

1993

Five Marine Resource Management Programs: Innovations and Common Themes

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FIVE MARINE RESOURCE MANAGEMENT PROGRAMS:

INNOVATIONS AND COMMON THEMES

by

Louisa Rand Moore

*A paper submitted in partial fulfillment
of the requirements for the degree of
Masters of Marine Affairs*

University of Rhode Island
1993

Major Paper
Masters of Marine Affairs

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1993

ABSTRACT

This paper investigates essential elements of marine resource management programs, particularly how they are initiated and what is needed for their success. The focus of this paper is on management planning for sites where marine resources are still largely intact as opposed to those which are severely disturbed. Planning is aimed at determining carrying capacity of the marine systems and limiting disturbances accordingly.

Questions for this inquiry were developed from research of a bay in eastern Maine where marine resources have not been severely disturbed, but are vulnerable to over-exploitation due to lack of coordinated management. Using these questions, five programs in three countries are analyzed for common themes.

Many innovations and common themes are evident despite very different settings. Each program is built upon clear understanding of the area's scientific, social, economic, political and regulatory barriers to marine resource management.

Ingredients critical to success in these five programs have been: a clear problem, local commitment and leadership, an economy tied to local marine resources, support and collaboration - but not control - from all pertinent levels of government and non-governmental organizations,

ecologically based plans which encourage "sustainable" economic uses, marine research and monitoring, education for stewardship, an open and balanced public process, and broad participation.

The lack of quantifiable evaluation measures may inhibit both the growth of these programs and transfer of their essential elements to other sites. However, themes shared so widely may be worth emulating when creating other such programs.

ACKNOWLEDGEMENTS

I am very grateful to my advisor, Rick Burroughs, for clear guidance on this research, for a lively discussion in response to every concern, and for his vision in the field of marine policy.

I am also grateful to fellow classmates, especially Abby Friedman and Kerry Hood, for their comraderie, thoughtful discussions and shared literature sources.

Many individuals working in the five marine resource management programs contributed information and assistance to this inquiry, for which I am very thankful.

Special thanks go to Barbara Vickery of the Maine Chapter of the Nature Conservancy for the opportunity to work with her and apply this research to the Maine Chapter's work in Cobscook Bay, Maine.

Most of all, I am grateful to my husband, Peter, for his love and support, and his willingness to pursue graduate education together in the Marine Affairs Program.

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CHAPTER 1. INTRODUCTION

In the past two decades, coastal management and pollution control programs have regulated and restored many heavily impacted industrialized coastal and nearshore areas. During this time, coastal management and pollution control strategies have grown increasingly sophisticated to match the diverse sources of stress on coastal and marine resources.

An important challenge in the coming decades is to protect coastal and marine resources prior to severe degradation by pollution, over-use and over-extraction. "Laws and regulations must do more than buy time by slowing down the degradation of the marine environment; they must restore damaged ecosystems and prevent the defiling of healthy ones."¹

This paper is concerned with management schemes designed to protect coastal and marine resources. Many terms are used to describe government management of the coast, including "coastal zone management", "integrated coastal resource management", and "ocean management".² In this paper, the term "marine resource management" is used. This is to emphasize the importance of positive outcomes for marine

¹ Thorne-Miller, Boyce L., and John G. Catena, The Living Ocean: Understanding and Protecting Marine Biodiversity, Island Press, (Washington, DC; Covelo, CA) 1991, p. 87.

² Sorensen, Jens C. and Scott T. McCreary, "Institutional Arrangements for Managing Coastal Resources and Environments", National Park Service, U.S. Department of the Interior and U.S. Agency for International Development, *Renewable Resources Information Series*, Coastal Management Publication No. 1, 2nd printing, 1990, p.3.

resources, in addition to the outcomes for coastal or terrestrial resources.

This paper focuses on management programs that characterize the natural processes in an estuary, a bay or a marine system and address the human uses and activities that may be altering those processes. Fundamental to such programs is the goal of understanding the marine systems involved. Marine resource management programs are becoming more common as coastal residents reckon with significant changes occurring in nearshore environments.

Challenging tasks distinguish marine resource management from other resource management tasks. These include the need for site-specific marine scientific data (which is rarely complete in a given site), the challenge of "comprehensive" management in a fluid, constantly changing aquatic environment, and the need to engage the many parties who have an interest in the marine "commons". Management strategies often consider uses in the entire watershed, the estuary, and the ocean, for which an array of *land use* controls and *marine use* controls are adopted.

This is a "wetter" approach than is used in many coastal management programs. The latter often focus on the transition zone between land and ocean, with a bias toward land uses and land use controls, and less emphasis or research on marine systems.

The purpose of this paper is to discern fundamental ingredients needed for a marine resource management program

to begin and to succeed. Effective coastal and marine resource management programs are complex and difficult to establish and maintain. Local implementation is one fundamental ingredient. As Thorne-Miller and Catena note, "International agreements and national laws are needed to drive the solutions, but implementation must be on the local level. Consequently, coastal communities must be motivated to participate in effective coastal zone management, and they must have access to the appropriate scientific guidance and environmental monitoring to ensure the effectiveness of their programs."³

The sooner such essential ingredients are identified and adopted for any coastal and marine area, the greater the chance for timely management of coastal and marine resources there. Likewise, the sooner such ingredients are broadly identified, the more promising the outlook for coastal and marine regions in general.

Numerous benefits arise from establishing marine resource management prior to severe disturbance. They include: the uninterrupted flow of economic and other benefits from a fully functioning ecosystem (such as productive fisheries); the apprehension of use conflicts; and the lower cost to society of prevention measures when compared with clean-up and restoration.

³ Thorne-Miller and Catena, 1991, p.74.

With the above needs and benefits in mind, this paper addresses three questions:

1. What are some of the barriers to establishing an effective coastal and marine resource management program in relatively intact coastal areas?,
2. How can these barriers be approached and overcome?, and
3. What program elements are important for long-term success?

For answers to these questions, five programs were investigated, each representative of a different type of marine resource management scheme.

Despite inherent differences, these five programs have overcome similar barriers. Aspects of their origins, settings, organizational structure, funding, program goals and action plans, participation, and evaluation measures are investigated. Selected common themes are discussed and elements of success are analyzed.

My interest in these questions grew out of work experience in the Alaska Coastal Management Program. As a reviewer projects and permit applications for coastal development activities, it became very clear to me that permitting - while essential to governance of coastal resources - represents a continual "parceling out of the coast" and can not accomplish *management* of coastal resources, or maintenance of marine resource values. I concluded that premeditated, comprehensive and long-term

goals must be established first, and my interest shifted to this aspect of coastal management.

In the Spring of 1992, I approached the Maine Chapter of the Nature Conservancy with my research interests. I had the good fortune of arriving just as Barbara Vickery, Director of Conservation Planning, was considering how to approach future activities in Cobscook Bay, Maine. The Maine Chapter had protected numerous land parcels around the bay, but saw an additional opportunity to help maintain the marine resources and the livelihoods of people who rely upon them. I wrote a proposal and was hired by the Conservancy for the summer, to characterize the marine resource uses of Cobscook Bay, particularly economic and ecological aspects of those uses. I wrote a report, *Cobscook Bay's Marine Industries and Uses: A Preliminary Inventory of Economic and Ecological Data*, completed in August, 1992.

Based on a second proposal in February, 1993, the Maine Chapter asked me to identify and assess several marine resource management "models" and how they could be instructive for efforts in Cobscook Bay. My report, *Five Marine Resource Management Programs and their Relevance to Cobscook Bay* was completed in April, 1993, for the Maine Chapter to use in their work in Cobscook Bay and elsewhere on the Maine coast. Research for both of these reports was used to complete the present paper.

CHAPTER 2. METHODS

In order to select the marine resource management programs to be investigated for this paper, several criteria were applied.

First, programs are located in somewhat rural, less industrialized areas with economies tied to their marine and watershed resources were sought out. Second, the areas' resources were not previously managed with a coordinated, regional approach, but this developed as a result of the program. Third, stresses on marine resources - or potential stresses - were comparable to those of Cobscook Bay; where important factors include nearshore fisheries habitat alteration, fisheries stock depletion, marine use conflicts, shoreline development, waste discharge and bacterial contamination, and risk of pollution from catastrophic or chronic oil spills or toxic discharges.

Additional criteria were applied regarding the nature of the selected management programs. First, program activities were to be founded upon an understanding of marine ecosystem processes. Second, the programs were to be reasonably well along in planning and implementation, as opposed to being in a conceptual stage only.

Fourteen programs in the U.S. and elsewhere were considered. Based on the above criteria, the following five programs were selected:

- I. The Atlantic Coastal Action Program, a local/federal coastal management program in the Atlantic Provinces of Canada,
- II. The Buzzards Bay Project, a National Estuary Project of the U.S. Environmental Protection Agency, in southwestern Massachusetts,
- III. The Florida Keys National Marine Sanctuary, a National Marine Sanctuary Program stretching from Miami into the Gulf of Mexico,
- IV. Sian Ka'an Biosphere Reserve, a marine, estuarine, and terrestrial International Biosphere Reserve on the Yucatan Peninsula, Mexico, and
- V. The Morro Bay Task Force Program, a local watershed district/coastal management program on the central coast of California.

It is worth noting that special area management planning was not among the program types selected. Special area management planning is a program of the U.S. Federal Coastal Zone Management Act, which has proven useful in coastal planning in the U.S. and elsewhere. This analysis would be of great interest but was not pursued because Maine's Coastal Program has never applied it in a Maine community, based on the perception that it calls for more intensive planning than Maine communities are willing to engage in. Special area management planning may well be used in Maine in the future, whether it is by that name or another.

One purpose of studying Cobscook Bay's marine uses during the summer of 1992 was to identify barriers to coastal and marine resource management there. The research included interviews of marine resource users and individuals with responsibilities for managing resources in and around the bay. For each industry or use, "management or conservation issues" were defined, and "barriers to resolving the issues" were identified. For example, one issue is whether or not harvest rates for green sea urchins (*Strongylocentrotus droebachiensis*) exceed reproduction/repopulation rates. One barrier to resolving this issue is the absence of data on sea urchin abundance or reproduction in Maine waters (and in Cobscook Bay specifically).

In addition to defining barriers specific to individual industries, I compiled a list of other obstacles to effective management, based on interviewees' comments, survey responses to resource-related questions in town planning surveys, and my own observations. An example of one such barrier was a comment made by a state official that "...there's no interest in taking care of the bay, people are generally fatalistic, with a few exceptions".⁴ Based on such comments and other information, the list of apparent barriers includes "Lack of public attention to marine resource protection, or consensus on the need for it". (See Appendix A, Apparent barriers to

⁴ Dent, David, Marine Patrol Officer, Maine Department of Marine Resources, Cobscook Bay, pers. comm., 7/92.

creation of a coastal resource management program in Cobscook Bay.)

To research the five programs, 31 questions were formulated based on the apparent barriers, and on questions of interest to the Maine Chapter. The questions were organized into six categories or "elements" of program design:

Origins

Characteristics of the Setting

Organizational Structure

Program Goals and Action Plans

Participation: Processes Used and Participants' Roles

Evaluation and Key Elements of Success

A form was developed to compile information in a consistent format for each of the five programs, covering the 31 questions. (See Appendix B, Program Information Form.)

The method of investigation was to gather and review printed background information on each program and subsequently, to interview key players for further details and assessments of their program's success. Assessments were sought from the program manager as well as the key representative of a non-governmental organization associated with the program.

Once the five programs were researched, the specific features that were instructive for the circumstances of Cobscook Bay were analyzed and compiled for The Nature

Conservancy report. Further steps were taken for purposes of this paper, dissociated from the specific circumstances of Cobscook Bay. Brief summary descriptions of the five programs are included in Chapter 3, Findings.

Tables were constructed to compare and contrast information across the five programs and identify common themes. For several key questions, common themes were apparent among all five programs. These questions (14 of the original 31) were selected for in-depth discussion:

Origins of the Programs

How was the program initiated, and by whom?

Characteristics of the Settings

What marine resource management concerns were present at the time the program was established?

What social and economic conditions were present?

Organizational Structure of the Program

What type of organization(s) is(are) leading the program?

Note key characteristics.

How has the program been funded?

Program Goals and "Action Plans"

What specific actions does the program call for on each priority?

What strategies in the program provide for long-term economic uses of the marine resources?

Participation Processes

What specific policies and activities have been used to ensure local leadership in planning and implementation?

Participants' Roles

What roles have the following entities served in the marine program and in what ways have they advanced the program? Note specific partnerships and initiatives.

- governmental agencies, especially local governments
- non-governmental conservation organization(s), particularly their role in encouraging local efforts for "sustainable and compatible" development?

Evaluation and Key Elements of Success

What measures are being used to evaluate program success?

What key aspects have contributed to the success of the program overall? Note aspects of Origin, Characteristics, Organizational Structure, Program Goals and Action Plans, and/or Participation.

If there was a "failure" or flaw identified in the program, what was it and what can be learned from it?

What are the biggest challenges ahead for the success of the program?

The common themes identified for each of these questions are shown in tables and analyzed in Chapter 4, Discussion of Findings.

CHAPTER 3. FINDINGS

Brief summaries of the five programs and some of their unique features follow. Maps and full descriptions of programs are included as Appendices C-H.

Program Summary: The Atlantic Coastal Action Program

This is a recent initiative of the Canadian federal government in which communities on the Atlantic Canadian coast can get support for a locally-run coastal planning process. The program emphasizes involvement of all interests in the community, and management of the watershed and coastal resources for the long-term.

The Atlantic Coastal Action Program (ACAP) is underway at 13 initial sites. A committee at each site will develop its long-term vision, assess its environmental quality, establish remedial measures, and write a comprehensive environmental management plan, with specific projects outlined. The committee is made up of marine users and others with a direct interest in the resources or "stakeholders". For this substantial local commitment, approved projects receive federal guidance and funding.

Unlike the U.S., Canada does not have a national coastal management program. Past federal efforts have focused on large scale, federally run clean-up programs in high priority sites like the Great Lakes. The ACAP will attempt to shift responsibility for the quality of coastal watersheds and

marine waters to the local level. The ACAP has many planning elements which could be useful in starting programs elsewhere. It has been built on principles from the U.S. National Estuary Program and the Great Lakes Remedial Action Planning process, and adapted for use in smaller bays and estuaries surrounding Atlantic Canada.

It is admittedly an experiment, but many officials are hopeful it will be a successful foundation on which to build a coastal management program for both the Atlantic and Pacific coasts of Canada. (See Appendix D.)

Program Summary: Buzzards Bay Project (National Estuary Project)

The Buzzards Bay Project is one of the first estuary protection programs in the country. As stated in its plan, the project is "an example of an emerging nationwide effort to develop management strategies that take into account the uniqueness of certain coastal areas. This "special area management" approach is being successfully carried out in several other regions, including Chesapeake Bay, the Great Lakes, Puget Sound, and San Francisco Bay...

"Two major themes of the National Estuary Program (NEP) are (1) a phased program approach to identify priority problems, establish their probable causes, and devise strategies to address them; and (2) a collaborative problem-solving process that involves all concerned parties in each

phase of the program and secures commitments to carry out recommended actions."⁵

As a result of five years of research, demonstration projects, and planning, the Buzzards Bay Project has completed its Comprehensive Conservation and Management Plan, which has been approved for implementation by all levels of government involved. An ambitious set of goals, objectives and commitments have been agreed to by local, regional, state and federal agencies, with additional recommendations included.

Implementation is underway, coordinated by committees and staff of the Buzzards Bay Project, and the twelve towns which surround the bay. These twelve towns are using a unique regional approach: they signed a compact for protection of the bay and implementation of the comprehensive conservation and management plan. The towns have no history of working cooperatively, but are doing so as a result of the Buzzards Bay Project. The project has recently received awards for its innovative successes in managing a nitrogen sensitive embayment and setting up a protocol for oil spill preparedness among bay towns. (See Appendix E.)

