustrated by Figure 3.1. Within the territorial sea and exclusive economic zone, total or near-total government control is exercised. This control was reaffirmed by the Law of the Sea regime which adopted the concept of a two hundred nautical mile exclusive economic zone (EEZ). The national government usually has most -- if not



*In several areas of the world, the continental shelf extends beyond 200 nautical miles. In these situations, the oceanward boundary of the national jurisdictional claim can be the outer edge of the continental margin.

Figure 3.1: Extent of government control with regard to management of marine and coastal resources.

all -- the powers to manage the exclusive economic zone. Some authority is frequently delegated to sub-national governments along the coastal margin of the EEZ.

For the intertidal zone, the public trust is asserted, which, in turn, carries predominant government control. In many nations, the concept of the public trust is the heritage of common law. In Mexico, for example, the seashore up to the high tide line is "burdened with a right of commons quite similar to [American]...tideland trust" (Nanda and Ris, 1972). The Mexican concept "property of common use" (bienes) equivalent to [American] public trust lands includes the seashore waters, fisheries, and riverbanks (Nanda and Ris, 1972).

The next area inland, the shorelands, is often subject to extensive government control. Exclusion zones are sometimes imposed in this band, such as in Costa Rica, to prohibit private encroachment into wetlands, beaches, or to guarantee unrestricted public access to the shore. Prohibitions or strong regulations also may be imposed to protect coastal views or maintain water quality -- as discussed in the section on management strategies.

For the coastal uplands, the tradition in most nations is to exercise less control than of the more shoreward areas. Exceptions are nations with strong programs for land use planning or town and country planning (e.g., Great Britain), or nations with a major commitment to economic development -- in a specific coastal region -- such as France's development plan for the Aquitaine or Mexico's tourism plan and development of Cancun.

Finally, areas which have traditionally enjoyed no government control with respect to coastal resources are usually located inland of the coastal watershed boundary or beyond the most oceanward jurisdictional claim.

As discussed in Section 3.5, the complexity of government, in terms of sectors, functional divisions, and number of levels, usually increases in relation to the level of economic development. In the middle income developing nations, authority is likely to be distributed among several ministries, which may suggest formation of an interministerial council to draw together existing bureaucracies, as opposed to creating a new institution. (This point will be explored in Section 7).

Central government in the developing countries often has greater powers to control the use of private property. Section 7 mentions two notable examples of developing nation's greater public control over private land: Nigeria's nationalization of all land not in productive use and Costa Rica's shorelands exclusion zone.

The characteristics of coastal nations presented in this section exert a strong influence over the choice of institutional arrangement and management strategies. This relationship is developed in more detail in Sections 6 and 7.

4. EVOLUTION OF COASTAL ZONE MANAGEMENT FROM CONCEPT TO PRACTICE

Review of coastal management efforts indicates that nations and subnational units appear to follow a very similar process in the evolution of their program -- from the initial awareness stage through to program implementation and evaluation. Figure 4.1 diagrams this general process.

4.1 Incipient Awareness (Stage 1)

Recognition by a nation or subnational unit of the need for an integrated coastal management program usually requires either evident signs of coastal resource degradation or extensive destruction from coastal hazards. Either of these manifestations is compounded by the occurence of intense conflicts among different coastal use activities (e.g., recreation vs. oil refineries and power plants) and their associated interest groups. In other words, a nation's or subnational unit's of its coastal resources and environments has to exceed some threshold of resource degradation, natural hazard destruction, or conflict before government takes action.

A catastrophic coastal event can be instrumental in raising public and goverment consciousness of the need for integrated coastal resources management. The Torrey Canyon oil spill in 1967 made France and other nations realize that "institutional arrangements were...inadequate to deal with environmental disasters of such magnitude" (Harrison and Sewell, 1979). Similarly the well-publicized oil spill in 1969 off Santa Barbara, California from the blowout of an offshore oil well did much to bolster the citizens' campaign to enact state-wide coastal zone management legislation. (Adams, 1973).

Descriptions of the genesis of coastal awareness in ten nations confirm the observation that degradation, destruction, and multiple use conflicts are usually -- if not always -- preconditions for consideration of integrated coastal resources management. The ten nations are: the United States (Englander, et al, 1977), England (Waite, 1980; Steers, 1978), France (Harrison and Sewell, 1979), Greece (Camhis and Coccossis, 1982), Australian states (Cullen, 1982), Sweden (Hildreth, 1975), Ecuador (Ecuador Navy and United Nations, 1983), Sri Lanka (Amarasinghe and Wickremeratne, 1983), Philippines (Zamora, 1979), and Thailand (Adulavidhaya et al., 1982).

Figure 4.1 indicates that awareness of coastal management possibilities has been stimulated by the international travel of government, industry, and academic representatives to national as well as international conferences, or visits by foreign experts such as the UNEP Regional Seas teams, and international assistance missions, advisors or consultants. An example of the influence of such activity was the report of the United Nations mission to Sri Lanka in 1974 that recommended creation of a Department of Coast Conservation (Amarasinghe and Wickremeratne, 1983).

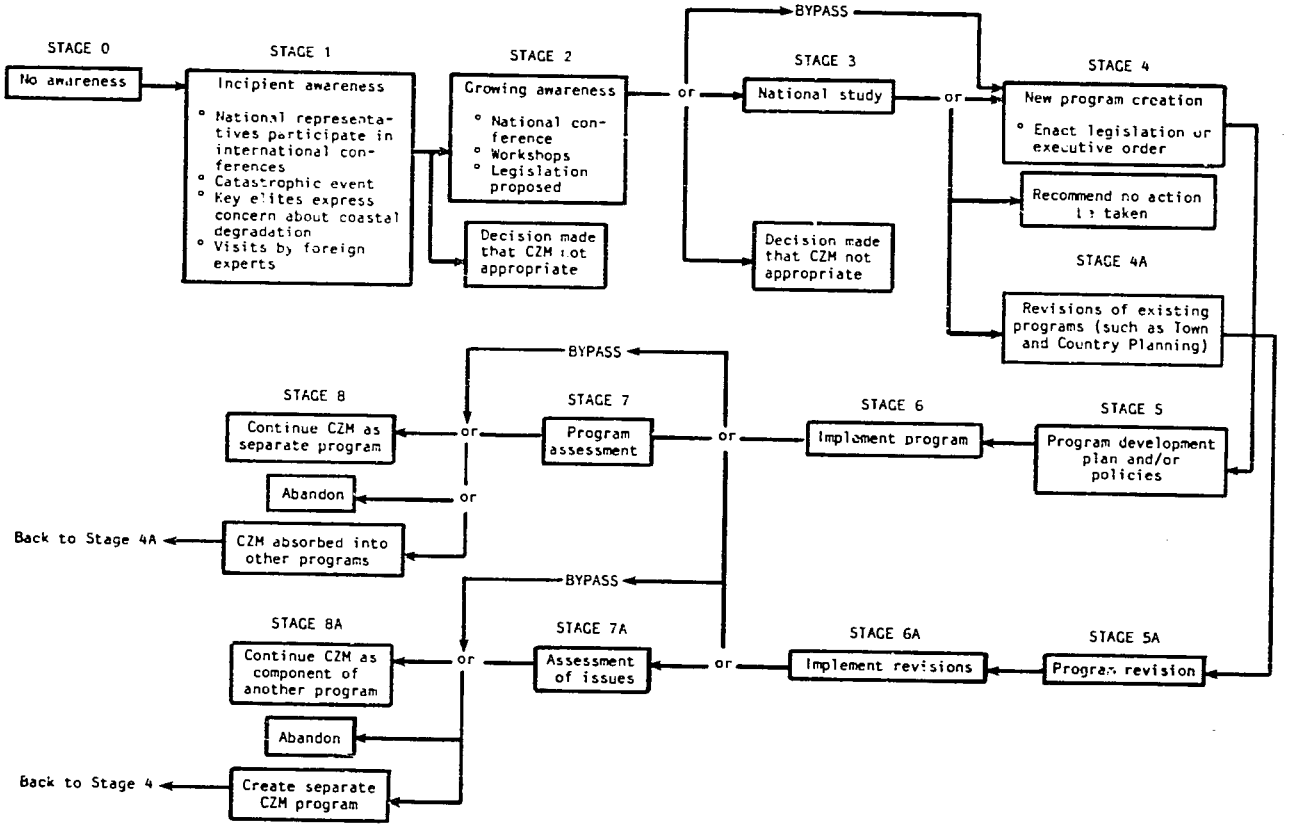


Figure 4.1. Evolution of coastal zone management: from concept to practice.

4.2 Growing Awareness (Stage 2)

National conferences, workshops or hearings convened by government officials, academic institutions -- and often by representatives of environmental and industry interest groups -- are usually the next step in program evolution. At least the following nations have convened national conferences or workshops to consider the creation of integrated coastal resources management programs: Philippines (Zamora, 1979), Australia (Cullen, 1982), Canada (Morgan and Secter, 1980), Ecuador (Ecuador Navy and the United Nations, 1983), France (Harrison and Sewell, 1979), Indonesia (Koesoebiono, et al, 1982), United States (Ketchum, 1972).

4.3 National Study (Stage 3)

Conferences, workshops, or visits by international assistance missions often lead to the preparation of a national study or conference proceedings analyzing coastal resources, institutional arrangements, and management options. The following eleven studies or proceedings illustrate this step:

- U.S. Commission on Marine Science, Engineering and Resources (Stratton Commission), Our Nation and the Sea, 1968.
- Great Britain, Countryside Commission, The Planning of the Coastline: A Report of a Study of Coastal Preservation and Development in England and Wales, 1970.
- Sweden, Ministry of Physical Planning and Local Government, National Physical Plan: Management of Land and Water, 1971.
- Ireland, Bord Failte Eireann and An Foras Forbartha, National Coastline Study, 1972.
- France, Interministerial Committee for Regional Development and Planning, The Picard Report, 1972.
- United Arab Emirates, Coastal Development Planning Study, (as reported in Ali and Armstrong, 1976).
- Ecuador Navy, Ordenacion y Desarrollo Integral de las Zonas Costeras, 1983.
- Philippines, National Environmental Protection Council, Proceedings of a Planning Workshop for Coastal Zone Management, 1978.

- Israel, Ministry of the Interior Planning Section, The National Outline Scheme for the Mediterranean Coast, 1978.

- Canada, Council of Resources and Environment Ministries, Proceedings of the Shore Management Symposium, 1978.

- Australia, House of Representatives. Report on Management of the Australian Coastal Zone, 1980.

Figure 4.1 also indicates the way in which national or subnational units can bypass Stage 3 and create new coastal programs without conducting comprehensive studies or convening exploratory conferences. This appears to be the route taken by Greece, Indonesia, and Thailand.

4.4 New Program Creation (Stage 4)

At least five of the national studies listed in the previous stage initiated or revised their coastal resource management programs. Findings and recommendations of the Stratton Commission report, Our Nation and the Sea, prompted the drafting of the legislation that ultimately evolved into the U.S. Coastal Zone Management Act (Zile, 1974).

The Countryside Commission Report lead to creation of the Heritage Coast Program for conservation of natural areas with scenic attraction and recreational opportunities for the public (Cullen, in press). The literature on the history of coastal management in England does not indicate whether national land use policy makers at one point in time made a conscious decision to not create a new and separate program for the integrated management of the United Kingdom's coastal resources. In any event, the United Kingdom's arrangement for coastal governance consists of a number of revisions to existing acts and programs -- most notably the Town and Country Planning Act, the Local Governance Act, the National Parks Program, and the Natural Area Preserves Program (Waite, 1980; Steers, 1978; Cullen, in press). This marginal revision of existing programs for coastal management purposes is indicated in Figure 4-1 as Stage 4a, the alternative of program revision rather than either the creation of a new and separate program or the decision to have the government not embark on any form of integrated coastal resources management.

In Sweden, the National Physical Plan of 1971 lead to amendments to the Building Act and the Nature Conservancy Act (Hildreth, 1975). The revisions structured a new master planning (land use planning) process for all municipalities and directed initial efforts to coastal areas and those inland lakes where pressure for leisure home development was the greatest (Hildreth, 1975). The Swedish response is another example of Stage 4a, marginal revisions of existing programs.

The Picard Report of 1972 proposed that the French government take five measures to secure "sound" coastal management:

- creation of the Conservatoire du Litteral;

- the protection of sensitive perimeters;
- the development of coastal bases for leisure and nature;
- the preparation of marine resource and sea water use plans;
- the preparation of regional coastal plans (France, Ministry of the Environment, 1980).

The latest report in English indicates that all five of these measures have been implemented. The most "successful" measure to date has been the land acquisition and management program of the Coastal Conservatoire (France, Ministry of the Environment, 1980).

It should be noted that coastal management may be initiated first at the subnational regional scale before going nation-wide or state wide. Two examples of this "scale up" process are: initiation of the San Francisco Bay Conservation and Development Commission seven years prior to enactment of the California program, and creation of the Port Philip Authority twelve years in advance of Victoria's coastal program (Cullen, 1982).

Although all the existing national programs known to us have followed the process diagrammed by Figure 4.1, two other avenues may emerge. Ocean management programs spawned by the Law of the Sea Treaty -- discussed in Section 2.10 -- may spin off a coastal zone component as a separate program. Brazil's ocean resources planning program may produce such a spin off (Brazil Interministerial Commission on Ocean Research, 1981). The second avenue could be evolution from a coastal and marine research co-ordination program. Colombia's program for co-ordination of government and university marine research may become an example of this avenue (Knecht, 1983).

4.5 Program Development, Implementation, and Evaluation (Stages 5 through 8)

Detailed information on coastal program development, implementation, and evaluation stages documented in English appears to be the best recorded for seven nations: the United States, Australia, France, the Philippines, Sri Lanka, Japan, and the United Kingdom. The great preponderance of literature is on the U.S. Coastal Zone Management Act and the various state program responses (particularly California). Initiation of a program in Equador is presently on hold until international funding and technical assistance can be otained (Kinsey and Sondheimer, 1984). What became of the national studies and planning initiatives in Ireland, United Arab Emirates, and Israel is unknown to us at this time. Further analysis should be undertaken to determine the fate of these five efforts, as well as all other national or subnational efforts. The successes and failures of these initiatives should be instructive to both developed and developing nations as well as those international assistance agencies considering integrated coastal resource management.

5. ISSUES

Issues are defined here as the conflicts and matters indispute that motivate creation and implementation of a coastal resources management program. The importance of defining and understanding the nature and range of coastal management issues should be stressed. This will become more apparent as we describe how issues affect the field of coastal management in the following five areas:

- o program design;
- o program evaluation;
- o information exchange;
- o setting international assistance priorities;
- o defining the field of coastal zone management.

There should be a good fit between the set of issues a program is attempting to resolve and the design of the institutional arrangement. For example, if the important issues include the impacts of watershed practices on coastal resources, then the jurisdictional boundary should include the watershed area that generates the problems and the institutional arrangement should include the agencies with the appropriate watershed management authority. Conversely, if the major concern is the management of the immediate shoreline area -- including issues such as coastal erosion, tourism development, and public access -- then a narrow jurisdictional zone should be appropriate and the organizational arrangement should consist primarily of agencies that exercise control over shoreline uses.

The issues that motivated a nation to design a program are likely to reappear as the criteria for program evaluation. (This is further discussed in Section 8.) The essential evaluation question is, to what extent is the program resolving the issues that generated its creation. The full scale design of a coastal zone management program should logically contain an implementation evaluation component. Moreover, international assistance agencies are increasingly requiring program evaluation to assess the success of their investment.

Information exchange on an international basis occurs primarily at the level of technology development and application, such as dredging machines, fisheries gear, and soil erosion control devices (Kildow, 1977). The issues to which the technology is applied are also a common basis for information exchange. A number of international information exchange networks have already been established for several coastal management issues. For example, the International Geographical Union has formed a commission on the coastal environment to exchange information on coastal geomorphology. There is relatively little international information exchange, however, on the institutional arrangements designed to address

the issues. The variation in combinations of environmental, socio-economic, political and legal factors give a particular national character to each coastal nation's institutional arrangement. As a result, opportunities are limited for international transfer of information on this topic.

One of the criteria for funding international assistance projects has been the transferability of the experience and products to other nations. In general, the more common an issue among coastal nations, the greater the potential transferability. International assistance agencies could also benefit from knowing the relative importance of issues for each coastal nation. Issues that are both globally common and consistently high in national priority should warrant more attention from the international assistance community.

One of the well-recognized problems inherent in the field of coastal zone management is lack of identity. There is no clear distinction as to which issues coastal zone management includes, and which it excludes. Generally, if a problem or opportunity arises from the use or the value of a coastal resource or environment, it is a coastal zone management issue. This definition includes a broad spectrum of issues. Perhaps the best approach to a universal definition is to compile a list of the coastal nations' concerns for the management of their coastal resources and environments.

A review of the literature -- particularly Mitchell's article (1982) and the UNOETB book (1982) -- reveals a pattern of repetition among the issues. A few common themes demonstrate how the issues provide an international structure to the field of coastal management. Virtually every coastal nation with a major metropolitan area bordering an estuary appears to have an estuarine pollution problem - usually as a function of municipal sewage and industrial toxins. The estuary pollution issue arises in all coastal nations - irrespective of the degree of development or variation in environmental and socio-economic conditions. Similarly, nearly every coastal nation that actively harvests its coastal fishery stocks appears to have an overfishing problem (a predictable result of common property exploitation). Coastal nations with substantial mangrove acreage almost always experience stresses from watershed practices, pollution, filling, and the overharvesting of timber for fuel. Similarly, every discussion of a coastal nation's institutional arrangement seems to recite the same litany of policy-making problems. Inadequate information, lack of intergovernmental coordination and inadequate professional resources are almost required conditions to motivate integrated coastal resources management.

The similarity and repetition among issues leads us to the conclusion that "there are many ways to slice the same pie." The universe of issues is the "pie" and "slicing" is the defining and categorizing of them.

5.1 Global Issues Index

The importance of a global perspective and the universality of issues leads to two conclusions regarding the organization of the field of coastal management: (1) there is a need for an international indexing system; (2) it could be created rather simply. Issue categorization systems have been constructed at the national and ocean regions levels. Notable examples are:

- "Coastal Zone Problems: A Basis for Evaluation," (Englander, et al., 1977);
- Environmental Problems of the East African Region, (United Nations Environment Program, 1982);
- Marine and Coast Area Development in the Wider Caribbean Area: Overview Study, (UNOETB, 1980);
- Man, Land and Sea, (Soysa, et al., 1982);
- "Coastal Zone Management in Australia," (Cullen, 1982);
- Ordenacion y Desarrollo Integral de las Zonas Costeras, (Ecuador Navy and United Nations, 1983).

However, our literature search did not reveal any attempts to construct a global index of issues.

Our design for a global issues index builds on the previous efforts cited. These efforts have organized the broad array of issues into groupings. Generally, distinctions have been made between the following four types of issues:

- impacts of one coastal area activity (e.g., tourism development or filling wetlands) on others (e.g., decreased commercial fishing yields);
- coastal hazards -- or impacts of natural forces (e.g., shore erosion, river flooding, ocean born storms) on coast use activities;
- development needs or sectoral planning (e.g., fisheries development plan);
- organizational process problems, such as an inadequate data base or lack of coordination.

Each of the issues is discussed below. Appendix B presents a global list of the issues for the first three groupings: impact issues, hazards, and sectoral planning.

5.2 Impact Issues

This is the most difficult set of issues to define. The many environmental and socio-economic causal relationships among coastal use activities form a web of interconnections. Untangling the impact issues requires determination of separate cause and effect chains (also commonly discussed in the literature as impact networks or trees). In general, environmental and socio-economic impacts can be delineated as a four-step sequence of:

- coastal land or water use (e.g., tourism development);
- specific activity (e.g., filling of wetlands);
- change in environmental or socio-economic condition (e.g., reduced estuary productivity);
- impact of critical social concern (e.g., decreased fisheries yield).

For an issue to be perceived as a problem, the causal chain must evolve to the final step in the sequence -- an impact on a social value -- such as decreased fisheries yield. Hence, Appendix B assumes all chains culminate in impacts on critical social values.

The list of impact issues has been clustered into the following ten sets with the number in parentheses indicating the number of issues contained in each set:

- estuary, harbor and near shorewater quality (pollution) impacts (15);
- groundwater quality and quantity (2);
- filling of wetlands (including mangroves) (5);
- mangrove impacts (5);
- coral reef and atoll impacts (9);
- beach, dune, and delta impacts (6);
- fishing effort (2);
- access to the shoreline and subtidal area (2);
- visual quality (2);
- employment (2).

It is noteworthy that the adverse environmental and socio-economic impacts primarily concern water quality (pollution) and ecosystem types (e.g., wetlands, mangroves, coral reefs). There is some redundancy between two categories: filling of wetlands and mangrove impacts. Although

mangroves are one type of wetland, the ubiquity and importance of mangrove systems to most developing nations merits a separate grouping.

Of the 50 impact issues listed, 28 of them concern effects on fisheries yield and 18 of them concern effects on tourism and recreation attraction. (There is some double counting, and very similar impact chains have been combined.) Fisheries conservation and the maintenance of tourism or recreation quality clearly emerge as the two main arguments for integrated coastal resources management. These two coastal uses are affected by almost all of the other use activities listed. The economic importance of fisheries and tourism will strongly influence the extent to which developing nations will want to initiate coastal resources management programs. Mangrove forestry operated on a sustainable yield basis appears to be of secondary importance, but is a significant coastal dependent sector in several nations. The greater the value of coastal fisheries, coastal tourism, and mangrove forests to the national economy and coastal populations, the greater the nation's interest in coastal zone management.

The list of impact issues clearly illustrates the zonal nature of the coast. Nineteen of the issue impacts occasionally or always originate in coastal watersheds -- often far inland from the shoreline (see Coastal Watersheds Case Study). On the ocean side, 10 of the issue impacts can originate offshore and move landward to adversely affect coastline or estuary environments (see Coral and Sand Mining and Coastal Erosion Case Studies). The many watershed-coast-ocean connections clearly demonstrate that the coastal zone is where use activities which affect renewable resources must be coordinated.

5.3 Hazard Issues

This is a relatively clear set of concerns. We found that five types of hazards were distinguished by coastal nations in the literature reviewed:

- coastal erosion (see Coastal Erosion Case Study);
- coastal river flooding;
- ocean born storms;
- tsunamis;
- migrating dunes (see Coral and Sand Mining Case Study).

All five are naturally occurring phenomena. However, coastal erosion, river flooding, and dune migration can be caused in some situations solely by use activities. More commonly, the natural phenomena are exacerbated by the additional effects of human use activities.

From reviewing Appendix B and its supporting documentation, we find that coastal hazards are another major economic stimulus to initiate a

coastal resources management program. This leads us to the tentative conclusion that in the lower income developing nations, if neither fisheries, nor tourism, nor coastal hazards devastation are important concerns, there is little potential for the development and implementation of a coastal zone management program unless there is considerable outside infusion of international assistance funds and expertise.

5.4 Developmental Needs

Concern for development needs is not an issue in the same sense as the three other broad categories. These needs are essentially expressions of sectoral planning interest in response to one or more problems or opportunities identified by the coastal nation. However, coastal nations want information on these topics, and therefore development needs are appropriate items for an issue-based information system. Ten types of development needs emerged from the literature survey:

- fisheries;
- natural area protection systems;
- water supply;
- recreation development;
- tourism development;
- port development;
- energy development;
- oil or toxic spill contingency planning (as a component of a water pollution control plans);
- industrial siting;
- agricultural development;
- aquaculture development.

Almost all coastal nations are conducting, or will want to conduct, sectoral planning for fisheries, water supply, natural areas, port development, industrial siting, and agriculture. With regard to these sectoral interests, the most meaningful differences among coastal nations will be the relative priority each attaches to the various sectors. For example, is fisheries development planning higher on a nation's priority list than port development? The utility of the list would be improved if a number of broad sectoral categories were subdivided into more specific topics. For example, port development should be subdivided into the primary type of port facilities needed (e.g., oil, bulk container, general purposes, fishery, recreation marinas).

5.5 Organizational Process Problems

Program evaluation literature commonly makes a distinction between the organizational process problems and outcome problems. Outcome problems in coastal zone management are listed in Appendix B under the headings, impact issues and hazards. Organizational process problems are those characteristics or procedures that inhibit an organization from attaining its goals and objectives. A number of organizational process problems are also discussed in Section 8, Program Implementation and Evaluation.

Seven years ago an analysis was conducted of the issues that motivated passage of the U.S. Coastal Zone Management Program (Englander, et al., 1977). The analysis identified the following thirteen organizational problems:

- lack of coordination among public agencies;
- insufficient planning and regulatory authority;
- insufficient data base and lack of information for decision making;
- little understanding or knowledge about coastal ecosystems;
- resource decisions made primarily on the basis of economic considerations to the exclusion of ecological considerations;
- lack of clearly stated goals;
- lack of state and local government funds to manage the coastal zone adequately;
- primitive analytical tools and predictive methodologies;
- dominance of short-term management over long-range planning;
- complex, conflicting and confusing laws;
- little awareness of or concern with coastal problems;
- lack of properly trained and educated management personnel;
- limited public participation in decision making.

The thirteen problems were rated according to their frequency, as well as the emphasis they received in the documents and interviews. The first five listed clearly predominated and the second four were moderately

dominant.

Most of the descriptions we reviewed of coastal issues in developing nations did not mention organizational process problems. Those that did usually identified lack of coordination, an insufficient data base, lack of personnel, lack of clearly stated goals, and outmoded laws. It appears that the same types of organizational process problems will occur irrespective of the nation's level of development. For example, lack of adequate governmental coordination and inadequate information for decisions are two problems inherent in almost all comprehensive policy-making.

The principal distinction among nations will probably be the relative importance of each of the organizational process problems. Developing nations, for instance, have stressed the lack of properly trained and educated personnel, and complex, conflicting and confusing laws as obstacles to program development. However, these two concerns were given a relatively low priority in the survey of U.S. problems. Conversely, developing nations are not expected to be very concerned about limited public participation in decision making, lack of state or local government funds, or decisions being made primarily on the basis of economic considerations, issues which are very important to U.S. resource planners.

5.6 National Listings

In Appendix B, we have listed nations that the literature indicated were concerned about the issue. This is just the start of a complete list of nations for each issue, because it includes only the issues documented in our literature review. As a result, individuals familiar with one or more nation's coastal zone will probably find that the list does not identify all the issues for that nation. The gaps in the national lists are attributed to at least five factors. These are discussed in Appendix B.

A major limitation of the national list is the absence of priority rankings. With the exception of the Englander article on U.S. coastal management problems, the literature seldom indicates the relative importance of each national issue. Without a national importance rating, the issues list would include almost all nations, thus decreasing the utility of the index.

Only a cross-section of nations is needed to ensure that the issues confronting coastal nations are identified for the index. Fortunately, the 30 or so coastal nations with fairly complete descriptions constituted a good cross-section of the important variables. The sample has good representation on level of development, global climatic zones (i.e., temperate, dry tropic, humid tropic, oceanic island), and continental locations.

5.7 Surveying National Issues

Compiling a global index of coastal management issues is a two-step process. The first step is to construct the initial list of issues based

on a review of national descriptions. Appendix B represents the product of the first step. The second step is to complete a global survey of all coastal nations to both further refine the issues list and to complete the national lists. This task was beyond the scope of this study, but the process for conducting the global survey is outlined in the appendix.

Certainly coastal nations should be encouraged to conduct their own survey and ranking of coastal issues. The Philippines, Indonesia, Australia, New Zealand and Ecuador have defined national concerns by convening national conferences or workshops and appointing task forces. Most coastal nations cannot be expected to go to this level of effort. It is more likely that one agency -- such as the national planning office or an environmental policy council -- will compose a ranked list of coastal issues.

It is not expected that either review of additional national descriptions, or national surveys will add a significant number of new impact issues to the list. As previously mentioned, the 30 nations used as the basis for constructing the list are considered to be a representative sample of the world's collection of coastal nations.

Since we wanted to determine the consensus of developing nations, an issue impact had to be identified by a developing nation to be included in our list. However, further iterations of the issues index should also include issues that are of concern only to developed nations. At a minimum, the list would help document one of the differences between these two groupings of nations.

6. MANAGEMENT STRATEGIES

This section reviews and analyzes 11 distinct strategies for management of renewable coastal resources now in use throughout the developed and developing world. Our review of the coastal literature has not identified any one document that defines and describes the full array of coastal management strategies currently being used by coastal nations. Review of the more general planning and environmental protection literature, however, has led to the identification of 11 management strategies. Each of the 11 strategies is a complex topic that could be dealt with at book length. (For example, see Horberry's work on environmental impact assessment and guidelines in the international community, 1983).

There is much less information on management strategies used by developing nations. It appears however that almost all developing nations are using two or more of the 11 management strategies identified. It should also be noted that with the exception of regional seas, none of the management strategies is necessarily coastal zone specific. They have been used in inland as well as coastal areas. Shoreland exclusion, for example, has been used for managing inland rivers and lakes. The 11 strategies are:

- broader scope sectoral planning of coastal uses or resources;
- national economic planning;
- regional seas;
- nation-wide land use planning and regulation;
- special coastal area plans or regional programs;
- shoreland exclusions;
- critical coastal area protection or exclusion;
- environmental impact assessment of coastal development proposals;
- coastal conservation and development guidelines;
- coastal special area acquisition programs;
- coastal atlases or data banks.

As Table 6.1 illustrates, these strategies are not mutually exclusive and in fact they are usually mutually supportive. For example, France uses

Table 6.1: Strategies used in coastal resource management programs

	FRANCE	U.S.A.	GREECE	INDONESIA	SRI LANKA	THAILAND	PHILIPP.
National economic planning	X			X		X	X
Broad sectoral planning		X	X	X			
Regional seas	X		X	X		NA	NA
Nation or state-wide land use	O	O	O	X	O	O	O
Special area & regional plans	X	X	X	O		O	
Shoreline exclusion	X	SU	X	X		NA	X
Critical area protection	X	SU	X	X		X	X
Impact assessment		X	X	X	X	X	X
Guidelines			X	O	X	X	X
Acquisition programs	O	X					
Coastal atlas - data bank		X	X	X	O	O	O

O Principal strategy
X Complementary strategy
NA Information not available
SU Seldom used

nationwide or statewide land use planning together with natural area acquisition campaigns as principal strategies. They are complemented by national economic planning, participation in the Regional Seas program, special area planning, shoreland exclusion, and critical area protection. In the United States, all strategies are used to various degrees, with the exception of national economic planning and regional areas. Statewide land use planning under a broad federal framework is the principal strategy in the United States reinforced with broad sectoral planning, special area and regional plans, impact assessment, acquisition programs and the coastal atlas data bank technique. Less often used are shoreline exclusion and critical area protection.

Sri Lanka is also using nationwide land use planning and regulation as its principal strategy for coastal zone management supported by national economic planning and impact assessment. Indonesia depends heavily on environmental guidelines, reinforced with national economic planning. That nation is moving towards greater dependence on regional or specialized planning together with a national land use planning framework.

For each strategy, the discussion is organized to define and describe the technique, cite examples of its use, and present some of the more notable advantages and disadvantages. In cases where strategies are very similar, the distinctions are spelled out. The discussion also suggests which strategies are complementary in scope and purpose.