Program Summary: Florida Keys National Marine Sanctuary

The mission of the National Marine Sanctuary Program is to designate a system of marine areas of outstanding national

⁵ Buzzards Bay Project, Comprehensive Conservation and Management Plan (CCMP), Vol.1 "Management Recommendations and Action Plans", 1991, p.1, 6.

significance and manage each one comprehensively for its ecological, research, educational, recreational, and/ or esthetic values. Thirteen national marine sanctuaries have been designated in the program, embracing more than 14,000 square miles of area.⁶ The National Marine Sanctuary Program is still the only manifestation of national ocean policy on a site-specific, comprehensive basis.⁷

The designation of a national marine sanctuary entails several steps and can take several years. First, a list of candidate sites is established by the National Oceanic and Atmospheric Administration (NOAA) based on advice from regional scientific evaluation teams. The list of sites has been under revision during the past year. From that list, NOAA periodically selects an "active site", which initiates a planning and public review process. Once a sanctuary is designated and a management plan is agreed to, a staff is hired to manage activities and restrictions within the sanctuary.

Overlapping and conflicting marine uses in the Florida Keys may be the more complex than in any other U.S. waters. Designation of the Florida Keys National Marine Sanctuary has been hailed as "the single most important step that's ever

⁶ Studds, Gerry E., "Capitol Improvements", in *Marine Sanctuary* (Magazine of the National Marine Sanctuary Program), Spring/ Summer 1993, p. 17.

⁷ Bill Harrigan, Former Chief, National Marine Sanctuary Program, NOAA, pers. comm., 9/93.

been taken" to protect the Keys ecosystem.⁸ The sanctuary spans 2,600 square nautical miles, the second largest of all the sanctuaries designated to date (Monterey Bay National Marine Sanctuary is 5,327 sq. nm.).

A management plan is being written for the Florida Keys Sanctuary as part of the required environmental impact review process. Management of the sanctuary will include zoning of marine uses such as replenishment areas, protection areas, areas to be avoided by ships, and restrictions on fishing gear in certain areas. The management plan will also attempt to bring consistency to a morass of conflicting marine regulations.⁹ (See Appendix F.)

Program Summary: Sian Ka'an International Biosphere Reserve

Sian Ka'an is a 1.3 million acre reserve on the Caribbean Sea. In the past ten years a unique combination of protection and research activities has been developed for its resources and people. A complex hydrologic system links the terrestrial and marine habitats; inundated forests, "cenotes" (sinkholes), savannas, fresh water channels, lagoons, bays and coral reefs. An impact to fresh water in the uplands can impact much more than the habitat in which it occurs.

⁸ Mark Robertson, Director, The Nature Conservancy, Florida Keys Initiative, quoted by Donald Cameron Torrance, "Deep Ecology: Rescuing Florida's Reefs" (Cover story), *Nature Conservancy Magazine*, The Nature Conservancy, July/ August, 1991.

⁹ Rob Finegold, Program Specialist, Florida Keys National Marine Sanctuary Program Planning Office, NOAA, pers. comm., 4/93.

According to Kenchington and Agardy, "the Biosphere Reserve Concept is a radical departure from many recent conservation approaches. It is part of the Man and the Biosphere Programme of the United Nations Educational, Scientific and Cultural Organization (UNESCO), and is based on the concept that humans are an integral component of the system. A Biosphere Reserve is integrative, linking 'sustainable' use with the normal functioning of the ecosystem or wider ecobiome involved, and conducive to coordinating management.

"It fosters a 'grassroots' approach to management -- stewardship rather than control. It seeks to develop management regimes that are based on scientific understanding of the long-term nature of ecosystems... biosphere reserves promote sustainable development by utilizing carefully-developed zoning plans in which different areas serve the differing roles of conservation (preservation of species and habitats), logistics (providing controlled locations for research into ecological systems and human interactions with them) and development (controlled resource-use)."¹⁰

Sian Ka'an Biosphere Reserve has also been designated a Mexican federal biosphere reserve, which parallels the UNESCO concept. Both designations recognize the marine, estuarine and brackish ecosystems of Sian Ka'an which are rich in

¹⁰ Kenchington, Richard A. and M. T. Agardy, "Achieving Marine Conservation Through Biosphere Reserve Planning and Management", *Environmental Conservation*, Vol. 17, No. 1, Spring 1990, p.41.

biological diversity. These ecosystems also support a fishery (spiny lobsters) on which local Mayan communities depend for their income. The lobster fishery has a locally managed sustainable harvest program with marine research and monitoring.

The overall approach to economic activity within the reserve is to identify sustainable levels of harvest or human activity, educate users about the significance of sustaining local resources, and about the practices which will enable them to continue their uses without exceeding sustainable levels. Monitoring is conducted to ensure the resources are maintained. (See Appendix G.)

Program Summary: Morro Bay Task Force Program

In Morro Bay, an original estuarine watershed management program has been underway since 1987. The project evolved as a local estuarine watershed management initiative, not a preconceived federal or state program. The initiating parties were a mix of residents, local officials and state conservation agency people who recognized the bay's unique values.

The Morro Bay area is less developed than most of California's coast, includes a national forest and state parks and preserves, is home to a large oyster and mussel mariculture operation, supports clam digging, ranks continually among the top five sites in the National Audubon Society's nationwide Christmas bird count, and is an

overwintering area for 70 migratory bird species. Rapid population growth and farming and grazing practices have caused extensive erosion which has silted in the bay and brought numerous ecological changes. These changes have effected fishermen, boaters, tourist businesses and naturalists, creating a large constituency for management of the bay.

The Morro Bay Task Force bid for designation of Morro Bay as a National Estuary Project in 1992, but did not win the designation. Nonetheless, the Task Force has succeeded in leveraging millions of dollars of support for its projects from many sources outside the bay. The Task Force has accomplished many goals of education, problem solving and steps toward a comprehensive conservation and management plan for the bay. Constituents intend to write and implement such a plan even in the absence of National Estuary Program support. (See Appendix H.)

CHAPTER 4. DISCUSSION OF FINDINGS

Tables were constructed from information on the five programs to identify common themes. Themes evident in all five programs are discussed here. Many other themes were common to two or three of the programs, and very interesting, but will not be discussed here. Selected examples are given for each theme, not necessarily from all five programs.

Origins of the Programs

All five programs began when coastal degradation had become apparent to one or more constituency (See Table 1, Origins of the Programs). Before ACAP began, a nationwide public consultation was conducted which identified strong public concern for the coasts. In Buzzards Bay, contamination by pathogens and industrial toxins was well established. At Sian Ka'an, concerns existed about overharvest of spiny lobsters, coastal plant species and other resources.

To varying degrees, "focusing events" occurred, such as the dead zone occurring in Florida Bay, and a ship grounding on the reef. In none of these sites, however, was there a singular catastrophic event of *Exxon Valdez* proportions which sparked initiation of the program. In regard to the origins of estuarine management programs, one analyst observed, "A crisis, however small, often gets programs off to a fast

Table 1: Origins of the Programs

1. When was the marine resource management program initiated?
2. When was it "approved" or sanctioned to begin implementation?
- *3. How was the program initiated, and by whom?

(Questions marked with an asterisk are featured in the Discussion of Findings).

Atlantic Coastal Action Program

1. 1990 - ACAP concept developed
2. 1991 - ACAP announced in Canada's "Green Plan"
3. Initiated by: Federal gov't, based on a
 - national public consultation which confirmed need for CZM in Canada
 - lack of gov'tal responsibility for nearshore
 - coastal concerns high in Atlantic Provinces
 - Environment Canada managing pilot program in Atlantic Provinces, with local committees

Sian Ka'an Biosphere Reserve

1. 1983 - State began study of resources
2. 1986- Mexican & Int'l Bio. Reserve created
3. Initiated by: State of Qunitana Roo
 - many scientists knew values at Sian Ka'an
 - growth of tourism resorts threatened area
 - Governor of state designated Mexican Bio. Reserve and created an NGO to foster support for the Reserve
 - little local involvement in designation
 - UNESCO designated Int'l Bio. Reserve.

Buzzards Bay NEP

1. 1985 - EPA & state set up "Buz. Bay Project" a pilot est. mgmt project (before NEP)
2. 1988 - BBP included in the NEP
3. Initiated by: Towns, state and EPA
 - Envir. concerns in Buzzards Bay were high
 - NEP is a federal initiative implemented regionally. Here, strong town roles led to a *Compact* among 12 towns.
 - State support strong since beginning.

Morro Bay Program

1. 1966-1975 - State resource studies, plan
2. 1989 - Morro Bay Task Force formed
3. Initiated by: CA Senate noted valuable resources, called for protection plan (1966)
 - 1975 - watershed mgmt plan written, dropped
 - many orgs, many missions, no coordination
 - watershed uses impacting (filling) bay
 - 1986 - a fisheries biologist & a coastal planner revived the 1975 report, called meeting.
 - broad-based task force formed, County as hub.

Florida Keys NMSP

1. 1972 - NMSP enacted
2. 1988 - Florida Keys Sanctuary study began
 - 1990 - " " " designated
3. Initiated by: Florida's U.S. delegation, from
 - public attn to degradation and groundings
 - urgency led to accelerated designation
 - varied constituent groups pressed for competing interests in sanctuary
 - NOAA initiated sanctuary mgmt planning

start."¹¹ This implies that if a site *does not* have an outstanding issue on which local attention is focused, the start of a marine resource management program may be hindered.

In each of the five sites a significant number of people viewed the coastal or marine degradation as unacceptable for the future of the area, and they were willing to act. Their collective awareness became the basis for the new initiative. These "initiators" are critical to innovations of policy, according to Cobb and Elder. They note, "Conflicts and dramatic events may help to attract public attention; but unless they are effectively exploited, such happenings are not by themselves likely to galvanize opinion around an issue. Effective advocacy is needed. This task falls to people who are willing to invest their time and energy in promoting the issue...Initiators are instrumental in building public support, and shepherding an idea to the governmental agenda..."¹²

¹¹ Ann Swanson, Executive Director, Chesapeake Bay Commission, Annapolis, MD, remarks given during panel at *Watershed '93*, A National Conference on Watershed Management, March 21-24, 1993, Alexandria, VA.

¹² Cobb, Roger W., and Charles D. Elder, Participation in American Politics: The Dynamics of Agenda Building, The Johns Hopkins University Press (Baltimore and London), 1972, 1983, p. 187. (These authors credit Robert Eyestone for the term "initiator", from his book, From Social Issues to Public Policy, John Wiley (New York), 1978, p.88-96).

APPENDIX A.

Apparent barriers to creation of a coastal resources management program in Cobscook Bay.

Origins

- No singular or large scale "focusing event" currently exists to draw widespread attention to management needs for Cobscook Bay coastal and marine resources as a whole. Specific stresses such as shellfish closures draw attention from separate groups of marine resource users, but these issues do not generate broad public interest or actions.
- Non-local organizations interested in the area are unsure of how to proceed, though interest in conservation and management has increased in recent years, particularly at The Nature Conservancy, the Maine Coast Heritage Trust, and at UNESCO's Man in the Biosphere Program.

Characteristics of the Setting

- The natural assets in the bay are outstanding, but protection measures and management are minimal.
- Lack of understanding of the ecosystem functions and values, in the scientific community and among the marine users and the public.
- Stresses are occurring in the bay, but conclusive scientific information on the potential threats to the bay's marine ecosystem processes is lacking.
- Local fear of (or aversion to) "government intervention" and activities which could lead to regulations. People fear that government attention to resources on which local residents depend will result in decreased economic opportunity. Economic opportunity is the top concern in the region due to low annual income and high unemployment. Many local residents rely significantly on marine resources, with a traditional view that when the resources are needed, they will be there.
- Lack of public attention to marine resource protection, or consensus on the need for it. In *public* forums, people will stand up for resources they feel they should be able to *take*, regarding fisheries allocation and closures. However, in *private*, numerous individuals call for resource protection.

Organizational Structure of the Program (No overall program exists, so barriers listed pertain to the lack of a program.)

- Absence of coordinated management of the bay as a whole watershed/estuarine system by resource management agencies. Land use management regimes are fragmented and separate from marine use management regimes. The uplands may be managed along county lines or private/public ownership boundaries, rather than along watershed boundaries. The bay is likely to be regulated as part of a larger geographic area, such as

- Lack of communication and cooperation between the towns (and two townships and the Indian reservation, hereafter, "towns") on the bay. Low level of support for regional planning commission functions or any other regional focus for resource management.
- Funding for scientific studies is unavailable at the state level, and does not appear to be available from other sources (this probably depends upon the nature of the study). Staffing of state marine resource management programs is already thin, such as for DMR's monitoring of aquaculture sites in the bay.
- Fiscal crises in most if not all of the Cobscook Bay communities - due to reductions in local tax revenues, and state and federal funds - constrain towns from meeting current obligations, leave alone new objectives.

Program Goals and "Action Plans"

- Local and county initiatives tend to be driven by economic need, as noted above in "Characteristics of the Setting".
- Specific goals or actions to pursue have not been articulated.

Participation

- Public participation in a related arena of governance - local comprehensive planning - has been low in Cobscook Bay communities, as evidenced by low turnouts for planning meetings and low returns on public surveys. Progress in comprehensive planning lags behind that of coastal towns in the rest of the state. (Two of the bay's six incorporated towns have begun comprehensive plans. Statewide, 144 of the 152 coastal towns have begun or finished their plans).
- Individuals and towns do not participate in regional functions, as noted above in "Structure of the Program".
- Scientists knowledgeable about marine resources of Cobscook Bay may have ongoing research on specific questions but lack an impetus to collaborate on bay-wide questions.
- Participation in local conservation activities is limited. There are few conservation or other groups focusing on coastal or marine resources.
- Conservation has a mixed reputation in the region, including the perception that conservation efforts equal anti-development efforts. The private property rights movement is vocally represented by the Washington County Alliance.
- Aside from hearings held by DMR regarding contentious fisheries allocation issues, there is an absence of public process regarding the marine resources that are central to many residents livelihoods.

APPENDIX B.**PROGRAM INFORMATION FORM****PROGRAM:****LOCATION:**

.....

• Program Summary**A• Origins of the Program**

1. When was the marine resource management program initiated?
2. When was it "approved" or sanctioned to begin implementation?
3. How was the program initiated, and by whom?

B• Characteristics of the Setting

1. What marine resource management concerns were present at the time the program was established?
2. What social and economic conditions were present?

C• Organizational Structure of the Program

1. What type of organization(s) is(are) leading the program? Note key characteristics.
2. At what level of governance (national/ county/ town/ watershed management unit, etc.) is the program authorized or sanctioned?
3. On what geographic scale (national/ county/ town/ watershed, etc.) is the program implemented?
4. How has the program been funded?
5. Were specific obligations attached to the funding, and if so, what were they?

D• Program Goals and "Action Plans"

1. What priorities or goals were identified in the program?

2. What specific actions does the program call for on each priority?
3. How are marine resource management strategies monitored and enforced?
4. What strategies in the program provide for long-term economic uses of the marine resources?
5. What strategies provide for conservation of biological diversity?

E• Participation

1. What specific policies and activities have been used to:
 - a. ensure local leadership in planning and implementation?
 - b. develop consensus about common goals?
 - c. work cooperatively on a regional basis (with multiple jurisdictions)?
 - d. make decisions with an ecosystem-wide perspective?
 - e. resolve conflicts (such as between users, between public and private rights, and between conservation and development)?
 - f. promulgate and adopt best management practices in the watershed and bay?
2. What roles have the following entities served in the marine program and in what ways have they advanced the program? Note specific partnerships and initiatives.
 - a. scientific institutions
 - b. industry / business representatives such as fishing, shipping, or recreational interests?
 - c. governmental agencies, especially local governments
 - d. non-governmental conservation organization(s), particularly their role in encouraging local efforts for "sustainable and compatible" development?
 - e. social or economic development organizations.
 - f. other entities or individuals.

F• Evaluation and Key Elements of Success

1. What measures are being used to evaluate program success?

2. What key aspects have contributed to the success of the program overall? Note aspects of Origin, Characteristics, Organizational Structure, Program Goals and Action Plans, and/ or Participation.

3. If there was a "failure" or flaw identified in the program, what was it and what can be learned from it?

4. What are the biggest challenges ahead for the success of the program?

Sources of printed reference information

People contacted for information

Recommended contact person(s) for further information

Attachments

Characteristics of the Settings

Multiple marine resource management concerns had arisen by the time each program was established. Pollution and physical alterations were evident on the coasts and in the nearshore environments of these sites. Only at Morro Bay was there one *prevailing* cause of ecological disturbance, namely sedimentation of the bay (See Table 2, Characteristics of the Settings).