The section concludes with a discussion of the appropriateness of the 11 management strategies to different types of coastal nations. Appropriateness is assessed in terms of four characteristics: level of development, coastal orientation, geographic dimension of the issues, and availability of information and expertise.

6.1 National Economic Planning

National economic planning generally involves the setting of prescriptive goals for each sector of the economy, affecting the allocation of labor, investment capital and land use. This style of planning occurs in both socialist countries and nations with a mix of central economic planning and private markets.

In some cases, planning decisions are centralized at the national levels; in others, targets for production are established at the regional level, or through the intervention of central planning institutions and local authorities. The regional level is usually the prime focus for implementation of a national economic plan.

The main vehicle of national economic planning is usually a long term plan, spanning a four or five year period, and setting production targets in those sectors of the economy which are declared most important. Production, as the central feature of an economic plan, is then used to specify the size of the workforce, the type and quality of land needed for a particular industry, and the amount of investment capital needed to implement the plan. Besides striving to achieve production targets,

national economic plans generally aim to effect a fast growth of the economy, reduce large disparities in income, and create employment opportunities.

Economic sectors which often pertain to the coast are fisheries, ports and shipping, transportation, agriculture, tourism, and industry. One potential strategy is to use national economic planning for the integration of sectors to produce an integrated coastal program for a region. In this way, sectors such as fisheries, ports, and tourist development can be made mutually supportive. To some extent, the linkages between economic sectors will depend upon the resources available to the nation.

Second, recognizing the value of coastal resources in the economy leads to recognition of the impact of one sector on another. This in turn can foster a strategy of avoidance of unintended negative impacts.

An example here would be the expansion of agriculture and aquaculture in Indonesia at the expense of mangrove wetlands, and estuarine habitats. According to a recent assessment of Indonesia, an Interagency Committee on National Policy and Planning for Coastal Zone Management is providing policy ideas to the national planning agency for incorporation into the economic development plan for 1984 to 1989 (Kux, 1983).

National economic plans create a degree of certainty about the coastal frontage and adjacent land needed for development within a particular time frame, thus avoiding more random patterns of proposals and demands on coastal resources. This certainty, in turn, provides more time to accomplish the integration with other sectors and the avoidance of impacts described above.

Four or five year plans may prove too rigid to take account of changing coastal circumstances. This rigidity may hamper a strong response to an environmental perturbation -- such as the crash of a fishery. National economic plans have also been criticized for being too mechanistic and therefore obstructive to innovation -- an effect that could also be felt in efforts to protect resources. At the other extreme, altering economic plans in response to every small perturbation in the economy is extremely disruptive for the agencies and productive units responsible for carrying out the plan.

6.2 Broad Scope Sectoral Planning

Traditional sectoral planning combines forecasting and implementation for capital investment, land use planning, and infrastructure needs for specific sectors of a national economy. Thus, sectoral planning shares several characteristics with national economic planning (see Section 6.1), but places more emphasis on issues other than the production of economic goods.

Those sectors with greatest economic relevance to coastal management in developing nations are port planning, fisheries, and tourism. Given the

close dependency of each of these sectors on a vigorous natural resource base, a consideration of habitat and environmental quality factors must be integrated with other aspects of sectoral planning to make the effort successful.

Several nations have recognized the importance of environmental factors, and taken steps to include them in sectoral planning of a broader scope. In the United States, fishery plans for specific species prepared by the National Marine Fisheries Service (NMFS) under the U.S. Fisheries Conservation and Management Act are based on environmental system analyses that take into account sustainable yields, on recruitment rates, among other matters.

The U.S. program also includes a capital investment dimension. Seed money has been granted to stimulate the organization of marketing cooperatives to help stabilize the economic fortunes of individual fishermen and stimulate fishery development of underutilized stocks. NMFS also tries to ensure that fishing does not interfere with other important marine resources. For example, they have worked with Gulf Coast shrimpers to try to avoid unnecessary mortality to endangered sea turtle species.

Given the fact that virtually all major ports are located in estuaries, port expansion is likely to produce the following impacts: the pre-emption of fringing wetlands, pollution of water, and destruction of productive benthic (bottom) communities. In addition, industrial facilities conflict spatially with public recreation or commercial fishing as well as pre-empt public access to the shore.

According to a forthcoming article on coastal management in Japan, port authorities operating under the mandate of the National Ports and Harbor Act and the guidelines of the Ministry of Transport prepare comprehensive coastal management plans for their land and water jurisdiction (Inoue, in press). The transportation development sector in Japan is concerned not only with port modernization plans but also with various urban development and environmental improvement programs. Figure 6.1 illustrates the process. The process depicted by the figure includes the preparation of an environmental impact statement and review of proposed plans by a local port council consisting of various interests including fisheries, recreation and citizens' groups (Inoue, in press).

Successful tourist development requires a mix of attractive accomodations and shops, suitable infrastructure (clean and sanitary water, good roads) and an accessible, relatively unspoiled environment. These goals can conflict with each other and with the development plans of other sectors.

A decade ago Yugoslavia organized a pioneering program to accomplish balanced tourist development on the Adriatic Coast with concern for both environmental carrying capacities (particularly water supply and beach area crowding) and maintenance of cultural values (Shankland and Cox, 1972). Oceanic island nations -- such as Western Samoa and Fiji -- are recognizing the need to plan tourism development in a manner that will neither threaten the exceptional fragility of island ecosystems nor disrupt island

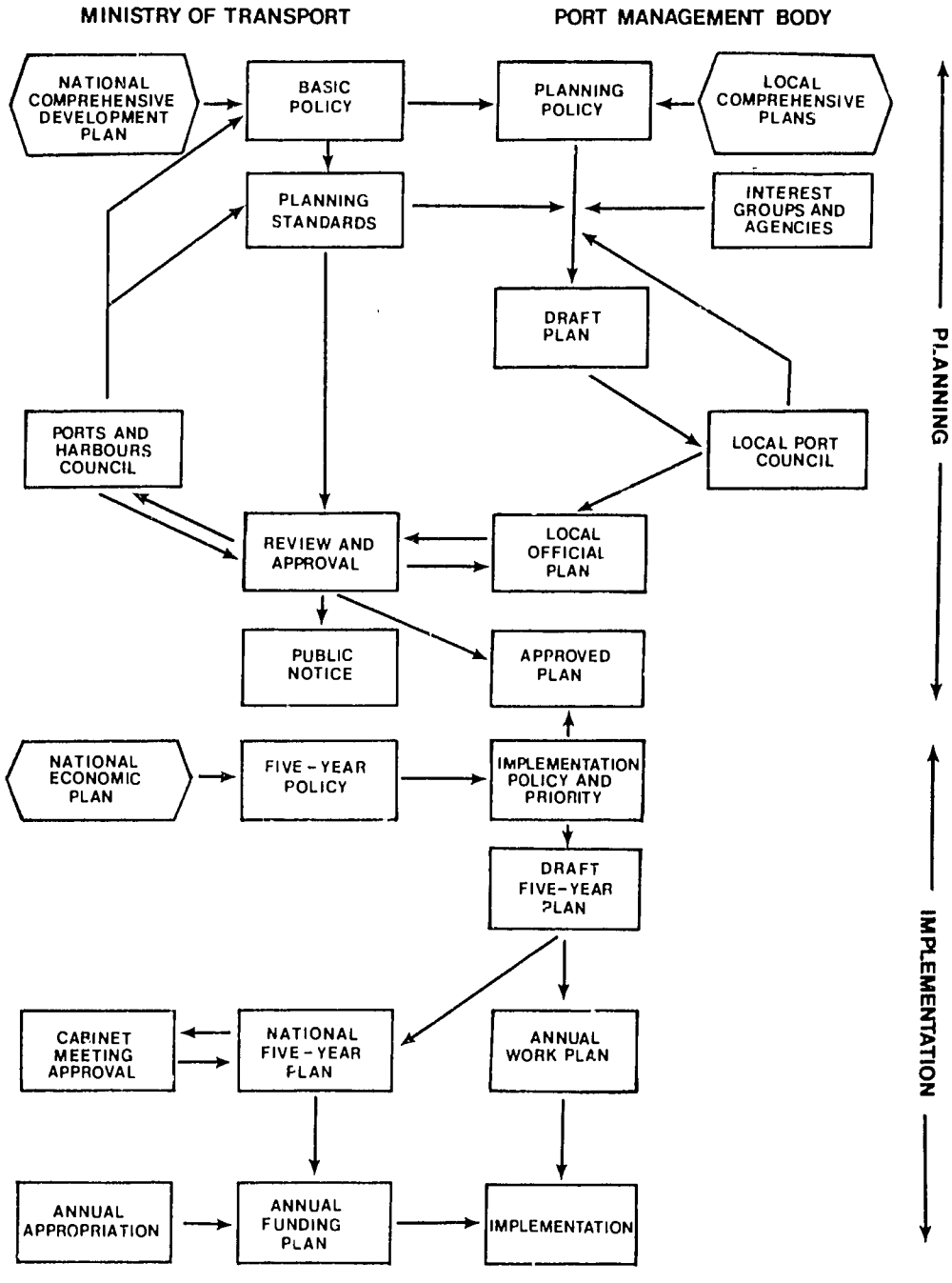


FIGURE 6.1: Procedure of port planning and implementation in Japan (Source: Inoue, in press).

societies. (See the Island Ecosystems Case Study.)

Brazil and Colombia provide examples of broad sectoral planning for marine and coastal research. Both nations have established coordinating organizations linked to the national economic planning program to chart national programs for marine and coastal research. In Brazil the applied research objectives are related to information needs of other governmental sectors -- such as aquaculture development and estuary pollution control (Brazil Interministerial Commission on Ocean Research, 1981; Knecht, 1983).

Broad scope sectoral planning is only a marginal change from the status quo. Since institutions have an inherent tendency to make only marginal adjustments when confronted with a necessity for change, broad scope single sector planning is more likely to be implemented than any other management strategy. Broad scope sectoral planning often serves as a transition to the integrated management strategies. If an agency broadens its horizons to assess the full range of impacts associated with its projects, and this wider perspective produces a net benefit to the agency, this positive experience should make the agency more amenable to taking the next step to an integrated management strategy.

The evident disadvantage of broad scope single purpose planning is the perpetuation, to some degree, of non-integrated, single purpose programs and, accordingly, lack of interest in integrated planning when such an approach would be the most effective means for resolving an issue.

6.3 Regional Seas

The institutional parent of the Regional Seas Program, the United Nations Environment Program (UNEP) was created in late 1972, largely as an outcome of the Stockholm Conference on the Human Environment (Hulm, 1983; UNEP, 1982). UNEP's first governing council set the health of the oceans as its foremost concern in 1973, and it remains one of seven leading issues today.

The Regional Seas Program was initiatied by UNEP in 1974. At the time, the major ocean concerns were trans-boundary pollution, ocean dumping, fisheries, scientific research, and conservation.

Initially, four regions were chosen for special attention: the Mediterranean, Kuwait and the Gulf Region, the Caribbean, and West Africa. Over the next five years, UNEP added four more regions: the East Asian Seas, the Red Sea and Gulf of Aden, the South East Pacific, and the South Pacific. In 1980, the governing council expanded the program to include East Africa and the South-West Atlantic.

In each case, UNEP's strategy consists of four steps (UNEP, 1982):

- an Action Plan setting out activities for scientific research and cooperation, including assessment and management;
- a legally binding convention embodying

general principles;

- technical and specific protocols to deal with individual issues;

- financial and institutional arrangements that implement the first three steps.

Each nation participating in a Regional Seas Program must adopt the Action Plan before the process can move forward.

Regional Seas Action Plans usually contain four parts: assessment, environmental management, legislation, and support measures (UNEP, 1982b). Assessment, the first priority, is geared to evaluate sources and effects of pollution, the state of living and marine resources, and development practices.

Management projects are aimed to help build the capacity of local officials to make decisions and develop plans for coastal development. The legislative section includes regional conventions and protocols, which may be adopted simultaneously. Often, however, there is a significant time delay.

The leading success of the Regional Seas Program is the Mediterranean planning effort. A companion agency to UNEP, the Food and Agriculture Organization (FAO), provided the early impetus which was broadened in 1975 when an action plan was adopted. The European Economic Community (EEC) has joined all Mediterranean nations, with the exception of Albania in ratifying the convention. A 'black list' of banned substances is identified by the anti-dumping protocol; they include mercury, cadmium, DDT, PCBs, radioactive wastes, some plastics, and lubricating oils. A third protocol against land based substances was signed by twelve nations in Athens in 1980. Another protocol on protected areas, signed in 1980, is expected to increase the fifteen marine parks located in the Mediterranean to a network of one hundred. Eighty-four marine laboratories participate in a first phase of water quality testing; a second phase will run until 1991.

By early 1983, some US $8 million were paid into a trust fund for Action Plan implementation by the seventeen Mediterranean nations and the EEC. Offices oriented to specific aspects of the Action Plan are being opened around the region, consistent with UNEP's policy of delegating ultimate responsibility to the participating nations.

The voluntary participation of coastal nations in the Regional Seas Program helps to foster a sense of international goodwill, mutual benefit, and regional self confidence. The program is flexible enough to allow nations and regions to concentrate on solutions that are most pressing, or for which there is already common agreement. In this way, a political momentum is generated to inspire efforts to address the more contentious issues. The requirement that all nations adopt the Action Plan and subsequent conventions and protocols helps to catalyze improvement in the environmental laws of developing nations. Another strength of this program

is the explicit multilateral participation of scientists and scientific institutions.

A nation's participation in the Regional Seas Program would be likely to improve the nation's institutional capability, data base, and financial support for the following sets of transboundary issues:

- o marine pollution;
- o fisheries protection;
- o marine research of large scale oceanographic phenomena (e.g., ocean currents, upwelling, or storm forecasting).

The Regional Seas mechanism may also help nations deal with other joint multi-national interests, such as:

- o tourism (particularly in the Caribbean and the South Pacific);
- o mangrove conservation;
- o protection of migratory marine mammals and birds.

Since UNEP can only act at the request of national governments to begin formulating an action plan, the Regional Seas Program cannot respond quickly to resolve conflicts. Adoption of the Action Plan by all affected nations must precede further progress. The series of steps -- Action Plan, convention, protocol, implementation -- can take several years. (For example, the latest Mediterranean protocol to establish protected areas was signed five years after the Action Plan was adopted.) Since most members of Regional Seas Programs are developing nations, support measures for training, management and project implementation must be provided. Funding has been problematic, but UNEP has been fairly successful in "packaging" funds from UN multilateral and bilateral sources. As the name implies, members of Regional Seas are cognizant of major land based pollution sources if they affect ocean quality. However, the program does not give special scrutiny to land use issues that impinge on coastal resources of a transboundary nature -- such as the conversion of mangrove ecosystems for aquacultural and agricultural purposes and the consequent reduction of the regional shrimp fisheries.

6.4 Nation Wide or Subnational Land Use Planning and Regulation

The practice of land use planning and regulation at the national or subnational (usually a state or province) level is aimed at specifying the type, intensity, and rate of development in a particular area. Where impetus for land use planning and regulation originates from a central authority, there is usually a set of goals or policies to which particular plans should conform. Land use plans, consisting of both maps and

policies, are then normally translated into a set of guidelines and legally binding rules such as zoning ordinances. The earliest and still most common form of zoning is often called Euclidean zoning, a practice in which a single use designation (e.g., low density residential, central business district or heavy industry) is assigned to each parcel of land.

More recently, several variations on the theme have been proposed and implemented in some locations. Overlay zoning is a technique often used to protect sensitive resources. This involves the imposition of special restrictions (e.g., requirements for setbacks or retention of wetland habitats) in addition to designation of permitted land uses. Incentives may also be combined with land use designation by permitting greater density on coastal frontage to encourage development of high priority facilities, such as commercial fishing piers or other maritime commercial uses.

In the 34 former British Commonwealth countries, land use planning is derived from the English tradition of Town and Country Planning. In the United Kingdom, the Town and Country Planning Act requires local planning authorities to make careful surveys of their areas and to estimate needs over the next twenty years for housing, schools, industry, and roads (Waite, 1980). The authority then draws up a proposal showing how these needs will be met in land allocations, and prepares maps of various scales, depending on whether the subject is a town, a county borough or a county area. Town maps show proposed areas where special powers for land acquisition may be sought. The plan is supported by a written statement outlining the major proposals, and a program map illustrating the phasing of development. A public hearing is held and an inspector -- a trained civil servant -- makes recommendations to the Minister for Town and Country Planning who then decides whether or not to approve the plan. After plan approval, planning permission for all but relatively minor projects must be approved by local authorities. Local decisions may be appealed to the Minister.

In recent years, the tendency in Town and Country Planning in England has been devolution of authority to local units of government, increased public participation, and streamlined administrative processes.

The U.N. Ocean Economics and Technology Bureau book's descriptions of national efforts indicate that at least four countries have amended their Town and Country Planning programs to include a particular set of policies for land use control within a delineated coastal area (UNOETB, 1982). The Bahamas are preparing "development plans on an island-by-island basis, treating the coastal area as a separate planning entity." In Cyprus under the Town and Country Planning Act "there are detailed regulations governing streets, construction and alteration of buildings . . . in coastal areas." Jamaica is preparing a plan for coastal management which endorses "the evaluation of sensitivities and classification of areas of environmental concern." In Mauritius,

> the coastal area is regarded for physical planning purposes as both a separate entity and a part of national planning. The coast is dealt with as an entity in respect to recreation. For

planning purposes coastal areas begin from 1 km inland of the high water mark to the end of the coral reef (about 50 m depth) (UNOETB, 1982).

Guatemala is another example of special policies for land use planning within a shoreland area.

The coastal area of the country has been treated as a separate entity with regard to zoning. The coastal areas extend 3000 meters inland from the seashore (UNOETB, 1982).

In the United States, California's requirement that all 53 coastal cities and 15 coastal counties draw up a Local Coastal Program (LCP) is the basis for the most ambitious of the United States' coastal management programs with land use planning as its focus. Consisting of a land use plan and zoning regulations, an LCP must reflect the state policies on public access, water and marine resources, land environments, new development, ports, and energy facilities. Within the general framework of coastal resource protection, local governments have discretion over which goals to emphasize. The State Coastal Commission, the permit-letting agency for the coast, is responsible for reviewing all LCPs to ensure consistency with the policies embodied in the State California Coastal Act. Following state approval, local governments are responsible for administration of the land use plan and implementation zoning ordinances. However, the Coastal Commission still has oversight jurisdiction over sensitive habitats and areas immediately adjacent to the shoreline.

A state requirement that local governments prepare coastal zone land use plans -- as practiced in California -- is one of the most popular mechanisms used by coastal states to implement coastal zone management programs funded by the U.S. Coastal Zone Management Act. The arrangement has been termed state-local collaborative land use planning (Sorensen, 1978). To date -- in addition to California -- Alaska, Florida, Louisiana, Maine, Michigan, Minnesota, North Carolina, Oregon, Washington, and Wisconsin have adopted the state-local collaborative land use planning model to implement their coastal zone management program.

Sweden has taken steps to intervene in coastal land use at the national level. Legislative changes in the National Physical Plan empower the King in Council (the Government) to define a national interest in a particular area and order revision or preparation of the local master plan to address that national interest. Additionally, the King in Council may order that the plan be legally binding, and declare a moratorium on development while the plan is pending. These steps are motivated by the finding that environmental quality was being impaired in many parts of the nation's coastal zone. Industrial siting, "holiday homes," and public recreation needs were key issues (Hildreth, 1975).

Ireland also follows the model of a central land use planning authority cast in the role of issuing guidelines for use by local land use authorities. The National Institute for Physical Planning and Construction Research has recently issued guidelines for use by local governments in amending Town and Country plans for coastal areas (Mitchell, 1982).

Although Nigeria does not actively operate a strong national coastal management program, it does have a Town and Country planning process. In March 1978, the federal government issued a land use decree which effectively nationalized all land not in productive use. "Theoretically, this makes possible comprehensive national regulation of development in presently unoccupied coastal areas" (Mitchell, 1982).

In Thailand, the government:

> has perceived the coastal zone to be an area important to the national economy, which can be extensively developed, especially in agriculture, fisheries, forestry, industry, tourism, and environmental conservation. As a result, many initial efforts to organize national coastal resource management programs have been developed. The Coastal Land Development Project was established in 1971 to facilitate proper planning of multiple use and management of coastal resources. Coastal land will be managed for eight types of use: coastal agriculture, fisheries, animal husbandry, salt farming, mangrove forest preservation, port construction, industrial zones, and tourism. When this plan is finished, it is to be submitted to the Coastal Land Development Committee for approval (Adhulavidhaya et al., 1982).

Land use planning presents a mechanism to resolve use conflicts arising either along the shoreline or at inland locations affecting the coasts. In this way the consequences of agriculture, watershed development and potential filling of wetlands can be addressed in the context of coastal resource management. When linked with strong zoning, land use planning provides clear guidance and certainty about future development -- both in pinpointing the precise location of future development and specifying the types of uses allowed.

Programs organized at the state-wide or nation-wide level provide an opportunity to deal with multiple use conflicts in a consistent manner. Lessons learned in one local area can be adapted to other locations. Under both the Town and Country Planning and state-local collaborative land use planning arrangements described above, strong policies can be formulated by a central authority and adapted to local conditions, with an oversight role to ensure that the state or national interest is upheld.

Land use planning has often been criticized for its somewhat speculative nature. In most cases, plans are only as effective as the zoning ordinances and use restrictions that implement the plan. These in turn are guided by the integrity or political will of the government agencies responsible for plan administration. The principal vehicle for plan administration and implementation is the issuance of development permits. In most cases, land use plans alone cannot stimulate capital investment, nor do they ensure that development actually occurs on a specific plot of land.

For the developing countries, customs and traditions of opportunistic use of land, combined with uncertain land tenure, may complicate efforts to

implement a clear, rational land use plan. This is most clearly evident in the proliferation of squatter settlements in most metropolitan areas.

Programs for land use planning instituted at the state or national level may override traditional local authority. Objections to this perceived preemption have been registered in many locations, notably those U.S. states practicing state-local collaborative and Sweden. Local authorities in Sweden have objected to invasion by the national government of their traditional "planning monopoly" (Hildreth, 1975).

To be successful, land use planning requires an extensive information base -- covering a range of natural resource characteristics, historical settlement patterns, institutional and political concerns. The strategy also requires the capability to interpret the data and fashion a single coherent plan. In most developing countries, the data base and the capability to synthesize the data may not be available. For example, in El Salvador a professional planner observed that approximately eighty percent of the essential information base is lacking. What little information exists is not adequate to support nationwide land use planning (UNOETB, 1982).

Finally, land use planning does not provide a strong mechanism to cope with issues at the land/water interface or in the water column. Obvious examples here are protection of mangroves, coral reefs, submerged grass beds, or fisheries. The failure of land use planning to include water areas has been noted by a number of planners in developing nations (Baker, 1976; Beller, 1979; Amarasinghe and Wickremeratne, 1983; Mitchell, 1984).

6.5 Special Area Plans or Regional Programs

"Special area" plans or "regional programs" refer to programs for land use regulation, economic development resource or environmental management, or a combination. They are multi-sectoral in nature. They may concentrate on a single issue (e.g., tourist development), but other considerations are included as well. Their geographic focus is typically larger than a single city or county, but less than an entire state or province. A distinguishing feature of special area plans -- as the term is used in this report -- is that they are mandated by a legislative body or responsible ministries of a nation or state.

The boundaries of such programs are usually delineated with two purposes in mind. First, they are intended to "capture" national resource or economic development issues that cross the boundaries of states or local governments. Such issues might include watershed management, protection of sensitive habitats, or development of a regional transportation network. Second, the boundary is drawn to encompass a significant natural resource, such as an embayment, river basin, estuary, mangrove hydrologic unit, or a littoral drift cell defined by shoreline erosion processes.

The French government engages in large scale coastal resource development programs acting through units of the special interministerial committee which oversees land use planning (Harrison and Sewell, 1979;

France, Ministry of the Environment, 1980). The principal tools of these units are extensive legal powers and substantial budgets for planning and capital works construction. The coasts of Languedoc and the Aquitaine region are the focus of efforts to attract visitors from other heavily used resort areas. Some of the early work in the Languedoc region generated significant environmental impacts. A chain of resorts extends along 125 miles of coast. Roads, hotels, and marinas were installed, wetlands filled, harbors and lakes deepened, and artificial beaches created. In contrast, the planning for the Aquitaine region has been recognized as a model of sensitive coastal development and conservation (Mitchell, 1982).

In Greece, the most successful part of the national coastal effort has been the development of regional coastal planning programs "which have contributed to the mobilization of regional and national interests for cooperation in [resolving] coastal issues" (Camhis and Coccossis, 1982). Crete has been one of the most active areas. The Chaind region of Eastern Crete was elected as a pilot project for an in-depth examination of coastal managment issues. The purpose of this effort, besides solution of problems in the area, was to provide information for program evaluation. The pilot program gave special emphasis to developing an appropriate implementation strategy with the cooperation of local authorities and the public (Camhis and Coccosis, 1982).

Indonesia's program for integrated coastal swamplands development in Sumatra presents a good example of the regional planning approach in a developing nation (Hanson and Koesoebiono, 1979). The principal motivation of this effort is a desire to locate and develop suitable settlements for a portion of the nation's rapidly growing population, which now occupies just seven percent of Indonesia's area. Government policy to settle marginal land arises from the current distribution of population and the permanent cultivation of the best agricultural land. This forced a difficult choice between development of agriculture and settlements in erodable uplands, and settlement in estuarine deltas with productive forests and shrimp fisheries.

Given the large number of questions about the optimal use and management of these marginal lands, an integrated program was suggested for area development and environmental management. Between 1969 and 1974, six pilot projects were developed by the Ministry of Public Works (P.U.T.L.). These trial efforts led to a committment in 1974 to open one million hectares of delta lowland. Together with the finding that rice crops could be grown within one year after swampland is directly connected to a river, an awareness grew of the need to pay close attention to coastal zone environmental factors (Hanson and Koesoebiono, 1979).

The Ministry of Public Work's Tidal Swamp Reclamation - The Second Five Year Development Plan 1974/5- 1978/79 urged that development planning take account of environmental factors and that resources must be managed on a sustained yield basis. Throughout the country, regional planning units have been set up at the provincial and Kabupaten (county) level. A growing interest in impact assessment in Indonesia has led University scientists to prepare tables and matrices to evaluate likely consequences of development action and to transmit them to decision makers. Planning is complicated by

two systems of land tenure. One arises out of adat law in which resource rights are vested in village units; the second arises from national law. Further, Indonesian decision making involves multiple agencies with poorly defined channels of authority. Hence, decisions are often reached by a gradual process of consensus (Hanson and Koesoebiono, 1979).

Recent analyses of this situation have argued for a more formal set of agency responsibilities to carry out the conceptually sound regional planning approach (Hanson and Koesoebiono, 1979). The Regional Planning Office (BAPPEDA) is suggested as a focal point for impact assessment and a specialized unit is recommended for resource management and protection, through any of the three agencies which have coastal zone responsibility.

In the United States, one of the first regional planning bodies with an effective implementation program was the San Francisco Bay Conservation and Development Commission (BCDC). The agency was created in 1965 in response to citizen and legislative concern over the alarming rate of peripheral filling of San Francisco Bay -- and the consequent shrinkage of the Bay's size. Initially the agency was endowed with limited permit granting authority for the Bay shoreline and directed to report to the legislature on long-term regulatory needs. The outcome was a Bay Plan and permanent mandate to approve or deny projects that would fill bay bottoms or block public access within one hundred feet of the shore -- a policy which still exists. Decisions are made by a commission comprised of a mix of local governments, agencies and citizens. BCDC has virtually halted the net loss of wetland acreage and bay bottoms, yet has permitted construction of needed port and airport facilites along the Bay's edge by obtaining mitigation in the form of wetland restoration (Swanson, 1975).

Australia established the Port Phillip Authority in 1966 to cope with major issues confronting the state of Victoria -- notably coastal erosion, land-use conflicts, and lack of coordination between public agencies (Cullen, 1977; Cullen, 1982). Membership of the Authority is drawn from a mix of public representatives and the pre-existing agencies concerned with aspects of coastal development: the Departments of Crown Lands and Survey, Public Works, two local government representatives, and two citizen representatives. Jurisdiction extends two hundred meters landward and six hundred meters seaward. Responsibilities include coordinating development in the Port Phillip area, preserving existing beauty and preventing deterioration of the foreshore, and improving facilities in the Port Phillip area for public use. The Authority was strengthened in 1980 to improve its permit enforcement capabilities. Based on the general success of the Port Phillip Authority, the Victorian government later extended many aspects of the approach to the rest of the state (Cullen, 1982).

The regional level of planning and analysis confers a number of advantages which are absent from local level and national level planning. At the regional level, it is possible to address and resolve resource issues confronting whole ecosystems, such as siltation of an estuary as a result of development in its watershed. Very often these issues cross a number of jurisdictions and cannot be dealt with effectively without a regional geographic focus. Coastal management institutions organized at the regional level -- like BCDC and the Port Philip Authority -- often

present an opportunity for local government authorities and officials with responsibility in various sectors affecting the region to cooperate in resolution of common problems. This trend was illustrated by the examples drawn from Australia, California, and Indonesia.

By choosing a regional focus, national governments achieve the benefit of being able to concentrate on the areas with the most pressing problems. At the same time, a regional program can serve as a model which can be tested and modified and perhaps extended to other regions. This was the approach used in Greece, Australia, and California.

Most regional planning exercises have a predominantly landward focus and do not explicitly deal with water based issues such as fisheries management. Either the regional agency does not have the regulatory authority for water areas and resources, or it chooses not to exercise its authority in the "wet side of the coastal zone." BCDC, the California agency, has no significant authority to manage bay fishery resources. Similarly, the French planning exercises are predominantly land use planning linked with capital works and resort development (Harrison and Sewell, 1979). The Indonesian example, though still at an early level of development, offers some promise to deal more specifically with the "wet side" fisheries and wetland habitats.

The issue of local autonomy may arise during the creation of a regional planning agency by a state or national level legislative body. This opposition is the most significant where traditions of local government control are strong. Consider the case in which a politically powerful city (such as the national capital and largest metropolitan area) is situated on an estuary. If that estuary is the object of a nationally-sanctioned regional planning effort, conflicts could arise over the economic or port development goals of the city and the regional need to preserve fishery, aquaculture, tourism, and recreation resources.

6.6 Shoreland Exclusion or Restriction

Shoreline exclusion refers to regulatory programs which specifically prohibit or significantly limit certain uses within a strip or band in the coastal zone. The areas subject to shoreline restriction are typically landward of the high water mark; they are rarely the intertidal zone or submerged lands because the national government usually controls those areas under separate mandates. In developing nations the shoreline exclusion strategy commonly arises from three concerns: blockage of public access, degradation of views, and erosion of shorelines. Residential development and tourist development appear to be the primary targets of shoreline exclusion. In some cases, exclusion zones and land use planning boundaries for permit letting are mutually supportive, and may be integrated into a single program. Shoreline exclusion zones differ from critical area management programs (see Section 6.7), in that they are coast wide, and do not carry a special designation declaring the uniqueness of particular types of areas.

There are essentially two types of shoreland exclusion programs: (1)

those with fixed upland and offshore dimensions and (2) those defined on the basis of the features of the shoreland. A variety of dimensions have been defined in shoreland exclusion zones. Figure 6.2 displays the inland extent of exclusion zones in twelve nations or states. The twelve examples identified are not assumed to be a definitive lising of this management strategy. The inland distances depicted in Figure 6.2 vary from forty feet to three kilometers.

Costa Rica's 1977 law defining the boundaries and management regime, La Ley Sobre La Zona Terrestre, is an example of the first type of exclusion -- fixed boundaries. The fifty meters above mean high water is the Public Zone. It cannot be owned or controlled by any private party. Its use is dedicated to public use and free transit. The next one hundred and fifty meters landward is the Restricted Zone where development is tightly controlled by three national government agencies with extensive coastal management interests (Blair, 1979).

In Greece, the National Coastal Management Program imposes "strict controls" within a five hundred meter band on both sides of the shoreline. Thus, Greece departs from the general pattern and imposes controls both landward and seaward of mean high water (Camhis and Coccossis, 1982).

The concept of public ownership of land along the shoreline is an historical tradition in many countries. In Australia and New Zealand, a one hundred meter-wide band of Crown Lands constitutes this public area. In both countries tradition has not been maintained in some areas, and Crown Lands have been sold off ("alienated") for development. Some steps have been taken, however, to preserve the public interest in Crown Lands through shoreline exclusions. Since 1851, coastal subdividers in New Zealand have been required to set aside esplanade or foreshore reserves for public open space uses. These foreshores consist of strips of land 66 feet wide paralleling the mean high water line (Chapman, 1974).

In the United States, a program to protect resources and guarantee public access in the state of Oregon exemplifies the second type of exclusion program -- coast-wide exclusion based on the configuration of natural features. A state supreme court decision upheld a century-old law requiring that the entire foredune area (to the inland line of permanent vegetation) be kept free of construction and fencing to ensure the continued right of access. This restriction also confers the benefit of protecting dune vegetation and associated wildlife (Oregon, 1976).

The Bahamas offer another example of a shoreland exclusion determined by the characteristics of the site. The government's Planning Guidelines for the Control of Land Use and Development in the Commonwealth of the Bahamas (1976) do not fix the setback requirement for building in the coastal area, but requires "a view of the sea," whereas, in the city, the limit is set by distance (from fifteen to thirty feet) from the street (UNOETB, 1982).

Norway has both a fixed and variable setback. No building is allowed within the first one hundred meters, and for second homes, development is set back as far as necessary to control the adverse effects of residential

Figure 6.2: Coastal Exclusion or Restriction Setbacks

DISTANCE INLAND FROM SHORELINE*

Hawaii	--40 ft.
Philippines (mangrove greenbelt)	----- 20 m.
New Zealand	------- 66 ft.
Oregon	---------- Permanent vegetation line (variable)
Indonesia**	---------- 50 m.
Costa Rica (public zone)	---------- 50 m.
Norway (no building)	---------- 100 m.
Sweden (no building)	---------- 100 m.
Costa Rica (restricted zone)	50 m. ---------- 200 m.
Italy (no construction)	---------- 300 m.
Indonesia** (mangrove greenbelt)	---------- 400 m.
Greece	---------- 500 m.
Denmark (no summer homes)	---------- 1-5 km.
USSR (exclusion of new factories)	---------- 3 km.

*Definition of shoreline varies, but it is usually the mean high waterline.

**Indonesia has both a 50 m setback for forest cutting and a 400 m "greenbelt" for fishery support purposes. (See text for explanation).

construction. (UNOETB, 1982).

Denmark has a similar exclusion program for beech protection. Its Conservation of Nature Act provides protection against construction and landscape changes in a one hundred meter coastal zone. Recent guidelines drawn up by the Ministry of Environment prohibit building of summer houses within a protected belt of one to three kilometers from the coast (UNOETB, 1982).

Shoreline exclusion or restriction programs are administratively attractive: they are inexpensive, geographically precise, and offer clear guidance about prohibited uses. This administrative simplicity provides a high degree of certainty for both coastal management agencies and potential developers. Such zones can be tailored to particular natural resource features such as dunes, mangroves, or other wetland habitats, to ensure that they are protected wherever they occur in the coastal zone. Exclusion providing a setback for public access and shoreline recreation is likely to enjoy wide support from inland residents who don't own coastal property. Shoreline exclusion zones with specific dimensions provide consistency throughout a nation or subnational unit. In a situation where coastal resources are being degraded at an alarming rate, exclusion zones are a convenient way to impose a moratorium on development until a more comprehensive land use plan can be prepared and implemented.

This technique is ideally suited to be combined with a broader program of coastal land use planning for a state or nation. Exclusion zones can constitute both the first thrust for the declaration of public trust <u>and</u> form the core of a permanent system to limit modification where sensitive resources occur as well as allow development elsewhere on a permit basis.

In developing nations, the concept of the public right to gain access to and along the coastline may be a persuasive political argument for coastal zone management. Costa Rica exemplifies this situation. Exclusions providing a setback for public access and shoreline recreation are likely to enjoy wide support from inland residents.

Coasts which are highly developed or urbanized present difficult or impossible circumstances for exclusion zones. Imposition of an exclusion zone would be opposed in political circumstances where native citizen private property owners have enjoyed a high degree of discretion in implementing their own development plans. Similarly, it is doubtful that exclusion programs could be adopted without strong support from a nation's legislative body or the chief executive's commitment.

The inland exclusion distance is often not great enough to resolve the issues the strategy was established to resolve. For instance, public access (or view protection) may not be guaranteed by any boundary line that is seaward of the public road nearest the coast. Similarly, effective control of shore erosion hazards may not be achieved unless the exclusion zone includes the entire shore area that can be expected to erode during the lifetime of existing or proposed development (e.g., 50-75 years).

Without a complementary program of land use planning or some other

effective planning strategy (e.g., sectoral planning), exclusion programs alone leave large gaps in a national effort to achieve an integrated coastal management program based on a coastal systems perspective -- as outlined in Section 2.6.

6.7 Critical Area Protection or Exclusion

Critical area protection programs are enacted by state or national governments to achieve one or more of the following purposes: (1) to conserve or preserve a particular type of sensitive environment or natural area (such as mangroves, wetlands, barrier islands, coral reefs, and endangered species habitats), (2) to preclude development on selected eroding coasts, or (3) to restrict development in a special flood plain. In the context of the first purpose, critical area protection is very similar to sectoral planning for wildlife protection. In the second and third contexts -- hazard protection -- critical area protection is very similar to exclusion zones.

Three features distinguish critical area protection as a management strategy. First, a formal designation sets the stage for the program. Often this is a result of an inventory of resources and a screening of candidate sites, and a recommendation from an agency staff person to a decision making body. Second, critical area programs are not implemented on a coast-wide basis -- such as for all the nation's mangrove forests. Instead, they are selected for specific geographic locations -- such as the mangrove forests bordering Guayaquil Bay. Third, designated critical areas typically address the concerns of more than one sector; they simultaneously serve the purposes of wildlife protection, hazard area management, parks, and perhaps research. The strategy of critical area designations often represents an intermediate step before the creation of wildlife refuges, parks, or hazard control zones. Area designations for eroding coasts may precede a shoreland wide exclusion strategy.

The International Union for the Conservation of Nature and Natural Resources (IUCN) has been an important force in assisting nations to establish protected areas for habitat preservation and conservation of genetic diversity, including both marine and terrestrial areas adjacent to the shoreline.

A commonly used technique to implement critical area programs is severe restriction of development -- usually in perpetuity, through some form of purchase, ministerial restriction or condemnation. Often an activities plan is prepared for the critical area delineated in order to prevent use conflicts. In some cases, education or research programs are organized to take advantage of the resources in the critical area (McNeely and Miller, 1983).

Land use planning for a "buffer zone" around the core resource area is sometimes incorporated in critical area programs; in other cases, an environmental assessment must precede any project in or adjacent to the critical area. Under Indonesia's National Forestry Act, a 50 meter wide belt of "protection forest" must be maintained along coastlines in

mangrove harvesting and a 10 meter wide belt must be kept intact along river banks (Koesoebiono et al., 1982) (a complementary program involves reforesting upland areas to promote the goal of sustainable yield). In a separate initiative, the Directorate General of Fisheries ordered provincial governors to maintain a 400 m "greenbelt" along the coastlines (Koesoebiono et al., 1982).

In Queensland, shoreline erosion is addressed through the Beach Protection Authority (BPA), which maintains a four hundred meter jurisdiction. Within this jurisdiction, special Beach Erosion Control Districts have been created, within which no development may proceed without BPA's approval. BPA can also control sand removal or vehicle use within a Beach Erosion Control District (Cullen, 1982).

The Barbados Parks and Beaches Commission Act enables the Commission to prepare regulations governing beach protection, sanitary conditions and practices to be observed with respect to public parks and beaches (UNOETB, 1982).

Critical area management shows promise as a technique to help developing nations avoid the consequences of urbanization in flood plains, and agriculture or forestry on steep erodable slopes, two of the most common problems confronting nations throughout the world. This management strategy enables a nation to concentrate funds and staff resources on the most threatened or hazardous areas of the coastal zone. The very term "critical area" alerts citizens and decision makers to the need for quick action. Since many designated areas support more than one important resource or hazard, the critical area strategy provides the flexibility to tailor detailed site plan or management approach to unique local conditions. Often this is preferable to routine use of general environmental guidelines (see Section 6.9).

The designation strategy can also be used as a stop gap measure until a more programmatic solution can be found through shoreland exclusion or perhaps a more standard sectoral plan for parks, research or erosion control. Administration is relatively simple, and overall costs are low.

Critical area designation, like acquisition programs (see Section 6.10), is seldom a complete response to a resource issue. It is likely to be more comprehensive than acquisition alone, however, because critical area protection usually has both a land use regulatory program and rules for guiding human activities within the area. A critical area designation can also become the focal point of intense political controversy.

6.8 Environmental Impact Assessment

One of the notable consequences of the Stockholm Conference on the Environment was the international diffusion of environmental impact assessment ("EIA"). The term is used both to desribe a governmental process and an analytic method. As a process, EIA is usually imposed by government to force public agencies -- and in some cases private developers -- to disclose environmental impacts, to coordinate aspects of planning, and to submit development proposals to review. As an analytic method, EIA

is used to predict the effects of a project or a program. The three fundamental premises supporting these objectives are:

- cause and effect relationships can be determined with reasonable accuracy and presented in terms understood by policy makers;
- prediction of impacts will improve planning and decision making;
- the government can enforce decisions emanating from the impact assessment process.

The EIA process includes assessment of a proposed project's potential effects on the sustained use of renewable coastal resources as well as the potential effects on the quality of the human environment. The process is mandated by law or executive decree and generally involves a procedure that requires the following set of information: (1) the characteristics of the project site, (2) description of the project, and (3) description of the consequences or impacts of a project for different dimensions of the environment. Usually it also required that alternatives to the project be identified and comparatively assessed, and measures to avoid or mitigate impacts are spelled out.

Typically the procedure of impact identification and assessment of its severity is combined with an institutional process requiring preparation of a formal document, or holding of a hearing, in order to describe environmental impacts and strategies to reduce them. A specific agency or ministry is given responsibility for being the focal point of the EIA process. The outcome of this process is often the imposition of mitigation measures as a condition of project execution. These measures may take the form of design changes, shifts in project location, or changes in the order in which different portions of the project are constructed. For example, a resort development may be redesigned to avoid destruction of dune vegetation and prevent interruption with a natural sand supply, or construction of a pier may be timed to avoid interference with the spawning cycle of a commercially important fish.

In this discussion, it has been noted that impact assessment is usually focused on the project level. In fact, assessments may focus at the program level, such as for a river basin development initiative. This programmatic approach is less common in developing countries (Horberry, 1983). Program level assessment -- when done for a large geographic area -- is conceptually similar to regional planning but does not include a mechanism to compel actual plan making and implementation.

Three different standards of review are in common use to decide whether an EIA is needed. Depending on the agency and its mandate, the EIA process may be invoked as follows:

- for all projects in the coastal zone or other sensitive area (Greece's coastal management program has this requirement);

- for any project likely to create significant environmental impact (the most common situation);

- for any project of a specific type (e.g., major roads, large public works projects).

In the United States, the National Environmental Policy Act (NEPA) and subsequent guidelines, established the legal framework for impact assessment. Its requirement that the environmental consequences of federal projects, and their alternatives, be assessed extends to all U.S. supported international activities with potentially significant adverse environmental impacts, including projects funded by U.S. AID. Special emphasis is to be placed on irreversible impacts and on the cumulative effect of a project together with past and future projects. The World Bank also requires that environmental impacts of projects be assessed. Most other regional development banks have recognized that good investment policy requires an accounting of projects in terms of both economic and environmental feasibility. In fact, failure to consider environment impacts has been cited as the cause of major shortcomings in the success of resource development projects -- particularly large scale impoundments (World Environment Report, 1982).

A number of nations in both the developed and developing world initiated requirements for environmental impact assessment following the 1972 Stockholm Conference. Since that time, several nations have taken steps to upgrade their EIA requirements or to incorporate them in other dimensions of coastal management.

In Holland, procedures for environmental impact assessment have been regarded as a significant contribution to that nation's coastal management effort (Wiggerts and Koekebakker, 1982). Greece requires an impact statement on all projects within five kilometers of the shore (Camhis and Coccossis, 1982).

The European Community has proposed a Directive on Environmental Impact Assessment that, once ratified, would bind all member states. The proposal calls for developers of certain types of projects to submit an EIS when seeking project approval. An open process is suggested requiring the responsible agency to coordinate with other agencies and to make the report public before rendering a decision (Camhis and Coccosis, 1982).

Developing nations with assessment requirements include Brazil, Thailand, the Philippines, Indonesia, and India. Sri Lanka requires an environmental impact statement for all major development (Amarsinghe and Wickremeratne, 1983). USAID funded an environmental assessment in that country for a major irrigation program of the multi-donor Mahaweli Development Program. The study evaluated land use changes, losses to forestry and wildlife, soil erosion, water quality changes, reduction of wetlands, effects on fisheries, and several social issues. Extensive recommendations were made on natural system management which were carried forward in an action plan with special emphasis on animal migration corridors and wildlife conservation. Horberry (1983) cites the case as unusual because the impact assessment was carried forward into a specific

environmental planning program implemented by local authorities.

The UNEP Regional Office for Asia and the Pacific reported that an Environmental Impact Assessment on a deep sea port near the outlet of the Songkhla Lake basin influenced final port design (Horberry, 1983). Documentation of the potential sedimentation of the lake from dredging and construction, and pollution from port operations caused a change in the site of the port to minimize mixing of water from the port and the lake.

Given the impetus of the U.S. 1969 National Environmental Policy Act (NEPA) and the 1972 U.N. Conference in Stockholm, impact assessment has become one of the most widely used coastal management strategies -- in both developed and developing countries (Horberry, 1984). This wide usage and relatively long term experience means that the methodology for impact assessment is well developed and commonly understood. Impact assessment procedures produce better information about both the host environment and the project, and serve to define and separate issues. Unlike broad scale sectoral planning, regional planning or national economic planning, impact assessment focuses attention on the details of projects that cause use conflicts in the coastal zone. Program level impact assessment can serve as an "early warning system" to avert the worst consequences of large-scale efforts such as river basin development plans, and ensure that the ecological, hydrological, geological, and social consequences are adequately addressed. Finally, a major advantage of EIA is the mitigation measures derived from an environmental assessment.

Mitigation planning in a region, or pooling of mitigation requirements, is the next step beyond EIAs carried out on a project-by-project basis and would be a useful way to build good integrated coastal resource management principles into the development sector. Thailand's National Environmental Board (NEB), the adminstrator of the nation's EIA program, has developed extensive guidelines on environmental assessments, with particular reference to coastal areas. The NEB is interested in using the EIA process to expand and incorporate coastal management considerations both within its own agency and other agencies (Kinsey and Sondheimer, 1984).

Many nations have experience with impact assessment through their involvement with international development banks and U.S. AID. As a result of this early exposure to the strategy, nations can often build on existing mechanisms to develop and refine useful impact assessment programs. This seems a particularly fruitful area for collaboration between governmental officials and academicians, as seen in the Indonesia example.

The strategy is relatively simple to execute and is not costly to administer. Consider a nation which has a strong commitment to rapid economic development, but lacks some other strategy with hard standards for guiding new coastal development. Impact assessment offers a way to make changes in project design and location, thus avoiding the most serious use conflicts without undermining the attractiveness of a project in economic or social terms.

The most common objection to environmental impact assessments is that they are only information reports or "report cards"; they are not decision documents. Their effect typically occurs late in the development process so they accomplish only minor, and perhaps insignificant "fine tuning" of project location or design. Conversely, impact assessment has been criticized for putting roadblocks in the way of timely project completion. These concerns are most likely to arise where institutions invoke impact assessment as an afterthought, or "add on," rather than an integral part of the planning process.

The identification and assessment of potential impacts is only as good as the available data base. Experience in developing countries suggests that the amount and quality of data is steadily improving, but is still deficient in many, if not most, areas. Collaboration of universities and government agencies may be one way to overcome this deficiency.

Environmental impact assessment is fundamentally an analytic and interpretive procedure; it is not a substitute for sound policies. Without a clear, straightforward translation of an assessment into a specific action such as change in project design, the EIA strategy is usually not meaningful, but only a cosmetic exercise.

A vexing problem in EIA is the difficulty of assessing the cumulative effects of environmental alteration. Impact assessment is most often conducted on an ad hoc or project-by-project basis. Few agencies have found suitable procedures to predict and account for impacts of a series of projects in a particular region or a particular ecosystem over a period of time. A related problem is the difficulty of identifying thresholds -- levels of change beyond which irreversible damage occurs.

6.9 Advisory Guidelines

Guidelines are distinct from impact assessment in that they are advisory in nature, and are not accompanied by a formal process requiring review and comment on a written document. Guidelines are usually multisectoral in scope; they may address a range of project types and natural resources, social and cultural issues. In this respect, they differ from broad scope sectoral planning, a management strategy which incorporates environmental consideration into planning for a single sector of a nation's economy (Section 6.2). Environmental guidelines are also similar to the model of land use planning in which central authorities draft guidelines for incorporation in plans prepared at the local level. However, the guidelines' strategy, by definition, does not mandate preparation of a specific plan or implementing measures -- otherwise it would be one of the other management strategies.

National or state guidelines are usually organized along three lines: types of uses (e.g., tourism development, channel dredging, and spoil disposal); types of environments (e.g., wetlands, mangroves); or geographic regions. Adoption of national guidelines is exemplified by the joint efforts of the Indonesian National Committee on the Environment, the Indonesian Institute of Sciences, and other leading universities to prepare

"General Guidelines on the Development and Management of Coastal Areas" (ASEAN, 1983). The management guidelines were organized as follows:

- inventory of natural resources;
- human settlement;
- land use and development allocation;
- environmental considerations in project planning and the development of coastal resources;
- food production and raw materials;
- conservation and environmental protection;
- recreation and tourism;
- infrastructures and engineering works;
- construction materials;
- public health;
- management of water resources;
- institutional framework;
- navigation, shipping and harbors;
- security.

A review copy of the guidelines was circulated to a variety of departments and used for six years. The Office of the Minister for Development Supervision and the Environment (the successor to earlier environment agencies) plans to revise the document to reflect both users' comments and recent environmental laws. The book may also be translated into English for review or use by ASEAN member countries (ASEAN, 1983).

An opposite response to the adoption of environmental guidelines is exemplified by Ecuador. That nation considered, but did not, adopt coastal development and conservation guidelines. It was concluded that on a nation-wide basis conditions in the coastal zone and along the continental shelf varied too greatly to apply uniform guidelines (Vallejo, 1981).

International assistance agencies have produced a considerable number of guidelines for types of projects and environments -- many of which have direct or indirect bearing on coastal management. For example UNEP recently produced a pamphlet on "Coastal Tourism" (Ahmed, 1982) as part of its environmental guidelines series. Similarly, the UNDETB (1982) produced a manual on technologies for coastal erosion.

Environmental guidelines can serve a valuable educational function and

offer general direction for project design and construction. At least they raise the level of awareness and understanding among agency and government staff. Drafting and revising guidelines also serves as a vehicle for intergovernmental communication as well as a forum for government agencies and interest groups concerned with coastal management -- as exemplified by the Indonesian experience. Guidelines can sensitize planners and policy makers in different sectoral or functional divisions to issues that require horizontal or vertical integration of government efforts. Guidelines have also been shown to be of assistance to the private sector that has an interest in development within the coastal zone. The guidelines should act as a handbook to provide foreknowledge of the government's policy and concerns regarding the impacts the proposal may generate. In some cases advisory guidelines contain hidden power because of the strength or influence of the agency issuing them. The perceived threat of formal imposition of guidelines by law may inspire voluntary compliance by developers.

A recent survey of 92 environmental guidelines publications produced by international assistance institutions made a number of conclusions that appear pertinent to developing nations:

> The fact that we found so little evidence of the systematic application of the existing guidelines suggests that either they have been tried and found useless or that agencies have not made sufficient resources and incentives available to sustain their use. We suggest that some agencies never put some guidelines into operation because their function is to improve public relations or to provide educational material to the development community in general. In other cases, staff of agencies do not use guidelines systematically because the guidance is too general or incompatible with real tasks and problems. In many cases, staff do not use guidelines because agencies do not require their use, nor provide the appropriate training and resources, nor establish any institutional penalties for failing to use them (Horberry, 1983).

6.10 Acquisition Programs

In this context, the term "program" is used to refer to an organized effort -- usually over an extended period -- for systematic land purchase. as distinguished from a one-time acquisition project. In developed nations, acquisition usually is the single most reliable way to secure the future of a sensitive resouce, or to ensure that land is available for a specific type of development for public use such as a port facility or a park. Acquisition programs may be carried out by the public sector, non-government organizations dedicated to particular resource protection or development purposes, or a partnership of public and private sectors.

In capitalistic developed nations -- and some middle income developing nations -- acquisition of specific parcels often represents the final implementation of a critical area protection program, as exemplified by the U.S. estuarine sanctuary program. It may also be used to implement

portions of a land use plan, or as implementation for sectoral planning for parks and reserves.

France operates an acquisition program dedicated to carrying out "a land policy of coastal protection respecting the natural landscape and ecological balance." Its Coastal Conservatoire is empowered to acquire land using preemption in cases anticipated by law or through appropriation. In addition, the Conservatoire is allowed to receive legacies and donations, and may enter into covenants with individuals to secure protection of the shoreline.

Policies and priorities for land acquisition are set by the Conservatoire's Administrative Council, a 34 member body comprised of elected officials and representatives of agencies and associations. Directions for action are based on the information of seven shoreline councils from North Sea, Atlantic - Bretagne, Mediterranean, Corsica, lakes, French shores of America, and French shores of the Indian Ocean. The Conservatoire can intervene in any shoreline community of more than one hundred hectares. A recent report indicated that sixty-five sites had been acquired representing 10,000 hectares and 120 kilometers of coast. Goals set in 1980 called for acquisition of 50,000 hectares in the following years (France, Ministry of Environment, 1980).

British experience with acquisition to achieve coastal protection dates back to 1895 when the National Trust for Places of Historic Interest and National Beauty was formed. A private organization, the Trust, accomplished its first acquisition on coastal cliffs at Dinas Oleu, near Balmouth, Wales. Other individual acquisitions followed, and in 1962-1963, the Trust inventoried the coast to identify suitable sites. In 1965, Enterprise Neptune was launched -- a campaign for fund raising and coastal acquisition. The government opened the fund raising with a 250,000 pound contribution. In two and a half years the fund grew to 1 million pounds, with private contributions, and stood at 2 million pounds by 1978. By 1976, 333 miles of coast had been saved by acquisition or covenant. Stewardship activities complement the land purchase work of the Trust (Steers, 1978). England's National Trust program has served as a model for similar citizen oriented efforts in New Zealand and Japan (Chapman, 1974, and Shapiro, 1984).

Acquisition is seldom a complete response to a significant coastal resource issue. There may be an erroneous tendency to assume that a problem is solved once an acquisition transaction is complete. For example, a land acquisition program for important wetland habitats can be frustrated by poor land use practices in the surrounding watershed, causing excessive siltation in the wetland basin. Beyond the problem of managing adjacent land uses, the acquisition must be followed up by a vigorous program of stewardship to ensure that the initial acquisition objective is fulfilled. This may mean monitoring easements or covenants to guarantee a free, well-signed public right-of-way, or a well-protected endangered species habitat.

Though administratively cost-effective, acquisition is certainly one of the most expensive of coastal management strategies. Unless a sustained

flow of funds can be assured and earmarked for exclusive use in acquisitions, this strategy is not likely to prove effective.

At this time, major acquisition programs for coastal protection appear to be concentrated in developed countries. As development pressure begins to impinge on the most sensitive resources in developing nations, acquisition campaigns are likely to become more important.

The financial, legal, and administrative costs of acquisition programs should be kept in mind by developing coastal nations. Presently many -- if not most -- of them have an advantage over developed nations with respect to the relatively rural, agricultural, or vacant condition of most of their shorelines. The generally undeveloped nature of their shorelines -- particularly when combined with liberal constitutional provisions for either the taking of land or restriction of private property development -- provides the opportunity for ensuring public use of shorelands, hazard control, and resources conservation through exclusion or critical area strategies. Nigeria's nationalization of all land not in productive use and Costa Rica's creation of an exclusion zone -- two examples decribed previously -- both illustrate the relative ease with which many developing nations may impose restrictions or acquire private property without full or even partial compensation to property owners. Obviously a developing nation's imposition of the exclusion zone or the critical area strategy is far less costly than the acquisition strategy developed nations are often forced to use as the only option available to achieve the same coastal zone management objectives.

6.11 Coastal Atlas or Data Bank

A coastal atlas or data bank is a systematic compilation, interpretation, and display of information linked to a specific set of coastal issues, organized for an entire state or nation. The premise of coastal atlases is described in a document prepared by the State of Texas:

> Through inventory and evaluation of coastal zone resources, environments, and land and water uses, programs can be established that will permit use of natural resources and maintenance of environmental quality by adjusting use to resource capacity (Brown et al., 1980).

Although simple data or mapping for one site or several sites can assist the policy making process such an effort is not regarded as an atlas or comprehensive data base. Rather, several features must be present to qualify an information system as an atlas or data base.

- information collected should be issue oriented, designed to lay the foundation for policy making;
- information should be collected consistently for the same parameters, and preferably at the same scale -- on a coast-wide basis;

- information should be compiled and synthesized in meaningful ways, using consistent weighting and scaling techniques;

- information should be easily retrievable.

A coastal atlas meets the criteria outlined above and, in addition, includes a reproducible set of maps prepared on a common scale. In some cases, the map may represent the final output of the data base. In other cases, preparation of a series of descriptive and interpretive maps may be part of the analytic effort. For example, an initial round of maps might be prepared to delineate biological, geographical and land use features on a stretch of coast. Next, a second round of maps may be prepared. At this stage, a map of slope stability could be prepared using maps of geological units, slope, and historical landslides. At the third stage, a composite map of all geologic hazards could be compiled, indicating levels of risk for new development and indicating areas to be avoided.

The same approach could be used to combine maps of shellfish beds, wetlands, and endangered species habitats into a single map of sensitive biological resources. The resulting maps would give planners and policy makers tools to guide the type and intensity of new development, or to choose priority areas for protection or acquisition.

For coastal management purposes, a data base refers to a set of information systematically organized around consistent geographic units. For example, a data base could be keyed to parcels or townships of land, an offshore tract, or a particular linear kilometer of coastline. Often the data base is conceptually organized as a table with information on a set of natural resource parameters (geologic material, soil type, vegetation cover, prevailing land use, agricultural suitability) keyed to each geographic unit. Alternatively, a coastal pollution data base might be organized as a network of points reflecting the location of monitoring stations for water quality. With the advent of reliable, low-cost computer automation, there is a pronounced trend towards computer storage of data bases. This, in turn, allows easy updating of information and completion a variety of computations.

Several U.S. states have prepared state wide atlases of their coasts as the information foundation for their coastal management program. Florida launched a mapping effort in the early 1970's, and Texas followed a few years later. One of the more ambitious efforts was completed by the state of Washington, in collaboration with the University of Washington's Geography Department. Over thirty parameters are mapped for each coastal county, each keyed to policies regulating shoreline development.

The European Commission recognized the need for consistent reliable mapped data and in 1973, as a method for "classifying the territory of the community on the basis of environmental characteristics" (Briggs and Hansom, 1982). The role of "Ecological Mapping" in the coastal zone was reiterated in the European Coastal Charter (Briggs and Hansom, 1982). Although a case study was carried out for the Basilicata area of Italy, the

proposed method does not evaluate the coastal zone as a separate entity. Four specific applications of data base and coastal stages have been suggested for the European Community: flood-hazard mapping, erosion hazard mapping, coastal pollution, and landscape and habitat evaluation (Briggs and Hansom, 1982).

The Philippines' Coastal Zone Program has undertaken a program of data collection for selected areas via analysis of LANDSAT images (Zamora, 1979). A national survey of coastal resource use is under way and a four volume report has been prepared. Approximately ten years ago, the Japanese government collected 24 natural and social factors pertaining to the coastal zone (Shapiro, forthcoming). The data was computer mapped for a band extending one kilometer on either side of the shoreline. Presently a coastal atlas is being prepared for Osaka Bay at a scale of 1:25,000 (Shapiro, forthcoming). The Osaka atlas is being prepared by university students, faculty, and citizens groups to influence the government's coastal development policy making process.

Sri Lanka is preparing maps of the coastal zone with technical assistance funded by USAID. Much of the work is being completed by students and faculty of the Geography Department, Peridynia University (Kinsey and Sondheimer, 1984). New Zealand has compiled an Atlas of Coastal Resources. The announcement for the Atlas proclaims:

> It will be of interest to all those who use the coast to work and play, and of particular value to students and teachers, engineers, planners, scientists, fishermen, boat owners, divers, marine farmers, and many others (Tortell, 1981).

The Eastern Carribean Natural Areas Management Program (ECNAMP), a non-governmental organization, has assisted in the preparation of a series of island areas in the Eastern Carribean. That effort drew heavily on the skills and capabilities of island residents and included an integral training component. (See Island Ecosystems Case Study).

Coastal zone atlases and data bases can play a central role in facilitating a more integrated and better informed approach to coastal resource management. These strategies promote sound organization of the often fragmented information existing for the coast. By drawing together data from different aspects of the environment -- for example on mangrove location, shrimp production, and land use designations -- data bases emphasize the interaction of specific components of the environment. Often a coastal atlas or data bank is first used as a tool for problem identification, perhaps directing attention to sites that need immediate attention.

Coastal atlas and data bank preparation has direct connections to the Regional Seas Program for those nations that border on constricted ocean areas. If the coastal zone issues are transboundary in nature, data banks and atlas programs may have to be designed for two or more nations if the products are to be effectively applied. Regional preparation of an atlas or data bank should also realize savings to be achieved by economies of scale.

To be effective as a management tool, as distinct from a problem identification technique, coastal atlases and data bases must be linked to a prescriptive set of policies and actions based on the assembled technical information.

Like the strategies of impact assessment and acquisition programs, a coastal atlas can yield valuable educational benefits. The educational benefits are derived not only from the product but also the compilation process -- particularly if it is an open process involving all relevant government agencies and non-governmental organizations. If the product is presented in a clear, attractive format, maps of the coastal zone can also help convey the need for regulation, acquisition, or capital investment. This in turn can help generate support for coastal management policies among citizens, interest groups, agency personnel and elected officials.