All sites are ecologically rich in coastal and marine resources, with a litany of unique species and values. The Sian Ka'an Biosphere Reserve is the most preemptive program, compared with the others which focus more on restoration from cumulative impacts. Mexico is rapidly losing large tracts of intact land and coastline. The coastal and marine resources at Sian Ka'an were recognized by many scientists as pristine and unique, deserving protection in advance of degradation.¹³

All sites have marine- and coastal-dependant economies. The businesses and livelihoods have been put at risk by threats to the marine environment. At ACAP sites, commercial and sport fishing, agriculture and tourism all rely upon high water quality and environmental quality in general. Untreated waste discharge has resulted in widespread shellfish closures.

¹³ Joe Quiros, The Nature Conservancy Project Manager for Sian Ka'an and Co-Director, TNC Mexico Program (Phoenix, AZ), pers. comm., 4/93.

Table 2: Characteristics of the Settings

- *1. What marine resource management concerns were present at the time the program was established?
*2. What social and economic conditions were present?
(Questions marked with an asterisk are featured in the Discussion of Findings).

Atlantic Coastal Action Program

1. Environmental quality varied at 13 sites
 - all have rich coastal resources, plus...
 - untreated sewage disposal in the ocean
 - bacterial closures of shellfish beds
 - agricultural erosion and pollutants
 - nearshore fish habitat changes
2. Rural, marine-dependant communities
 - economies relied upon natural resources fishing, aquaculture, tourism

Sian Ka'an Biosphere Reserve

1. Wide variety of coastal ecosystems
 - second longest barrier reef in world
 - nesting by marine turtles, waterbirds
 - concerns about overharvest of lobster, coastal plants, tourism developments slash and burn agriculture
2. Rural, resource-dependant population
 - economic prospects limited, desired
 - lobsters important to foreign trade
 - some sport fishing, farming, logging.

Buzzards Bay NEP

1. Unique mix of coastal wildlife species
 - history of industrial pollution (PCBs)
 - pathogen contamination
 - excess nitrogen inputs to nearshore
2. Coastal town populations rising
 - declining environmental quality resulting in economic losses

Morro Bay Program

1. Diverse wildlife populations occur or migrate through bay area
 - agricultural uplands, urban shore
 - watershed erosion and sedimentation of the bay, altering habitats
2. Natural assets support ranch economy and rural quality of life

Florida Keys NMSP

1. Physical destruction of coral reefs
 - chemical pollution of Florida Bay
 - increased salinity, temperature
 - eutrophication of south Florida waters
 - intense tourism development
 - increased coastal population densities
2. Growth of marine businesses
 - millions of visitors annually.

In Buzzards Bay, New Bedford Harbor is a designated Superfund site. The presence of PCBs in seafood species in and around the harbor has forced closure of commercial fishing harvest since 1979.¹⁴ When asked what principles would be transferable from the Buzzards Bay Project to other sites with similar challenges, the program director said, "recognize the importance of the bay in terms of its economy, lifestyles and traditions."¹⁵

In the Florida Keys, the current economic value of reef resource uses has been estimated to be \$400 million per year.¹⁶ Water quality degradation in Florida Bay has led to shrimp harvest declines.¹⁷

The risks of economic loss from abuses of marine resources have been recognized at Sian Ka'an and Morro Bay as well. Program managers at all five sites note the importance of economic risks in building constituencies for a marine resource management agenda. The bond between environmental protection and economic prosperity is clear to residents and political actors in these coastal and marine areas.

¹⁴ Buzzards Bay Comprehensive Conservation and Management Plan, Volume 1: Management Recommendations and Action Plans, p.131.

¹⁵ Dennis Luttrell, 4/26/93.

¹⁶ Torrance, Donald Cameron, "Deep Ecology: Rescuing Florida's Reefs" (Cover story), *Nature Conservancy Magazine*, The Nature Conservancy (Arlington, VA), July/ August, 1991, p.11.

¹⁷ Laycock, George, "Good Times Are Killing The Keys" (Cover story), *Audubon Magazine*, National Audubon Society, September/ October, 1991, p.44.

Organizational Structure and Funding

In all five programs the planning and management activities are led by a newly formed "multi-stakeholder" organizational structure. The structures vary, but each one has a committee which engages all levels of government, multiple agencies, business and industry, non-governmental interest groups, and marine resource users in public discussion and planning. (See Table 3, Organizational Structure of the Programs.) In the ACAP, Buzzards Bay and Morro Bay programs, local leadership is emphasized. In the Florida Keys and Sian Ka'an, the leadership lies more heavily with a federal agency, and non-governmental organizations such as The Florida Keys Sanctuary Advisory Council and Amigos de Sian Ka'an.

These new "multi-stakeholder" committees support development of a common agenda. One report noted that such organizations are often filling a vacuum, linking many organizations which were previously moving forward with separate and often conflicting agendas.¹⁸ Partnerships are being forged to join the many interests in marine resources; private, local, state, and federal interests, and stretch their limited resources further than they could singly. One example is the cooperative agreements between state and

¹⁸ The Minnesota Project, "Protecting the Mississippi River: A report of seven 'water protection partnerships' located throughout the country as examples of multiple-stakeholder networks", September, 1992., p.17.

Table 3: Organizational Structure of the Programs

- *1. What type of organization(s) is(are) leading the program? Note key characteristics.
 2. At what level of governance (national/ county/ town/ watershed) is the program authorized?
 3. On what geographic scale (national/ county/ town/ watershed) is the program implemented?
 - *4. How has the program been funded?
 5. Were specific obligations attached to the funding, and if so, what were they?
- (Questions marked with an asterisk are featured in the Discussion of Findings).

Atlantic Coastal Action Program

1. A federal agency and a local committee
 - Environment Canada is umbrella of expertise
 - local committee of all "stakeholders" incorporates, does planning, implementation
2. Federal authorization
3. Coastal watersheds in Atlantic Provinces
4. Federal funds from Canada's "Green Plan" followed by local support at each site
5. All stakeholders must join in, letter of intent to complete ACAP planning process

Sian Ka'an Biosphere Reserve

1. A federal/ state partnership and a local NGO
 - the agencies provide political & national import, municipalities cooperate with them
 - the NGO has many constituents, continuity channels international support, plans & implements projects
2. International and federal authorization
3. Reserve area is 1.3 M acres, project scales vary; site, watershed, bay, and reef
4. Federal, state, local business, international agencies and NGOs
5. Yes, specifics unknown

Buzzards Bay NEP

1. A federal agency, plus committees for mgmt, technical advice, & 12-town *Compact*
 - EPA provides expertise, structure
 - committees provide technical and local leadership
 - no new gov't agency created, just agreements
2. Federal and state authorization
3. Whole watershed (17 towns) and bay
4. Federal, state, and state in-kind services
5. Project had to accomplish planning steps

Morro Bay Program

1. A "multi-stakeholder" task force, federal & state initiatives, an enviro. coalition, and a bay foundation
 - Task Force members represent watershed and bay users and interests well
 - USDA/ SCS & CA Coastal Conservancy are key
2. Local, county, regional, state & federal
3. Watershed and bay
4. Federal, state, county, local, business, much leveraged from outside bay area
5. Yes, specifics unknown

Florida Keys NMSP

1. Federal agency, and multi-faceted public advisory group
 - NOAA makes decisions in NEPA process
 - Advisory group is very influential
2. Federal authorization, state support
3. Ecosystem scale, watershed, keys, waters
4. Federal, state, local, private funding
5. Yes, specifics unknown

federal agencies responsible for enforcement of marine regulations in the Florida Keys.

The new organizations are also reaching a larger number of constituent groups than a federal agency or NGO could on its own. This degree of outreach is identified as a continuum by Sorensen and McCreary. They observe that the chances for an "implementable or durable outcome" increase with more participants in the institutional arrangement, but the outcome is likely to take years to obtain.¹⁹

In each site, a local committee has the lead in establishing the agenda, with a federal entity providing a designation, a planning framework, and/or resources. In ACAP, Buzzards Bay National Estuary Program and Florida Keys National Marine Sanctuary, the federally guided planning processes are more pre-established than in the other sites.

Regardless of structure, local entities are using their influence heartily, according to interviews with federal officials. ACAP has a structure of a *federal framework with local control*. The federal ACAP director noted, "It is a surprise and a threat to decision makers that there is a lot of expertise out there. We open up Pandora's Box and must be prepared for the follow up."²⁰

¹⁹ Sorensen, Jens C. and Scott T. McCreary, "Institutional Arrangements for Managing Coastal Resources and Environments", National Park Service, U.S. Department of the Interior and U.S. Agency for International Development, *Renewable Resources Information Series* Coastal Management Publication No. 1, 2nd printing, 1990, p.98.

²⁰ Jim Ellsworth, Director, ACAP, Environment Canada, Atlantic Region, Dartmouth, N.S., pers. comm. 3/18/93.

The Florida Keys program is a *federal planning effort with a citizens' advisory committee*. This is very different from the ACAP structure and generally allows local participants a much less active role. The Florida Keys Advisory Council is an exception to this, however. A federal planner claimed, "The Advisory Council is very powerful, giving marching orders to the federal agency, like the tail wagging the dog."²¹ Amigos de Sian Ka'an and the Morro Bay Task Force also drive their programs' agendas, and a federal framework does not prevail over the specific steps taken in those programs.

One form of leadership is the designation of a site for its marine significance, by an agency with authority beyond that of local influence. A larger than local status or organizational structure can focus many entities (and their resources) on protecting valuable coastal and marine resources. This has been especially true at Sian Ka'an. This is constructive only if it is based on or consistent with local desires. Conversely, if bestowed from afar, a designation can be threatening to local users who might otherwise be allies. Fishermen in the Florida Keys and shell fishermen in rural ACAP sites resisted federal designations.

Organizational structure in these five programs is no more complex or formal than the setting calls for. For example, ACAP projects are to be small scale and local, so

²¹ Rob Finegold, Program Specialist, Florida Keys National Marine Sanctuary Planning Office, NOAA, Miami, FL, pers. comm. 3/93.

they start with small scale, locally incorporated committees. The Morro Bay Task Force is a public forum, not a decision-making body. The members raise issues, develop solutions and make recommendations. This allows them to gain consensus on goals and complete projects without the complexity and expense of creating another layer of government. The Task Force's recommendations are implemented by existing agencies, organizations and volunteers. In Morro Bay and in Buzzards Bay, the fact that no new government authority has been established above the local level is perceived very positively.

Of necessity, organizational structure changes with time. As these organizations have matured, they have reorganized to better address their primary functions. The new structures at Buzzards Bay, Florida Keys and Morro Bay include: an overall forum, a technical advisory committee, an advocacy/lobbying group and a foundation. One interesting question, however, is how stable or "durable" are these organizations as institutions?

Institutional stability is of interest in view of the large number of players who need to stay involved in "leadership", and the long-term goals and action plans established. Limited resources are available, not the least of which is the participants' volunteer time. All five programs have been heavily endowed with this resource. As public sector funding declines, volunteer work may be needed more than in the exciting, early stages of program creation.

However, a tendency for public momentum to wane on public policy issues has been identified by Downs, who calls this the "issue attention cycle".²²

Can the programs maintain public involvement for long enough to accomplish the long-term goals? This is one apparent weakness in organizational structure. Without longevity, these programs may complete certain projects, but they may not institute the protection and management measures they aspire to. Legal incorporation of an organization is one step toward formality. Each local ACAP committee incorporates as a nonprofit organization, in order to receive support. However, incorporation is no guarantee of longevity.

All five programs have received federal funding. (See Table 3, Question 4.) In exchange for this support, certain steps are to be taken. At all sites except Morro Bay, federal seed funding was instrumental in starting the initiative. The ACAP, the National Estuary Program, and the National Marine Sanctuary Program are all predominantly federally funded. At Sian Ka'an, there is only partial federal funding. At Morro bay, federal funding has been provided for specific watershed management measures. This allowed more overall freedom of direction, but less certainty.

²² Downs, Anthony, "Up and Down with Ecology-The Issue Attention Cycle", *Public Interest*, Volume 12, 1972, p.38-50, as cited by Cobb, Roger W., and Charles D. Elder, Participation in American Politics: The Dynamics of Agenda Building, The Johns Hopkins University Press (Baltimore and London), 1972, 1983, p. 187.

Federal funding is never certain, so these programs have fundraising components to seek other sources of support. In the Florida Keys NMSP, and Morro Bay there are now nonprofit foundations to raise long-term support and distribute funds for research and projects. The Buzzards Bay Project is evaluating special fees and taxes which could be levied to pay for watershed improvements.²³ In the U.S., with shrinking federal budgets and diminishing state and local resources, this is a necessity. In Mexico, a large share of funding for Sian Ka'an is solicited from sources outside the country. In Canada, local ACAP committees are directed by Environment Canada to ensure self-sufficient funding by the fifth year of operations. With a diverse list of supporters, particularly local sources, these initiatives may be able to earn political and financial support more readily than if a sole source had sponsored it.

Program Goals and Action Plans

Environmental assessment and/or research is a priority action in all five programs reviewed here. (See Table 4, Program Goals and Action Plans.) A firm understanding of the marine ecosystem is needed for effective management of uses

²³ Pratt, Edwin H.B., Jr., and Dennis Luttrell, "A Proposal for Funding the Implementation of the Buzzards Bay CCMP, Searching for a New Approach", a paper presented at *Watershed '93*, A National Conference on Watershed Management, March 21-24, 1993, Alexandria, VA.

Table 4: Program Goals and Action Plans

1. What priorities or goals were identified in the program?
- *2. What specific actions does the program call for on each priority?
3. How are marine resource management strategies monitored and enforced?
- *4. What strategies in the program provide for long-term economic uses of the marine resources?
5. What strategies provide for conservation of biological diversity?

(Questions marked with an asterisk are featured in the Discussion of Findings).

Atlantic Coastal Action Program

1. Implement comprehensive plan in each site
2. Action plans must be scientifically defensible, based on local intent, analysis of enviro costs/ benefits, specific tasks
 - Demonstration projects- conservation, BMPs, education, restoration, local enviro. monitoring, on-ground results emphasized
3. Enforcement will vary by site
4. Players in local economy must be engaged in mgmt plan, action plans
 - Sustainable uses are emphasized, policies of "polluter pays" are encouraged
5. No explicit strategies for biological diversity

Sian Ka'an Int'l Biosphere Reserve

1. Protect reserve resources & sustainable uses priorities are on project by project basis
2. Research, , water quality monitoring, coastal inventory, reef inventory, lobster population study, alternative resource uses
 - Encourage progress via clear project results
3. Lobster coop members enforce own rules
4. Mgmt by sustainable harvest levels, foster renewable low/no impact industries as alternatives to destructive livelihoods
5. Monitor, ensure resource protection in "core" & buffer areas, ensure natural functions

Buzzards Bay NEP

1. Write & implement Comprehensive Conservation and Mgmt Plan for the bay
2. Action plan for each priority, with commitments for local, state, federal actions
 - Pathogens/shellfish, nutrient inputs, toxic contaminants are top action plans
3. Regulatory agencies enforce new measures
4. Educate players on link between enviro. quality and economic returns from marine assets (shellfish, tourism, recreation)
5. No explicit strategies for biological diversity

Morro Bay Program

1. Initially, take actions to restore & protect the bay. Soon, develop & implement mgmt plan for the watershed and bay
2. Research, education, BMPs to reduce siltation from grazing lands, trap sediments in wetlands above the bay, show results
3. Enforcement not emphasized
4. Ranchers & businesses engaged in plan
 - Assistance to, not regulation of, users
5. Address threats to bay's species, functions at source of problem based on good data on hydrology of watershed

Florida Keys NMSP

1. Agree to & implement a comprehensive sanctuary mgmt plan for long term protection of the resources & their uses
2. Education, research and monitoring, water quality, submerged cultural resources, law enforcement, measurable results
 - Some zoning & restrictions on human activity
3. Regulatory agencies, emphasizing education
4. Accommodate users but protect resources
 - Businesses have say in mgmt measures
5. Replenishment areas, quantify threats & measure diversity

and activities which impact marine resources. This requires site-specific marine scientific assessment and research, and "increasingly sophisticated knowledge of estuarine processes and an understanding of the effect of land use on water quality."²⁴ Marine environments present the special challenges of scale (the fluid movement of water masses over vast distances), connectivity ("massive transfer of materials between sites") and field observation (limitations on time underwater).²⁵

The ACAP calls for environmental quality assessments on which action plans are to be based. Action plans must be "scientifically defensible" to be approved by Environment Canada. The Buzzards Bay NEP action plan for nitrogen sensitive embayments required an assessment of the nitrogen loading capacity of Buttermilk Bay waters. At the Florida Keys Sanctuary, benthic and other marine habitats are being mapped, and program managers call for management-oriented research on all parts of the ecosystem from Everglades to Florida Bay to Dry Tortugas at the end of the Keys. Over 150 scientists have contributed to a "Research Action Plan". The Sian Ka'an Reserve is sponsoring research on the fore reef within its boundary to identify indicators of the ecological health of the reef, and trends over time. An early task at

²⁴ Buzzards Bay Comprehensive Conservation and Management Plan, Volume 1, p.25.