Since atlases and data bases record the condition of the coast at a given moment in time they provide a valuable benchmark to be used as the basis for future comparisons. In this way, rates and patterns of natural changes can be measured, and the effectiveness of a particular regulatory program can be evaluated. Computerized data banks are especially suited to periodic updating for tracking progress. A second technology that advances the case of atlases and data banks is LANDSAT imagery, which is ideal at a gross scale for preparing base maps and identifying resources, and generates new data at frequent intervals. Since academicians can often make valuable contributions to data bases, a nation adopting this approach is likely to benefit from collaboration between universities and environmental agencies.

The utility of coastal zone atlases and data banks is governed by several constraints. First, these strategies are fundamentally tools for compilation and synthesis of information. They must be linked to a process of interpretation of findings, policy setting and intervention in the form of regulation acquisition or capital investment and construction to be considered a management strategy. Many initial attempts to build atlases and data bases are not linked to a specific policy making process which spell out how the findings are to be applied. Without setting clear goals for the relationship between data collection and implementation, nations that prepare atlases and data bases may be disappointed with the result. It is common for the information assembled to have only marginal application to the policy making questions asked. By contrast, the environmental impact statement strategy is tied to the analytic process by formal institutional procedures for report preparation or project revision.

Second, it is clear that the value of a coastal data base or atlas is critically dependent on the quality and quantity of raw information. In developing countries, the available data is often uneven with regard to accuracy and consistency of coverage. Third, the methods by which data is compiled, scaled and aggregated has an equal impact on the utility of the data base or atlas. This is especially evident in considering the map scales at which data are obtained and repr[illegible]d. For instance, maps compiled at 1:250,000 or 1:125,000 are us[illegible] or large scale regional planning, but much finer grain is needed (p[illegible]ps 1:24,000) for preparation

of land use plans. Even more detailed maps are needed for site plans of particular projects. Fourth, atlases and data bases can quickly become obsolete, so there must be a commitment to their timely use and continual updating. Finally, building an atlas or data base is costly in dollar and staff terms. It should not be undertaken without a clear realization of both start up and maintenance costs. Since the methods, contents and results derived from coastal zone atlases and data banks vary so widely, systematic evaluation of these techniques should be undertaken.

6.12 Choosing Appropriate Strategies

This sub-section discusses the characteristics of coastal nations presented in Section 3 as influences on their use of the 11 management strategies. We have found that three factors appear to be important in guiding a nation's choice of management strategies. They are:

- level of development and coastal orientation;
- geographic dimension of coastal issues;
- information and staff availability.

The suggestions presented here are an attempt to help resource managers choose from the "menu" of available management strategies. The true "appropriateness" of management strategies for a given coastal nation can only be determined after those nations gain more experience with coastal resources management. We stress that the following discussion is meant to offer suggestions, rather than to prescribe a rigid formula for integrated coastal resources management. Nevertheless, we believe the discussion does reveal how important differences among nations can influence the appropriateness of management strategies.

6.12.1 Level of development and coastal orientation

The discussion in Section 3 proposed two characterizations of coastal nations, one reflecting the level of development and the other profiling coastal orientation. Levels of development range from (1) low income developing nations, (2) middle income developing nations, (3) oil and mineral exporting nations with surplus revenues, and (4) developed nations. The four categories of coastal orientation are: (1) small island nations, (2) large island or large archipelago nations, (3) coastal-oriented continental nations, and (4) non coastal-oriented continental nations. A useful way of combining these two characterizations is to construct a matrix with development on one axis and coastal orientation on the other axis. This combination produces Table 6.2, a matrix with 16 cells. The matrix illustrates how the combination of development level and degree of coastal orientation can offer some guidance as to which coastal management strategies may be appropriate for a given nation.

TABLE 6.2: Typology of nations relative to development status and degree of coastal orientation, with example nations listed

	MORE COASTAL ORIENTED			LESS-COASTAL ORIENTED CONTINENTAL NATIONS OR STATES
Level of Development	Small Island Nations or States (1)	Large Island Nations or States	Continental Nations or States	
Developed Nations	Singapore Bermuda	Japan New Zealand United Kingdom	U.S. Canada Australian States	USSR Romania Germany Poland Belgium
Middle Income Developing Nations	Bahamas Mauritius Barbados Trinidad-Tobago	Sri Lanka Papua-New Guinea Philippines Indonesia	Chile Malaysia Thailand Nigeria	Colombia Argentina Mexico Costa Rica
Exporting Nations with Surplus Revenues	Bahrain Nauru Abu Dhabi Qatar	Brunei	Kuwait Libya	Saudi Arabia Iraq Iran
Lower Income Nations	Cape Verde Maldives Comoros Kiribati	Cyprus Madagascar Haiti Dominican Republic	Bangladesh Pakistan India Somalia	Sudan Mauritania

(1) Includes peninsula nations.

Table 6.3 presents the 11 management strategies for developing nations in context with their development status and coastal orientation. The matrix is the conceptual basis for assessing the appropriateness of management strategies. Since the matrix presents twelve distinct categories of nations, and there are 11 distinct management strategies, this discussion could be organized as a series of management prescriptions for each coastal nation typology. A more useful approach, however, may be to concentrate on the similarities of nations.

All coastal nations ould benefit from EIA for projects or sectoral programs with potentially significant adverse environmental effects. However, the strategy of environmental guidelines may be an appropriate response to a shortage of data resources or professional expertise in the least developed countries. This strategy can be used to foster voluntary compliance and then evolve into EIA as data and expertise are accumulated.

Exclusion zones are similarly appropriate as a management strategy for all coastal developing nations because they are simple to establish and enforce. They may represent the highest appropriate level of effort for many of the low income nations. They can be a bridge to the somewhat more comprehensive approach to dealing with coastal resources exemplified by broad scope sectoral planning.

Critical area designations, especially those for sensitive habitats should be based on solid site-specific information and therefore require more governmental sophistication than shoreline exclusion zones. They appear to be an appropriate management strategy for both the middle income nations, and the surplus revenue nations. Again, critical areas are not usually a complete response to coastal management needs. The strategy represents another bridge to a more integrated approach for middle income, coastal oriented nations.

Broad scope single sector planning with a strong mechanism for incorporating impact assessment and project implementation authority represents a sort of middle plateau as a management strategy. It demands a strong national commitment to development of a specific economic sector. Additionally, it is more demanding of staff time, information and expertise than administration of environmental guidelines or exclusion zones, and it generally covers a broad portion of the coastal zone. On the other hand, broad scope sectoral planning has by definition a narrower issue focus than regional planning. Broad scope sectoral planning is less comprehensive in its geographic coverage than national land use or national economic planning Accordingly, broad scope sectoral planning appears to be an appropriate peak level of effort for the coastal-oriented revenue surplus nations.

Integrated coastal resources management, the highest level of effort for coastal governance, is achieved by national land use planning, national economic planning, and regional planning. These three strategies have the most demanding requirements for information, expertise, coordination among government ministries, and strong linkages between analysis, plan making, and implementation. These strategies also require the longest time to

Table 6.3: Potential management strategies for developing nations in context with degree of coastal orientation and development status

Level of Development	MORE COASTAL ORIENTED: Small Island Nations or States (1)	MORE COASTAL ORIENTED: Large Island Nations or States	MORE COASTAL ORIENTED: Continental Nations or States	LESS COASTAL ORIENTED CONTINENTAL NATIONS OR STATES
Middle Income Developing Nations	NLUP AQ CA EZ CI EIA	RP or NLUP CA AQ CI EIA	RP or NLUP AQ RP EIA	RP EZ EIA
Exporting Nations with Surplus Revenues	NLUP or BSS AQ CA CI EZ EIA	NLUP or BSS AQ CI RP EZ EIA	NLUP or BSS AQ CI RP CA EIA	BSS AQ RP CA EIA
Lower Income Developing Nations	CI EZ EIA or G	RP EZ EIA or G	RP EZ EIA or G	EZ EIA or G

LEGEND:

(1) Includes peninsula nations

AQ: Acquisition Program
EZ: Exclusion Zone
CA: Critical Area Designation
CI: Coastal Inventory
NLUP: National Land Use Planning

EIA: Environmental Impact Assessment
BSS: Broad Scope Single Sector Planning
RP: Regional Land Use Planning
G: Guidelines

register successful implementation. National land use planning appears to be especially appropriate for the middle income and surplus revenue small island or peninsula nations. It is the strategy that should best address the coastal economic sectors, the broad range of impacts, and the high level of coastal dependency characteristic of these nations. National land use planning and its alternate, regional planning, appear to be the appropriate highest level of effort for large island and coastal oriented continental nations with a middle level of income. Depending on the importance of fisheries or tourist sectors of the surplus revenue nations, national land use planning may be desirable.

This discussion presents some initial suggestions for use of nine management strategies, matched to the level of economic development and coastal orientation. Making recommendations for two other management strategies -- regional seas and national economic planning -- is not well informed by the economic development/coastal orientation matrix because their use is governed by other factors. A nation's relationship to regional seas is governed largely by its geographic orientation whereas the possibility of adopting national economic planning is fundamentally guided by a nations's political economy.

Nevertheless, the framework presented in this sub-section appears to explain a good deal of the choice of coastal management strategies employed in developing nations. Clearly, to sketch a more complete picture of a prospective coastal management program for a developing nation, institutional arrangements must also be factored in with the dimensions of coastal orientation and development.

Small island or peninsula nations: First, the small island or peninsula nations at all income levels have a strong motivation to utilize some form of coastal management. At a minimum, a strategy to identify and avoid, or mitigate, the worst impacts of coastal development seems appropriate. Environmental impact assessment is a logical choice. It appears to be especially beneficial to combine assessments with environmental data bases or atlases whenever possible. In the low income small island nations, envionmental guidelines might be a more feasible substitute to impact assessment.

Shoreline exclusion zones seem appropriate for small island nations. For the revenue surplus small island nations, and those of middle income, acquisition campaigns appear to be appropriate.

Second, the middle income small island nations appear to be the strongest candidates for creation of an integrated coastal zone management, using the strategies of national land use planning or regional planning. The suitability of these strategies is underscored in island nations where fisheries and tourism are strong economic sectors and are experiencing significant degradation of resource values. National land use planning is deemed feasible given the fact that virtually no part of a small island is without coastal influence.

Middle income large islands: These nations could be strong candidates for integrated coastal management using the strategies of regional planning

or -- perhaps a less likely occurrence -- national land use planning. The impetus for this integrated approach is often a vigorous, but environmentally vulnerable fishery, mangrove forestry, or tourism sector, or a devastating experience with coastal hazards -- a point discussed at greater length in Section 7. Environmental impact assessment appears to be appropriate for large islands, especially if combined with a coastal atlas or data base. Such data gathering efforts will probably be warranted by the strong economic dependence of most large islands on their coastal resources. Also, large islands often have more staff capabilities for assembling an atlas and data base. Non-governmental organizations and regional networks building on the talents of island residents appear to be a useful avenue to organize the capabilities to construct a data base or an atlas (Island Ecosystems Case Study).

Coastal oriented continental nations: This cluster of nations is also a strong candidate for integrated coastal management using the strategy of regional planning, broad scope sectoral planning or environmental impact assessment. EIA could be especially effective if a mechanism were created to allow mitigation for several projects to be pooled to restore a single habitat area. Since the hinterland of continental nations is likely to play a significant role in the economy, national economic planning does not appear to be a logical vehicle for integrated coastal management.

Revenue surplus nations: The revenue surplus nations are, by definition, concerned with petroleum or mineral extraction as their principal coastal-dependent economic sector. They have the economic resources to mount integrated coastal resource programs. In these nations, two principle motivations for pursuing national land use planning can be identified. One is the presence of a strong, culturally significant fishing industry. The second is a national commitment to develop a major destination resort, such as the one Kuwait is now constructing (Holland, 1982). Given the degree of central control in many revenue surplus nations, the integrating program for coastal management will likely be either national economic planning or broad scope public works planning. Less complex techniques such as critical area designation or exclusion zones are also appropriate for revenue surplus, coastal oriented nations.

Less coastal-oriented continental nations: Nationwide integrated coastal management appears to be inappropriate for non coastal-oriented continental nations. Regional coastal zone management, however, may be well suited for areas where there is a concentration of coastal issues, such as estuaries with large ports and surrounding metropolitan development. Middle income oil exporting nations in this category may add a coastal dimension to sectoral planning. Techniques of modest geographic extent, especially exclusion zones for coastal resources or coastal access, are appropriate for all the less coastal oriented nations. These techniques are simple and do not require or suggest that coastal management is a national priority.

6.12.2 Geographic dimension of issues

Coastal issues (or coastal use conflicts) are manifested at several distinct geographic scales. This question of scale has significant relevance to the adoption of appropriate coastal management strategies.

At the site level, conflicts over the survival of a particular species or the integrity of a specific wildlife habitat may arise. Often these can be resolved in the context of a critical or special area plan for a single site. Coast wide issues may be limited to a narrow portion of the coastal zone. Examples are public access to the beach and shoreline erosion. In this case, a shoreland exclusion zone may be the appropriate tool. Some issues arise over a broad expanse of the land/water interface and the coastal watershed -- such as the siltation or contamination of important shellfish beds in a major estuary. These issues are best handled through regional planning on an ecosystem wide basis. Finally, some issues are very demanding of land and capital, and may recur throughout a nation. Examples would be national programs for coastal agriculture and aquaculture development (Indonesia) or resort development (Fiji).

The perceived scale of issues is often a function of the dimensions of a coastal nation. In a small island nation, for example, the regional and national level are essentially the same. Therefore, national land use planning is very appropriate for small island nations.

Larger nations might use regional planning to sort out use conflicts around an urbanizing embayment or other areas where issues are concentrated. A large island nation or coastal oriented continental nation might choose the strategy of national land use planning to lend order and predictability to large scale changes in use type and intensity along the shoreline. This is especially true when the documented impacts on coastal resources occur in geographically dispersed areas (e.g., deposits of sediment from upland slopes on oyster beds).

At the other extreme of scale, designation of a critical area or exclusion zone could be appropriate in either island nations or continental nations trying to cope with a localized issue. Examples are protection of a bird rookery or provision of access to swimming beaches. Both actions would benefit the tourism sector.

It appears that many developing nations eventually initiating integrated coastal resources management programs will begin at the regional level, rather than on a national basis, largely as a result of the concentration of major issues in a discrete area of the coastal zone. This approach is logical for several reasons. First, in most developing nations, most of the shoreline is in essentially open space uses, while the most intense use conflicts are concentrated in the capital or major metropolitan region -- usually situated on a major estuary or embayment. Second, the regional level of planning and analysis offers an opportunity to concentrate funds and staff, which in turn improves the odds of a successful outcome. Third, the regional models of river basin or agricultural development planning, familiar in many developing countries, provide successful management examples.

6.12.3 Availability of information and expertise

The discussion on differences and commonalities among coastal nations presented in Section 3 pointed out that availability of information and expertise increases with the level of national development.

Inadequate information may be easier to overcome in small island nations, where the resources and land area are decidedly finite and therefore are relatively inexpensive to inventory and analyze. At the scale of a small island, integrated coastal planning appears to be feasible and appropriate. In the low income small islands, integrated coastal management might not use the national land use planning strategy because of the costs of information required and the lack of professional staff.

Data shortages may represent a more acute problem in the low income large island nations. Inventory and analysis costs increase with the geographic area studied, so there is more likelihood that information gaps would preclude the more complex, information-intensive strategies such as national land use planning.

In the absence of good information on natural systems land use and public services, several alternate management strategies can be adopted. Environmental guidelines can give considerable leverage yet require relatively little new data, and can be applied with modest effort by a government ministry.

Another strategy that does not demand extensive information is creation of a shoreland zone. Creation of a shoreland exclusion zone with a fixed setback from the coast requires very little data. Clearly good technical data can inform the choice of boundaries and the resources to be protected, but such data is not a strict requirement.

Designation of a critical area can be accomplished without a comprehensive national data base. The only real information requirement is site-specific data on natural systems (such as wetlands, bird rookeries) or natural processes (e.g., high erosion rates).

A fourth strategy to be considered in settings with limited information, environmental impact assessment, is something of a paradox. Because the quality of EIA is dependent on the quality of available information, in the early stages assessments may be very general. However, as a nation gains experience with EIA, it also compiles an information base as reports are produced.

As more developing nations adopt management strategies for their renewable coastal resources, valuable opportunities will arise to evaluate both the process and the outputs of their management efforts. As discussed in Section 3, these evaluations should enable testing of the suggestions offered in this paper, and should better inform future programs for coastal resources management.

7. GOVERNANCE ARRANGEMENTS

Institutional arrangement is defined as the composite of laws, customs, and organizations established by society to allocate scarce resources and competing values for a social purpose -- such as to govern a nation or to manage a nation's coastal resources and environments. Over time, every coastal nation has established its own institutional arrangement for managing coastal resources and environments. Five commonly identified components of a society's institutional arrangement are:

- legal and administrative authorities;
- customs and traditions;
- governance arrangements;
- non-governmental organizations;
- management strategies.

Since institutional arrangements are formed to resolve issues (i.e., issues force government to allocate scarce resources and competing values), are there similar institutional arrangements in each nation for the resolution of coastal issues? More importantly -- if there are common types of arrangements -- do certain institutional arrangements appear to be either more effective, efficient, or equitable in the resolution of coastal issues? In order to compare institutional arrangements across nations, the nature of public intervention -- or governance arrangement -- for coastal resources management must be characterized.

7.1 Complexity of the National Governance Arrangement

The source of complexity in the national or subnational governance arrangement is the sectoral, functional, and hierarchical differentiation that accompanies national social development and modernization (Blau and Meyer, 1956). Accordingly, these three factors are also the criteria most frequently used to compare governance arrangements.

7.1.1 Sectoral and functional differentiation

Sectoral differentiation results from governmental specialization in a discrete policy area. Section 2, coastal management definitions, mentioned sectoral differentiation in the context of sectoral management or planning. In the realm of coastal management, specialization tends to focus on policy areas formed by coastal uses (e.g., fisheries, ports and harbors, water supply and wastewater disposal, and tourism). Table 7.1 indicates that the coastal zone of a nation can include between fifteen and twenty-five sectoral differentiations. It is possible -- and not uncommon -- for most of the sectors listed in Table 7.1 to have at least one or more government

Table 7.1: Sectoral planning and development in the coastal zone

Sectors that are often coastal zone or ocean specific	Sectors that are rarely coastal zone specific but have direct impacts
1. Navy and other national defense operations (e.g., testing, Coast Guard, customs)	1. Agriculture-Aquaculture
2. Port and harbor development (including shipping channels)	2. Forestry
3. Shipping and navigation	3. Fish and wildlife management
4. Recreational boating	4. Parks and recreation
5. Commercial and recreational fishing	5. Education
6. Mariculture	6. Public health - mosquito control and food
7. Tourism (especially in island nations)	7. Housing
8. Marine and coastal research	8. Water pollution control
9. Shoreline erosion control	9. Water supply
	10. Transportation
	11. Flood control
	12. Oil and gas development
	13. Mining
	14. Industrial development
	15. Energy generation

units responsible for each sectoral division. One of the inherent problems of integrated coastal resources management is the large number of sectoral divisions -- and corresponding number of government bureaucracies -- that directly or indirectly affect coastal uses, resources, and environments. By comparison most social policy areas (e.g., criminal justice, public education, and health care) involve relatively fewer government sectors.

The greater the number of sectoral divisions within a policy area -- such as integrated coastal resources management -- the greater the potential for fragmentation of governmental responsibility and duplication of effort. Horizontal integration is the term commonly used to describe efforts to coordinate the separate sectoral divisions and thereby reduce fragmentation and duplication.

For each governmental sector, there is also functional specialization and differentiation. Functional divisions are the forms of governmental intervention. Functional divisions that commonly occur in the governance of coastal resources and uses are:

- generating and disseminating information (including research and education);
- levying charges;
- taxing;
- funding and/or constructing projects and programs;
- acquiring, managing, and selling property;
- long-range policy-setting and planning;
- regulating private development and operations, particularly permit letting.

The order of the items on the above list reflects the relative degree of governmental intervention with the first item reflecting the least governmental intervention.

Functional division of government sectors also tends to create separate agencies. For example, in Ecuador there are two different government units which set fishing policy, another two units are responsible for fisheries research, another unit administers technical training for fishing, and still another unit funds fishing enterprises (Vallejo and Caparro, 1981).

The differentiation and specialization of functions in each sector thus increases the potential for fragmentation of responsibility and duplication of effort. Horizontal integration procedures are also commonly used to integrate and coordinate the separate functional divisions of a government sector.

The combination of functional and sectoral differentiation produces a

matrix arrangement of government organizations as illustrated by Table 7.2. The matrix depicts the basic complexity of a nation's governance arrangement for integrated coastal resources management. Agencies with involvement in each of the sectoral functions are shown in the boxes produced by the intersection of the parts of the matrix. The agencies indicated in Table 7.2 are only a few examples drawn from U.S. national, state, and local government involvement in coastal management. A key to the agency abbreviations and acronyms appears opposite the table.

If a coastal nation has twenty-five sectoral divisions that directly or indirectly influence coastal uses and resources and each of these sectors has seven functional divisions, the product is one hundred and seventy-five separate points of potential government involvement for a fully integrated coastal resources management program. This hypothetical figure is about twice the total number derived from an analysis and inventory of U.S. national government involvement in coastal resources which identified eighty-three different federal units of government with responsibilities that affected coastal zone uses and resources (Gamman, et al., 1974).

Fortunately, government does not perform all seven functions in many, if not most, sectors. More significantly, as the matrix illustrates, an agency often performs many or all of the same functions for a particular sector (horizontal integration). Also, it is common for one governmental unit to have the same or different functional responsibilities across more than one sector. For example, the matrix shows the U.S. Army Corps of Engineers (COE) has responsibilities in both the port development and pollution control sectors. These consolidations of agency responsibility reduce the number of different government units with functional responsibilities in sectors that affect coastal management. However, horizontal consolidations are more than offset by governmental tendencies to further subdivide sectoral functions into both geographic and activity jurisdictions.

7.1.2 Geographic and activity subdivision

Coastal zone management programs are complicated greatly by the multiplicity of authorities operating within geographic specific areas or zones. For example, Table 7.2 illustrates a number of geographic subdivisions of sectoral functions in the United States. For example, the National Park Service (NPS) provides coastal recreation within the jurisdictional boundaries of its coastal zone parks and the Forest Service (FS) provides coastal recreation within the jurisdictional boundaries of its coastal zone forests. In another example, Figure 7.1 depicts the geographical division of New Zealand's coastal zone. Regulation of fresh water and coastal pollution (under the Water and Soil Conservation Act of 1967) is the responsibility of the Ministry of Works and Development. However, the geographic extent of this function stops at the oceanward limit of territorial waters (three nautical miles). Coastal pollution oceanward from this boundary to the outer limit of the fishing zone (five nautical miles) is the responsibility of the Ministry of Transportation.

Table 7.2: The arrangement of government organization in the United States for selected (example) sectors

Functions (Functional Division)	Port Development	Fisheries	Pollution Control	Parks and Recreation	Marine Research
Policy Setting and Plan Making	CG COE LPD	NMFS SD SFGD	EPA COE CG	NPS FS LG	NSF NOAA ONR
Regulation (Permit Letting)	CG COE LPD	NMFS CG SFGD	EPA SWQA COE	NPS LG SPD	NOAA FWS SFGD
Levy Charges	LPD	NMFS SFG	SWQA LG	NPS FS LG	(NOT APPLICABLE)
Fund and/or Construct Projects and Programs	COE EDA LPD	NMFS EDA SBA	EPA SWQA LG	NPS FS SPD	NSF NOAA ONR
Acquire, Manage and Sell Property	GSA CG LPD	GSA LG	GSA LG	NPS FS LG	GSA UNIV. NOAA
Generate and Disseminate Information	UNIV. MARAD LPD	NMFS SFG UNIV.	EPA SWQA UNIV.	NPS FS UNIV.	NSF NOAA ONR
Taxation	IRS STB LPD	IRS SFGD	IRS	IRS STB	(TAX EXEMPT)

← HORIZONTAL INTEGRATION →

Table 7.2: (continued)

Key to Agency Abbreviations

CG	- U.S. Coast Guard
COE	- U.S. Army Corps of Engineers
EDA	- U.S. Economic Development Administration
EPA	- U.S. Environmental Protection Agency
FS	- U.S. Forestry Service
GSA	- U.S. General Services Administration
IRS	- U.S. Internal Revenue Service
LG	- Local Government (City and/or County)
LPD	- Local Port District
MARAD	- U.S. Maritime Administration
NMFS	- U.S. National Marine Fisheries Service
NOAA	- U.S. National Oceanic and Atmospheric Administration
NPS	- U.S. National Park Service
NSF	- U.S. National Science Foundation
ONR	- U.S. Office of Naval Research
SBA	- U.S. Small Business Administration
SD	- U.S. State Department
SFGD	- State Fish and Game Department
SPD	- State Park Department
STB	- State Tax Board
SWQA	- State Water Quality Agency
UNIV	- State Universities

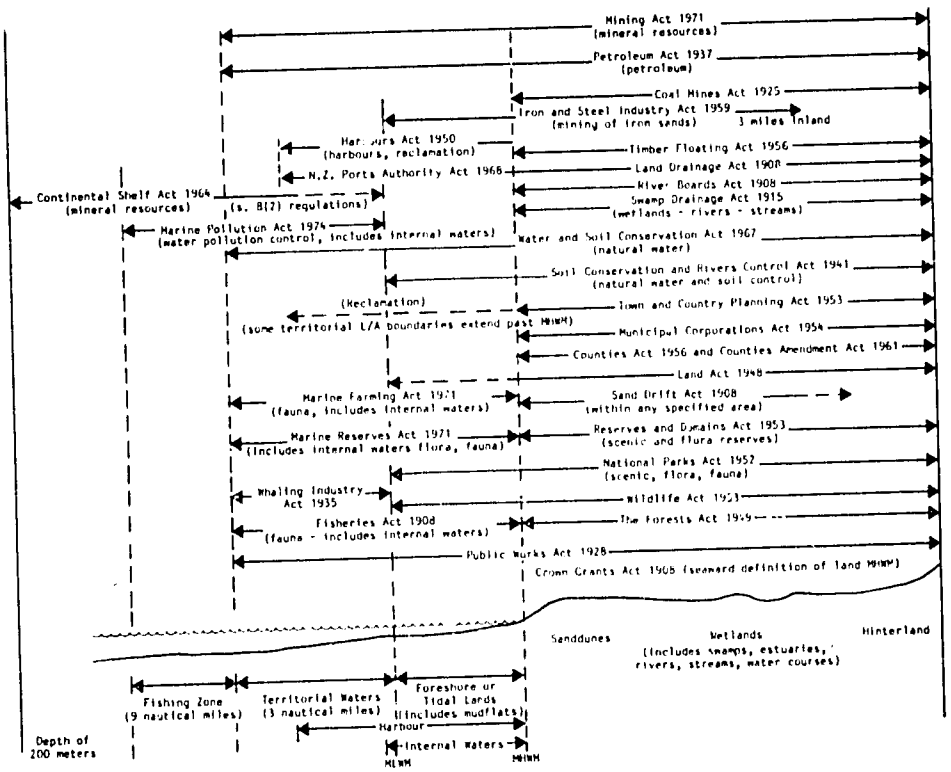


Figure 7.1: Legislative administration of the coastal environment in New Zealand (Source: from UNOETB, 1982).

The geographical division of the same sectoral function is one of the more vexing problems in coastal zone management, as Figure 7.1 illustrates. The shoreline often is the jurisdictional boundary for national or state laws and accordingly, government agency responsibility for the same sectoral function often changes at this boundary. Moreover, it is evident that geographic division of jurisdiction occurs lengthwise along the coast as well as across the coastal zone divisions. For example, Figure 7.2 represents a typical lengthwise jurisdictional division of coastal area in a metropolitan region of Japan.

To further complicate the institutional picture, different agencies are frequently assigned different activities within the same sectoral function. Table 7.2 indicates that the Coast Guard (CG), Environmental Protection Agency (EPA), and the Corps of Engineers (COE) all have some responsibility for pollution control policy setting and plan making. The Coast Guard's jurisdiction is focused on oil spills and spillage of hazardous wastes from ships, the Corps of Engineers' concern is dumping of dredge spoil. The Environmental Protection Agency must consider all possible pollutants -- including those that are the specific responsibility of other agencies such as the Corps of Engineers and the Coast Guard.

7.1.3 Hierarchial differentiation

The foregoing discussion was premised on the existence of one level of government. Most nations, however, have three or more hierarchial levels, or tiers, of government. The most common division is into national, state, and local levels of government. Since the functional and sectoral divisions depicted in Table 7.2 can also occur at the state, provincial and local government level, separate matrices could be constructed for each level of government involvement in various sectoral functions. In a companion study to the analysis of U.S. Federal agency responsibility cited above, an inventory and analysis was done of California state involvement in the coastal zone. Forty-two different state units of government were identified as having reponsibilities that affect coastal zone uses and environments (Gamman, et al., 1974).

Generally as one descends down the levels of government, there are less sectoral divisions. Comparisons have commonly been made among nations on the basis of the division and concentration of sectoral functions among levels of government. Generally, developing countries are characterized by strong national governments with relatively weak state and local governments. Exceptions to this pattern are those metropolitan regions built around cities which are both a nation's capital and its major port: Lagos, Buenos Aires, Dar es Salaam, Jakarta, Rangoon, Kingston, Columbo, Monrovia, Bangkok, Manila, and Dakar. These combined port-capital regions typically have much greater political influence than most subnational units

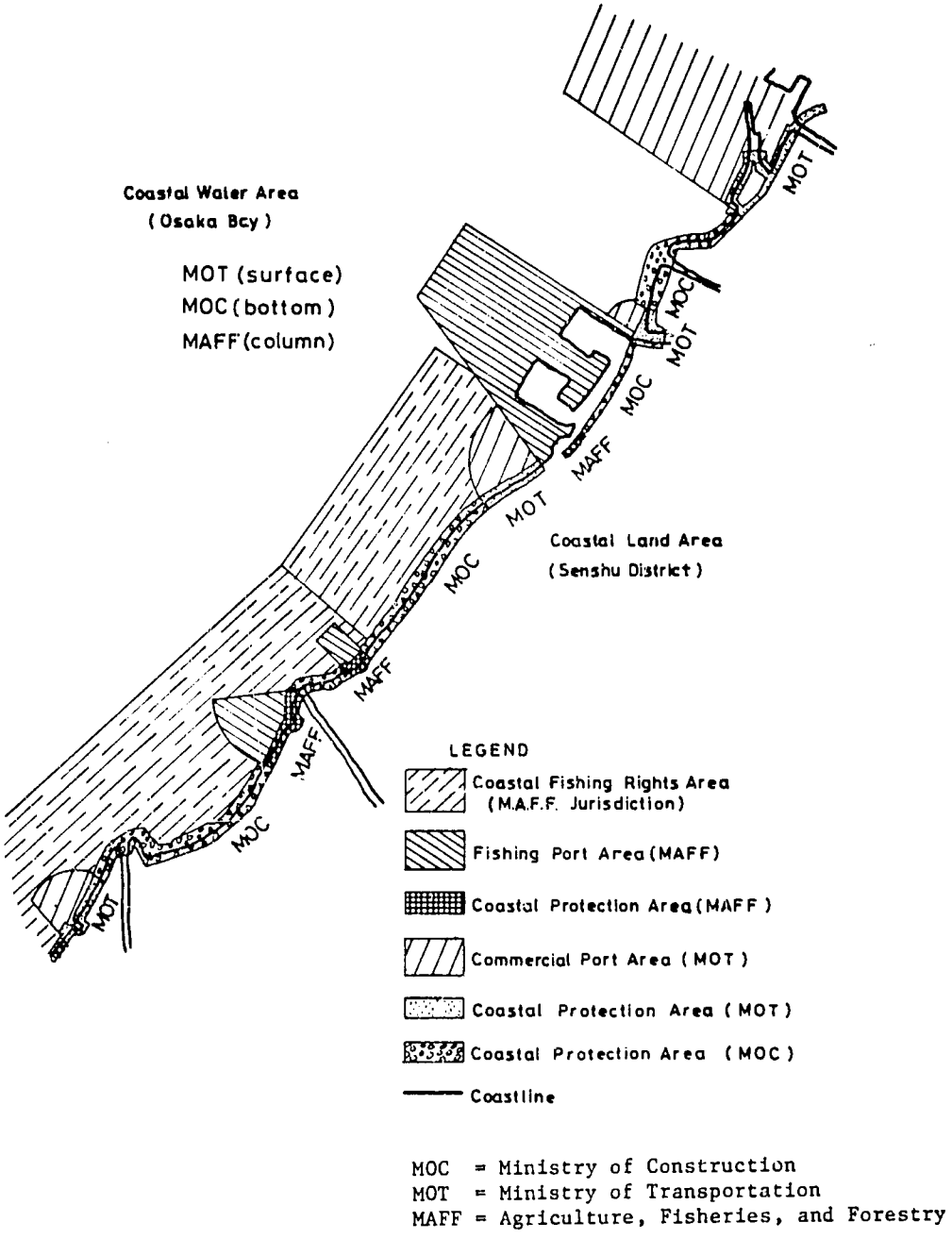


Figure 7.2: Longitudinal division of the Coastal Zone for Osaka Bay, Japan (Source: Schapiro, in press).

Another form of hierarchial differentiation occurs within large scale government agencies. Authority is divided into a series of levels. Each upper level controls and supervises the subordinate levels. The U.S. Marine Fisheries Service has both regional management offices and regional research laboratories that are subordinate to their respective headquarters office in Washington.

7.2 Need for Sectoral Integration

The interconnection of important coastal dependent economic sectors is another reason for integrated coastal management in developing nations. Integration of fisheries, tourism, oil and gas development, and coastal hazards regulation is especially necessary because they share the same coastal zone, environmental and public service systems. For example, both fisheries and tourism depend to a large extent on a high level of environmental quality, particularly coastal water quality. Both sectors receive spillover impacts such as pollution, loss of wildlife habitat and aesthetic degradation from uncontrolled economic development. Because fisheries require port services, while tourism depends on construction of an infrastructure system for water supply, sanitation, transportation, and telecommunications, they should be integrated with the transportation and public works sector.

Table 7.3 indicates important linkages between coastal dependent sectors, and illustrates the positive and negative consequences of these linkages. These linkages demonstrate the need for integrated coastal management in developing nations. For example, the need for coastal management is evident where coastal zone oil and gas development occurs in nations with a strong economic involvement in ports or fisheries. Indeed, a developing nation pursuing port development is not likely to be concerned about integrated coastal management in the absence of a strong fisheries or tourism industry.

Coastal natural hazards are usually addressed in sectoral plans for public health and safety. These natural processes cut across all coastal dependent economic sectors. Wind damage from a hurricane, inundation by a tsunami, or rapid coastal erosion can affect tourism, the fishing industry, port operations, public works, and transportion. Other sectors such as housing and industry are also vulnerable. The devastating consequences of development in coastal hazard-prone areas, together with the presence of any significant economic activity that depends on coastal resources or coastal location, necessitate integrated coastal management.

It is also clear that the thirty or so developing nations in the humid tropics with extensive mangrove forests should have a strong incentive for integrated coastal resources management. IUCN's recent report, Global Status of Mangrove Ecosystems, documents that all developing nations with extensive mangrove forests are confronted with similar stresses which threaten the existence of this renewable resource (Saenger et al., 1983). Conversion of mangroves to aquaculture ponds or croplands is a particularly destructive and pervasive problem. Three renewable resource uses are

Table 7.3: Examples of positive and negative relationships among sectors.

SECTORS RECEIVING IMPACTS		SECTORS GENERATING POSITIVE AND NEGATIVE IMPACTS					
		Ports + Shipping	Transportation	Public Works	Tourism	Fisheries	Additional Sectors Can Be Portrayed
FISHERIES	+	Harbors and processing facilities	Roads, railroads to ship products	Sewage from processing	Provide sportfishing opportunities		
	-	Ship pollution wetland fill	* Wetland fill * Estuary fragmentation	Wetland fill for development enabled by provision of public works	* Pollution from fish processing * Fill of wetlands for tourist facilities		
TOURISM	+	Passenger liner facilities	Airports, roads to tourist areas	Infrastructure for tourism development		Conservation of habitat areas vital to both recreational and commercial species	
	-	Ship pollution in beaches and swimming areas	Encroachment of urban development provided by road	Encroachment of urban development stimulated by public works		Air and water pollution from fish processing industries and boats	
PUBLIC HEALTH AND SAFETY	+	Docks and channels enabling evacuation before storm and flooding	Roads and bridges for evacuation before storm and flooding	Public works such as dams and revetments to reduce or eliminate hazards	Improvement in quality of public water supply and/or sewage treatment	Fisheries development increases both amount and healthfulness of product	
	-	Port development in hazard-prone areas	Provision of transportation stimulates development of hazard-prone areas	Provision of public works stimulates development of hazard-prone areas	Development of tourist facilities in hazard-prone areas	Water pollution from fish processing industries and boats	
Additional Sectors Can Be Portrayed ↓							

+ Sector reinforces or has positive impacts on another sector.
- Sector has negative impacts on another sector.

pitted against one another. The IUCN report recommends the preparation of national mangrove plans to protect and enhance this ecosystem's resource values. Such a nation-wide mangrove planning effort would represent a clear example of integrated coastal resources management.

In many small island nations, agriculture and forestry commonly occupy significant coastal upland areas where there is also strong pressure for conversion of these lands to tourism, vacation home estates, and in some cases, housing for the resident population. Resolution of the conflicts arising from the conversion of forests or agricultural lands to housing or tourist facilities -- as well as the sedimentation impacts of forestry or agriculture practices on fishery habitats -- will require an integrated resource management approach. (See Mangrove Management Case Study.)

7 3 Need for Issue-Based Governance Analysis

The previous subsection presented and organized basic concepts about the complexity of the governance arrangements in a nation's coastal zone. This classification is necessary to fill a void in the literature on institutional complexity in the management of coastal resources. Although the literature sometimes touches on the various factors that create complexity, most documents included only statements on the usual list of problems caused by specialization and differentiation in government: fragmentation, gaps in sectoral functions, and overlapping and duplicate sectoral functions. The impression gained from this literature is analogous to the blind men defining the "elephant" needs to be defined and touched. The governance arrangement elephant needs to be defined and analyzed in its entirety by each coastal nation contemplating any substantial shift into integrated coastal resources management.

Many states participating in the U.S. coastal management program conducted an analysis of their coastal governance arrangement as one of the first steps of program preparation. (This process is often called institutional stock taking.) A number of developed and developing nations such as the United Kingdom, Australia, Canada, the Philippines, Indonesia, Sri Lanka, and Malaysia, have conducted institutional analyses.

The analysis of the governance arrangement should be issue-based. For any given coastal nation, one certainly could identify and describe all the sectoral and functional intersections for all levels and units of government affecting the use of coastal resources and the quality of coastal environments. Such a time consuming task, however, would be an inefficient use of analytic resources. The target should be narrowed to only the most proximate set of coastal issues, i.e., those motivating a nation to consider initiating a coastal management program.

The governance arrangement analysis should thus be organized according to each of the major issues or issue groupings (such as stresses in mangrove ecosystems) currently confronting the coastal nation. For each issue, the following input and intervening factors should be identified.

Inputs:

- o the laws and policies that affect the issues;
- o the government units that are mandated to implement these laws and policies, and their specifically mandated responsibilities.

Intervening Factors: (characteristics of the above inputs which in turn influence the issue)

- o gaps in responsibility (e.g., either no government mandate or a mandate so vague that it cannot be implemented);
- o fragmentation of responsibility among different units of government;
- o overlaps and duplication of effort among competing units of government;
- o conflicts between units of government trying to achieve their respective mandates.

A standardized process should be constructed for use by coastal nations in conducting issue-based governance analyses. The structure of such an analytic process would also be applicable to non-coastal environments and issues. This point is particularly relevant to U.S. AID's ambitious program to prepare environmental profiles of all the nations eligible for its assistance.

The Dominican Republic environmental profile is the first phase two report generally available from the AID program and therefore it is reviewed here (Hartshorn, et al., 1981). Although the report is a treasure trove of environmental information about the Dominican Republic, it is difficult to extract from the text the relationship between the issues and the present governance arrangement for the environment -- or more specifically -- the coastal zone.

The environmental profile offers numerous recommendations on various improvements the Dominican Republic could make in laws, government arrangements, and management strategies to resolve environmental problems. The content and structure of the analysis, however, is not issue organized and therefore it is difficult -- if not impossible -- to portray an overall set of optional governance arrangements that the Dominican Republic could adopt to improve the regulation of its environment.

7.4 Classification of Coastal Governance Arrangements

If there are 136 sovereign and 40 semi-sovereign coastal states, are there 176 different governance arrangements for the management of coastal resources and environments? The answer is both yes and no -- depending on the definition of "different." It is evident that no coastal nations will ever have exactly the same two governance arrangements for achieving a social purpose as complex as coastal zone management. Given the possibility of 20 to 30 different sectoral divisions, with each divisable into as many as seven different government functions, significant differences among nations are bound to occur. When governmental tiers and the geographical divisions are added to the array of sectoral and functional divisions, the resulting arrangement becomes as individually distinct as a fingerprint. Like fingerprints, governance arrangements -- although individually different -- can be grouped into clusters that share similar attributes. Organizing the governance arrangements into groupings or classifications defined by similar or dissimilar attributes preoccupies the field of comparative government.

Several practitioners and researchers of international coastal management have suggested that a classification of national governance arrangements for the management of coastal resources and environments should be devised (Mitchell, 1982; Englander, et al., 1977). The two most persuasive reasons for formulating such a classification system -- particularly for the international assistance community -- are:

- to provide a framework for the comparative assessment of national coastal management efforts;
- to identify conditions likely to facilitate wider adoption of program components that have met with significant success (Mitchell, 1982).

Our literature review identified only one proposed classification for clustering similar governance arrangements. Mitchell's chapter in Ocean Yearbook 3, "Coastal Zone Management: A Comparative Analysis of National Programs," suggests that coastal management programs could be classified according to three dimensions or criteria:

(1) focus

coastal specific missions to deal with substantive systematic problems (Sri Lanka's approach is given as the example);

-- or --

coastal management as merely one task of an agency with broad functional responsibilities such as land use planning or national economic development (United Kingdom's approach is given as the example);

(2) strength of national control

relatively weak national control; high levels of regional or local government control; variable program content and opportunities for public participation (the U.S. approach is given as the example);

-- or --

strong national control; use of formally specified management systems with mandatory components and limited public participation (the French approach is given as the example).

(3) orientation

policy orientation primarily to enhance economic development goals and mitigate national hazards (Japan's approach is given as the example);

-- or --

policy orientation toward environmental preservation and tendency to stress amenity considerations (the United Kingdom's approach is given as the example).

Our literature review confirms that these dimensions are the most important factors that shape coastal management programs. They produce an eight division classification as shown in Figure 7.3.

The eight classes appear to be a workable set, and examples for most of them can be readily identified. The real test of the classification is whether all the world's coastal nations will readily fit into the category, "nations with coastal specific programs." In fact, the present utility of Mitchell's classification for making comparative assessments is limited since the vast majority of coastal nations do not have a "coastal specific" program.

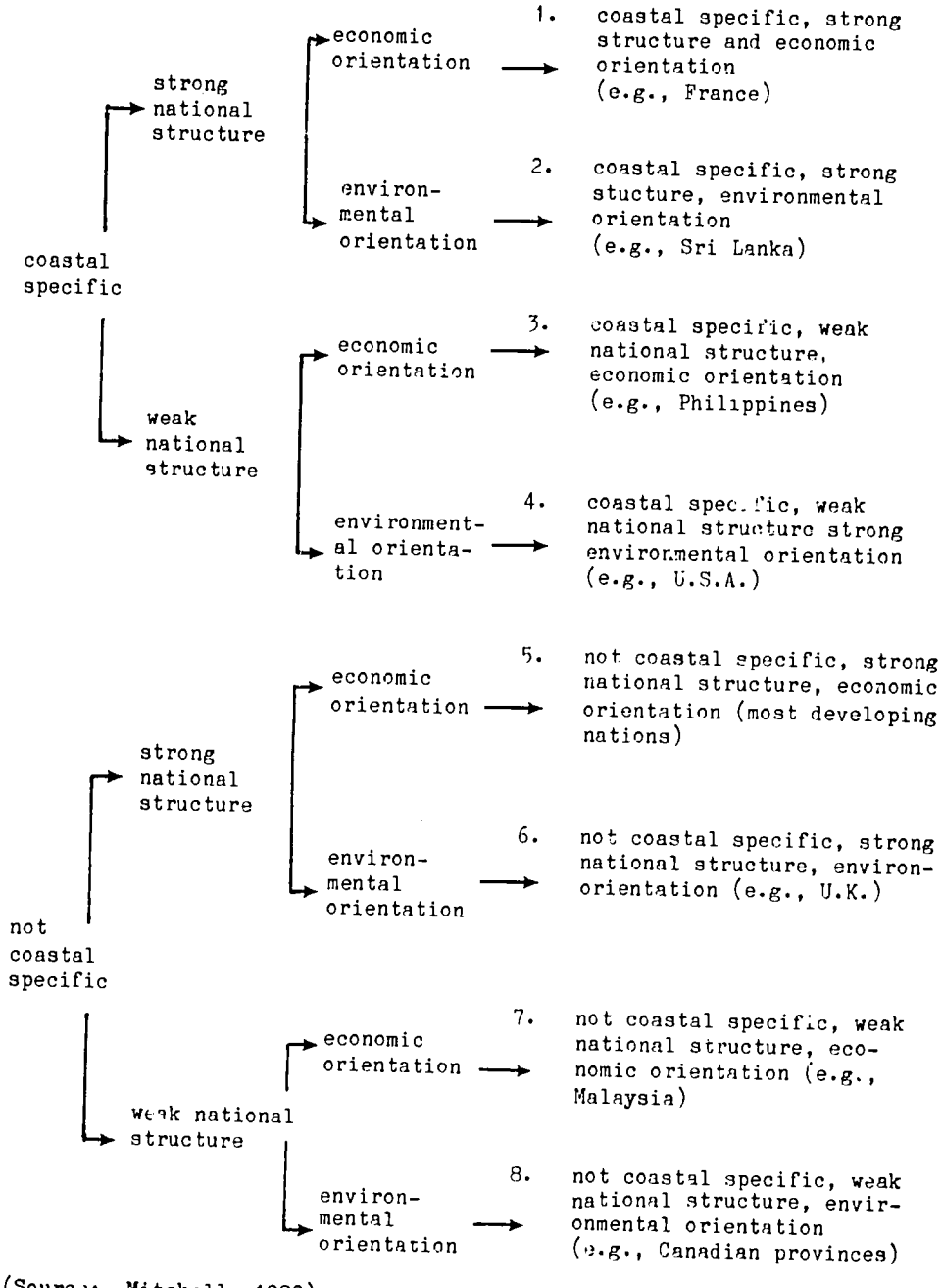
We have determined that only seven nations and approximately twenty-five subnational units have established programs specifically designed to manage coastal resources and environments in an integrated fashion. Our literature review confirms the fact that a very great majority of the world's coastal nations either:

- o do not have a national, state, or regional program with particular regard for the integrated management of coastal resources or environments,

-- or --

- o regard the integrated management of coastal resources and environments as a component of another

Figure 7.3: Mitchell's Typology of Governance Approaches



(Source: Mitchell, 1982)

governmental program such as land use or environmental planning.

In recognition of both the global paucity of national and subnational programs for integrated coastal resources management and the global ubiquity of non coastal specific management programs, a revised classification is proposed to reflect the fact that all coastal nations manage one or more coastal resources. This classification is illustrated by Table 7.4.

To be effective in making a comparative assessment of institutional arrangements, a classification should capture and reveal the main factors affecting the ability of the governance process to achieve program objectives (e.g., maintain sustained yield of a fishery, or reduce degradation of resources).

The question is then: does the classification which sets out the five types of arrangements displayed in Table 7.4 meet this criterion? Our review of the literature strongly suggests that the main features of coastal governance are:

- divisions caused by sectoral planning and development of coastal resources and environments, and
- integrated planning efforts to counteract the effects of sectoral divisions.

Type 1 is sectoral planning and development with little or no integration to connect the sectors. Many developing nations fit into this category.

Type 2 is an improvement: sectoral planning integrated by planning efforts that do not single out coastal resources or environments for special attention. The three most common strategies for integrated planning of this type are national economic planning, land use or town and country planning, and environmental impact assessment. Japan, Fiji, New Zealand, Poland, and Singapore exemplify the Type 2 institutional arrangement.

Type 3 consists of sectoral planning integrated by programs that do make a special coastal distinction. The strategies used to accomplish this integration -- such as national economic development or land use planning and control (described in the next section) -- include special policies, guidelines, or some other programmatic component to address coastal resources or environments. Examples include ad hoc guidelines for land use plans prepared for the coast, or environmental guidelines for projects along the coast. Examples of nations using the Type 3 approach are the U.K., Cyprus, Norway, Thailand, and Brazil.

A higher level of effort for coastal resources management is reflected in Type 4, sectoral planning integrated by a coastal management program. A formal coastal zone management program, designated by the appropriate legislative authority, is the only major form of integrated sectoral

Table 7.4: Coastal management governance approaches

Types of Governance Arrangements	1. Sectoral Planning and Development	2. Integrated Planning With No Particular Regard For the Coastal Zone	3. Integrated Planning With Particular Regard For the Coastal Zone	4. Integrated Coastal Zone Management Program
TYPE ONE Many, if not most, developing nations.	X			
TYPE TWO Most developed nations (e.g., Japan, New Zealand, Poland, Sweden). Many developing nations (e.g., Columbia, Brazil, Ecuador).	X	X		
TYPE THREE (e.g., United Kingdom, France, Cyprus, Norway).	X		X	
TYPE FOUR (e.g., United States).	X			X
TYPE FIVE (e.g., Sri Lanka, South Australia, the Philippines, Thailand, Indonesia).	X	X		X

planning. States participating in the U.S. Coastal Zone Management program exemplify this approach.

Finally, Type 5 consists of sectoral planning integrated by a coastal zone management program, and reinforced with another management strategy, such as national economic development. Sri Lanka, the Philippines, Indonesia, Greece, France, South Australia, and New South Wales are examples.

7.5 Non-Governmental Organizations

Non-governmental organizations (NGOs) can be a powerful complement to government agencies or interagency councils in carrying out coastal resource management programs. In the developed world, NGOs frequently play the role of watchdog or "loyal opposition" to governmental programs affecting coastal resources. NGOs in developed countries also play educational, public information, and data gathering roles.

NGOs in the developing world often tend to act as an extension or partner to government policies. Among the functions they perform are the following:

- communicate government policies to resource users;
- serve as a forum to critically review government proposals and to speak for the interests of important resource users;
- train local resource managers;
- collect and organize technical information for management decisions.

At least four types of NGOs are now active in developing nations' coastal management programs. These include:

- national-level organizations concerned with a single resource;
- regional level organizations concerned with a variety of coastal resources;
- global organizations concerned with direct action for coastal resources conservation;
- global organization concerned with collecting, organizing, and sharing information to inform coastal management policy.

A review of environmental and natural resources management in developing countries indicates that non-governmental organizations

operating at the national level "have been very active in the environmental conscience of development decision makers." (International Institute for Environment and Development, 1981):

> All over the developing world there are examples of NGO's active participation in environmental issues. In Latin America, the Colombian Ecological Action Committee monitored the Environmental Impact Assessment which was done for a proposed sulphuric acid factory. In India, the Chipko movement, which arose from local inhabitants' discontent with the negative impact of rapid development on their economic well-being and environment, now has a large following in the mountainous region of Uttar Pradesh State. The movement advocates a reform in forest policy so that local people will play an active part in managing their own forests. The activities of other NGO's in all parts of the developing world are being chronicled by the Environmental Liaison Center in Nairobi, (IIED, 1981).

Where a resource subject to government regulation is remote or dispersed, and where responsible agencies have limited staff, NGOs can be a vital link to effective implementation. For example, the Indonesian Ministry of Population and Environment has helped create over 300 NGO environmental groups in the last four years to provide the government with an extensive environmental monitoring network (Kinsey and Sondheimer, 1984).

National mangrove committees (NATMANCOMS) exemplify NGOs concerned with a single resource. NATMANCOMS -- inspired by UNESCO, have been established in India, Bangladesh, Thailand, Malaysia, Indonesia, Papua New Guinea, and Venezuela. The NATMANCOMS consist of qualified persons from government (usually the mission-oriented agencies) and universities, appointed, and sometimes supported, by a government agency. These NATMANCOMS serve as: (1) a communication link to UNESCO and other UN bodies; (2) an advisory group to government; (3) a coordinator of in-country research and training; and (4) a conservation watchdog. Since NATMANCOMS consist of a network of individuals who are influential in their respected professions, they have become effective spokesmen for coastal resource management in their countries (Snedaker, 1983).

An NGO concerned with a single resource in a single nation is Ecuador's shrimp producers association, Association of Cultivators of Bioaquatic Species (ACEBA). Although many of the 35 members of the ACEBA converted mangroves to shrimp growing ponds, the organization now understands that mangroves are critical spawning and rearing habitats for shrimp and other valuable shellfish and finfish. It appears that the support of ACEBA will exert considerable influence on the successful implementation of controls governing mangrove conversion (Aquaculture Case Study).

IIED's review of environmental and natural resources management in developing countries reached this conclusion:

> In most of the countries where such NGO's are active, there is

every indication that they are beginning to adopt the activist, confrontational approach that appears to be a distinctive feature of environmental NGOs in the West, particularly the U.S. Whether or not that adversarial approach is conducive to effective environmental management and whether it will survive the political climates of most developing countries is open to debate. Their existence is an important component of the environmental mangement process, particularly in the developing countries, where they fill a serious gap by providing education and public information (Horberry, 1983).

The Eastern Caribbean Natural Area Management Program (ECNAMP) is a regional level organization concerned with several coastal and marine resources. ECNAMP operates as a network of scientists and conservation specialists in a federation funded by the Rockefeller Brothers' Fund, and the Caribbean Conservation Association. (See Island Ecosystems Case Study for a more detailed discussion of ECNAMP). The organization was founded on the dual premise that national parks and wildlands are needed, and that programs for critical area protection could help Caribbean nations complete multiple use resource assessment and develop local skills is resource management.

Two principles have guided ECNAMP: the need for a moderate to a long time horizon (three to ten years), and the need to use local experts, participants, and plans as the basis for action. ECNAMP has contributed to several types of management strategies described in Section 7: a series of island data atlases for 25 island areas in the eastern Carribean, a marine parks programs for the British Virgin Islands, and coastal management program for Anguilla, St. Bartholeme, and St. Martin/St. Maarten.

The International Union for the Conservation of Nature and Natural Resources (IUCN) and its World Wildlife Fund (WWF) affiliates represent a globally oriented organization. These groups are perhaps the best known NGOs with a commitment to marine and coastal resources conservation. IUCN has been a force for species preservation and conservation of genetic diversity for over two decades, and the organization has been active in promoting marine parks and other critical area designations since the early 1970's. With funds raised mainly from WWF affiliates, 1500 projects have been implemented in support of protected areas.

The hallmark of IUCN is the high degree of technical rigor associated with its programs, and the ability to forge consensus among scientists. This consensus building skill was used successfully to derive a ten point "Bali Action Plan" at the World National Parks Congress in Bali, Indonesia. One of the ten major goals was to "incorporate marine, coastal, and freshwater protected areas into the world-wide network" (McNeely and Miller, 1983). To facilitate this process, IUCN has produced a handbook (Salm and Clark, 1984) on coastal and marine protected areas, covering identification, selection, and management of critical marine and coastal habitats. As discussed in Section 6, protected areas can be strengthened if combined with other management tools, such as special area management organized on the watershed level.

The International Geophysical Union (IGU) represents a global organization with information collection responsibilities for the oceans. IGU's Commission on Coastal Environments keeps world-wide track of coastal geomorphology. Similarly, the International Association of Port and Harbor Managers, another information-sharing NGO, monitors the status of harbor development.

7.6 Alternative Administrative Arrangements

If the coastal nation or subnational unit decides to initiate an integrated coastal resources management program, an administrative arrangement must be selected. Review of the literature indicates at least the following four options:

- to create an interagency network to coordinate policy making, land use allocation, or development through an interministerial council or a regional board (examples are the Philippines and Indonesia);
- concentration of authority within a single existing unit of government (an example is the United States);
- concentration of authority within a new unit of government (examples are Sri Lanka and South Australia);
- concentration of authority in a new or existing unit of government and creation of an interagency council to advise the unit of government.

There is no preferred arrangement. Each of the four arrangements has its strengths and weaknesses. The decision on selection of the administrative alternative should be based on the answer to two questions:

- How politically feasible is each of the alternatives? What is the relative likelihood of legislative enactment and/or executive adoption?
- If the program is enacted or adopted, to what degree will each administrative alternative promote program implementation?

Response to the second question depends on the implementation criteria posed. The discussion in Section 8, program implementation and evaluation, poses the criteria that should be met, or "conditions" needed for successful implementation. Since each of the administrative arrangements has been chosen by one or more governments there is an excellent opportunity to make a comparative assessment of the administrative arrangement's effect on implementation.

It should be noted that a program's administrative arrangement can

change over time. It is not uncommon for the administrative arrangement to change when the program moves from the preparation stage to the implementation stage. Figure 4.1 indicates this possibility.

Whereas the driving force for creating a particular institution was fairly clear in the foregoing discussions, it is far from obvious how the current institutional arrangements in a developing country will affect the next step in coastal management. To a large extent, the evolution from current to new coastal governance arrangement is nation-specific, and is influenced by a whole series of intervening variables. These include:

- the division of power and authority for land regulation, budget making, and project construction;
- the legal traditions of land tenure and private autonomy vs. private control in development;
- governmental ability to plan and assess policy options;
- strength and complexity of personal networks among experts in coastal processes and government management (Allen, 1970, 1978);
- degree of institutional rigidity and bureaucratic entrenchment;
- attitudes and policies of current national administration towards coastal resources.

Despite the number of uncertainties in extrapolating from present to future institutional arrangements, some observations can be made. First, governments generally tend to make marginal adjustments in prevailing institutions. If there is already a strong mechanism for integrated planning in place -- such as town and country planning (e.g., Barbados) or national economic development (e.g., Ecuador), -- it is likely that these strategies would be augmented slightly to address coastal issues. Environmental guidelines or impact assessment might be added to the prevailing arrangement.

Second, where there is both a strong need for intersectoral integration to conserve and develop coastal resources and to minimize hazards, and there is no integrated mechanism in place, two options for institutional change are apparent. Where multiple ministries have responsibility for the coast, and have relatively equal power and influence, an interministerial council of co-equals is likely to be convened. This is the case in Indonesia and the Philippines. The strategies likely to be employed in this option under this arrangement are sectoral planning or regional planning with an impact assessment component. Interministerial cooperation of this type also confers the advantage of pooling maps, data, and professional expertise to solve a common problem.

8. PROGRAM IMPLEMENTATION AND EVALUATION

To complete the analytic cycle for coastal management, it is necessary to consider program implementation and evaluation. The two are distinct, yet related steps in the overall process of coastal management. Implementation is "the delivery of specific objectives set forth in constitutionally adopted public policies" (Mazmanian and Sabatier, 1983). Program evaluation is the determination of the degree to which an organization or implemented policy achieves its goals. In most cases two conditions are required for any evaluation: (1) an adequate post-implementation time period to allow a program to reach maturity and (2) a set of indicators for measuring performance.

There are two basic types of program evaluation: outcome evaluation and process evaluation. The latter is also called an implementation assessment or evaluation. As Mazmanian and Sabatier (1983) observe:

> All implementation studies seek to evaluate program performance, although they differ markedly in the evaluative criteria employed. They can also be distinguished by whether they focus on either policy outputs or eventual outcomes or both.

One of the first evaluations made of a coastal management program used the outcome or the goal approach to effectiveness assessment. This entails:

> discovering what the organization itself has postulated as its ideals, then...measuring organizational success by objective observation of the degree to which the standard is reached. An organization may thus be judged effective to the extent that it achieves its goals (Swanson, 1975).

Process evaluation, on the other hand, examines the means by which goals are achieved. Process indicators include the clarity of goal statements and legislative mandates, measures of the rationality of organizational structures and the process and information flow, the adequacy of yearly budget allocations, the number of permits issued, and the number of agreements executed to promote interagency cooperation.

Outcome evaluation indicators can be subdivided into environmental/socioeconomic and instrumental indicators. Environmental or socioeconomic factors measure such things as the extent of protected wildlife habitat or the number of jobs created. Instrumental indicators measure goals whose achievement is thought necessary to the achievement of environmental and socioeconomic goals. These may include the extent of the information base, the efficiency of permit review, and the extent of public participation.

Table 8.1 presents examples of process indicators and outcome indicators applicable to coastal management evaluation. A myriad of environmental and socioeconomic outcome indicators can be identified. Some environmental indicators are water quality, the amount of protein derived

Table 8-1: Examples of process indicators and outcome indicators for coastal resources management evaluation

Process Evaluation Indicators

- o budget allocation per year
- o number of permits issued, denied, conditional
- o consistency of law dealing with coastal management
- o number of agreements or memoranda executed for interagency cooperation
- o availability of appropriately trained and educated staff
- o number of subnational programs initiated or approved

Outcome Evaluation, Instrumental Indicators

- o cost and length of time for permit review
- o number of procedures, steps eliminated ("streamlining")
- o public participation - number of individuals and groups
- o geographic scope and issue coverage of information base

Outcome Evaluation, Socioeconomic and Environmental Indicators

- o water quality (dissolved oxygen, nutrient levels)
- o fishery yields
- o protein component of diet derived from coastal fisheries
- o number and linear distance of access ways
- o kilometers of coast in public ownership
- o number of recreation user days
- o number of coastal species on the International Union for the Conservation of Nature and Natural Resources (IUCN) endangered species list
- o acreage of wetlands protected or restricted
- o number of low and middle income housing units provided within the coastal zone
- o tonnage and value of commodities handled in ports
- o employment derived from fisheries, ports and tourism sectors
- o hazard impacts - lives lost, property damages

from coastal fisheries, linear kilometers of the coast in public ownership, and acreage of wetlands protected or restored. Socioeconomic indicators include lives and property lost due to coastal hazards, tonnage of goods handled in ports, and employment generated by ports, fisheries, and coastal tourism.