²⁵ Kenchington, Richard A., Managing Marine Environments, Taylor and Francis New York Inc., 1990, p. 28ff.

Morro Bay was developing a list of "Research Needs" for the bay.

If these programs were arrayed on a spectrum, the sophistication of assessment, research and monitoring would be directly correlated with the number of users who may be impacted by a marine resource problem, the economic value of the uses, and the research funding made available. The Florida Keys area supports millions of tourist visits each year. Scientists' attention to marine research and management there is extensive when compared to the more rural, "lower risk" sites such as those in the Atlantic Provinces. One might deduce that lower risk sites will have difficulty attracting research funding.

Regardless of research funding levels, each of these programs made a commitment to proceed with certain promising actions despite scientific uncertainty about the system as a whole. This is common, according to two analysts of estuarine programs, "The need for action by government almost always precedes a full understanding of the system."²⁶

For example, it was the rapid decline of numerous resources in the Florida Keys which spurred Congressional action in 1990. Over two years later, scientific uncertainty remains: the causes of the "dead zone" in Florida Bay are still not well understood, and the dead zone is enlarged, despite scientific inquiries. If actions are withheld until

²⁶ Burroughs, R. H., and Virginia Lee, "Narragansett Bay Pollution Control: An Evaluation of Program Outcome", *Coastal Management*, Volume 16, 1988, p. 375.

all scientific findings are conclusive, the opportunity for protection may be lost, and restoration may become the only option available.

A strictly scientific program will accomplish few management goals. Action plans also address issues of constitutional, statutory, regulatory, economic, historical and social import. All five programs call for ongoing education efforts in scientific as well as other aspects of the program. The premise is that participants will be more supportive if scientific findings and other information are clear and understandable. This understanding requires education and outreach. For instance, Florida fishermen have resisted marine sanctuaries, partly on the grounds that sanctuary planners may not use science the way their more familiar regulators- fisheries management councils- do, to restrict harvests.²⁷ Education about research and action plans brings in new participants, and once involved, participants educate others about the purpose and activities of the program.²⁸ Many education programs highlight successes and results to increase public interest.

On this theme, all five programs have begun projects early on, not just planning. Some programs simply start with projects and activities the participants can agree on, and

²⁷ Stimpson, Dee Rivers, and Linda Buckmaster, "Fishermen are Leery of Marine Sanctuary", *National Fisherman*, July, 1991, p.7.

²⁸ Parks, Dawn L., "Citizen Participation in Regional Planning Efforts", in *Proceedings of Coastal Zone '91*, The Seventh Annual Conference on Coastal and Ocean Management, Long Beach, CA, July , 1991, p.51.

save long-term planning and more controversial goals for later, such as at Sian Ka'an and Morro Bay. In contrast, ACAP, Buzzards Bay and Florida Keys attempt broad agreement on a comprehensive program early on, but began implementation of demonstration projects as early as possible.

Goals and action plans focus on the resource concerns with the greatest local economic import. For example, reducing the impact of pathogens on shellfisheries is a top priority in Buzzards Bay. Shellfish in Buzzards Bay have been on the decline, but comprise almost a third of the entire state's annual landings. The cooperative approach to erosion control work with ranchers at Morro Bay has fostered better soil conservation for ranchers as well as support for a more long-term watershed and bay management program.

Action plans support businesses which are compatible with renewable resources. The emphasis is on continuing those uses, with improved practices or more protective siting measures. For instance, ACAP seeks to "improve and sustain environmental quality, on the principle of user pays and polluter pays", including "at source control of pollutants by changing the manufacturing process".²⁹ At Sian Ka'an, where lobstering is a renewable industry, lobster coop members have agreed to use a substitute for their traditional palm plant in lobster traps during a two year study on growth rates of the endangered palm.

²⁹ Environment Canada, *ACAP News*, Autumn, 1991, p. 3.

Participation: Processes and Participants

This section is composed of two parts, the processes used to engage participants in planning, and the roles of various categories of participants.

Processes

To varying degrees, each program arranges for governance of local resources by local entities. (See Table 5, Participation Processes.) The programs deliberately set up a new entity (or more than one) to accomplish what has not been done by previous governance: local planning and commitment to environmental quality. This represents a "devolvement" of federal responsibility. ACAP and Buzzards Bay are good examples. Both programs emphasize local pollution reduction, a realm where the respective federal environmental regulatory agencies have led the process before this generation of initiatives.

The ACAP's devolvement is particularly notable in recent Canadian government history, where environmental programs have been strongly centralized. ACAP resembles "special area management planning", a program of the U.S. Federal Coastal Zone Management Act, in which a specific coastal area is delineated as needing more detailed planning than other areas around it, to address future development and conservation issues. In both ACAP and special area management planning,

Table 5: Participation Processes

1. What specific policies and activities have been used to:
- *a. ensure local leadership in planning and implementation?
 - b. develop consensus about common goals?
 - c. work cooperatively on a regional basis ?
 - d. make decisions with an ecosystem-wide perspective?
 - e. resolve conflicts
 - f. promulgate and adopt best management practices in the watershed and bay?

(Questions marked with an asterisk are featured in the Discussion of Findings).

Atlantic Coastal Action Program

- a. All stakeholders on planning committee
 - Public participation and endorsement sought
 - Participation is to be as broad as possible
- b. Consensus on "vision"
- c. All jurisdictions in watershed are invited
- d. Planning focuses on watershed and bay
- e. Discussion, compromise, and agreement
- f. Pilot projects

Sian Ka'an Int'l Biosphere Reserve

- a. Local leadership is premise, achieved by increasing outreach by NGO
 - NGO is autonomous, board has local leaders
 - Partnerships- local users, NGOs, researchers
- b. Specifics unknown
- c. Specifics unknown
- d. Baseline ecological studies of resources
- e. Find solutions for conflicting uses, educate
- f. Studies have aimed at improving practices

Buzzards Bay NEP

- a. Mgmt committees are forum for local ideas, towns share proposals, solutions
 - Public input, expertise in each phase of plan
 - EPA guidelines for effective participation
- b. Towns focus on common resources, goals
- c. Towns cooperate due to Compact, fiscal needs
- d. Mgmt plan addresses watershed & bay
- e. Empower local officials to solve problems
- f. Studies identified BMPs, local, state adoption

Morro Bay Program

- a. Policy of open participation on Task Force
 - Many local interests offer talents to " " and its cooperative mgmt approach
 - County served as neutral coordinator
- b. Early consensus on goals for mgmt effort
- c. Increase communication via local Directory
- d. Identify unknowns, study on ecological basis
- e. Face problems in non-confrontational way.
- f. Identify needs & remedies, educate, adopt

Florida Keys NMSP

- a. Elect broad Advisory Council, members do close review of all mgmt plan measures
 - Members represent many constituent groups
 - Solutions sought from members, constituents
 - Extensive public input sought and received
- b. Committee consensus is best insurance
- c. Mgmt plan should merge conflicting rules
- d. Mgmt plan covers all watershed, marine issues
- e. Discuss, investigate, compromise
- f. All suggestions channeled to NOAA planners

local leadership is essential to reduce pollution and protect resources. Local priorities are reflected in special area management plans.

Similarly, the Buzzards Bay CCMP states, "The future of Buzzards Bay rests with the communities and their ability to control the quality of their environment."³⁰ In recent years the U.S. government has increasingly delegated environmental protection programs to state agencies.³¹ The National Estuary Program represents an even broader devolvement of responsibility, not just to states, but to a local management conference in which the role of decision making is shared among all levels of government, and other interests as well. These two programs bear out what one analyst noted as the merits of community-based planning:

- local participation increases the potential for political support when the committee needs attention,
- there is a framework for targeting specific, well known audiences,
- it is an efficient way to deliver government services, according to known needs, and
- it provides an accountable framework for evaluating strategies and their results.³²

³⁰ Buzzards Bay Comprehensive Conservation and Management Plan, Volume 1: Management Recommendations and Action Plans, p.3.

³¹ Imperial, Mark T., Donald Robadue, Jr., Timothy M. Hennessey, "An evolutionary Perspective on the Development and Assessment of the National Estuary Program", *Coastal Management*, Volume 20, 1992, p. 311.

³² Biddix, Wade, USDA Soil Conservation Service, "Community Based Natural Resource Planning by Hydrologic Unit" a paper presented at *Watershed '93*, A National Conference on Watershed Management, March 21-24, 1993, Alexandria, VA.

In all five programs, solutions to watershed, coastal and marine concerns are sought in an open and non-confrontational forum for local agreements. Planning processes are designed to bring key players into the planning and maintain an "even playing field" for all participants.

For ACAP, Environment Canada provides "ground rules" with which the ACAP committees operate. Future visions and common concerns are emphasized. Pre-existing conflicts are played down. Environment Canada officials seek out local leaders who are "natural facilitators" to carry the committee planning process. A skilled "troubleshooter" can be called in from Environment Canada to facilitate resolution of hotly contested issues.

The chief planner in the Florida Keys Sanctuary Planning Office emphasizes the need for a balanced, consistent approach by his office, to listen to and incorporate input from myriad players. An extensive amount of public comment has been solicited. Public meetings feature presentations by researchers, and debates and work sessions.

The Morro Bay Task Force holds open meetings, maintains open books, and fosters non-adversarial discussion focused on common goals. This kind of discussion did not exist prior to the advent of the Task Force.

In addition to the techniques for an open forum, the "multi-stakeholder" organizations in these programs all use consensus decision-making, and a cooperative regional

to be held to their promises."³⁸ So, the more *positive* the outcome the better. However, for purposes of instituting similar programs elsewhere, the more *objective* the evaluation the better.

Evaluation can either be "formative" or "summative". Formative evaluations can be used for course corrections while a program is underway. Summative evaluations are carried out after program completion.³⁹ Both of these types could serve the coastal and marine resource management field well if used more assiduously.

An ideal evaluation measure is rooted in clear goals. These goals are delineated by specific objectives for outcomes, which are based on good science, are measurable, and for which there is a responsible party and a target date. In the words of Carol Weiss, "Somebody has to do something differently when the goal is reached."⁴⁰ Though some goals may be rational and the outcomes desirable, at least four of the programs reviewed here may have what Burroughs and Lee call "insufficient or no linkage between goals and instruments or between instruments and expected measurable outcomes...A program with a vague goal that does not translate into a specific outcome is unlikely to succeed".⁴¹ The implication is that specific measures of program outcome should be spelled out in order to be attributable to goals.

³⁸ Ann Swanson, Remarks at *Watershed '93*, 3/22/93.

³⁹ Weiss, Carol H., 1972, p.17.

⁴⁰ Weiss, Carol H., 1972, p.26.

⁴¹ Burroughs, R. H., and Virginia Lee, 1988, p. 375.

All five programs reviewed here identify the need for biological, chemical and/or physical environmental measures of program outcome. These measures are generally not well developed or articulated, however. (See Table 7, Evaluation and Key Elements of Success.) This vagueness may constitute a serious weakness unless remedied.

The Buzzards Bay Project is the exception, with its Monitoring Plan incorporated into its comprehensive conservation and management plan. In contrast, the Morro Bay Task Force's "Goals for the Watershed" call for environmental indicators, but target numbers and dates have not yet been spelled out.

It is noteworthy that all five programs are still in stages of development or early implementation. They are wrestling with environmental performance measures. After management measures are implemented, time must elapse before their performance can be judged.

It is equally noteworthy that specific evaluation measures are not well articulated for the organizational and educational goals. The outcomes of these goals are more difficult to measure than environmental outcomes. Nonetheless, declarations of success are made about organization and education.

As noted above in the evaluation discussion, "success" in program goals is not yet easily demonstrated empirically. However, certain common ingredients have contributed to the overall success of all of these programs, according to

Table 7: Evaluation and Key Elements of Success

- *1. What measures are being used to evaluate program success?
 *2. What key ingredients have contributed to the success of the program overall? Note aspects of Origin, Characteristics, Structure, Goals and Action Plans, and/ or Participation.
 *3. If there was a "failure" or flaw identified in the program, what was it and what can be learned from it?
 *4. What are the biggest challenges ahead for the success of the program?

(Questions marked with an asterisk are featured in the Discussion of Findings).

Atlantic Coastal Action Program

1. For program- standard federal evaluation measures, clear, single local agenda, mgmt plans done, independent funding
 - For environment- measures not yet estab'd
2. Origins- nationwide need for coastal mgmt
 - Character- valuable resources, economic need
 - Structure- locally led with agency expertise, federal seed funding
 - Plan- vision & priorities for watershed & bay
 - Partic.-neutral committee keeps process open, local, public, private players cooperate
3. Minimal federal strategic plan- rough start
 - Local skepticism of gov't effort in rural sites
4. Leaders, participants, commitments, funds

Sian Ka'an Int'l Biosphere Reserve

1. No formal measures for program evaluation
 - Working on biological indicators for reefs
2. Origins-commitment from top, & from NGO
 - Char.- outstanding resources, local needs
 - Structure- project partnerships, int'l funds
 - Plan- sustainable economics, stewardship
 - Partic.- open, autonomous NGO partnerships among many entities
3. Poor local participation in NGO at first
 - Scientists' disputes caused uncertainty, delay
 - No long-term plan or enforceable protections
4. Creative leadership, constituents' support, credible marine monitoring program

Buzzards Bay NEP

1. Clear objectives, dates for each Action Plan
 - Monitoring plan- goals & assessment methods
2. Origins- early commitment, top to bottom
 - Char.- valuable resources, dependant economy
 - Structure- local, state, federal mgmt teams
 - Plan- prioritized conservation & mgmt plan
 - Partic.-developed ideas, agency commitments towns, NGOs, agencies share stewardship
3. Limited public involvement in decisions
4. Local responsibility, funds to implement & institutionalize mgmt plan

Morro Bay Program

1. Goal: implement plan, no formal measures
 - Goals for envir. measures, but no targets yet, except to slow sediment input to bay
2. Origins- clear need, many local commitments
 - Char.- important resources, valued by many
 - Structure- local Task Force, gov't support
 - Plan- goals, remedies for priority problems
 - Partic.- open, constructive forum for progress broad participation raised stewardship
3. Lack of community involvement in first plan
4. Funds tighter than in the past, need to keep initiatives going despite low funds

Florida Keys NMSP

1. Sanctuary mgmt to be assessed every 5 years
 - Designing measures of marine habitat health
2. Origins- clear and urgent need for mgmt
 - Char.- valuable resources, dependant economy
 - Structure- federal planners, advisory council
 - Plan- comprehensive, ecosystem approach
 - Partic.- investigate, debate, compromise broad public, all agencies & NGOs
3. Designation preceded broad public support
 - Outreach insufficient for huge population
4. Preserve and restore in face of multiple uses
 - Scientifically based zones & mgmt schemes
 - Effective sanctuary leadership, merging, funding its efforts with existing institutions

program managers interviewed. The following discussion covers aspects of Origins, Characteristics, Structure, Program Goals and Action Plans, Participation.

Origins. A clear need for management was evident, and local commitment to address that need ensued. For example, Environment Canada received clear signals from their public opinion survey regarding coastal management...a major need was going unmet by government programs. When ACAP was announced, candidate sites launched their committees and followed through with strong local action. Managers have pronounced that similarly clear needs and local commitment were keys to success at each of the sites.

Characteristics. In all cases, the ties between functioning natural systems and local marine-dependant businesses were clear and key to program development. For instance, Morro Bay is the only safe harbor for commercial fishing vessels for more than a hundred miles on the central California Coast. As the bay filled in, deep water anchorages were reduced. The state's second largest mariculture site is located in Morro Bay and algal blooms threatened operations before this program began. On these grounds, commercial fishermen and shellfish growers had reason to support restoration of the bay.

Organizational structure and funding. Local leadership and decision making has been characteristic. This may ensure that those people most effected by new management measures will have taken "ownership" and responsibility for them

during planning. Outside expertise for certain steps, funding for research and land acquisition, and other functions have been provided by federal agencies or private NGOs from outside the communities.

Goals and plans. These plans are ecologically based with human needs incorporated. Each program considers the carrying capacity of the entire watershed and bay, and attempts scientific rationale for allowing or limiting human activity. This marine ecological approach may bode well for the success of these plans, compared with previous coastal management efforts. For instance, The Morro Bay Task Force's Goal II.b. states, "Quantify bay and watershed resource limitations. Determine overall 'carrying capacity' of the bay before irreparable damage is done. This would include an assessment of impacts and levels of potential use for all activities..."⁴² For the Florida Keys, one marine scientist believes "a long-term plan with goals is needed, reflecting carrying capacity of the marine environment, users, and their impacts. Specific goals are needed at the outset, for chronic and acute threats."⁴³

This is a daunting challenge, but it advances coastal management a step further. Early emphasis in U.S. coastal management programs was on permitting of coastal developments in a manner consistent with the state's approved coastal

⁴² Morro Bay Task Force, Goals for the Watershed, 1989.

⁴³ Kathleen Sullivan, Marine Ecologist; Professor, Department of Biology, University of Miami; and contractor, Florida Chapter of The Nature Conservancy, pers. comm., 4/24/93.

policies. Now, instead of assuming that a state official can make a decision about cumulative impact each time an individual permit is sought, these plans commit to managing uses based on understanding of the marine, estuarine, and watershed processes. This is comparable to special area management planning of the federal Coastal Zone Management Act, but emphasizes marine scientific underpinnings of management actions.

The second strength common to these plans is that they address *human needs* for resource uses more progressively than coastal programs have in the past. Sian Ka'an Biosphere Reserve illustrates this point well. Local resource uses predate the designation of the Biosphere Reserve. Some fishing and forest practices used are destructive to the very assets the Reserve attempts to protect. Therefore, the reserve is managed with the guiding principle that if a species or ecosystem is threatened by human activity, alternative practices will be pursued to *meet the human needs*, prevent the destructive practice and thereby reduce the risk to the species or ecosystem. In other words, the local population's problems are included on the resource management agenda. Similar principles are at work at the other sites as well. Managers report that local resource users support the programs to the extent their problems are considered and surmounted.

Participation process. Conflicting uses are endemic to coastal and marine resource management. These five programs

have deliberately incorporated conflict resolution processes to balance all concerns. For example, ACAP committees are to be open to all participants, engendering non-judgemental debate and compromise, and consensus agreements, what one official called "bureaucractization of democracy"⁴⁴. As mentioned earlier, ACAP federal staff join local committees to keep the process on an even keel. If communications break down, facilitation is one form of federal expertise available to the committee.⁴⁵ According to ACAP officials, this backup service has been key to successful committee operations. Similar approaches are used elsewhere.

A second intention of the open participation processes is that local stewardship will emerge. Stewardship is emphasized frequently by program proponents as more effective than external controls.

Participants' roles. The approach of involving all "appropriate political actors"⁴⁶ has been essential to success so far. Government entities have carried out their traditional responsibilities, such as permitting and enforcement, and NGOs have continued with their customary activities. Both have also invested in a more collective approach to governance, by contributing to the central task force, management conference, or advisory committee along with other levels of government, scientists, resources users

⁴⁴ Carol Donaldson, ACAP Staff, Dartmouth, N.S., pers. comm., 2/24/93.

⁴⁵ Carol Donaldson, pers. comm., 2/24/93.

⁴⁶ Imperial, Mark T., Donald Robadue, Jr., Timothy M. Hennessey, 1992, p. 327.

and private parties. This is a step beyond previous chapters of environmental management, when the federal government (or state government or NGO) attempted to draw other players into a process they essentially "owned". The most apparent pitfall in this collective governance approach is in keeping all actors engaged over the long term.

Lessons can be learned from the failures or flaws identified in the programs so far. Inadequate involvement of appropriate parties weakened each program at some stage. For example, when the Governor of Quintana Roo nominated Sian Ka'an as a Biosphere Reserve, he established Amigos de Sian Ka'an as the NGO to support it. Amigos was based in Mexico City initially, distant from the local residents at Sian Ka'an. Not only was local involvement lacking, but relations with other likely partners, such as the state university, were strained due to Amigos' reputation as a group of outsiders. This may have inhibited progress at first, since Amigos was the primary moving force for the Reserve.

Similarly, when Environment Canada launched ACAP, it neglected to convene all the government agencies affected by the program beforehand. In effect, perhaps Environment Canada used a *top-down approach* with their fellow agencies, contrary to the *consensus approach* they ask ACAP committees to use in local committee work. This has caused some inter-agency turf problems, which hopefully will not undermine the success of the individual projects. The other programs have suffered a variety of similar consequences, only some of

which have been surmounted. To preclude this problem, lead participants in a program should attempt to involve all appropriate participants early in the agenda forming process.

Funding and leadership are among the biggest challenges ahead for success. Program managers in all five programs acknowledged that long-term implementation accomplishments will be regulated by funding. All aspects of an effective program cost money; coordination, communications, public participation and education, research, monitoring, and evaluation. If the leadership decides to maintain formal organizations, operational costs will also require support.

Program managers in each program also noted the importance of creative, strong leadership for continued success. The Atlantic Coastal Action Program will need local leadership to ensure local plans are agreed to and carried out; the Buzzards Bay National Estuary Project will need committed leaders in all watershed towns and in many seats of state government to follow through on commitments made; the Florida Keys National Marine Sanctuary will need leaders to integrate sanctuary activities with those of hundreds of local, state, federal and private organizations, so sanctuary management is woven into every day life; the Sian Ka'an Biosphere Reserve will require creative leadership to keep ties with local users as well as the international sponsors; and the Morro Bay Task Force's program will need aggressive leaders for ambitions the scale of a national estuary

program, absent the national estuary program scale of funding.

CHAPTER 5. CONCLUSIONS

This assessment has reviewed five different coastal and marine resource management programs in three countries. Elements of each program were analyzed for how they resolved three primary questions: what are some of the barriers to establishing an effective coastal and marine resource management program in relatively intact coastal areas?, how can these barriers be addressed?, and what program elements are important for long-term success?

Many innovations and common themes are evident. Each program is built upon clear understanding of the area's scientific, social, economic, political and regulatory barriers to marine resource management. These issues have been addressed over a period of years to attain the programs' current levels of effectiveness.

Coastal and nearshore areas are increasingly complex environmental and social settings in which to accomplish resource management. Any new resource management undertaking requires certain steps, such as comprehensive natural resource inventory. Others steps, however, are unique to the challenge of managing coastal and marine resources, such as measuring marine ecosystem functions and integrity. Marine scientific indicators are being identified for management purposes.

Still other aspects are peculiar to common property marine resources. Coastal and marine uses which have not traditionally been restricted are appearing on the public agenda, such as how much area an individual lobsterman can fish, and how many house lots should be allowed in a town based on the nitrogen they will discharge into a bay. New broadly democratic public processes are being used to address common property issues because traditional processes are inadequate for the complex issues at hand.

Shortcomings of existing management efforts must be recognized, such as lack of coordination among agencies for regulation and planning, and lack of a system-wide approach. Then, specific measures to improve management can best be fashioned by engaging all entities with direct interests in the resources.

Ingredients critical to success in these five programs have been: a clear problem, local commitment and leadership, an economy tied to local resources, support and collaboration - but not control - from all pertinent levels of government and non-governmental organizations, ecologically based plans which encourage "sustainable" economic uses, marine research and monitoring, education for stewardship, an open and balanced public process, and broad participation. These ingredients are not easily created or maintained.

The programs reviewed here share weaknesses as well as strengths. Weaknesses include inadequate public involvement, unclear evaluation measures, and uncertain institutional

futures. Common strengths include their abilities to increase public awareness of marine resource values, to address local human needs for marine resources, and to mesh many previously disparate agendas into a common agenda.

There is no simple way to assess marine resource management programs, generalize about them or apply their exact blueprints in other settings. An approach which fits well in one setting may not be suited to a different one, for reasons which may only be identified by direct experience and understanding of both settings. The exemplary motivation evident at Morro Bay might not occur in another site which lacks the vision and funding provided by the California Coastal Conservancy in the late 1980s.

As specific models for initiatives in other sites, these programs may be useful to the extent that their outcomes can be objectively and accurately evaluated. This study found limited evaluation information. Objective, quantifiable measures are not rigorously applied, and some processes are difficult to quantify. Moreover, these are "young" programs. In order for management measures to be assessed, time is needed for results to develop. At a minimum, however, certain common themes repeat themselves despite very different settings. It is hoped that these themes can serve as both as warnings and inspirations for initiatives elsewhere.

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APPENDICES

APPENDIX A. Apparent barriers to creation of a coastal resources management program in Cobscook Bay

APPENDIX B. Program Information Form

APPENDIX C. Map of Five Program Sites

APPENDIX D. Map and Description of the Atlantic Coastal Action Program

APPENDIX E. Map and Description of the Buzzards Bay Project

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APPENDIX H. Map and Description of the Morro Bay Task Force Program

APPENDIX A.

Apparent barriers to creation of a coastal resources management program in Cobscook Bay.

Origins

- No singular or large scale "focusing event" currently exists to draw widespread attention to management needs for Cobscook Bay coastal and marine resources as a whole. Specific stresses such as shellfish closures draw attention from separate groups of marine resource users, but these issues do not generate broad public interest or actions.
- Non-local organizations interested in the area are unsure of how to proceed, though interest in conservation and management has increased in recent years, particularly at The Nature Conservancy, the Maine Coast Heritage Trust, and at UNESCO's Man in the Biosphere Program.

Characteristics of the Setting

- The natural assets in the bay are outstanding, but protection measures and management are minimal.
- Lack of understanding of the ecosystem functions and values, in the scientific community and among the marine users and the public.
- Stresses are occurring in the bay, but conclusive scientific information on the potential threats to the bay's marine ecosystem processes is lacking.
- Local fear of (or aversion to) "government intervention" and activities which could lead to regulations. People fear that government attention to resources on which local residents depend will result in decreased economic opportunity. Economic opportunity is the top concern in the region due to low annual income and high unemployment. Many local residents rely significantly on marine resources, with a traditional view that when the resources are needed, they will be there.
- Lack of public attention to marine resource protection, or consensus on the need for it. In *public* forums, people will stand up for resources they feel they should be able to *take*, regarding fisheries allocation and closures. However, in *private*, numerous individuals call for resource protection.

Organizational Structure of the Program (No overall program exists, so barriers listed pertain to the lack of a program.)

- Absence of coordinated management of the bay as a whole watershed/estuarine system by resource management agencies. Land use management regimes are fragmented and separate from marine use management regimes. The uplands may be managed along county lines or private/public ownership boundaries, rather than along watershed boundaries. The bay is likely to be regulated as part of a larger geographic area, such as

- Lack of communication and cooperation between the towns (and two townships and the Indian reservation, hereafter, "towns") on the bay. Low level of support for regional planning commission functions or any other regional focus for resource management.
- Funding for scientific studies is unavailable at the state level, and does not appear to be available from other sources (this probably depends upon the nature of the study). Staffing of state marine resource management programs is already thin, such as for DMR's monitoring of aquaculture sites in the bay.
- Fiscal crises in most if not all of the Cobscook Bay communities - due to reductions in local tax revenues, and state and federal funds - constrain towns from meeting current obligations, leave alone new objectives.

Program Goals and "Action Plans"

- Local and county initiatives tend to be driven by economic need, as noted above in "Characteristics of the Setting".
- Specific goals or actions to pursue have not been articulated.

Participation

- Public participation in a related arena of governance - local comprehensive planning - has been low in Cobscook Bay communities, as evidenced by low turnouts for planning meetings and low returns on public surveys. Progress in comprehensive planning lags behind that of coastal towns in the rest of the state. (Two of the bay's six incorporated towns have begun comprehensive plans. Statewide, 144 of the 152 coastal towns have begun or finished their plans).
- Individuals and towns do not participate in regional functions, as noted above in "Structure of the Program".
- Scientists knowledgeable about marine resources of Cobscook Bay may have ongoing research on specific questions but lack an impetus to collaborate on bay-wide questions.
- Participation in local conservation activities is limited. There are few conservation or other groups focusing on coastal or marine resources.
- Conservation has a mixed reputation in the region, including the perception that conservation efforts equal anti-development efforts. The private property rights movement is vocally represented by the Washington County Alliance.
- Aside from hearings held by DMR regarding contentious fisheries allocation issues, there is an absence of public process regarding the marine resources that are central to many residents livelihoods.

APPENDIX B.**PROGRAM INFORMATION FORM****PROGRAM:****LOCATION:**.....
• Program Summary**A• Origins of the Program**

1. When was the marine resource management program initiated?
2. When was it "approved" or sanctioned to begin implementation?
3. How was the program initiated, and by whom?

B• Characteristics of the Setting

1. What marine resource management concerns were present at the time the program was established?
2. What social and economic conditions were present?

C• Organizational Structure of the Program

1. What type of organization(s) is(are) leading the program? Note key characteristics.
2. At what level of governance (national/ county/ town/ watershed management unit, etc.) is the program authorized or sanctioned?
3. On what geographic scale (national/ county/ town/ watershed, etc.) is the program implemented?
4. How has the program been funded?
5. Were specific obligations attached to the funding, and if so, what were they?

D• Program Goals and "Action Plans"

1. What priorities or goals were identified in the program?

2. What specific actions does the program call for on each priority?
3. How are marine resource management strategies monitored and enforced?
4. What strategies in the program provide for long-term economic uses of the marine resources?
5. What strategies provide for conservation of biological diversity?

E• Participation

1. What specific policies and activities have been used to:
 - a. ensure local leadership in planning and implementation?
 - b. develop consensus about common goals?
 - c. work cooperatively on a regional basis (with multiple jurisdictions)?
 - d. make decisions with an ecosystem-wide perspective?
 - e. resolve conflicts (such as between users, between public and private rights, and between conservation and development)?
 - f. promulgate and adopt best management practices in the watershed and bay?
2. What roles have the following entities served in the marine program and in what ways have they advanced the program? Note specific partnerships and initiatives.
 - a. scientific institutions
 - b. industry / business representatives such as fishing, shipping, or recreational interests?
 - c. governmental agencies, especially local governments
 - d. non-governmental conservation organization(s), particularly their role in encouraging local efforts for "sustainable and compatible" development?
 - e. social or economic development organizations.
 - f. other entities or individuals.