8.1 Outcome and Process Assessments of Coastal Management Programs

For developed countries, particularly the United States, there is an emerging literature of coastal program evaluation. Coastal zone programs in the United States at both the Federal and state levels have been a testing ground for many innovative and ambitious institutional arrangements and environmental management strategies. Passage of the Coastal Zone Management Act in 1972 was the first nation-wide program in land use management. The twelve year track record and innovativeness of numerous federal and state programs have induced scholars and environmental management practitioners to conduct a considerable number of program evaluations.

In the outcome evaluations, goals are measured by various indicators. Swanson's 1975 outcome evaluation described the effectiveness of the Bay Conservation and Development Commission (BCDC) in preventing land fills, increasing public access, and improving shoreline quality. McCrea and Feldman (1977) reviewed Washington state's first three years of experience with the Shoreline Management Act. The program was judged a success in minimizing environmental damage, enhancing public access, and encouraging water-dependent uses. Healy (1978) evaluated the impact of the first thirteen months of the 1972 California Coastal Act on beach access and implementation, density and economic growth, wildlife habitat protection, energy facilities development, aesthetics, and agriculture.

Sorensen (1978) examined a series of instrumental indicators for nine U.S. states that have similar collaborative management arrangements between state and local governments. (Under the collaborative arrangement, local governments are required to prepare land use plans based on state guidelines. The plans are then reviewed by the state coastal agency.) The instrumental goals were: reduce uncertainty, develop an affirmative policy position, manage resources of state or regional concern, manage resources that extend beyond local government boundaries, accomodate local variation, and facilitate accountable decision making.

Rosenbaum (1979) reviewed enforcement of and compliance with coastal wetland regulations in several states including Massachusetts, New Jersey and North Carolina. McCrea (1980) completed an evaluation of output indicators for port planning for the State of Washington. She specifically examined conformance of port projects with the goals of the State Shoreline Management Act.

Process evaluations or implementation assessments, by contrast, do not assess whether goals have been achieved, but rather whether the organizational structure and political process will facilitate this.

Cullen (1977) has reviewed Australia's Port Phillip Authority with an emphasis on the intergovernmental conflicts that arose in a particular site. Sabatier (1977) reviewed permit procedures and policy directives of the 1972 California Coastal Act analyzing a random sample of regional permit decisions appealed to the State Coastal Commission. Decisions were analyzed in terms of the major issues discussed, and the decisions reached by regional and state commissions on different types of development. The Conservation Foundation described the enactment of the 1972 California Coastal Initiative, its planning and permitting activities, and its re-enactment in the Coastal Act of 1976 (Healy, 1978).

The U.S. Office of Coastal Zone Management (OCZM) and its successor, the Office of Ocean and Coastal Resource Management (OCRM), are directed by Section 312 of the Coastal Zone Management Act to prepare annual evaluations of each state's coastal program. As with most government evaluation directives, these "312" evaluations tend to concentrate on process rather than outcome because it poses fewer methodological problems. Measuring input is almost always easier than measuring output. The 312 program evaluations typically emphasize process indicators such as the number of programs approved and the funds allocated to different functions. The most recent Biennial Report to Congress for 1980 and 1981 (USNOAA, 1982), for example, highlights interesting or innovative program features, but does not assess the degree to which the goals of the program have been achieved.

A good program evaluation design would compare states with similar coastal environments and different levels of mandated coastal management in order to assess the impact of the coastal management program on environmental and socioeconomic outputs. For example, a useful comparison would be Georgia with no coastal management program, Florida with a modest level of coastal management, and North Carolina with a concerted coastal management program since they have similar coastal environments. Coastal management assessments with designs comparing the effects of varying levels of a program with the effects of no program do not exist. Consequently, policymakers may draw misleading or erroneous conclusions about a coastal management program's impact. For example, an analysis of federal responsibilities in state coastal programs by the U.S. Department of Commerce, Office of the Inspector General (1983) documents a tendency by OCRM to attribute all improvements in coastal environmental quality to programs administered by OCRM, even though many other agencies have programs that directly or indirectly improve coastal environmental and socioeconomic conditions. For example, EPA may be the key actor in cleaning up water pollution, despite similar efforts of the national and state coastal management program.

The review of the literature failed to identify any evaluations of coastal management programs in developing nations or their subnational units. This finding is to be expected since Sri Lanka and three other developing nations -- Philippines, Indonesia and Thailand -- that have initiated, or are attempting to initiate integrated coastal resource management are only in the beginning stages.

Developing nations for the most part do not evaluate program process

and outcome. Public administration in developing nations has not adopted the concept of program evaluation. Also in nations where authority is highly centralized within the chief executive's office, program evaluation will not be practiced if the results could be negative or critical. If program evaluation is to be both an effective and efficient process, a "checks and balances" relationship must exist among the legislative, executive, and judicial branches of government. Since this relationship often does not exist within developing nations, program evaluation will probably occur in rare and unusual circumstances -- such as when the actions or inactions of a government agency causes an unexpected disaster. Examples are: catastrophic flooding or the sudden crash of an important fishery. Therefore, practioners of coastal management evaluation in developing nations are unlikely to be within the national government agencies but come from the organizations providing international assistance for coastal resources management such as U.S. AID, the World Bank, regional development banks, and IUCN. International assistance organizations should be motivated to conduct evaluations of coastal management they have supported for the same two basic purposes motivating all organizations that practice program evaluation; (1) assessing the efficiency and effectiveness of the investment and (2) determining what improvements should be made to the program.

8.2 Criteria to Assess Program Implementation

Two methods could be used to gather information for a process evaluation or implementation assessment. The first method is to review and synthesize existing case studies of coastal management programs in developed and developing nations. This is feasible for a mature public policy field where a large data base exists. In the absence of recorded case studies, new case studies could be undertaken. Clearly, such an effort is outside the scope of this report. The second method for determining the criteria for implementation is to review implementation analyses in other policy areas, extract the relevant portions, and organize a framework for assessing coastal management implementation.

It is appropriate to use this second method given the sparse data on coastal management in developing countries and the uneven data for developed nations. The most useful analytic framework of the number reviewed for this study is one constructed by Mazmanian and Sabatier (1983). Their framework is derived from a study of five widely divergent policy areas and the early experience of the California Coastal Commission. Implementation assignment criteria do not change significantly across public policy fields. The set of implementation problems is inherent to the process of public administration in democratic societies.

Mazmanian and Sabatier's framework consists of seven criteria:

- mandates are clear and consistent;
- mandates incorporate a sound theory identifying causal linkages to policy objectives; enabling act gives implementing officials sufficient jurisdiction

over target areas and points of leverage;

- o enabling legislation structures implementation process to maximize the probability that implementing officials and target groups will perform as desired;

- o leaders of implementing agency possess managerial and political skills and are committed to statutory goals;

- o the program is supported by organized constituency groups and a few key legislators;

- o priority of objectives is not undermined over time by emergence of conflicting policies.

This list addresses all the organizational problems identified in Section 5.5 of this report. The authors are realistic about applying the framework:

> In practice, of course, all conditions are very unlikely to be attained during the initial implementation period for any program seeking substantial behavioral change....In short, the list of conditions can serve not only as a relatively brief checklist to account post hoc for program effectiveness or failure but also as a set of tasks which program proponents need to accomplish over time if statutory objectives are to be attained. In fact, the appropriate time span for implementation analysis is probably seven to ten years. This gives proponents sufficient time to correct deficiencies in the legal framework, and it also tests their ability to develop and maintain political support over a sufficient period of time to actually be able to bring about important behavioral or systematic changes. It also gives the political system sufficient experience with the program to decide if its goals were really worth pursuing and to work out conflicts between competing values (Mazmanian and Sabatier, 1983).

With these caveats, the Mazmanian and Sabatier list of criteria is still useful as a framework for organizing a discussion of coastal management implementation. However, a number of individuals who reviewed earlier drafts of this study questioned the applicability of implementation evaluation criteria derived from studies in developed western societies to the nations of the developing world. The criteria posed by Mazmanian and Sabatier are congruent with implementation principles derived from studies of developing nations (Esman, 1978; Soysa et al., 1982; Vallejo, 1982). Also, three of the case studies -- Island Ecosystems, Mangrove Management and Aquaculture -- support one or more of the seven criteria. The International Institute for Environment and Development's review of developing nations' environmental management programs concluded that:

> the most important prerequisites for effective operation seem to be the mandate, the organizational structure and the level of

professional competence with which the institution is endowed. Where an institution's success has been marginal, or where it has failed, one can usually pinpoint the absence of one or more of these factors (IIED, 1981).

The difference in implementation assessment between developed and developing nations is not in the nature of the criteria but in the relative importance each plays in program achievement and failure. For example, the size and competence of professional staff is usually cited as one of the major implementation obstacles in developing nations. By comparison, developed nations usually do not rate this staffing as a major problem. Conversely, developed nations are commonly beset by constituency support problems and opposition by target groups. These participatory process obstacles are seldom expressed as a concern by developing nations.

It should be noted that many of the examples used to illustrate the seven conditions for successful implementation are drawn from California, either the San Francisco Bay Conservation and Development Commission (BCDC) or the state Coastal Commission. The reason for the focus on California is that coastal program evaluation literature is concentrated on that state. California's ambitious, innovative and controversial coastal management programs have made it the favorite case study for program evaluations. Also, the comparatively long history of BCDC (19 years) and the California Coastal Commission (12 years) present an opportunity to assess the evolution of implementation -- an opportunity not present in other coastal programs.

8.3 Clear and Consistent Policy Objectives

One problem evident in both the Federal Coastal Zone Management Act and several state acts in the United States is that rhetoric clouds policy objectives. Because mandates are the result of negotiated legislative compromise, they often avoid making clear statements of priorities among apparently conflicting goals. In a few cases, a vague mandate may be sharpened by rules and procedures adopted subsequent to legislative authorization.

Swanson's review of the Bay Conservation and Development Commission (1975) showed that much of the agency's success could be traced to its specific mission. Clear rules were laid out for making decisions on three issues: bay fill, public access, and improving shoreline water quality. He concludes that "BCDC owes much of its success to working for clearly defined goals through the political process."

In developing nations, vague and conflicting goals appear to be a common problem in environmental management programs. The goals and objectives emerge from the accumulation of laws over the years. Because outmoded legislation has often been kept on the books, administrators must choose among an array of vague and conflicting mandates (IIED, 1981).

8.4 Good Theory and Information

This criterion argues for the availability of good information about the consequences and opportunities for coastal development. The concept of impact assessment is well understood as a tracing of impacts from uses and activities through to biological/physical changes and social consequences. For instance, filling shallow mudflats around a bay margin is likely to have a negative impact on fisheries. Constructing buildings in a way that impairs public access will mean diminished recreational opportunities, aesthetic appreciation, and possibly lost tourism revenues.

While the causal networks such as those outlined in Section 5, may be well understood, there is far less understanding about the ecological function of a natural system, or the analytic tools needed to predict magnitudes of impact with certainty.

A major weakness of the Regional Seas program is the lack of data and models to make persuasive cause and effect connections between the terrestrial pollution sources and the degradation of the marine environment (Hulm, 1983). Several analysts have commented on the importance of, and the difficulty of achieving, a sound technical data base for coastal management.

Clark (1978) assessed the recruitment of natural science expertise in the preparation of the California Coastal Plan. He concluded that while scientists who had participated in various phases of plan preparation felt that the scientific content was adequate, there were many areas where the planner-scientist linkage could be strengthened.

During the course of his work, Clark interviewed a number of coastal management specialists on the theoretical and informational basis for the plan. One analyst observed:

> This data-rich situation is mandatory to the success of the planning program they've just adoped; otherwise it will be just a political judgement. (Clark, 1978)

Another analyst suggested that lack of good technical information weakened the Commission's ability to defend its jurisdictional boundary:

> Because the commission did not have good information about the dynamics of coastal systems -- the line (coastal zone border) was often set too close to the coast, and in some cases too far back....Since the Coastal Commission does not have the scientific information to support the line for much of its length, it appears that the inland boundary in several locations will be moved coastward during this session of the legislature, further compromising the Commission's ability to develop and implement a management strategy.... (Clark, 1978).

McCrea and Feldman (1977) noted that implementation of the Washington Shoreline Management Act was hindered during its first few years by lack of information on natural systems upon which local government could make

permit decisions. The same situation probably existed in all state coastal programs during the first phase of implementation.

McCreary (1979) identified three series of barriers to the use of biological information in California's coastal zone planning. Some are generic to the practice of biological research, a second set is common to any effort to inject scientific information into environmental planning, and a third set is specific to California's coastal planning. Despite the apparent chasm between scientific information and the planning process in California, Mazmanian and Sabatier (1983) gave the coastal program high marks in comparison to the other social programs reviewed.

In the absence of good natural resource information, the tendency is to base resource allocation decisions almost entirely on economic or political considerations. Certainly the tools for quantifying many values in economic terms are well developed (although still evolving). Economic indicators (dollars invested, jobs created) may have more meaning to most people than measures of wildlife habitat acreage, catch pertinent effort, species diversity indices, or rates of runoff and sedimentation. The U.S. experience strongly suggests that to be successful in coastal zone management, programs in developing countries must incorporate a strong knowledge of coastal processes along with the economic calculus. The information should be expressed in concise policy terms. When there is a potential for two policies to conflict, such as developing marinas versus protecting shellfish nurseries, clear decision rules should be laid down for reaching an outcome. (California deals with this by prescribing very narrow conditions under which wetlands can be filled.)

Reports on environmental management programs in developing nations have consistently noted the lack of adequate data and maps for environmental assessment and policy making (USAID, 1979). Since coastal management programs require an information rich base, data and map limitations are expected to be a major problem in program development and implementation.

8.5 Sufficient Jurisdiction and Authority

Implementing officials should have sufficient jurisdiction over target groups and other points of leverage to attain the coastal program's objectives. The discussion in Section 5 identified insufficient planning and regulatory authority as a major problem. To ensure that an agency has adequate authority, at least three important decisions must be made about:

- the geographic scope of the jurisdiction;
- the types of projects and issues within the agency's jurisdiction;
- the functional responsibilities (e.g., permit letting, advisory, review and comments, capital allocation, etc.).

The respective geographic jurisdictions of the San Francisco Bay

Commission (BCDC) and the California Coastal Commission are an interesting contrast here. BCDC has a jurisdiction extending just one hundred yards inland from the Bay margin. It excludes wetlands diked off from tidal action. BCDC's narrow jurisdiction is conducive to a crisp focus on the issues of preventing bay fill, preserving access, and reviewing designs for bayside structures. In these areas, it has a strong, proven record (Swanson, 1975).

This same narrow mandate has several shortcomings. Davoren (1982) points out that the agency's pioneering effort to promote access (and block bay fill) "never grew beyond the 1969 land use law and, more significantly, the one agency that the public sees as controlling the bay's destiny does not have power over undeveloped shoreline use or bay waters to exercise that control."

The California Coastal Commission, on the other hand, has an inland jurisdiction which varies in width from one thousand yards landward of mean high tide in urban areas to five miles or more around important wetlands or remote areas like Big Sur. Depending on the section of coast, this has given the Commission authority to intervene in a wide range of issues that affect the quality of the coast -- watershed erosion, urban coastal design, traffic capacity on roads near the shore, offshore drilling in state and federal waters. With these broad powers, the Commission's attention is diffused by being drawn in many directions at once. Unlike BCDC, the Coastal Commission cannot concentrate on a few issues in a narrow geographic jurisdiction.

Functional responsibilities maybe concentrated in a single agency or divided among several agencies. Where responsibilities are divided, the lead agency for coastal resource management must gain the cooperation of other agencies -- a process that may prove slow and difficult, as suggested by the experience of both developed and developing countries.

A new agency for the coast will likely have to contend with a wide array of existing institutions and agencies, both formal and informal. There may be battles over jurisdictional "turf," budget, staff, political influence, and organized constituencies. An analysis of the relationship between the California Coastal Commission and state agencies pointed out that the new agency:

> joined one of the nation's largest and most active state bureaucracies,a collection of commissions, boards and agencies noted for both professionalism and fierce independence (Banta, 1978).

Banta found that the Commission did not assign a high priority to resolving conflict with other state agencies. Conflicts continually arose when the Commission exercised its authority to review plans and permits of sister agencies, and when the Commission's tight deadlines necessitated making decisions without formal consultation with the experts of other agencies in fields such as water quality and fisheries biology. When the 1976 California Coastal Act was drafted creating a successor agency, steps were taken to improve interagency coordination (Banta, 1978). Similarly, a

review of Costa Rica's administrative alternatives for a coastal resources management program (Blair, 1979) suggested that a new agency would be unwieldy, and would have difficulty gaining cooperation from other agencies for sound resource management.

In Sri Lanka, the approach for building an interagency network for coastal management has been quite successful. The Coast Conservation Department (CCD), a unit within the Ministry of Fisheries, has established effective working relationships with three key agencies -- the Urban Development Authority (UDA), the Tourist Board and the Central Environment Authority. The four agencies share a commitment to incorporating environmental and coastal zone considerations into their decision making, and are mutually supportive. CCD has a permit authority for a zone 300 meters landward of the mean water mark, UDA has permit authority over all development activities within one kilometer of the shoreline, and CEA is an umbrella agency responsible for formulating environmental assessments and setting pollution control standards. Until the CCD gained an independent permit authority, the Tourist Board referred proposals for development of 50 units or more to the CCD for guidance on necessary beach setbacks (Kinsey and Sondheimer, 1984).

Neither a broad jurisdiction nor a narrow jurisdiction is "right" -- both have advantages and disadvantages. A developing nation must choose whether to concentrate on a narrow jurisdiction at the risk of overlooking important coastal issues, or gaining broad jurisdiction with the responsibility of resolving numerous issues and perhaps dissipating its energies in numerous directions.

8.6 Good Implementation Structure

The implementation process should be structured to maximize the probability that implementing officials and target groups perform in a manner to attain the objectives of the coastal program. The key ingredients for a successful coastal resource management program are an adequate budget, a sympathetic and dedicated host agency, and adequate political support. According to McCrea and Feldman (1977), the commitment of the responsible state agencies was critical to the successful achievement of the Washington State program's goals.

Agencies that are created as autonomous units who can control their own staffing and budget process have a greater liklihood of achieving program objectives. An example is Sri Lanka's recent creation of the Coastal Conservation Department to administer the nation's coastal zone management program. It was elevated to departmental level to provide the agency with budgetary and administrative flexibility (Kinsey and Sondheimer, 1984).

By contrast, the Philippines has a weak implementation structure. The National Environmental Protection Council (NEPC) has established a coastal zone management program that addresses such comprehensive issues as ports and dredging, tourism development, and marine pollution. There is also an Interagency Coastal Zone Task Force with representatives from 22 different

agencies of government.

However, there seems to be little attention paid by other agencies to either the Task Force or NEPC's coastal management program...the critical elements of cohesive policy regarding coastal resources and coordinated implementation among agencies to achieve these policies has not been articulated (Kinsey and Sondheimer, 1984). The state of Florida also has a similar administrative problem as the Philippines. Currently the state has a very small coastal management agency. Authority for coastal permitting and resource management is disbursed among several agencies. The initial program activity in Florida, preparation of a coastal atlas, was not initially linked to regulation or resource management and the implementation process was not clear.

"Target groups" for coastal management are numerous. The groups regulated by U.S. coastal management are primarily land developers, industrialists, commercial recreation entrepreneurs, and others seeking to extract or exploit resources. Relevant groups may also include the fishing community, which would benefit from the control of water pollution, but which might perceive catch restrictions as a disadvantage to them. The tourist industry would benefit from provision of beach access, control of water pollution, and preservation of natural phenomena that attract visitors. Local environmental interests represent a fourth type of target group.

Much of the early success or failure of coastal management programs in the United States is due to the involvement of target groups and the early evidence from developing countries also suggests that participation of target groups or constituencies is crucial to program success. The initial legislative mandate creating the BCDC was successful in large part because a citizens' organization mounted an effective public relations and lobbying campaign (Odell, 1972). They were, in turn, encouraged and reinforced by the work of BCDC's technical staff (Swanson, 1975).

Legislative support was as crucial to California's success with coastal management as support from conservation interest groups. The momentum generated in the early days of the Commission carried through to strong legislative support for the 1976 Act to create a successor agency. The persistence of people who cared about coastal conservation was credited as a key factor in the passage of the 1976 Act (Duddleston, 1978). Final negotiations included some successful bargaining with advocates of the building trades, thus overcoming some of the major opposition.

Maine's early experience with integrated coastal resource management, in contrast to California's, was colored by the failure of state planners to create a constituency of support among local citizens and communities (Lewis, 1975). Even though several progressive environmental laws were already on the books when the program was launched in 1972, the proposed state level intervention with limited citizen support killed the program. Six years later, the program was resurrected by the state, this time creating a greater measure of citizen involvement, expanded local government involvement, and greater emphasis on encouraging desirable economic development such as shellfish harvesting.

Templet's recent paper (in press) reflecting on the experience of creating a CRM program in American Samoa detailed the importance of involving target groups in each step of program development and thereby building a supportive constituency. Both instrumental goals (government process) and outcome goals (resource protection and economic development) emerged from a series of meetings with village councils. The next step was to distill a list of specific management policies from the general goals. Existing agencies with responsibility for some aspect of coastal management were encouraged to participate in return for increased staff and outside technical assistance.

American Samoa had several statutes which, when combined, provided sufficient authority to implement a coastal area management program. The program was invoked by executive order based on existing legislation. Consistent with traditional Samoan orientation to graphic presentation, the first atlas of American Samoa was produced. This was both a valuable analytic device and an educational tool complemented by courses on coastal resources in the public schools. Consensus decision making, cooperation among agencies and broad education were the hallmarks of American Samoa's coastal program. Samoa benefitted from western techniques, but retained the essence of traditional culture.

Turner (Mangrove Management Case Study) and Towle (Island Ecosystems Case Study) have suggested that involvement of residents of coastal areas is a strong precondition for successful coastal program implementation. Siddall, et al (Mangrove Management and Agriculture Case Study) have cited the participation of a shrimp producers' association as a potentially important factor in successful mangrove management.

8.7 Staff Competence and Commitment

Successful coastal management demands both executive skill and strong staff level capabilities. Coastal issues span a wide variety of disciplines: marine and terrestrial biology, hydrology and hydrolics, engineering, site planning, architecture, policy analysis, and economics. Often the skills of specialists in these diverse fields must be brought to bear on a single coastal project. In developing countries, skills and expertise are often in short supply so training programs are a crucial necessity. For example, Indonesian coastal managers cited the lack of trained and experienced personnel in many fields related to CRM including management/administration, policy analysis, data gathering and research, and enforcement (Kinsey and Sondheimer, 1984). International asistance efforts to promote ICRM clearly need to provide training in a series of disciplines, and in techniques to bridge disciplines in a team approach.

Leaders of the implementation agency should possess substantial managerial skill and be committed to achieving the program's obectives. Without strong, politically adept leadership, it is doubtful that a program for integrated coastal management can pass its infancy, let alone grow into maturity. An excellent example of the dividends paid by skilled political staff is the California coastal program. In its first incarnation

after passage of the 1977 coastal initiative, the Coastal Commission the 1972 initiative, the California Coastal Zone Conservation Commission drew some of its key staff, notably its executive director, and the chairman of the Commission, from the BCDC. These individuals had perhaps the most experience possible given the short history of coastal zone management at the time. After the first Commission's Plan was translated into legislation by the 1976 California Coastal Act, a new complement of top staff arrived who had participated in drawing up the mandate for the new agency. They were not just legal technicians, but were politically seasoned by their experience with the first coastal agency and negotiations to secure passage of the 1976 Act. This legislative experience and network of contacts has well served the Coastal Commission and a companion agency, the California State Coastal Conservancy, in securing funding and retaining jurisdiction.

8.8 Maintaining the Program's Priority on the Public Agenda

This condition for effective implementation can be compromised by a large number of factors -- many beyond the control of an agency. Most of the state coastal programs in the United States have had to withstand an economic recession and two "energy crises" with attendant pressure for accelerated offshore drilling. Dramatic shifts in a national economic policy or a change in administration usually bring changes in priorities for government intervention. These pressures underscore the importance of maintaining a strong organized constituency for coastal management, as described in subsections 8.4 and 8.6. In developing countries, coastal management may depend on ensuring that sustained yield of mangroves or coastal fisheries stays near the top of the public policy agenda.

One strategy for keeping coastal management at the top of the public agenda in a developing nation may be to forge strong liaisons with other sectors of the government or national economy. Templet's review of the program in American Samoa tends to confirm this suggestion (Templet, (in press).

9. GUIDELINES

The guidelines presented here, derived from the literature review and analysis presented in the preceeding sections, are divided into two parts. The first suggests programmatic guidelines for international assistance. The second offers more specific guidelines for national coastal resources management programs.

9.1 Programmatic Guidelines for International Assistance

1. To initiate and gain continued support for coastal resources management, the program must demonstrate a strong linkage to improvement in socioeconomic conditions.

Program initiation for coastal resources management is usually a response to a perceived use conflict, a severe decline in a resource, or a devastating experience with natural hazards. Launching a coastal program demands a clear motivation -- usually an event that dramatizes the importance and vulnerability of coastal resources. Over the long term, the socioeconomic benefits of coastal resources management must be evident in order for environmental quality and natural area protection to enjoy continued support. Fisheries productivity, increased tourism revenues, mangrove forestry, and the costs associated with natural hazard devastation appear to be the four most common and persuasive arguments for integrated coastal resources management.

In less developed large islands or continental nations without fisheries, mangrove forestry, tourism, or natural hazard devastation as important national concerns, there is little potential for the initiation and implementation of an integrated coastal management program, unless there is an infusion of considerable funds and expertise from international assistance organizations. In this cluster of nations, the more modest management strategies of impact assessment, shoreland exclusion zones, or critical areas would be appropriate.

2. A global issues index should be compiled to guide international assistance organizations in setting program priorities and organizing coastal management projects, and to promote international information exchange.

There are a finite number of ways that the world's development activities can have an impact on the world's coastal resources and environments. This finite number of impacts can be described in terms of cause and effect linkages, which can, in turn, provide the basis for a global listing of coastal issues. If consensus can be obtained on the list, then a structured survey should be conducted to compile national listings for each issue. The survey should also rate the issues according to their importance to each coastal nation, and to international organizations. The format presented in Appendix B appears to be a useful framework for the global issues index. Nations identified in connection with each issue could form the basis of international networks for sharing

information and expertise. In addition, the IUCN document Global Status of Mangrove Ecosystems (Saenger, et al., 1983) represents a good model for a compilation of issues related to one type of renewable resource.

3. A common format should be devised to analyze a nation's existing institutional arrangments in order to guide the creation of programs for integrated coastal resources management.

Every coastal nation has established its own institutional arrangements, consisting of laws, customs, management strategies and organizations to allocate coastal resources. A common analytic framework should reveal the institutional complexity of coastal management in three dimensions: structural and functional divisions, geographic and activity subdivisions, and levels of government.

Over the last decade, descriptions of national and state approaches have been generated at a steady rate, as revealed by the number of reports presenting such descriptions cited in the references list. Articles in professional journals, such as the Coastal Zone Management Journal, and papers presented at national and international conferences, have produced a considerable body of literature describing various national or state approaches. Since the descriptions of coastal governance do not follow a consistent format, the scope and depth of information varies considerably. To facilitate comparative assessments among institutional arrangements, the Coastal Zone Management Journal, as well as proceedings of future conferences on coastal management, should attempt to establish a consistent format for the description and assessment of national and subnational institutional arrangements. The format should be compatible with AID's environmental profile series in order to facilitate the incorporation of coastal governance as a component in forthcoming reports.

4. Research should be encouraged and funded to evaluate the major impediments and aids to successful implementation of integrated coastal resources management in developing countries in order to inform effective design of future programs.

Since the literature review did not reveal any studies of program design in developing countries, research should verify and refine the set of conditions needed to ensure program success derived from the U.S. experience. In the U.S., successful program implementation depends upon clarity of goals, understanding of cause and effect relationships, and the strength of the constituency. Analyses of environmental programs in the developing world suggest that vaguely worded goals and lack of expertise are two serious obstacles to program implementation. Non-governmental organizations, such as NATMANCOMS, the Eastern Caribbean Natural Areas Management Program (ECNAMP), and IUCN appear to be the most important expression of constituency influence on coastal resources management in the developing world. Research should investigate which conditions for successful implementation suggested by the U.S. experience should be emphasized in coastal management programs in developing nations.

5. International assistance organizations should be encouraged to fund an array of coastal programs, using a variety of institutional arrangements and management strategies.

No one prescription can be applied uniformly to every developing country. Management strategies must be tailored to reflect the institutions, laws, and customs now in place, the geographic extent and severity of issues, and the available expertise and staffing.

International assistance organizations should consider supporting programs that represent each type of institutional arrangement. Such an approach recognizes that there is no "best" institutional arrangement for managing coastal resources. The ultimate test of "goodness" in an institutional arrangement is the effective and efficient resolution of issues of concern to both the coastal nation and the international community. For the near future, coastal resources and environments in many, if not most, developing nations will continue to be managed by a fragmented collection of sectoral planning and development programs. For these nations, reduction in resource degradation and improved management practices (such as sustained yield) may only occur with international assistance that is structured to work through the existing institutional arrangement of sectoral planning programs.

Advice, information, and financial support to broaden the scope of sectoral programs -- such as port development, offshore oil development, fisheries development, and natural areas protection -- may produce as much or more environmental improvement than is produced by integrated planning. Similarly, assistance in non-integrative management strategies such as critical areas designation, shoreland exclusion zones, and impact assessment may bring immediate and low cost benefits.

9.2 Guidelines for National Coastal Resources Management

1. Boundaries for integrated coastal management programs should be tailored to "capture" and enable resolution of the relevant coastal issues. Simple political jurisdictions or rigid "zones" may be ineffective in promoting successful integrated coastal resources management.

A broad array of possible coastal zone boundaries exist (Figure 2.1). Some boundaries are quite narrow, and are best suited to deal with use conflicts occurring at the immediate shoreline. If watershed-generated impacts pose use conflicts (Coastal Watershed Case Study), then a coastal program boundary extending inland to the ridge line of watersheds draining into the coast would be more appropriate. The seaward side of the boundary should be adjusted to reflect the economic significance of the fisheries and ports sectors, and the importance of nearshore spawning and rearing habitats.

2. The key characteristics of coastal nations, together with important coastal issues, should guide the choice of coastal resources management strategies for a nation.

Some of the key characteristics include the economic importance of coastal-dependent sectors, the extent of prior governmental experience with some aspect of coastal resources management, experience with the destructive consequences of coastal hazards, and the revenue available for program implementation.

3. Non-governmental organizations (NGOs) should be encouraged to be participants in coastal resources management to represent key coastal users, communicate government policies, assist in training resource managers, and compile relevant information.

NGOs stretch the capacity of government agencies, provide realistic insights into the possibilities for effective program implementation, and broaden the dissemination of important information.

4. The chances for successful implementation of a coastal resources management program can be improved by clearly spelling out the causal relationship between policy goals or rules and the protection and management of coastal resources.

Government programs with ill-focussed goals are hard to administer. Often ecological cycles, food webs, and impact networks are not well understood by lay people so the logic of regulatory or planning strategies is not apparent. Both the initial mandate and the implementation process should stress the links between resource management goals and the management strategy.

5. Virtually all coastal nations can benefit from applying the strategy of environmental impact assessment (EIA) to projects affecting the renewable coastal resources.

EIA can be a flexible procedure to identify, evaluate, and help avoid the worst impacts of coastal development. This strategy can be a part of a larger integrated coastal resources management program, or it can stand alone as an intermediate step. The technical quality of EIA can be strengthened through the incorporation of a coastal atlas or data bank as a source of information for impact assessment.

6. Small island nations with important tourism and fisheries sectors have strong incentives to develop and implement programs for integrated coastal resources management.

Almost every activity on small island nations is linked to coastal resources. These linkages strongly suggest that management strategies be adopted to identify and resolve conflicts arising from competing demands on a small resource base.

Again, the precise strategies used to integrate planning and management across economic sectors should be tailored to local needs, capabilities, and traditions. Strategies to accomplish integrated management could include broad scope sectoral planning, special area/regional planning, or national land use planning. Preparation of an island-wide resource atlas covering watershed lands, shorelands, and submerged resources is likely to be a valuable investment in protecting critical biological and economic resources. Small islands may require external expertise. The ECNAMP experience in preparing coastal atlases for 25 island areas in the Eastern Caribbean could provide a model because it combined imported skills with indigenous expertise. Middle income nations -- both large islands and continental nations -- with a strong fisheries or tourist sector, or a recent experience with the effects of coastal hazards, are also strong candidates for integrated coastal resources management.

7. Shoreline exclusion zones and critical area designations represent an appropriate first step towards integrated coastal resources management.

Nations can cope with problems that occur in a limited geographic area, such as shoreline erosion, loss of coral reefs or estuarine spawning grounds, or encroachment on endangered species habitats using the strategies of critical area designation or shoreline exclusion. Both strategies can be implemented on a site specific basis, commensurate with available information, staffing, and expertise. They can be reinforced with special area planning or broad sectoral planning of a larger geographic scope. Combining estuarine or marine protected areas with more land-based strategies offers the possibility of managing an entire coastal ecosystem.

Since critical area designations and exclusion zones are relatively inexpensive and simple to administer, these strategies can be especially appropriate for nations that are otherwise without a strong coastal orientation.

8. Integrated coastal management programs using strategies such as land use planning may well have better success if they are begun on a regional basis, and then expanded to national land use planning.

The regional level of focus allows concentration on the most severe problems, enables a nation to obtain experience with coastal resources management, provides time to develop and recruit expertise, and presents an opportunity to make needed midcourse corrections. In this respect, the coastal programs of developing nations could follow the same evolutionary process documented in a number of developed coastal nations and subnational units.

In most developing nations, the lineal expanse of coastal zone can be divided into types of environments. The majority of the coastal zone consists of agriculture, rural settlements, pristine environments, or other undeveloped land. The remaining coastal zone usually consists of an urbanizing region surrounding the nation's major port and its associated

estuary. Major port and estuary complexes are usually the locus of the greatest intensity and number of coastal resource conflicts, and the greatest environmental degradation. As a result, national interest in integrated coastal resources management has usually focussed on the need for managing regions defined by the metropolitan port and estuary complex.

Coastal management at the regional scale provides the opportunity to test the concept and the approach as a pilot effort before committing energies and political capital to a nation-wide effort. The risk and consequences of a failure are likely to be considerably less when a program is implemented on a smaller scale. Also, the experience gained during the regional effort should increase the likelihood of success of a later nation-wide effort.

10. REFERENCES

Adams, J., 1973. Proposition 20 -- A citizen's campaign. Syracuse Law Review, 24(3):1019-1046.

Adams, T. J., 1964. First World Conference on National Parks. U.S. Department of Interior, Washington D. C., 471 pp.

Aderounmu, A., 1976. Nigeria. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 213-217.

Adulavidhaya, K., Sanit, A., Chindai, S. A., Rowchai, S., and Rougrujipimon, C., 1982. Thailand: Use and development of mangrove and fisheries resources. In: C. H. Soysa, C.L. Chia, and W. L. Collier, (editors), Man, land, and sea: Coastal resource use and management in Asia and the Pacific. Agricultural Development Council, Bangkok, pp. 273-296.

Ahmed, Y. J., (editor), 1982. Coastal tourism. Environmental management guidelines series. United Nations Environment Program, Nairobi.

Akaha, T., In press. Conservation of the environment of the Seto Inland Sea: A policy response under uncertainty. Coastal Zone Management Journal, 12(2).

Al-Abbar, F. S., 1976. Kuwait. In: K. H. Skedielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 189-194.

Ali, R., and Armstrong, J., 1976. United Arab Emirates Coastal Development Planning Study. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office,

Allen, T. J., and Cooney, S., 1973. Institutional roles in technology transfer: a diagnosis ofthe situation in one small country. Research and Development Management 4(1).

Allen, T. J., and Meyer, A. D., 1982. Technical communication among scientists and engineers in four organizations in Sweden -- results of a pilot study. Working Paper WP 1318-82, Sloan School of Management, Massachusetts Institute of Technology.

Alwis, L., 1982. River basin development and protected areas in Sri Lanka. Paper presented at World National Parks Congress, Bali, Indonesia, 8pp.

Amarasinghe, S. R., and Wickremeratne, H. J. M., 1983. The evolution and implementation of legislation for coastal zone management in a developing country -- the Sri Lankan experience. In: Coastal Zone '83, Proceedings of the third symposium on coastal and ocean management. American Society of Civil Engineers, Vol. III, pp. 2822-2841.

Argentina (government of), the Organization of American States and United Nations Environment Program, 1978. Environmental quality and river basin development: A model for integrated analysis and planning. Secretary General, Organization of American States, Washington, D. C., 67 pp.

Armstrong, J., Bissel, H., Davenport, R., Goodman, J., Hershman, M., and Sorensen, J., 1974. Coastal zone management: The process of program development. Coastal Zone Management Institute, Sandwich, Massachusetts, 176 pp.

ASEAN Experts Group on the Environment, 1983. General guidelines on the development and management of coastal areas. Sixth meeting of ASEAN Experts Group on the Environment, Jakarta, Indonesia, March 22-24, 1983. Document #21.

Ashbaugh, J., and Sorensen, J., 1976. Identifying the "Public" for participation in coastal zone management. Coastal Zone Management Journal, 2(4).

Australia, House of Representatives, Standing Committee on Environment and Conservation, 1980. Report on management of the Australian coastal zone. Australia Government Publication Service, pp. 86.

Aziaha, Y., 1976. Togo. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 235-242.

Bahamas, Government of, 1976. Planning guidelines for the control of land use and development in the Commonwealth of the Bahamas.

Baker, D., 1976. Barbados. In: K. H. Skekielda and B. Breuer (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 39-61.

Banta, John S., 1978. The coastal commission and state agencies: Conflict and cooperation. In: R. Healy, (editor), Protecting the golden shore, The Conservation Foundation, Washington, D. C., pp. 97-131.

Beller, W., (editor), 1979. Transactions at the conference on environmental management and economic growth in the smaller Caribbean islands. U.S. Department of State Publication, 187 pp.

Bird, E. C. F., and Ongkosongo, O. S. R., 1981. Environmental changes on the coasts of Indonesia. The United Nations University. (NRTS-12/UNUP-197), 55 pp.

Birke, P., and Roeseler, W. G., 1983. State response to the Coastal Zone Management Act of 1972. In: Coastal zone '83, Proceedings of the third symposium on coastal and ocean management. American Society of Civil Engineers, Vol III, pp. 206-225.

Blair, D. K., 1979. Coastal resource management in the Gulf of Nicoya. Institute for Marine Studies, University of Washington, 52 pp.

Blau, P. M., and Meyer, M. W., 1956. Bureaucracy in Modern Society, Random House, New York.

Borgese, E. M., and Ginsburg, N., (editors), 1982. Ocean Yearbook 3. University of Chicago Press, Chicago.

Boule, M., Olmsted, E., and Miller, T., 1983. Inventory of wetland resources and evaluation of wetland management in western Washington. Prepared by Shapiro and Associates for the Washington State Department of Ecology, 102 pp.

Brazil, Interministerial Commission on Ocean Research, 1980. Politica nacional para los recursos do mar. Interministerial Commission on Ocean Research, Brasilia.

Brazil, Interministerial Commission on Ocean Research, 1981. Plano setorial para los recursos do mar (1982-1985). Interministerial Commission on Ocean Research, Brasilia, 10 pp.

Briggs, D. J. and Hansom, J. D., 1982. Potential role of ecological mapping in coastal zone management in Europe. Ekistics 293, Mar-Apr 1982, pp. 114-118.

Brown, L. F., et al., 1980. Environmental geologic atlas of the Texas coastline; Brownsfield-Harlingen area. Bureau of Economic Geology, the University of Texas at Austin.

Burbridge, P. R., and Koesoebiono, In press. In: Southeast Asian seas: Frontiers for development. McGraw-Hill, pp. 110-135.

Caballero, H., 1976. Monografia de las costas de Honduras. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 119-133.

California Coastal Zone Conservation Commission, 1975. California coastal plan. State of California documents and publications, Sacramento, 443 pp.

California Public Resources Code Section 30000 et. seq. (The Coastal Act of 1976).

Camhis, M., and Coccossis, H., 1982. The national coastal management program of Greece. Ekistics, 293:131-138.

Canada, Council of Resources and Environment Ministeries, 1978. Proceedings of the shore management symposium.

Carlberg, E. C., and Grip K., 1982. Coastal policy in Sweden: Use and protection of marine resources. Ekistics, 293:137-142.

Center for Ocean Management Studies, University of Rhode Island. 1980. Comparative marine policy: Perspectives from Europe, Scandinavia, Canada, and the United States. Praeger Special Studies, 257 pp.

Chaguer, A., 1976. Morocco. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 201-211.

Chapman, V. P., 1974. Coastal lands management in New Zealand. Coastal Zone Management Journal, 1(3):333-348.

Clark, J. R., 1978. Natural science and coastal planning: The California experience. In: R. Healy, (editor), Protecting the golden shore. The Conservation Foundation, Washington, D. C., pp. 177-208.

Clark, J. R., 1983. Paper on wetlands for the global issues work group. U.S. National Park Service, International Affairs Unit, Washington, D. C., Draft.

Clausen, A. W., 1981. Sustainable development: the global imperative. Fairfield Osborne Memorial Lecture.

Coastal States Organization, 1981. Coastal management -- A sound investment: A position paper on future funding for the coastal zone management program, 26 pp.

Comal, S. K., 1976. India. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 135-141.

Conservation Foundation, 1980. Coastal zone management -- 1980: A context for debate. Conservation Foundation, Washington, D. C., 104 pp., plus appendices.

Craine, L., 1971. Institutions for managing lakes and bays. Natural Resources Journal, 11(3):523-546.

Cuenya, B. and Hardoy. J., 1981. Legal, regulatory, and institutional aspects of environmental and natural resource management in developing countries: A country case study of Venezuela. U.S. Agency for International Development and National Park Service Natural Resource Project, 67 pp.

Cullen, P., 1977. Coastal management in Port Phillip. Coastal Zone Management Journal, 3(3):291-305.

Cullen, P., 1982. Coastal zone management in Australia. Coastal Zone Management Journal, 10(3):183-211.

Cullen, P., In press. The heritage coast programme in England and Wales. Coastal Zone Management Journal.

Dalfelt, A., 1982. The role of international assistance organiza- in promoting effective management of protected areas. Paper presented at World National Parks Congress, Bali, Indonesia, 16 pp.

Davoren, W. T., 1982. Tragedy of the San Francisco Bay commons. Coastal Zone Management Journal, 9(2):111-153.

Dehart, G. H., and Glazer, M., 1980. Improved coordination for planning and permittng in special areas: A report to the President for the Federal Coastal Program. Second draft, 157 pp.

Duddleson, W. J., 1978. How the citizens of California saved their Coastal management program. In: R. Healy, (editor), Protecting the golden shore. The Conservation Foundation, Washington, D. C., pp. 3-64.

Ecuador Navy and the United Nations, 1983. Ordenacion y desarrollo integral de las zonas costeras. Proceedings of a seminar convened May 18-27, 1981, Guayaquil, Ecuador, 550 pp.

Elliott, H., 1974. Second world conference on national parks. International Union for the Conservation of Nature and Natural Resources, Morges, Switzerland, 504 pp.

Englander, E., Feldman, J., and Hershman, M., 1977. Coastal zone problems: A basis for evaluation. Coastal Zone Management Journal, 3(3):217-236.

Esman, M. J., 1978. Developing and managing institutions for industrial development. United Nations Industrial Development Organization, 25 pp.

Ewen, L., 1983. Institutional problems in the future management of the California coastal resource program. In: Coastal zone '83, Proceedings of the third symposium on coastal and ocean management. American Society of Civil Engineers, Vol. III, pp. 252-271.

Finn, D., 1983. Conserving the coastal and marine resources of East Africa. In: Coastal zone '83, Proceedings of the third symposium on coastal and ocean management. American Society of Civil Engineers, Vol. II., pp. 1823-1839.

Finn, D., 1983. Written comments on draft, Institutional arrangements for integrated coastal resources management, November 10.

France, Interministerial Committee for Regional Development and Planning, 1972. The Picard Report.

France, Ministry of the Environment, 1980. French coastal policy. Translated in Ekistics, 293 from Notes Vertes No. 13, Actions Nouvelles, November 1980, pp. 128-130.

Garnier, E., 1976. Haiti. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 113-117.

Gamman, J. K., Towers, S., and Sorensen, J., 1974. Federal involvement in California coastal zone: A topical index to agency responsibility. Institute of Marine Sciences, University of California, 180 pp.

Goodland, R., 1981. Indonesia's environmental progress in economic development. Center for Natural Resource Management and Environmental Studies, Bogor Agricultural University, Indonesia, 59 pp.

Goodland, R., 1982. Environmental requirements of the World Bank, including wetland conservation. Paper presented at the National Parks Congress, Bali, Indonesia, 52 pp.

Great Britain, Countryside Commission, 1970. The planning of the coastline: A report of a study of coastal preservation and development in England and Wales.

Gruppe, H., and Ofosu-Amaah, W., 1981. Legal, regulatory and institutional aspects of environmental and natural resource management in developing countries: A country study of Ghana. U.S. Agency for International Development and National Park Service Natural Resource Project, 67 pp.

Gruppe, H., and Ofosu-Amaah, W., 1981. Legal, regulatory, and institutional aspects of environmental and natural resources management in developing countries: A country study of Malaysia. U.S. Agency for International Development and National Parks Service Natural Resource Project, 82 pp.

Gwynne, M. D., 1982. The global environmental monitoring system (GEMS) of UNEP. Environmental Conservation 9(1):35-41.

Hanson, A., and Koesoebiono, 1979. Settling coastal swamplands in Sumatra: A case study for integrated resource management. In: Developing economics and the environment: The Southeast Asian experience. McGraw-Hill, New York, pp. 121-175.

Harrison, P., and Sewell, W. R. D., 1979. Shoreline management: The French approach. Coastal Zone Management Journal, 5(3): 161-180.

Harrison, P., and Parkes, M., (editors), 1983. Theme issue: Coastal management in Canada. Coastal Zone Management Journal, 11(1/2)148 pp.

Hartshorn, G., Antonini, G., Dubois, R., Harcharik, Heckadon, S., Newton, H., Quesada, C., Shores, J., and Staples, G., 1981. The Dominican Republic: Country environmental profile, a field study. Prepared for U.S. Agency for International Development, 109 pp.

Hayden, B. P., Dolan, R., and Ray, G. C., 1982. A system of marine biophysical provinces for conservational purposes. Paper presented at the World National Parks Congress, Bali, Indonesia, 15 pp.

Hayden, W., and Dolan, R., 1976. Classification of coastal environments of the world. Department of Environmental Sciences, University of Virginia, Charlottesville, Va.

Healy, R. G., (editor), 1978. Protecting the golden shore: Lessons from the California Coastal Commissions. The Conservation Foundation, Washington, D. C., 257 pp.

Hershman, M., 1980. Coastal zone management in the United States: A characterization. In: Comparative marine policy: perspectives from Europe, Scandinavia, Canada, and the United States. Praeger Special Studies, New York, pp. 57-64.

Hewson, C. A. Y., Malele, F., and Muller, P. D., 1979. Coastal area management in Western Samoa. In: M. Valencia, (editor). Proceedings of the workshop on coastal area development and management in the Pacific. East - West Center and University of Hawaii, pp. 113-115.

Hildreth, R. G., 1975. Coastal land use control in Sweden. Coastal Zone Management Journal, 2(1):1-29.

Hildreth, R. G., and Johnson, R. W., 1983. Coastal zone management on the west coast: An evaluation. In: Coastal Zone '83, Proceedings of the third symposium on coastal ocean management. American Society of Civil Engineers, Vol. III, pp. 231-251.

Holland, M. F., 1982. Kuwait waterfront project: An interdisciplinary approach to design. In: Proceedings of the seventh annual conference of the Coastal Society. Galveston, October 11-14, 1981, pp. 53-60.

Horberry, J., 1983. Environmental guidelines survey. International Union for Conservation of Nature and Natural Resources and the International Institute for Environment and Development, 84 pp., plus appendices.

Horberry, J., 1984. Status and application of environmental impact assessment for development. Conservation for Development Center, International Union for the Conservation of Nature and Natural Resources, Switzerland, draft paper, 84 pp.

Horberry, J., and Johnston, B., 1981. Environment l performance of consulting organizations in development aid. International Institute for Environment and Development.

Hulm, P., 1983. A strategy for the seas, the Regional seas programme past and future. United Nations Environment Program.

Hultmark, E., 1982. On effective coordination of marine resources development within new areas. Working paper prepared for the expert group meeting on institutional arrangements for marine resource development. United Nations, New York, 23 pp.

Inoue, S., In press. Coastal zone management in Japan. Coastal Zone Management Journal, 12(2).

International Institute for Environment and Development, 1981. Legal, regulatory, and institutional aspects of environmental and natural resource management in developing countries. U.S. Agency for International Development and U.S. National Park Service Project, 223 pp.

International Union for the Conservation of Nature and Natural Resources, 1980. World conservation strategy: living resources for sustainable development. Prepared in cooperation with United Nations Environment Program. Commission on Ecology Papers, Number 3.

Ireland, Bord Failte Eireann and An Foras Forbatha, 1972. National coastline study, 3 volumes. An Foras Forbatha.

Israel, Ministry of the Interior Planning Section, 1978. The national scheme for the Mediterraean coast.

Jayewardene, H. W., 1983. The law of the seas aftermath -- gearing for marine affairs management. The National Aquatic Resources Agency -- the Sri Lankan experience. Working paper prepared for the expert group meeting on institutional arrangments for marine resource development, January 10-14, United Nations, New York, 23 pp.

Johnson, B., and Ofosu-Amaah, W., 1981. Legal, regulatory, and institutional aspects of environmental and natural resource management in developing countries. A country study of Sudan. U.S. Agency for International Development and National Park Service Project, 63 pp.

Ketchum. B., (editor), 1972. The water's edge: Critical problems of the coastal zone. MIT Press, Cambridge.

Kildow, J. T., 1977. International transfer of marine technology: a three volume study. Massachusetts Institute of Technology Sea Grant Program Report, #MITSG 77-20, 101 pp.

Kim, S. W., 1979. Current activities in coastal area development and management in the Republic of Korea. In: M. Valencia, (editor), Proceedings of the workshop on coastal area development and management in the Pacific, East - West Center and University of Hawaii, pp. 103-110.

Kinsey, D., and Sondheimer, C., 1984. Country assessments memoranda: Ecuador, Thailand, Sri Lanka, Indonesia and Philippines. Prepared for the U.S. Agency for International Development and U.S. National Ocean Service Program on Coastal Resources Management in Developing Nations.

Knecht, R., 1983. Personal communication on Colombia's approach to marine and coastal resources management, September 16, 1983.

Koesoebiono, Collier, W. L., and Burbridge, P. R., 1982. Indonesia: Resource's use and management in the coastal zone. In: C. Soysa, L. S. Chia, and W. L. Collier, (editors), Man, land, and sea. Agricultural Development Council, Bangkok, pp. 115-133.

Kux, M., 1983. Memorandum on a proposed project on coastal resources management in Indonesia. USAID, Jakarta, March 13-14, 1983.

League of Women Voters of Washington, 1983. Public perception of the Washington Shoreline Management Act. Prepared for the Washington State Department of Ecology, 48 pp., plus appendices.

Lewis, Sylvia, 1975. Coastal plan runs aground. Planning, pp. 12-17.

Maembe, T., 1976. United Republic of Tanzania. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 243-255.

Mazmanian, D. A., and Sabatier, P. A., 1983. Implementation and public policy. Scott, Foresman and Company, 299 pp.

McCrea, M., 1980. Evaluation of Washington State's coastal management program through changes in port development. PhD dissertation, University of Washington, 30' pp.

McCrea, M., and Feldman, J. H., 1977. Interim assessment of Washington State shoreline management. Coastal Zone Management Journal, 3(2):119-150.

McCreary, S. T., 1979. The use of biological information in California coastal zone planning. Unpublished master's thesis. Department of Landscape Architecture. University of California, Berkeley.

McCreary, S. T., 1982. Legal and institutional opportunities and constraints in wetland restoration. In: M. Josselyn, (editor), Wetland restoration and enhancement in California. Tiburon Center for Environmental Studies and California Sea Grant Program, pp. 39-47.

McNeeley, J. A., and Miller, K. R., 1983. IUCN, national parks and protected areas: Priorities for action. Environmental Conservation, 10(1).

Mitchell, J. K., 1982. Coastal zone management: A comparative analysis of national programs. In: E. M. Borgese and N. Ginsburg, (editors), Ocean yearbook 3. The University of Chicago Press, Chicago, pp. 258-319.

Mitchell, J. K., 1984. Written comments on draft, Institutional arrangements for integrated coastal resources management, February 19.

Moran, J. A. G., 1976. Ordinacion of aprovechamiento de los recursos de la zona costera de la Republica Del El Salvador. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 39-61.

Mumba, J., 1976. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 177-181.

Myers, N., 1980. The sinking ark: A new look at the problem of disappearing species. Permagon Press, Oxford, 305 pp.

Nanda, V. P., and Ris, W. K., 1972. The public trust doctrine: A viable approach to international environmental protection. Ecology Law Quarterly, 5:291-303.

Ngee, L. J., 1979. Coastal development in Singapore. In: M. Valencia, (editor), Proceedings of the workshop on coastal area development and management in the Pacific, East - West Center and University of Hawaii, pp. 89-93.

Nir, Y. 1976. The Israel Mediterranean coasts. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 159-166.

Obayomi, L. S., 1976. Benin. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 63-80.

Odell, R., 1972. The saving of San Francisco Bay. The Conservation Foundation, Washington, D. C.

Olembo, R., 1982. UNEP and protected areas concerns. Paper presented at World National Parks Congress, Bali, Indonesia, 16 pp.

Ongkosongo, O. S. R., 1979. Human activities and their environmental impacts on the coasts of Indonesia. In: M. Valencia, (editor), Proceedings of the workshop on coastal area development and management in the Pacific, East - West Center and University of Hawaii, pp. 67-74.

Oregon, Land Conservation and Development Commission, 1976. Draft. Oregon Coastal Management Program, Salem, Oregon.

Philippines, National Environmental Protection Council, 1978. Proceedings of a planning workshop for coastal zone management.

Pongsuwan, U., 1976. Thailand. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 229-234.

Pontecorvo, G., et al, 1980. Contribution of the ocean sector to the United States economy. Science, 208:1000-1006.

Popper, F. J., 1981. The politics of land-use reform. The University of Wisconsin Press, Madison, 321 pp.

Pravdic, V., 1981. GESAMP, the first dozen years. United Nations Environment Program.

Ramirez, J. A., 1976. Monographia de Mexico. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 195-200.

Real Estate Research Corporation, et al, 1977. Coastal management consequences: Preliminary conclusions and evaluation approach. Prepared for the U.S. Office of Coastal Zone Management and the U.S Council on Environmental Quality, 89 pp.

Reeson, P., 1976. Monograph on Jamaica. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 167-176.

Richmond, R. N., 1979. Fiji. In: M. Valencia, (editor), Proceedings of the workshop on coastal area development and management in the Pacific, East - West Center and University of Hawaii, pp. 103-110.

Riddle, R., 1981. Ecodevelopment. St. Martin's Press, New York, 213 pp.

Ridgway, J., 1979. Coastal area development and management in the Solomon Islands. In: M. Valencia, (editor), Proceedings of the workshop on coastal area development and management in the Pacific, East - West Center and University of Hawaii, pp. 103-105.

Rosenbaum, N., 1979. Enforcing wetlands regulations. In: Wetland functions and values: The state of our understanding. American Water Resources Association, Minneapolis.

Ruangchotivit, T., 1979. A coastal land development project. In: M. Valencia (editor), Proceedings of the workshop on coastal area development and management in the Pacific, East - West Center and University of Hawaii, pp. 101-102.

Ruddle, K., 1982. Environmental pollution and fisheries resources in Southeast Asian coastal waters. In: C.H. Soysa, C.L Chia, and W. L. Collier, (editors). Man, land, and sea: Coastal resource use and management in Asia and the Pacific. Agricultural Development Council, Bangkok, pp. 16-37.

Sabatier, P., 1977. State review of local land-use decisions: the California Coastal Commissions. Coastal Zone Management Journal, 3(3): 255-290.

Saeijs, H. L. F., and de Jong, A., 1982. The oatirschelde and protection of the environment. Ekistics, 293:150-156.

Saenger, P., Hegerl, E. J., and Davie, J. D. S., 1983. Global status of mangrove ecosystems. International Union for the Conservation of Nature and Natural Resources, 88 pp.

Salm, R., and Clark, J. R., 1984. Marine protected areas guidebook. International Union for the Conservation of Nature and Natural Resources.

Sanchez, E., 1976. Spain. In K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 39-61.

Scott, J. W., 1983. An evaluation of public access to Washington's shorelines since passage of the Shoreline Management Act of 1971. Washington State Department of Ecology, 62 pp.

Shapiro, H. A., 1984. Written comments on earlier draft of this book.

Shapiro, H. A., In press. Coastal area management in Japan: an overview. Coastal Zone Management Journal.

Simons, R., 1982. Ten years later: the Smithsonian international experience since the Second World Parks Congress. Paper presented at World National Parks Congress, Bali, Indonesia, 11 pp.

Skekielda, K. H., and Breuer, B., (editors), 1976. Interregional seminar on development and management of resources of coastal areas. West Berlin, Hamburg, Kiel, and Luxhaven, May 31, to June, 14, 1976. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, 546 pp.

Snedaker, S. C., 1982. A perspective on Asia mangroves. In: C. Soysa, L. S. Chia, and W. L. Collier, (editors). Man, land, and sea: Coastal resource use and management in Asia and the Pacific. Agricultural Development Council, Bangkok, pp. 65-74.

Snedaker, S. C., 1983. Personal Communication to AID, Science and Technology, Forestry and Natural Resources Branch.

Soegiarto, A., 1976. Indonesia. In: K. H. Skekielda and B. Breuer, (editors), Interregional seminar on development and management of resources of coastal areas. German Foundation for International Development and the United Nations Ocean Economics and Technology Office, pp. 39-61.

Soegiarto, A., 1983. Marine sciences in Indonesia: Problems and prospects for national development. Paper presented at the Indonesia -- U.S. Seminar on Science and Technology. October 3-5, 1983, Washington, D. C., 16 pp.

Sorensen, J. C., 1978. State-local collaborative planning: A growing trend in coastal zone management. Prepared for the U.S. Department of Commerce, Office of Coastal Zone Management.

Soysa, C. H., Chia, C. L., and Collier, W. L., (editors), 1982. Man, land, and sea: Coastal resource use and management in Asia and the Pacific. Agricultural Development Council, Bangkok.

Steers, J. A., 1978. Saving the coast: The British experience. Coastal Zone Management Journal, 4(1/2):7-23.

Sumardja, E., and Wind, J., 1982. Nature conservation and rice production in Dumoga, North Sulawesi. Paper presented at the World National Parks Congress, Bali, Indonesia, 7 pp.

Swanson, G., 1975. Coastal zone management from an administrative perspective: A case study of San Francisco Bay Conservation and Development Commission. Coastal Zone Management Journal, 2(2): 81-102.

Sweden, Ministry of Physical Planning and Local Government, 1971. National physical plan: Managment of land and water.

Templet, P. H., In press. American Samoa: A coastal management area model for developing countries. Coastal Zone Management Journal.

Thailand, Office of Coastal Land Development, 1979. Establishment of a technological research center for coastal land development and management in Thailand. In: M. Valencia (editor), Proceedings of the workshop on coastal area development and management in the Pacific, East - West Center and University of Hawaii, pp. 103-110.

Thatcher, P. S., and Meith-Avcin, N., 1980. In: E. M. Borgese and N. Ginsberg, (editors), The oceans: Health and prognosis. Ocean Yearbook 1.

Tortell, P., 1981. New Zealand atlas of coastal resources. Government Printing Office, 60 pp.

Travis, W., 1980. Coastal program evaluation from a state perspective. Coastal Zone '80, Proceedings of the Second Symposium on Coastal and Ocean Management. American Society of Civil Engineers, Vol. I, pp. 451-469.

Trust Territory, Division of Lands, 1979. Coastal resources and environment: Trust Territory of the Pacific Islands. In: M. Valencia, (editor), Proceedings of the workshop on coastal area development and management in the Pacific, East - West Center and University of Hawaii, pp. 77-81.

UNESCO, 1980. Marine science and technology in Africa: present state and future development. Unesco reports in marine science, 66 pp.

UNESCO and Intergovernmental Oceanographic Commission, 1979. Workshop on coastal area management in the Caribbean region, summary report. Workshop report, No. 26. Unesco, 42 pp.

United Nations, 1978. Conference of the Plenipotentiaries of Coastal States of the Mediterranean Region for the Protection of the Mediterranean Sea. Mediterranean Action Plan and Final Act.

United Nations, 1980. Conference of the Plenipotentiaries of Coastal States of the Mediterranean Region for the Protection of the Mediterranean Sea Against Pollution from Land Based Sources.

United Nations, 1982. Conference of the Plenipotentiaries on the Protocol Concerning Mediterranean Specially Protected Areas.

United Nations, 1983. Conference of the Plenipotentiaries on the Protection and Development of the Marine Environment of the Wider Caribbean region. Final Act.

United Nations, Department of Technical Cooperation for Development, 1983. Experiences in the development and management of international river and lake basins. Proceedings of the U.N. Interregional Meeting of International River Organizations, Dakar, Senegal, 85 pp.

United Nations, Economic and Social Council, Committee for programme and co-ordination, 1983. Cross-organizational programme analysis of the activities of the United Nations system in marine affairs, report of the Secretary General, 40 pp.

United Nations Environment Program, 1980. Declaration of environmental policies and procedures relating to economic development.

United Nations Environment Program, 1982. Marine and coastal area development in the East African region. United Nations Environment Program, Regional Seas Reports and Studies #12, 86 pp.