F• Evaluation and Key Elements of Success

1. What measures are being used to evaluate program success?

- 2. What key aspects have contributed to the success of the program overall? Note aspects of Origin, Characteristics, Organizational Structure, Program Goals and Action Plans, and/ or Participation.**
- 3. If there was a "failure" or flaw identified in the program, what was it and what can be learned from it?**
- 4. What are the biggest challenges ahead for the success of the program?**

Sources of printed reference information

People contacted for information

Recommended contact person(s) for further information

Attachments

MAP OF FIVE PROGRAM SITES



Atlantic Coastal Action Program

acap sites

New Brunswick sites

1. Saint John Harbour
2. Miramichi Estuary
3. St. Croix / Passamaquoddy
4. Madawaska River
5. Letang Inlet

Nova Scotia sites

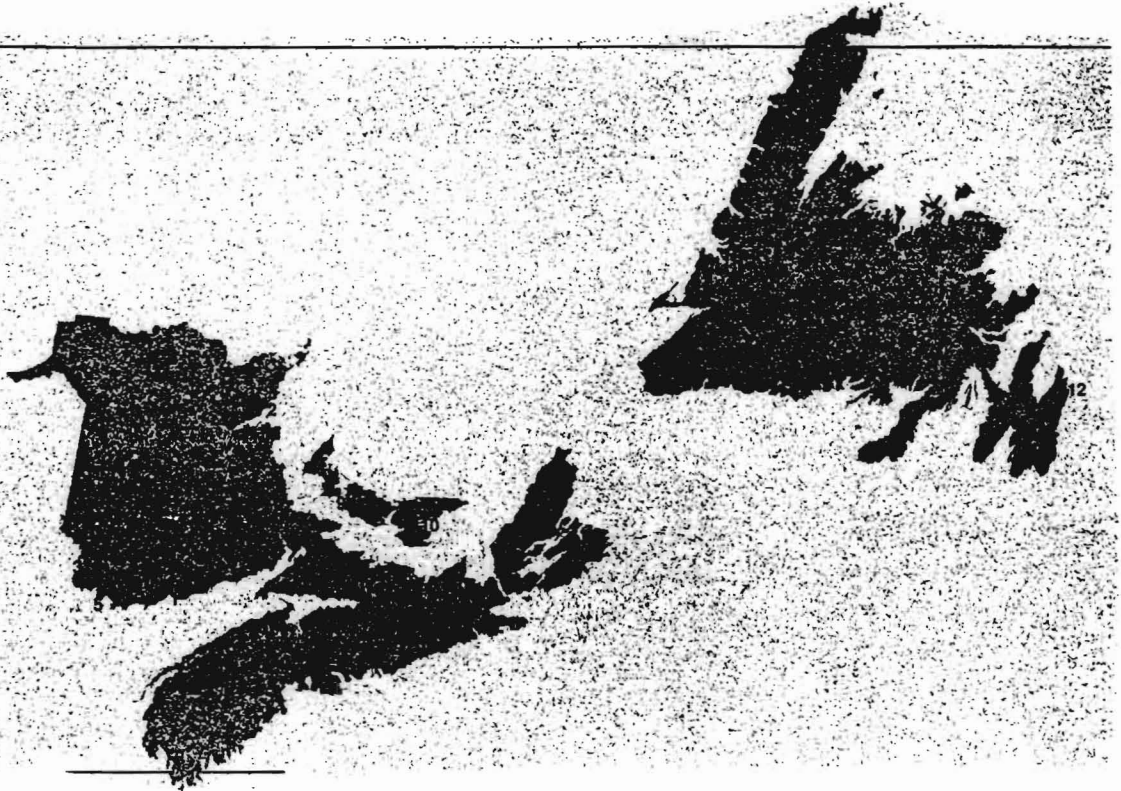
6. Pictou Harbour Estuary
7. Sydney Harbour
8. Annapolis River

Prince Edward Island sites

9. Bedeque Bay
10. Cardigan Bay

Newfoundland sites

11. Humber Arm
12. St. John's Harbour



Source: Environment Canada, *ACAP News*, Issue No.1, Autumn, 1991.

APPENDIX D.

PROGRAM: Atlantic Coastal Action Program

LOCATION: Atlantic Canada, at 13 sites in the four Provinces of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland.

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Origins of the Program

The ACAP was initiated as part of Canada's Green Plan by the Canadian Government in 1991. In the mid-1980's there was wide recognition of problems in Canada's coastal zone, and a lack of federal effort to reckon with them. One federal agency, Environment Canada, had freshwater management mandates, and another, Department of Fisheries and Oceans, had saltwater management mandates, mostly for oil development and offshore fisheries. Management and coordination for coastal and nearshore resources was lacking. Atlantic Canadians called for better management of the coasts during a National Public Consultation Program carried out for the Green Plan.

In 1985, an informal estuarine planning effort began, the Atlantic Cooperative Estuarine Venture, with the tenet that people with the most to lose should serve on teams to manage estuaries. At first the emphasis was on clean-up of estuaries, but this shifted to a planning and management emphasis, with strong local participation. These ideas finally took shape in the Green Plan as a commitment by the Canadian Government to implement a "marine environmental program", namely the ACAP.

Characteristics of the Setting

Distinct environmental conditions exist at each of the 13 sites. Some sites are urban and industrial, like Saint John Harbour, New Brunswick. Others are rural and agricultural, like Bedeque Bay, Prince Edward Island. But waste disposal in the ocean was among the primary marine resource management concerns at the time the program started. Most large cities in Atlantic Canada discharge sewage without treatment. Bacterial contamination of coastal waters is an issue at all the ACAP sites, urban and rural alike. Shellfish bed closures are widespread. Coastal erosion and runoff of agricultural waste and fertilizers have also been significant in some sites, like Prince Edward Island and Nova Scotia. Nearshore fisheries habitat and aquaculture operations have been impacted.

Social and economic conditions at each of the 13 sites are varied, but many sites consist of rural, marine-dependent communities. In some sites, such as on Prince Edward Island, all the primary economic activities rely on a high quality environment; sport fishing, commercial fishing (including mussel and oyster farming), agriculture and tourism.

Organizational Structure of the Program

Leadership in the program is from Environment Canada and the local ACAP committee at each site. A key characteristic of this structure is that the local committees are in the driver's seat. Environment Canada's Atlantic Region Office in Dartmouth, Nova Scotia, is the federal agency *facilitating* the program, with guidance from the federal level ACAP Advisory Committee. A staff person of Environment Canada serves on each local ACAP committee, as a "non-voting stakeholder" at the table. They are to provide a link to federal resources and expertise, as called for by each ACAP project.

Throughout the four Atlantic Provinces, the ACAP committees are planning and implementing their own programs. There are two ways in which committees have been formed. A key ingredient is that the group be neutral and accessible to all stakeholders. Either an existing organization takes on the ACAP initiative, such as a civic or

environmental group. In these cases, to ensure entirely open access to all interests in the community, Environment Canada has occasionally insisted that the group rewrite its by-laws. Or, a brand new organization forms for the ACAP specifically. In these cases, there is a clean slate, with no record of prior efforts which might repel certain participants.

Once each committee has formed, it establishes by-laws and incorporates as a non-profit organization. This allows it to enter into a funding contract with Environment Canada, and to receive other funds as they are raised. Each ACAP project is authorized at the federal level. Each project will be implemented on a watershed scale, by the local committee and any other responsible parties identified during the planning process.

With Canada's Green Plan, \$10 million in federal money has been made available for the initial six year period of the program. This amount must support a coordinator, secretary and office at each of the 13 sites (\$50,000/ year/site maximum), plus the costs of environmental quality assessments and pilot projects, plus four staff people at Environment Canada. Environment Canada's ACAP team indicate that this level of funding was purposefully low, to ensure that local players participated and procured community support early on. However, there is clear desire for higher levels of federal funding in the future. Current funds are stretched thin as the ACAP projects attempt to pay for environmental assessments and demonstration projects.

Before federal funding for a given site begins, all the major local stakeholders must be convened into an ACAP committee. The committee then signs a letter of understanding with Environment Canada stating it will carry out the steps in the ACAP process over five years. (In one site where the committee was not willing to sign a five year agreement, a one year agreement was signed for interim steps.) Seed funding for each site must be followed by locally raised support.

Program Goals and "Action Plans"

The goal of ACAP is to develop "blueprints for managing the coastal resources of 12 areas [now 13] in Atlantic Canada". "Sustainable economic use" of the watershed and marine resources is not a term used explicitly by Environment Canada, but it is what the ACAP is intended to achieve. Environment Canada's ACAP Director, Jim Ellsworth, stated that in each project, Environment Canada wants to foster three things:

- environmental citizenship, responsibility and decision making
- partnerships between the ACAP committees, private sector entities and government agencies, and
- feasible comprehensive plans with demonstrations of new technology and innovative economic measures

These are the goals that each Environment Canada staff person aims for as they participate with the ACAP committees.

During its first five years, each ACAP committee will complete the following ACAP planning steps:

1. a vision for the estuary or coastal area, including "use objectives"
2. an environmental quality assessment of the watershed and coast
3. a remedial action plan to address immediate pollution or disturbances
4. a comprehensive environmental management plan, including demonstration projects to meet the plan's objectives.

Environment Canada has guidelines for the action plans and comprehensive plans. They must: be scientifically defensible; be "based on the knowledge and aspirations of local residents and environmental costs and benefits of these, and other uses"; and identify what

will be done, by whom, by when, and with what financing. ACAP committees are encouraged to implement strategies of "polluter pays, user pays".

Each ACAP committee will identify management measures for the land based activities in the watershed and for the marine resources of the estuary or coast. Monitoring and enforcement of these measures is likely to be done with a combination of local and Provincial efforts, depending on what entity has jurisdiction over activities and resources. Locally, citizen environmental monitoring will probably be important. This year, local water quality monitoring will begin in the Saint Croix ACAP project.

Conservation of biological diversity is a background issue in this program. George Lindsay, Director of Environmental Protection in Environment Canada said, "if a group came in saying they wanted to work on biological diversity, I would tell them they had some work to do first!" In other words, biological diversity could be a noble goal and outcome, but not easily worked on directly.

Participation

Participation in each ACAP project is intended to be as broad-based as possible. Specific policies and activities have been used to ensure local leadership in planning and implementation. Environment Canada sets ground rules for participation, ensuring that the process is fair and open, not dominated by a minority of interests. Local leaders and natural facilitators are sought out from the beginning, to put the process in local hands. As mentioned above, each project is to be guided by a committee, which must be formed before any major steps are taken. All major land and water users must be engaged, a "multi-stakeholder group", which meets monthly. Strong public participation is also required.

Consensus amongst all participants must be reached in establishing the "vision" for the resources and uses of the area. To do this, the focus is on how the participants would like the estuary to be in 20 years, for their children and grandchildren. They are urged not to focus on issues or previous conflicts. The ACAP staff person ensures that all parties "listen and are listened to", and facilitates agreement amongst competing interests. Consensus decision making is geared toward bargaining and compromise.

The question of "vision" usually evokes lively discussion, which according to ACAP staff, results in very similar visions and use objectives from one site to the next. Most vision statements revolve around a clean environment with functioning ecosystems and a robust, sustainable economy. But it is important for each committee to go through the process. The "vision" and "use objectives" developed by the committee must then be brought to the broader public for input. Until this has taken place, the committee doesn't know it has the "public's mandate". Consensus is a new way of doing business in Canada, and especially challenging for agency bureaucrats, who are having to share some of their decision-making responsibilities.

In order for multiple jurisdictions to work cooperatively on a regional basis, there is a policy of open books and open meetings. Patience is needed to allow time for the right forum and resources to evolve. Cooperation amongst jurisdictions and various users is also aided by a charismatic leader who can focus attention on the goals of this new organization, not on issues between other organizations.

To make decisions with an ecosystem-wide perspective, the watershed and the coast or bay comprise the management unit. Planning is geared toward a comprehensive environmental management plan and top priority actions for this management unit. This unit is part of broader ecosystems, such as forests beyond the ridges of the watershed and

waters beyond the mouth of the bay. Participants of each project can choose how to address the external threats (and opportunities) of the broader ecosystem. Participants develop and adopt best management practices for the watershed and bay and carry out pilot projects to demonstrate solutions to environmental problems.

There has been good success so far with these participation policies and activities. The "average" stakeholder is very supportive of the process. Getting stakeholders together is a very ambitious, complex and time-consuming process. Unique problems arise in each site. For example, in the rural watershed of Mahone Bay, participation in the ACAP committee was hard to come by. Environment Canada helped establish a small group of key players and then signed a contract to give them money so they could get started together and bring in other players. The Director of ACAP noted that participation is "a surprise threat to decision-makers, there is a lot of expertise out there. When you open Pandora's box, you must be prepared for the follow up!" As the ACAP projects unfold, the strengths and weaknesses of the participation practices above can be better assessed.

Many entities are serving important roles in the ACAP projects. A premise of ACAP is that "partnerships and joint action are the most effective means of achieving sustained environmental quality." ¹ Partners will identify solutions and implement Action Plans at each site. Marine laboratories, such as the Huntsman Marine Lab in St. Andrews, New Brunswick, will be involved in planning and environmental assessments.

Environment Canada believes that in order for an effective organization to form at the local level, all major polluters in the watershed must be at the table due to their use of resources, their environmental impacts, and their role in the economy.

The roles of fishing representatives has been varied. Shellfishermen in the Saint Croix and mussel farmers in Bedeque Bay have a healthy skepticism about the ACAP process, and are not joining into the ACAP planning process readily. In contrast, Bedeque Bay sports fishermen are collaborating with the ACAP committee on environmental quality issues. And inshore fishermen are looking to ACAP and other means to ban trawling and dragging in nearshore waters, increase environmentally friendly gear, improve markets for underutilized fish species, and offer retraining for fishermen displaced by fishing closures.

Local governments have a key role in establishing the local ACAP agenda and seeing it through. Provincial governments have a key role in coastal management, as they have jurisdiction over some coastal resources. Environment Canada's role is to ensure that the ACAP projects accomplish long-term commitments. According to ACAP's Director, "such planning is not easy but it is essential. A string of good deeds will not satisfy the goals of this program." The role of the Environment Canada representative on each local committee is to provide a "window" on federal government information, activities, resources and jurisdiction. This is part of a larger effort to make Environment Canada more accessible to the public. A "hotline" is open to Environment Canada for ACAP committees to seek assistance if their process begins to break down.

Non-governmental organizations have been easily engaged in the ACAP committees. Environmental groups have adopted more "tempered behavior" than in their past work, due to the consensus process and the presence of other stakeholders. Some environmental

¹ ACAP News, Issues No.1, Autumn 1991.

groups choose not to be involved, however, opting to focus instead on the easier "good deed" ideas.²

Evaluation and Key Elements of Success

When asked, "how will you know that this program has succeeded?", ACAP's Director said, "This is the \$64 Million dollar question! If there are 13 projects which have: clear objectives; one agenda instead of multiple conflicting agendas; and plans for environmental management, then it will be a success. Other 'deliverables' include environmental citizenship, higher awareness, partnerships among players, and new technologies or economic instruments in place."

Environment Canada and ACAP will be accountable to the Canadian taxpayer through standard federal government evaluation methods, but the process and results will not always be quantifiable. Quantifiable measures of success include: the comprehensive plan due to Environment Canada by the 5th year of each project; independence from ACAP's structure and funding; and each project is encouraged to set measurable goals for environmental quality parameters (for example, a 50% increase in dissolved oxygen in the water column at certain stations).

Several key ingredients have contributed to the success of the program to date. The program is locally driven with federal and Provincial participation, instead of being federally driven. The broad-based, multi-stakeholder committee approach, with private/public interaction is important. Environment Canada's provision of seed funding and expertise to get ACAP projects started in the 13 sites are important features. Environment Canada's essentially neutral facilitator role (initially) maintains certain operating ground rules and prevents singular interests from dominating the local planning process. All these elements appear to be increasing local momentum. This program is still only two years old, however, so it is too early to declare overall successes.

Certain flaws have been identified in the program by Environment Canada staff, from which some points can be learned. Environment Canada did not have time (or make time) to sell ACAP to other federal and provincial agencies before the ACAP program was launched. A more collaborative approach among all agencies with coastal zone jurisdictions would have been better. The federal agency also launched ACAP without an internal strategic plan. This led to a chaotic first stage, until a strategic plan was laid out.

Several big challenges lie ahead for the success of the program.

1. Participation. Ensuring lasting, broad-based participation is critical, but may be difficult. Consensus and joint planning is a hard sell in the Saint Croix and other rural areas, due to the resistance rural people have about planning and outside influences. It is not clear how ACAP planning will work in rural areas over the long run. Provincial and federal officials will need to adapt to the locally oriented mode of operation, especially if ACAP's funding is to increase in the future. Environment Canada and the Department of Fisheries and Oceans need to work together better. Industrial players have had a very powerful role in the past, resisting regulation. The ACAP approach requires equal footing for all stakeholders. It is not clear how the politics will change in the long run.

2. Program. The agenda-setting process is important, but as one staff person said, "talk is cheap. Canada has a lot of work and expenditures ahead, to catch up with the U.S. on

² Jim Ellsworth, Environment Canada's Director of ACAP, pers. comm.

waste disposal practices."³ There are also valid questions about the implementation authority of the ACAP committees. For example, on what legal grounds can they establish and enforce higher standards of environmental quality than those required by federal or provincial law? In addition, effective evaluation of the ACAP program will be important to demonstrate successes to parties outside the ACAP program.

³ Doug Bliss, ACAP Staff Person, pers. comm.