United Nations Environment Program, 1982. Achievements and planned development of UNEP's Regional Seas Programme and comparable programmes sponsored by other bodies. UNEP Regional Seas Reports and Studies No.1., 64 pp.

United Nations Environment Program, 1982. Environmental problems of the East African Region: An overview. UNEP Regional Seas Reports and Studies No. 12, 80 pp.

United Nations Environment Program, 1982. Marine and coastal area development in the East African Region. UNEP Regional Seas and Studies No. 6.

United Nations Environment Program, 1983. Action plan for the Caribbean environment programme. UNEP Regional Seas Reports and Studies No. 26.

United Nations Environment Program/CEPAL, 1979. Marine and coastal area development in the wider Caribbean area: Overview study.

United Nations, Joint group of experts on the scientific aspects of marine pollution, 1980. Marine pollution implications of coastal area development, Reports and Studies, No. 11, 114 pp.

United Nations, Ocean Economics and Technology Branch, Department of International Economic and Social Affairs, 1980. Marine and coastal area development in the wider Caribbean area: Overview study.

United Nations, Ocean Economics and Technology Branch, Department of International Economic and Social Affairs, 1982. Coastal area management and development. Pergamon Press, Oxford, 188 pp.

United Nations, Ocean Economics and Technology Branch, Department of International Economic and Social Affairs, 1982. Technologies for Coastal Erosion Control, 132 pp.

U.S. Agency for International Development, 1979. Environmental and natural resource management in developing countries: A report to Congress, Volume I. Department of State Publication, Washington, D. C., 184 pp.

U.S. Agency for International Development, 1981. Report on the coastal zone management seminar-workshop. November 5-6, 1981, Manila. USAID Mission, Philippines, 24 pp.

U.S. Agency for International Development, 1982. Potential strategies and target countries for coastal resources management activities. AID/S&T/FNR.

U.S. Commission on Marine Science, Engineering and Resources, 1969. Our Nation and the Sea, U.S. Government Printing Office.

U.S. National Oceanic and Atmospheric Administration, Department of Commerce, National Oceanic and Atmospheric Administration, 1981. The Federal coastal programs review: A report to the president. National Oceanic and Atmospheric Administration, 331 pp.

U.S. National Oceanic and Atmospheric Administration, Department of Commerce, Office of Coastal Zone Management and California Coastal Commission, 1981. Final environmental impact statement: Tijuana River National Estuarine Sanctuary, 80 pp., plus appendices.

U.S. National Oceanic and Atmospheric Administration, Department of Commerce, Office of Coastal Zone Management, 1982. Biennial report to the Congress on coastal zone management: Fiscal years 1980 and 1981. U.S. Government Printing Office, 140 pp.

U.S. Department of Commerce, Office of the Inspector General, 1983. Opportunities to improve Federal oversight responsibilities of states' coastal zone management programs to assure more effective results, 15 pp.

U.S. Department of Interior, 1970. The national estuarine pollution study. U.S. Senate, 91st Congress, 2nd Session, Document 91-58. Superintendent of Documents, U.S. Government Printing Office.

U.S. Department of State, Bureau of Intelligence and Research, 1983. Status of the World's Nations. U.S. Government Printing Office, 19 pp.

U.S. Environment Protection Agency, Office of International Activities, 1977. International environmental issues: A preliminary resource guide. Office of International Activities, 144 pp.

U.S. National Academy of Sciences, Board on Science and Technology and the Ocean Policy Committee, 1982. Working papers prepared for the international workshop on coastal resource management, February 8-10, La Jolla, California.

Uruguay, Direccion Nacional di Relaciones Publicas, 1982. Uruguay, government of. Brochure, 4 pp.

Valencia, M., (editor), 1979. Proceedings of the Workshop on Coastal Area Development and Management in Asia and the Pacific. East - West Center and University of Hawaii, 202 pp.

Vallejo, S. M., 1982. Comments on draft, Institutional arrangements for marine aid and coastal resource use management. Draft.

Vallejo, S. M., 1983. El marco institutional para el desarrollo y ordinacion de los recursos costeros y marinos: problemas y experiencias. Working paper for a marine resources planning seminar, Mexico City, May 16 to 27, 1983, 22 pp.

Vallejo, S. M., and Caparro, L., 1981. Preliminary information on the resources, uses and problems of the Ecuadorian coastal area. United Nations Department of International Economic and Social Affairs, Ocean Economics and Technology Branch.

Waite, C., 1980. Coastal management in England and Wales. In: Comparative marine policy: Perspectives from Europe, Scandinavia, Canada, and the United States. Praeger Special Studies, New York, pp. 57-64.

Warren, R., Weschler, L. F., and Rosentraub, 1977. Local-regional interaction in the development of coastal land use policies: A case study of metropolitan Los Angeles. Coastal Zone Management Journal, 3(4):331-362.

Wetterberg, G., 1982. The exchange of wildland technology: A management agency perspective. Paper presented at World National Park Congress, Bali, Indonesia, 11 pp.

World Bank, 1982. Environmental requirements of the World Bank. Office of Environmental Affairs, Projects Advisory Staff. Washington, D. C.

World Environment Report, 1981. October 30, 1981.

World Environment Report, 1981. November 30, 1981.

World Environment Report, 1982. June 30, 1982.

World Environment Report, 1982. December 30, 1982.

World Environment Report, 1983. May 15, 1983.

World Environment Report, 1983. June 15, 1983.

World Environment Report, 1983. June 30, 1983.

World Environment Report, 1983. October 30, 1983.

Wiggerts, H., and Koekebakker, P., 1982. Coastal planning and management in the Netherlands. Ekistics, 293:143-149.

Zamora, P. M., 1979. The coastal zone management program of the Philippines. In: M. Valencia, (editor), Proceedings of the workshop on coastal area development and management in the Pacific, East - West Center and University of Hawaii, pp. 85-88.

Zile, Z. L., 1974. A legislative - political history of the Coastal Zone Management Act of 1972. Coastal Zone Management Journal, 1(3):235-274.

11. AUTHOR BIOGRAPHIES

11.1 Jens C. Sorensen

Principal, Jen Sorensen and Associates and Adjunct Lecturer in Ocean Policy, Massachusetts Institute of Technology. Ph.D. from University of California, Berkeley, 1978. Specializing in coastal resources management since 1968 with extensive studies in the United States (particularly California) and Australia. Travel and case study experience in the South Pacific, Lesser Antiles, Mexico, Canada, Argentina, and Uruguay. Author of 27 articles and reports on coastal resources management both in the United States and abroad. Teacher of university courses in ocean and coastal policy, regional environmental planning, and impact assessment.

11.2 Scott T. McCreary

Ph.D. Candidate, Massachusetts Institute of Technology. Master's of Landscape Architecture, U.C. Berkeley. Author of several articles on estuarine sanctuaries, institutional issues in wetlands restoration, coastal hazards, and energy development. Program Manager, Nonprofits Program, and Project Analyst, Wetlands Enhancement Program, California Coastal Conservancy; responsible for a dozen resource enhancement projects. Project Analyst, Office of Coastal Zone Management and California Coastal Commission; principally responsible for designation and implementation of Tijuana River National Estuarine Sanctuary. Conservation Foundation, Coastal Resources Program; project planner for shoreline strategy, Apalachicola Bay, Florida. County of Monterey, Planner for Big Sur. U.C. Berkeley Sea Grant Trainee, Project Planner, Honolua Bay, Maui, (Hawaii) Marine Life Conservation District.

11.3 Marc J. Hershman

Professor of Marine Studies and Adjunct Professor of Law at the University of Washington in Seattle. His teaching, research and writing deals with coastal zone management, marine and coastal law, land use planning, marine resources law and policy, and seaport management. He manages the Coastal Resources Program of the University's Institute for Marine Studies, and is founder and Editor-in-Chief of the Coastal Zone Management Journal.

APPENDIX A: DATA NEEDED TO ASSESS THE VALUE OF A NATION'S COASTAL RESOURCES

Sector	Data Needs
Coastal Fisheries (Finfish and Shellfish)	o Estimated stock of commercial fin- and shell-fisheries that are biologically dependent upon the nation's coastal zone
	o Linear kilometers of coastline or square kilometers of coastal zone known to function as nurseries for finfish and shellfish
	o Catch (in tons) of commercial finfish and shellfish that are biologically dependent upon the nation's coastal zone
	o monetary value of total catch
	o monetary value of internal consumption
	o monetary value of export harvest
	o Tax revenues generated by fisheries
	o Relative contribution of fisheries to total GNP
	o Number of fish processing plants
	o Monetary value added by processing plants
	o Number of nationals employed directly or indirectly by fisheries sector
	o Relative proportion of nationals employed as a function of the total workforce
	o Relative contribution of fisheries to total worker earnings

Previous Page Blank

Sector	Data Needs
Commercial Fisheries	o Number of existing aquaculture facilities o Number of potential sites for aquaculture o Number of harbors for fishing fleets o Commitment to sectoral development indicated by (a) creation of a ministry and (b) legislative mandate o Commitment to development of fishery sector indicated by (a)creation of a ministry, (b) legislative mandate or executive order, (c) preparation of sectoral plans, and (d) capital investment

NOTE: Several factors complicate data collection for the fisheries dimension of coastal value. First, the issue of coastal dependency of a particular species may not be clear if its natural history has not been well studied. Second, species have transboundary habits. As a result, it difficult to attribute standing stock to a single nation, especially where the known range of a species crosses several national boundaries. Finally, the possibility of foreign ownership and control of some portion of the fishing fleet or fish processing facilities makes it is difficult to assess the actual contribution of the fishery sector to a nation's economy.

Sector	Data Needs
Coastal Tourism	o Number of facilities built within 1000 meters of the coast o Number of linear miles of coast allocated to coastal tourism development o Presence of swimmable beaches with excellent offshore water quality o Presence of protected bays, mangrove forests, rookeries, sanctuaries, and other reserves o Extent of public relations effort for coastal tourism o Earnings of coastal tourist-serving development o Relative contribution of coastal tourist facilities to GNP o Number of nationals employed directly or indirectly by coastal tourist sector o Relative proportion of nationals employed as a fraction of the total workforce o Relative contribution to tourism as a fraction of total worker earnings o Tax revenues derived from coastal tourism o Infrastructure devoted to coastal tourist development

Sector	Data Needs
Ports and Shipping	o Number of major and minor ports (as defined by the Ocean Yearbook) o Tonnage of imports and exports o Forecasted future exports o Number of ship and boat building facilities o Number of support facilities (e.g., chandleries) o Size of port hinterland served o Monetary value of exports o Monetary value of imports o Relative contribution of ports to GNP o Tax revenues generated by ports o Number of nationals employed directly or indirectly by port sector o Relative proportion of nationals employed by port sector as a function of the total workforce o Relative contribution of port sector to total worker earnings

Sector	Data Needs
Coastal Hazards	o Geographic extent of hazard-prone areas
	o Frequency of major disastrous events
	o Frequency of events causing major damage to lives or property
	o Number of lives lost
	o Number of injuries
	o Number of structures damages
	o Monetary costs of reconstruction and relocation
	o Monetary costs of service disruptions
	o Insurance rates increase as a function of hazards
	o Type and extent of architectural/engineering standards for development in hazard-prone areas
	o type and extent of standards for siting structures in hazard-prone areas
	o Number of structures and dollar value built in hazard-prone areas
	o Amount of vacant/uncommitted available in hazard-prone areas
	o Amount of vacant/uncommitted land available in non-hazard-prone areas
	o Commitment to intervention in hazard sector indicated by (a) creation of a ministry, (b) legislative mandate or executive order, (c) preparation of plans hazard guidelines for siting new development, and (d) preparation of architectural/engineering standards for development in hazard-prone areas

APENDIX B: GLOBAL ISSUES INDEX

This appendix presents a preliminary global list of important coastal resources issues. Three types of issues are discussed here: impact issues, hazards, and sectoral planning concerns. Under each specific category of issues, we have listed nations where that issue is an important social concern.

Part I of the Appendix is organized as a set of causal networks, flowing from left to right. The sequence of events begins with a use of a coastal resource, which involves human activities; these activities produce changes in environmental or socioeconomic conditions, which in turn result in an impact of social concern. For simplification, we have compressed the cause and effect sequence into three steps. This compression is achieved by combining either uses and activities or activities, and condition changes. Also, environmental and socio-economic condition changes often go through more than one cause and effect sequence before culminating as an impact. For example, increased turbidity reduces light penetration, which in turn decreases or kills coral growth. This produces the impact of decreased yields from coral reef fishery stocks. Sequences of multiple condition change have been compressed into one step or dealt with by cross-referencing.

I. IMPACT ISSUES

USE--------ACTIVITY--------	ENVIRONMENTAL CHANGE--------	IMPACT OF SOCIAL CONCERN
A. Estuary, harbor and near shore water quality impacts		
1. domestic and industrial sewage and waste disposal	- estuary pollution particularly adjacent to urban areas	- decrease fish yields
(Nigeria, Japan, Australia, Barbados, Brazil-Rio and Sao Paulo, Ecuador-Guayaquil, Greece, Bangladesh, Indonesia, Israel, Mexico, Panama, Philippines, China, Korea, Spain, United Kingdom, most states in the U.S., Venezuela, Cuba, Kenya, Mozambique, Haiti, Pakistan-Karachi, Senegal-Dakar, Morocco, Guyana, Jamaica, Dominican Republic)		
2. domestic and industrial sewage disposal	- estuary pollution	- contamination of fish and shellfish and water contact areas
(Ecuador, Japan)		

3. tourism sewage disposal	- estuary pollution	- decrease fish yields
(Jamaica, Fiji)		
4. domestic and/or tourism sewage disposal	- estuary and beach pollution	- decrease tourism and recreation attraction
(Jamaica, Trinidad-Tobago, Barbados)		
5. flood control and/or agriculture development and impoundments or diversions of coastal rivers	- increase estuary salinity, decrease estuary circulation, change sediment delivery	- decrease fish yields - smother coral reefs - alter beaches
(Tanzania, Kenya, Somalia, Australia, Bangladesh, India, Sri Lanka, Senegal) (See also No. 5 and 7)		
6. coastal oil development	- chronic release of oil and/or large oil spills from accidents, oil pollution of estuarine and nearshore waters	- decrease fish yields, decrease recreation or tourism quality - tainted fish and shellfish
(Nigeria, Indonesia, Venezuela, Mexico, Trinidad-Tobago, Dominican Republic, Ecuador, Oman, Liberia)		
7. port development and shipping and/or offshore shipping of oil	- chronic release of oil and/or large oil spills from accidents, oil pollution of estuaries and near shore waters	- decrease fish yields, decrease recreation or tourism quality
(France, Indonesia, Nigeria, Singapore, Thailand, Madagascar, Mozambique, Bangladesh, Oman, Liberia, Ivory Coast, Senegal-Dakar, Morocco, Barbados, Jamaica, Pakistan)		

8. agricultural pesticides	- toxic pollutants of estuaries and near-shore waters	- decrease fish yields, fish kills

(Mexico, Philippines, many U.S. states, Ecuador, Bangladesh, Guyana)

9. crop, grazing, mining forestry practices in coastal watersheds	- watershed erosion, estuary sedimentation and increased turbidity	- decrease fish yields

(Brazil, Bulgaria, Ethiopia, India, Indonesia, Philippines, Haiti, Dominican Republic, Surinam, Kenya, Madagascar, Mozambique, Tanzania, Malaysia, Jamaica)

10. crop, grazing, mining or forestry practices coastal watershed	- watershed erosion, floodplain deposition	- increase flood hazard

(Philippines, India, Brazil, Indonesia, Haiti, Mexico, Dominican Republic, Surinam, Kenya, Madagascar, Mozambique, Tanzania, Malaysia, Costa Rica)

11. crop, grazing or forestry practices in coastal watersheds	- watershed erosion, increase sedimentation of bays, deltas, nearshore areas	- sedimentation of navigation channels, berths, port areas

(Kenya)

12. crop, grazing or forestry practices in coastal watersheds	- watershed erosion, increase sedimentation, change composition of sediments, of bays, deltas and near shore waters	- cover beaches with unattractive sediment - decrease recreation and tourism attraction

(Kenya)

13. agriculture development and fertilizer	- increase amount of nutrients entering estuaries, eutrophication pollution	- decrease fish yields, fish kills
(Japan)		
14. coastal mining	- increase sedimentation and turbidity, change in composition of bottom sediments	- decrease fish yields
(Jamaica)		

B. Groundwater withdrawal impacts

15. agricultural development	- withdrawal of groundwater at greater rate than natural recharge	- salt water intrusion of aquifer, contamination of groundwater for domestic and/or agricultural use
(Thailand, India, many coral atolls, Mozambique, Tunisia, Oman, Morocco, United States - Florida, California, North Carolina)		
16. tourism and residential development	- withdrawal of groundwater at a greater rate than natural recharge	- salt water intrusion of aquifer, contamination of groundwater for domestic and agricultural use
(Fiji, United States - Florida)		
17. urban development	- withdrawal of groundwater at a greater rate than natural recharge	- subsidence of land below sea level with persistent urban flooding
(Louisiana and Texas, U.S.A.; Bangkok, Thailand)		

C. Filling of wetlands (including mangroves)

20. port development	- filling of wetlands	- decrease fish yields
(Japan, Jamaica-Kingston, Nigeria-Lagos, Singapore, Korea, Western Samoa, Australia, Fiji)		
21. port development	- filling of wetlands	- decrease fishing area or acquaculture area
(Japan)		
22. mining and spoil disposal	- filling of wetlands	- decrease fish yields
(Malaysia, Thailand, Indonesia, Fiji)		
24. tourism development	- filling of wetlands	- decrease fish yields
(Fiji, Jamaica)		
25. residential development (particular canal estates)	- filling of wetlands	- decrease fish yields
(Australia, Nigeria, Jamaica, United States - Florida,)		

D. Mangrove impacts

30. agricultural, aquaculture, or salt evaporation development	- draining or diking of mangroves	- decrease fish yields
(Indonesia, Philippines, Thailand, India, Bangladesh, Sri Lanka, Australia-Queensland, Ecuador, Panama)		

31. agricultural, aquacultural, or salt evaporation development	- draining or diking of mangroves	- reduction or loss of rare or endangered species
(Dominican Republic)		
35. mangrove harvesting for woodchips, fuel-wood and building materials	- harvesting at rate greater than sustained yield, decrease productivity	- decrease fish yields - decrease timber yield of successive harvests
(Indonesia, Philippines, Thailand, Bangladesh)		
36. mangrove harvesting for woodchips, fuel-wood and building materials	- harvesting at rate greater than sustained yield, decrease productivity	- reduction or loss of rare or endangered species
(Dominican Republic)		
38. mining (usually tin)	- removal of mangrove forest	- decrease fish yields
(Malaysia, Thailand, Indonesia)		

E. <u>Coral reef and atoll impacts</u>

40. municipal and/or industrial sewage disposal	- coral reef pollution	- decrease fish yields, decrease tourism and recreation attraction
(Jamaica, Philippines, Sri Lanka, Kiribati United States - Hawaii,)		

42. coral mining yields, decrease	- coral reef destruction	- decrease fish tourism and recreation attraction
(Sri Lanka, Indonesia)		
43. coral mining	- coral reef destruction	- increase shoreline erosion
(Sri Lanka, Indonesia)		
44. coastal or offshore mining	- sediment and turbidity pollution of coral reefs	- decrease fish yields decrease tourism and recreation attraction
(Malaysia, Thailand, Indonesia, Sri Lanka, Western Samoa)		
45. oil shipping along offshore international routes	- oil pollution of offshore waters	- decrease growth of coral reef, decrease beach erosion, decrease tourism attraction
(Barbados, Jamaica)		
46. dredging for construction materials	- sediment and turbidity pollution of coral reefs	- decrease fish yields, decrease tourism and recreation attraction
(Fiji, Western Samoa)		
47. crop, grazing or forestry practices in coastal watersheds	- watershed erosion sediment and turbidity pollution of coral reefs	- decrease fish yields, decrease tourism and recreation attraction
(Sri Lanka, Kenya, Philippines, Indonesia, Jamaica United States - Hawaii)		

48. fishing with dynamite	- coral reef destruction	- decrease fish yields, decrease tourism and recreation attraction

(Barbados, Tanzania)

49. intensive, localized fishing effort	- harvesting at greater than sustainable yield rate	- decrease coral reef associated fish yields

(Cook Islands, Tahiti, American Samoa, United States - Hawaii)

F. Beach, dune and delta impacts

50. recreation and/or tourism development	- trampling of beach and dune vegetation	- initiate or increase shoreline erosion, increase hazard

(United Kingdom, Australia)

51. recreation and/or tourism development	- trampling of beach and dune vegetation	- decrease tourism and recreation attraction

(United Kingdom, Australia, most U.S. states, Denmark, Germany)

52. grazing of livestock	- trampling and/or overgrazing of beach and dune stabilizing vegetation	- initiate or increase dune migration onto agricultural areas or infrastructure

(Somalia, Mozambique, Oman, Kenya, Bangladesh)

55. mining beach sand	- removal rate greater than natural accretion	- initiate or increase beach shoreline erosion, increase hazard

(Australia, Western Samoa, Dominican Republic, St. Lucia, Comoros)

56. mining beach sand	- removal rate greater than natural accretion	- loss of native vegetation, wildlife habitat, natural amenity, decrease tourism attraction

(Australia, Dominican Republic, St. Lucia, Comoros)

57. flood control and/or agriculture development and impoundments or diversions of coastal rivers	- decrease supply of beach material to shoreline	- initiate or increase shoreline erosion, increase hazard

(Mozambique, Bangladesh, United States - California, Louisiana, Texas)

G. <u>Fishing effort</u>

60. intensive and extensive fishing effort	- harvesting greater than sustainable yield	- decrease fish yields

(Mauritius, Japan, Thailand, Greece, Italy, North Sea bordering nations, most U.S. states, Mexico, Peru, Morocco, Jamaica)

61. competition between onshore and off-shore fishermen for same stocks	- harvesting greater than sustainable yield	- decease fish yields - social conflicts between two groups

(Malaysia)

H. Access to the shoreline and subtidal areas

70. residential development on the shoreline	- block or impair public access to the shore	- resentment among local inhabitants - increase recreation pressure on accessible areas, site deterioration, decrease recreational quality

(Australia, Greece, Norway, Sweden, most U.S. states)

71. tourism development of shoreline	- block or impair public access to the shore	- resentment among local inhabitants - increase recreation pressure on accessable areas, site degradation, decrease recreational quality

(Virgin Islands, Jamaica, Grenada, Barbados, Trinidad-Tobago, Greece, Dominican Republic, United States - Florida, Hawaii, California)

I. Visual quality

80. residential development (particularly second home)	- decrease visual quality of rural or natural landscapes	- decrease recreation and tourism quality

(Australia, Barbados, Finland, Denmark, Spain, France, Greece, New Zealand, Norway, Sweden, United Kingdom, Seychelles)

81.	tourism development	- decrease visual quality of rural or natural landscapes	- decrease recreation and tourism quality

(Australia, Bahamas, Barbados, France, Greece, Jamaica, Israel, Mauritius, Poland, Sri Lanka, Tanzania, Togo, Tahiti, Fiji, Western Samoa, Seychelles)

J. Employment and cultural values

90.	tourism development	- attraction of higher salaries	- loss of agricultural workers, decrease agricultural productivity

(Jamaica, Barbados)

91.	tourism development	- erosion of local customs and cultural values	- resentment and social problems among natives

(Jamaica, Grenada, Mexico, Virgin Islands, Western Samoa)

II. HAZARDS

100. Shoreline erosion

(Australia, German Democratic Republic, Guatemala, Japan, Spain, Philippines, Sri Lanka, Togo, USSR-Black Sea, United Kingdom, most U.S. states)

110. Coastal river flooding

(El Salvador, Ethiopia, Guatemala, India, Netherlands, Mauritius, Panama, Philippines, Togo, United Kingdom, China, Tanzania, Malaysia)

120. Storms - (wind, wave and water damage)

(Mauritius, Mexico, Philippines, Fiji, Pakistan, all inhabited Pacific coral atolls, Hawaii, China, Indonesia, all Caribbean Islands - particularly those where population is concentrated on low lying shoreline, United States - Florida, Texas, Louisiana)

130. Tsunamis

(West Indies, Indonesia, Venezuela, Ecuador, Pakistan, United States - Hawaii, California, Alaska)

140. Migrating dunes (cover infrastructure and/or agriculture)

(Somalia, United States - Oregon, France - Aquitane)

III. SECTORAL PLANNING

200. Fisheries development (particularly conversion of artisanal fisheries)

(Tanzania, Nigeria, Nicaragua, Honduras, Guyana, Brazil, all islands of Commonwealth Carribean, Seychelles, Pakistan, Cape Verde Islands)

210. Natural area preserves system (including marine parks)

(Tanzania, Kenya, Australia, United Kingdom, Ireland, Ecuador, Indonesia, Argentina, Dominican Republic, all U.S. coastal states, Bonaire, Seychelles, Barbados)

220. Water supply (often a function of overdrafting coastal aquifers)

(Ethiopia, Guatemala, Israel, Thailand, Togo, Windward and Leeward Islands, China (Pearl River Delta), Pakistan, Cape Verde Islands, Morocco (desalinization), Guyana)

230. Recreation development (primarily for residents)

(Australia, Israel, New Zealand, Norway, Sweden, Ireland, United Kingdom)

235. Tourism development (particularly potential areas and/or infrastructure needs)

(Dominican Republic, Seychelles, Mozambique)

240. Port development (particularly new ports)

(Ethiopia, Guatemala, Japan, New Zealand, Singapore, Western Samoa, Mexico, Cape Verde Islands)

245. Fossil Fuel Energy--Oil or toxic spill contingency plan

(Dominican Republic)

250. Industrial siting (often in conjunction with increasing employment in depressed or impoverished areas)

(Greece, Japan, Nigeria, Sweden, Finland, most U.S. states)

260. Agricultural development

(Indonesia, Surinam, Belize, Kenya)

270. Aquaculture development (particularly shrimp)

(Bangladesh, Thailand, Mexico, Ecuador, Panama, Philippines, Indonesia)

APPENDIX B (continued)

The impact chains presented in Section I constitute a reference list; they are not intended to explain cause and effect relationships. Impact assessment analysts have documented cause and effect relationships in greater detail, but such rigorous description often produces more information than is needed for an index. The impact issues only have to be described in sufficient detail to distinguish the various ways one use activity (whether it is coastal or not) affects a coastal use activity (i.e. the social value of a coastal resource or environment).

Forty-nine impact issues are listed. We derived the impact issues from review of the literature cited in the references section. A few impact issues known to occur in developed nations were not listed because none of the literature mentioned it as a concern. An example is the adverse visual impact of coastal industrial development, such as port facilities and refineries.

Two important limitations of the present list of nations are the number of national descriptions found and the sketchy nature of the descriptions. Descriptions were found for only 76 of the coastal nations -- less than half the world's total. More importantly, there was adequate information for only about 30 of the 76 coastal nations to draw conclusions about issues. Information on the other 46 coastal nations listed in this appendix comes primarily from Coastal Area Management and Development (UN Ocean Economic and Technology Branch, 1982), "Coastal Zone Management" (Mitchell, 1982), Development and Management of Resources of Coastal Areas (Skekielda and Breuer, 1976), Man, Land and Sea (Soysa, et al, 1982), and Marine and Coastal Area Development in the East African Region (United Nations Environment Program, 1982).

If a collection of coastal issues was specifically compiled as a national set of concerns, it was usually an analyst's opinion and not backed by a systematic assessment such as a review of national literature, interviews, or concerns from a national conference. In such cases it is questionable how close one analyst's list would match a list compiled by others -- particularly if other lists reflect a cross-section of national interests. The quality of a list of national issues will depend on the expertise, biases, and knowledge gaps of the individual or the group who makes the compilation.

A coastal nation may have a problem and not be aware of it. For example, many coastal nations -- particularly the lower income ones -- may experience adverse impacts on their fisheries yield or community health and not realize it because there is not adequate information about cause and effect relationships. A problem becomes an issue when the government recognizes its existence and places it on the public policy making agenda.

Determining the relative importance of issues requires setting criteria. This in turn raises the political question of who should set the priorities. Two criteria commonly used to determine the degree of importance are the number of people affected, and the potential monetary benefits to be derived. Clearly, the rating will depend on the perspective

and biases of the evaluator. For this reason, some attempt should be made to control bias. One approach would be to delegate the task to a national group representing the spectrum of coastal resource and environmental interests.

The priority ranking of national issues also raises the question of whether foreign interests should be consulted to add their ratings of national issues. For example, international conservation and scientific organizations such as IUCN and the Pacific Science Congress, as protectors of the world's natural resource heritage, have a legitimate interest in the environments and fauna of all nations. Both the issues identified and the ratings made by conservation organizations are likely to be quite different from those of some developing nations, where preservation of genetic diversity may not be high on the public agenda.

If there is consensus among professionals in international coastal resources management that a global coastal issues index should be prepared, the next step would be to survey coastal nations to identify the issues and rank their relative importance. There are a number of potential ways to obtain this information. The simplest is further review of the literature. Our literature search for this report was not exhaustive. There are many additional descriptions (particularly in French and Spanish) of coastal nations' environmental programs that are likely to include discussions of coastal issues.

Conducting structured surveys is another way to identify and rank issues. We suggest that the global issues list, with some modifications, could be the basis for structuring the survey. This index can serve as a checklist to determine if a coastal nation has a problem or opportunity. Criteria and measures should be used to assess the extent of the problems.

Professional institutions such as the Coastal Zone Management Journal, the Coastal Society, the Marine Technology Society, and the International Geophysical Union could undertake a structured survey among their overseas members or collegial counterparts. International assistance agencies -- particularly AID -- could survey their national missions. In AID's case, it seems useful to add a section on coastal management issues to the second phase of their country environmental profile series. This has already been done for the first published phase two report, The Dominican Republic Country Environmental Profile, A Field Survey. We hope that this precedent will be continued. If it is, future reports should indicate the relative importance of the coastal issues.

Some of the impact issues should be divided into more specific categories so that the effect of each use activity on each other coastal use is listed separately. For example, for impact issue No. 7, port development and offshore shipping of oil were combined and, in turn, the impacts of these issues were combined; (decrease fish yields and decrease recreation or tourism quality). Issue No. 7 should become four lists: port development - decrease fish; offshore shipping of oil - decrease fish; port development - decrease tourism quality; and offshore shipping - decrease tourism quality.

APPENDIX C: AN OUTLINE FOR DESCRIPTIONS OF COASTAL RESOURCES MANAGEMENT PROGRAMS

Setting and Brief Historical Perspective

Major Coastal Environments

Significant Coastal Resources, Relative Value of Coastal Resources to the Nation

Major, Ongoing, Coastal Resource Uses and Activities

Critical Problems of Coastal Use and Activity

Governance Structure

Property rights in Coastal Areas (particularly relative rights of the public and private sector)

Governance of Coastal Areas (legal powers, government organization, and procedures)

Decision Making

Who makes critical decisions?

What criteria and information are used?

What appear to be the major factors that influence decision-making?

How are decisions implemented and enforced?

Evaluation

Critical Problems Being Addressed

Critical Problems Not Being Addressed

Ability of Governance Structure and Decision-Making process to Address Problems

Major Implementation Problems Experienced or Anticipated

Prospects for Change