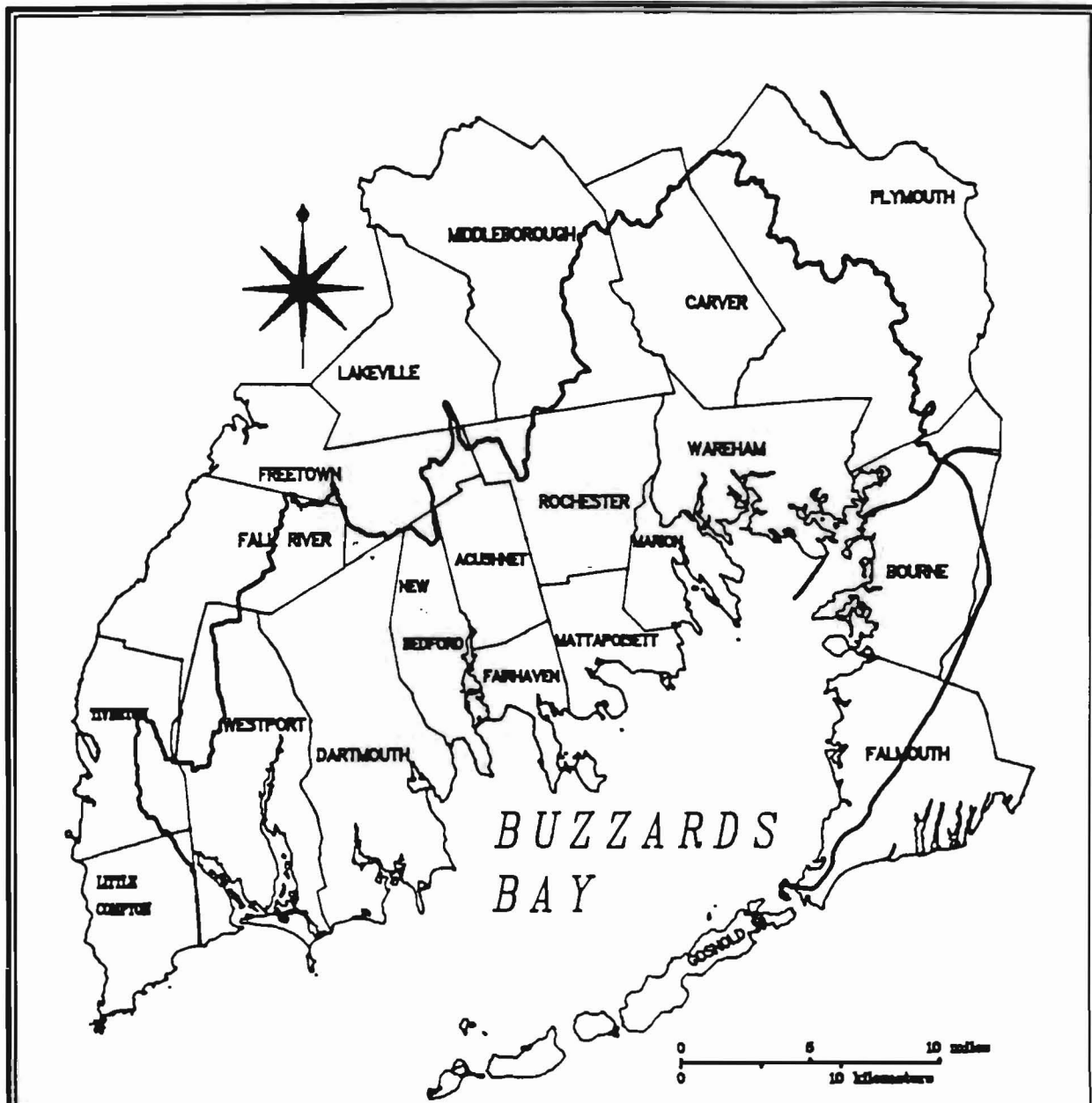
Sources of printed reference information

1. *ACAP News*, Issue No. 1, Autumn 1991.
2. Bedeque Bay Environmental Management Association brochure.

People contacted for information

1. Larry Hildebrand, Director, Conservation and Protection, Environment Canada, Atlantic Region, Dartmouth, Nova Scotia. Tel.(902) 426-8374.
2. George Lindsay, Director, Environmental Protection, Environment Canada, Atlantic Region, Fredricton, New Brunswick. Tel. (902) 452-3286.
3. Jim Ellsworth, Director, ACAP, Environment Canada, Atlantic Region, Dartmouth, N.S. Tel. (902) 426-3808.
4. Doug Bliss, ACAP Staff, and member of the Saint Croix ACAP committee. Tel. (902) 426-3808.
5. Carol Donaldson, ACAP Staff, *ACAP News* editor, and currently writing a detailed manual for the entire ACAP planning process. Tel.(902) 426-8606.
6. Shawn Hill, Board Member, Bedeque Bay Environmental Management Association, Bedeque Bay, Prince Edward Island. Tel. (902) 532-7533.

A National Estuary Project



Buzzards Bay and its drainage basin

Town boundaries provided by MassGIS and digitized from 1:25000 scale USGS quadrangle maps. Basin boundary compiled by USGS-WRD and digitized by MassGIS. Cape Cod side basin boundary based on interpretation of water table elevation contours published in Hydrologic Atlas No. HA-692.



APPENDIX E.

PROGRAM: Buzzards Bay Project (National Estuary Program)

LOCATION: Buzzards Bay, southwestern Massachusetts.

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Origins of the Program

In 1985, Buzzards Bay was selected with three other estuaries for study by the U.S. Environmental Protection Agency (EPA) to build "a framework for addressing pollution problems and the effects of overuse and development and for preparing comprehensive management plans to ensure an estuary's ecological integrity."¹ In 1987, Congress passed the Water Quality Act (a reauthorization of the Clean Water Act) creating the National Estuary Program. In 1988, Buzzards Bay was designated as an NEP "estuary of national significance". By 1991, the Buzzards Bay Comprehensive Conservation Management Plan was written and publicly reviewed, the 12 Buzzards Bay municipalities had signed their compact, Massachusetts Governor Weld had approved the Comprehensive Conservation and Management Plan, and U.S. EPA Administrator William Reilly followed suit shortly thereafter.

Characteristics of the Setting

Buzzards Bay, presumably named so for its abundant ospreys during the 18th and 19th centuries, is a relatively unspoiled area. It also has a " legacy of industrial pollution from greater New Bedford combined with widespread accelerated development threaten the bay's environmental and economic health and typify the stresses placed on many estuaries of the Northeastern United States by conflicting uses...The Buzzards Bay Project has focussed its efforts on three priority pollution problems - pathogen contamination, toxic contamination, and increasing nitrogen inputs - and how they affect water quality and living resources in Buzzards Bay. These pollution problems were selected because it was determined that they had the greatest impact on the economic, ecological and aesthetic values of Buzzards Bay."²

The primary sources of the three types of pollution are:

Nutrients and eutrophication- nitrogen from sewage treatment, combined sewer overflows ("CSOs"), and septic systems.

Pathogen contamination- sewage treatment plants, vessel sanitary wastes, on-site subsurface sewage disposal, stormwater runoff, wildlife, and waterfowl and domestic animals.

Toxic contamination- petroleum and fossil fuel hydrocarbons, pesticides, polychlorinated biphenyls (PCBs), and other synthetic organic pollutants.

In social and economic terms the results of these pollutants, such as closed shellfish beds, have caused declines in income, public health, and quality of life for the people of Buzzards Bay.

Organizational Structure of the Program

The National Estuary Program was created by Section 320 of the Clean Water Act, which is administered by EPA. Therefore, EPA's Region 1 Office has been instrumental in establishing and authorizing the Buzzards Bay Project.

¹ Buzzards Bay Project, p.6.

² Buzzards Bay Project, p.25.

To be funded by EPA, each NEP must progress through several major steps of environmental assessment, planning, public review and implementation agreements. The goal of these steps is successful implementation of the Comprehensive Conservation Management Plan (CCMP).

For the first three years, 95% of the Buzzards Bay Project was funded by EPA. Since then, a mix of support has been provided from federal and state program moneys and state in-kind support. Federal implementation funding, which is not guaranteed for national estuary projects, was provided for the first time to the Buzzards Bay Project last year. A Financial Plan has been written to address the many challenges ahead for funding the project's implementation.

At the outset of the project, leadership was established in a "Management Conference" by forming committees: the Policy, Management, Technical Advisory and Citizens Advisory Committees. Over the next few years, new roles were recognized and committees were reorganized. The Citizens' Advisory Committee divided into the Buzzards Bay Action Committee (town officials), and the Coalition for Buzzards Bay (a public advocacy group) both of which exist today. A Management Plan Advisory Committee was set up in 1990 and dissolved later that year.³ By 1991, the management plan had been approved by the local, regional, state and federal agencies involved.

A key feature of the program is the "Buzzards Bay Action Compact", a unique agreement among the 12 towns of the bay (10 are on the coast, two others are within a few miles of the bay) to work together on protecting Buzzards Bay. The Compact established a "voluntary, regional organization of local governments...who agree to share information and ideas that will expedite the region's ability to implement sound environmental regulations and by-laws to protect and enhance our mutual resource, Buzzards Bay." ⁴

The CCMP of the Buzzards Bay Project also calls for the involvement of all 17 towns which are wholly or partly within the bay's watershed. The plan is to be implemented throughout the watershed, because the watershed is the overall unit of resource management.

Program Goals and "Action Plans"

The goals of the National Estuary Program are "protection and improvement of water quality and enhancement of living resources. To achieve these goals, the NEP works to:

- establish working partnerships among federal, state, and local governments
- transfer scientific and management information, experience and expertise to program participants
- increase public awareness of pollution problems and ensure public participation in consensus building
- promote basinwide planning to control pollution and manage living resources
- oversee development and implementation of pollution abatement and control programs."⁵

Each NEP develops a program suited to its constituencies, resource concerns and jurisdictions. The Buzzards Bay Project is founded on local responsibility and implementation.

³ Buzzards Bay Project, p.5.

⁴ Buzzards Bay Project, p.184.

⁵ Buzzards Bay Project, p.6.

As mentioned above, the three goals being addressed by the project are "health risks from pathogens associated with the improper treatment or disposal of human wastes, and the subsequent closure of shellfish beds; excessive nutrient inputs to the bay, and their potential for causing water quality degradation and loss of habitat; and contamination of fish, shellfish, and lobsters by toxic substances such as trace metals, hydrocarbons, pesticides and PCBs. The loss of marine habitat and resources because of pollution and physical disturbances is also a major concern of the Project. These problems are the focus of the management recommendations in the CCMP.

"These recommendations cover a wide range of activities including changing individual behavior habits, strengthening regulations and bylaws, and planning for actions that minimize the impact of pollution sources such as stormwater runoff and wastewater."⁶
The CCMP contains 11 Action Plans:

- Managing Nitrogen Sensitive Embayments
- Protecting and Enhancing Shellfish Resources
- Controlling Stormwater Runoff
- Managing Sanitary Wastes from Boats
- Managing On-Site Systems
- Preventing Oil Pollution
- Protecting Wetlands and Coastal Habitat
- Planning for a Shifting Shoreline
- Managing Sewage Treatment Facilities
- Reducing Toxic Pollution, and
- Managing Dredging and Dredged Material Disposal

Each Action Plan is made up of seven sections: "Problem, Background, Major Issues, Goals, Objectives, CCMP Commitments, and Other Recommended CCMP Actions. The first three sections provide the reader with the necessary background for a full understanding of the subject matter. Goals are broad, long-term aims that indicate the desired condition for Buzzards Bay. Objectives are more specific, shorter-term targets for attaining goals. CCMP commitments are actions that have been agreed to by federal, state, and regional agencies as well as municipalities...Other Recommended CCMP Actions are suggested items that have not yet been agreed upon."⁷

The Action Plans on Nitrogen, Shellfish and Oil Pollution are discussed here briefly.
1. Managing Nitrogen Sensitive Embayments- Excess nitrogen entering coastal waters can cause excessive growth of macroalgae (seaweeds) and microalgae (phytoplankton) known as eutrophication. Nitrogen enters Buzzards Bay in many forms, notably human wastes and nutrient runoff. Whether this causes a problem depends on many factors, such as the amount of nitrogen input, depth of a bay and the flushing rate. Eutrophication problems include limiting light penetration of the water column thereby reducing eelgrass growth, and depletion of oxygen which can kill shellfish and finfish. In Buzzards Bay, "excess addition of nitrogen is one of the most serious long-term problems threatening many embayments..."⁸

The Buzzards Bay Project determined that development decisions in the watershed should be based on a nitrogen 'carrying capacity' specific to each bay and used for setting

⁶ Buzzards Bay Project, p.2.

⁷ Buzzards Bay Project, p.39.

⁸ Buzzards Bay Project, p.41.

lot size, loading rates per acre, or other management strategies."⁹ The technical basis of this strategy is the calculation of nitrogen loadings per unit area or loadings per unit volume during "water turnover time". The volume and flushing rate of the receiving waters and area of bottom within the euphotic zone also need to be calculated. The Buzzards Bay Project set recommended nitrogen loading rate limits for each water quality classification. Shallow embayments are of most concern, and they are defined as "those with 40% or more of their area less than 1 m[eter deep at mean low water] MLW or having a mean depth at half tide no greater than 2 m[eters]."¹⁰ Worksheets are provided in the CCMP to assist towns in calculating their nitrogen loading rates.

Among the actions taken already under this Action Plan, "Bourne, Plymouth and Wareham have adopted an 'intermunicipal overlay district' around Buttermilk Bay to manage nitrogen inputs in the surrounding drainage basin. These towns have amended their zoning by-laws so that future development will not exceed proposed nitrogen loading limits."¹¹ This has never been done before in the U.S., and in 1991, the Buzzards Bay Project received an award for the Buttermilk Bay initiative from former EPA Administrator William Reilly. (It is worth noting that such zoning changes may be challenged in court.)¹²

Another initiative regarding nitrogen controls was the construction and evaluation of several denitrifying domestic wastewater disposal systems in towns around the bay, supported by EPA's Near Coastal Waters Program.¹³

2. Protecting and Enhancing Shellfish Resources- The acreage of closed Buzzards Bay shellfish-harvesting areas have tripled over the past two decades. Commercial shellfisheries represent millions of dollars of income for fishermen of Buzzards Bay communities. Closures are not due entirely to the presence of pathogens. The state Division of Marine Fisheries sanitary survey program is inadequately supported. A full field review of closed sites can only be done every five years. If an area has been improved and is eligible for re-sampling, a longer time than necessary often elapses before state officials can sample the site. Another problem occurs when the fishing pressure of one area is shifted to open areas. Local shellfish management capacity is not adequate to keep up with fishing activity.

The goal of this Action Plan is to "increase availability of shellfish resources for recreational and commercial uses."¹⁴ Four towns now have "designated individuals with public health jurisdiction to assist the state Division of Marine Fisheries within their jurisdiction".¹⁵ A significant success was achieved recently, when the two towns of New Bedford and Dartmouth succeeded in reopening Clarks Cove, which had been closed to shellfishing since 1904. They worked together to solve a sewage problem and arrange for a conditional opening. The new harvest is estimated at \$1 million, with a multiplier effect

⁹ Buzzards Bay Project, p.44.

¹⁰ Buzzards Bay Project, p.45.

¹¹ Buzzards Bay Project, p.51.

¹² Jon Witten, "Quantification and Control of Nitrogen Inputs to Buttermilk Bay, Massachusetts", paper presented at Watershed '93, Alexandria, VA, March 24, 1993.

¹³ Buzzards Bay Project, p.51.

¹⁴ Buzzards Bay Project, p.61.

¹⁵ Buzzards Bay Project, p.62.

in the economy of six to ten times that amount as fishermen buy gear, processors get paid, and stores and restaurants reap their share. The effort to open the beds took only 18 months. Publicity on the success story is citing the Buzzards Bay Action Compact as the basis for town cooperation.¹⁶

3. Preventing Oil Pollution- Buzzards Bay is on the west end of the Cape Cod Canal, a major transit route for petroleum products shipped into New England. Oil spills have not only been feared, they have been frequent events in Buzzards Bay.¹⁷ In addition, oil enters the bay via municipal waste discharges, stormwater runoff and industrial sources.

The Buzzards Bay Project's goals are to "reduce the amount of petroleum hydrocarbons entering the bay, minimize the occurrence of oil spills in the bay and minimize the environmental effects from oil inputs to the bay."¹⁸ To do this, the objectives are "to promote a regional strategy for preventing and managing oil spills, to implement a source-reduction plan for chronic inputs of PAHs to Buzzards Bay, to provide adequate facilities for the collection of waste oil from cars and boats, and to take enforcement actions against the illegal discharge of oil."¹⁹

The Buzzards Bay Action Committee have earned another 'first' here, by establishing an oil spill mutual aid pact among the towns. Protocols for equipment purchases, priority sites for protection, and procedures for pooling resources have been agreed to. The towns act as the 'emergency medical technicians' to assist one another in containing a spill until federal response officials arrive on the scene. A radio frequency is designated for use during spill response procedures. For chronic inputs in town mooring areas, 'bilge pillows' are being made available to deploy around private boats to catch the inevitable residual oil from engines and bilges. Disposal cans are provided in harbors and marinas for the used pillows.²⁰

Many of the commitments and recommendations of the Buzzards Bay Action Plans call for stronger state regulations, local controls and enforcement programs. As with many NEPs around the country, agreements among the crucial players in pollution control may not have been reached on all items, but the goals have been agreed to publicly, and the Action Plans identify items for future attention.

Participation

A key characteristic of the National Estuary Program is the Management Conference (the committees) set up to carry out the planning process. The Citizens' Advisory Committee "helps to ensure that the management committee and estuary program staff include the public in the decision-making process, and integrate public opinion and expertise into each program phase."²¹ Guidelines have been provided by EPA to the estuary projects so they can build a broad and effective Advisory Committee of local

¹⁶ Dennis Luttrell, Executive Director, Buzzards Bay Action Committee, pers. comm., 4/26/93.

¹⁷ Buzzards Bay Project, p.88.

¹⁸ Buzzards Bay Project, p.90-91.

¹⁹ Buzzards Bay Project, p.91.

²⁰ Dennis Luttrell, pers. comm., 4/26/93.

²¹ U.S. EPA, "Estuary Program Primer, National Estuary Program", Office of Marine and Estuarine Protection, October, 1987, p.21.

interest groups and estuary users at the outset. Once CCMPs are written, the acknowledgements and participants listed at the front of the document go on for pages.

As with so many organizations set up to reckon with common resources, NEP committees often find that the only way to operate effectively is by consensus. The twelve towns on the Buzzards Bay Action Committee continue to work by consensus in implementation of their CCMP.²² As the Committee's Executive Director put it, "these towns have been in existence since the 1600's, they have a history of independence. But they will rally around Buzzards Bay, the resources near and dear to all of them. In the water, there are no boundaries for towns or for pollution. It is an easier road to hoe to work together. In fact, it costs less and is more effective."²³

In addition to the commitments of the towns, state and federal agencies have signed pledges of support for the CCMP. As the CCMP states,

"This is a particularly appropriate role for state government, which owns all the rights in tidal waterways beyond the low water mark and holds a public access easement for fishing, fowling, and navigation in the intertidal zone- all "in trust" for the benefit of the general public. The Commonwealth has a responsibility for effective stewardship of these and other public trust lands, and protecting the integrity of the Buzzards Bay ecosystem is clearly an important part of that responsibility."²⁴

Evaluation and Key Elements of Success

The Buzzards Bay Project CCMP consists of three documents, one of which is the Monitoring Plan. The CCMP states,

"Environmental Management...requires a coherent and effective monitoring strategy to determine if actions taken are effective and warrant further expenditures. In order to judge the success of this Project over time, data that show a reduction in pollution discharged into the Bay must be collected."²⁵

This contains the goals for monitoring environmental parameters, specific questions to be addressed, and methodologies to be used.

A key ingredient which has contributed to the success of the program overall is the empowerment of local government to do what they see as needed. Part of that is education of the 'town fathers'. All initiatives were related back to people involved in the economy, and water quality was engrained in every town official's mind, along with how they can administer their authorities to protect water quality... officials will not do things just because they see a good idea, they have to have a good reason to do things."²⁶

As to how the towns have worked together, the Compact was one of their first actions. The lifestyle and economy of the bay is a rallying point. Since then, there has been little criticism of individual towns' actions, just an emphasis on what can be achieved jointly.

²² Dennis Luttrell, pers. comm., 4/26/93.

²³ Dennis Luttrell, 4/26/93.

²⁴ Buzzards Bay Project, p.175.

²⁵ Buzzards Bay Project, p.1.

²⁶ Dennis Luttrell, pers. comm., 4/26/93.

Each town might have a solution to a given problem, they compare results, agree on an approach best suited to the problem. Once consensus is reached, the towns build on it, and with good press coverage, they are reinforced.²⁷

If there was a "failure" or flaw identified in the program, it might be that public participation in the decision-making process has been limited. Participation was invited in such a way that only a small minority of interested members of the public stayed truly engaged in the process. Some critics have noted that the primary form of participation has been the work of the Citizens' Advisory Committee (later reorganized as the Buzzards Bay Advisory Committee), not a wider public.²⁸

There are several big challenges ahead for the success of the program.

1. Local responsibility. The nature of the problems in Buzzards Bay, primarily nonpoint sources of pollution and cumulative impacts caused by growth and development, are not easily dealt with by state and federal governments. "The future of Buzzards Bay rests with the communities and their ability to control the quality of their environment."²⁹ One challenge will be gaining the cooperation of the five towns in the upper watershed which are not part of the Compact.

2. Funding of estuary program implementation. Buzzards Bay Project has taken some bold steps to secure federal implementation funding for their Action Plans. Other estuary projects are supporting them, and collectively, there is a lot of political clout in the Congressional districts of Buzzards Bay, Narragansett Bay, Casco Bay, Puget Sound, San Francisco Bay, and the others, a total of 21 estuary projects nationwide. Meanwhile, EPA is encouraging local financing of implementation. In 1988, EPA published a booklet, *Financing Marine and Estuarine Programs: A Guide to Resources*, on tools such as fees, taxes, debt, private capital, enterprise funds, and trusts.

Other challenges are to improve regulatory programs, continue to plan for the future, establish a regional perspective, take legislative action, and institutionalize the CCMP by incorporating the Action Plans into the Massachusetts Coastal Zone Management Plan.³⁰

²⁷ Dennis Luttrell, pers. comm., 4/26/93.

²⁸ Mark Imperial, Program Analyst, Rhode Island Coastal Resources Management Council, author of "Public Participation in the National Estuary Program: A Qualitative and Empirical Study", pers. comm., 4/29/93.

²⁹ Buzzards Bay Project, p.3.

³⁰ Buzzards Bay Project, p.186.

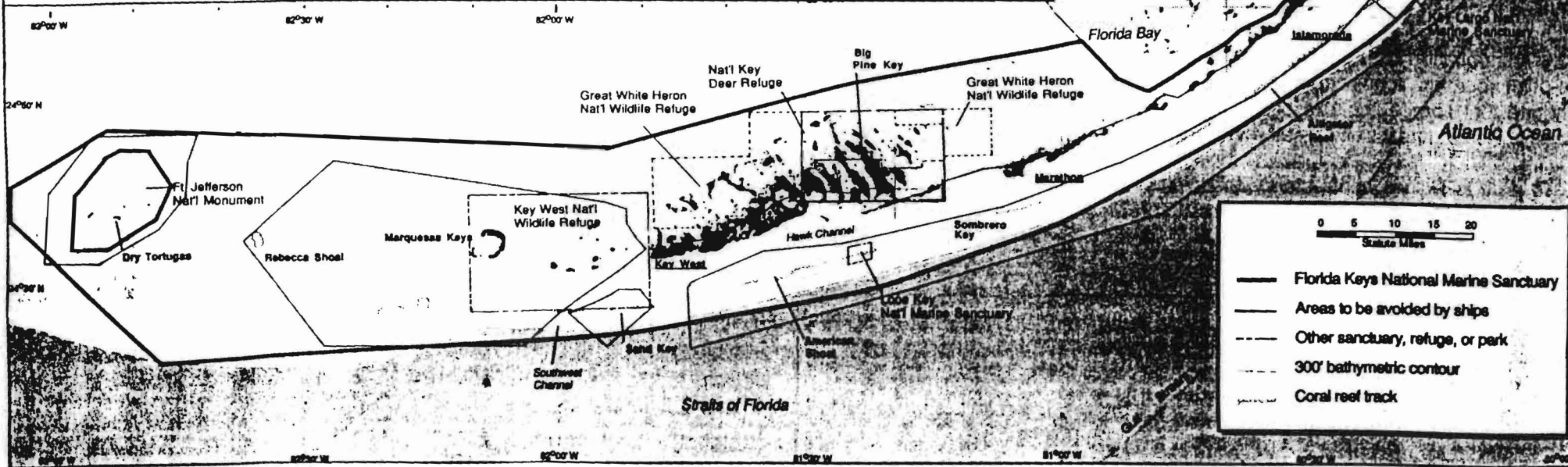
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4. Pratt, Edwin H.B., Jr., and Dennis Luttrell, "A Proposal for Funding the Implementation of the Buzzards Bay CCMP, Searching for a New Approach", a paper presented at Watershed '93, A National Conference on Watershed Management, March 21-24, 1993, Alexandria, VA.
5. Buzzards Bay Action Committee, 1992 Annual Report.

People contacted for information

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4. Dennis Luttrell, Executive Director, Buzzards Bay Action Committee (Marion, MA) Tel.(508) 748-3600.

The Florida Keys National Marine Sanctuary



Source: NOAA, "Inside the New Florida Keys National Marine Sanctuary", Autumn, 1991.

APPENDIX F.

PROGRAM: Florida Keys National Marine Sanctuary Program

LOCATION: The Florida Keys reef system from south Florida into the Gulf of Mexico

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Origins of the Program

The Florida Keys National Marine Sanctuary was designated in November 1990. The National Marine Sanctuary Program was enacted 20 years ago by Congress in the Marine Protection, Research and Sanctuaries Act of 1972 (Title III), and amended in 1980, 1984 and 1988.

In 1988, Congress asked NOAA to study how two small national marine sanctuaries in the keys could be expanded. The idea for a Florida Keys sanctuary was under development at NOAA in 1989, when several vessels grounded in the keys. In addition to damage from the groundings, the condition of the reef was recognized as deteriorating due to other causes. U.S. Representative Dante Fascell and U.S. Senator Bob Graham introduced legislation to protect the Keys region. Congress passed legislation and in November, 1990, President Bush signed the legislation that created the Florida Keys National Marine Sanctuary.

Due to the perceived urgency for protection, the Florida Keys NMS became the first congressionally designated national marine sanctuary. Previously, sanctuaries were not designated until after completion of the federally mandated environmental impact statement process.¹ The overall sanctuary designation process is highly structured. Congressional designation short circuits the process by making the sanctuary official before an environmental impact statement is completed, and a management plan is written.

Many other organizations have Florida Keys protection programs or have initiated programs to participate in the Florida Keys NMS development process. The Nature Conservancy opened its Florida Keys office in 1987.

Characteristics of the setting

Several marine resource management concerns were present at the time the sanctuary was established. Physical damage to the coral reef ecosystem was resulting from excessive use; boating, diving, destructive fishing practices, collection of tropical species, and shipping accidents. Coastal construction, and dredging and filling have compromised mangroves and seagrass beds. Chemical alteration of the reef has occurred with water pollution from Florida and pesticides transported from Caribbean. A series of biological alterations has occurred, each of which caused habitat loss. Algae blooms have occurred where nutrients from land-based sources are excessive.

The eutrophication of south Florida's waters is well known but there is debate amongst scientists over the causes, transport mechanisms and effects. In the past year, Florida Bay has been in a rapid decline due to massive diversions of fresh water over several decades. Salinity and water temperature have increased, and algae blooms have occurred over a 700

¹ Center For Marine Conservation, "Will the Florida Keys National Marine Sanctuary Protect our Keys for Generations to Come?", flyer, March, 1991.

square mile area. Sponges and seagrasses have been dying and a dead zone exists now. Blooms have occurred in the past, but the current one has lasted a year.²

In terms of social and economic conditions, literally millions of people visit the Keys and use the waters around them every year. One estimate of the economy of marine uses supported by the keys reefs was \$400 million per year.³ Intense tourism development and increasingly dense populations on the mainland have increased demands for water.

Organizational Structure of the Program

The organization leading the Florida Keys NMS Program is the National Marine Sanctuary Program in the U.S. Department of Commerce, National Oceanic and Atmospheric Administration's (NOAA) Office of Coastal Resources Management, Division of Sanctuaries and Reserves. As mentioned above, the NMSP initiates and carries out the designation of all sanctuaries.

During the past year, a revision of the "site evaluation list" has been underway. The NMSP has convened specialists to modify the procedures for identifying, evaluating, selecting and prioritizing sites on the site evaluation list. New sites can be nominated and will be ranked, to form a revised site evaluation list by 1994.

The Sanctuary Program managers see sanctuaries as partnerships between the state and federal agencies, with wide public involvement. For the Florida NMSP, an office near Miami is staffed with NMSP planners who are currently writing the management plan. They work closely with state and federal officials, and solicit public input. NOAA headquarters in Washington, D.C., as the lead federal agency in the environmental impact review process required by the National Environmental Policy Act, has the final say in what a sanctuary management plan requires and allows.

A very influential Sanctuary Advisory Committee also plays a key role. The 22 members were carefully selected to represent the many interests in the Florida Keys during development of the management plan. Elections are held every two years.

The Florida Chapter of The Nature Conservancy is very active in the sanctuary's development, as are many other organizations, each of which may be playing a lead role in some parts of the program.

The sanctuary program will be implemented on an ecosystem-wide scale, within the boundaries defined by the federal designation. It is important to note that 65% of the sanctuary area falls in state waters, and only 35% is in federal waters. Therefore, state / federal cooperation is essential. Unilateral federal actions would be inappropriate.

Support for development of all national marine sanctuaries comes initially from NOAA. Since its inception, appropriations for the sanctuary program overall have been meager at best. An independent study identified that "An annual funding level of \$4 million does not begin to meet the needs of the sanctuary program in place today, to say nothing of the

² Terry Sullivan, Public Affairs Director, The Nature Conservancy's Florida Keys Initiative, pers. comm, 4/93.

³ Figure from Florida Department of Natural Resources, cited by Donald Cameron Torrance, 1991, p.11.

program as it has been and is likely to be further extended by Congressional initiative...an adequate budget would be on the order of \$30 million."⁴

In addition to initial funding from NOAA, funding and in-kind work is supplied from other divisions of NOAA (such as NOAA's Office of Conservation and Resource Assessment), other federal agencies (such as EPA's Water Management Division), the State of Florida, private corporations and non-governmental organizations (NGOs). The Advisory Committee members work on a volunteer basis.

Program Goals and "Action Plans"

The goal of the Florida Keys NMS is to manage the resources of the Keys for their long-term protection, and for the enjoyment and productive use of their many users. The Legislative Act requires that a comprehensive management plan be developed for the sanctuary. A draft management plan is due out this summer, but is not yet available for review. The plan will include Action Plans for: Education; Research and Monitoring; Water Quality; and Submerged Cultural Resources and Law Enforcement.

"Accommodate but protect" is the philosophy, but as the former Sanctuary Program Chief Bill Harrigan admits, it is difficult to define and balance this philosophy. As the plan is developed,"the Sanctuary Planning Office is working aggressively to secure common sense protection solutions."⁵ The active participation of marine user groups on the Advisory Committee ensures that the plan will protect their economic interests to the degree they are compatible with the overall purposes of the sanctuary.

The Florida Keys NMS is also an attempt to make decisions with an ecosystem-wide perspective. In earlier decades, marine protected areas have been developed on small scales, but the approach is different now. Full systems must be recognized. In this program, it is from the Everglades out to Dry Tortugas and everything in between. There is a tremendous need for marine ecological data; observation of species interactions, community functions and ecological systems. Scientists are now striving for the ability to stay under water for 10 days to 2 weeks just to gather the data about relationships which is sorely needed for managing a system as a whole.⁶

Certain destructive or high risk activities are prohibited altogether, such as the use of explosives by treasure divers, the mining of "live rock" coral for aquariums, and oil and gas development. Commercial ship traffic is prohibited from certain areas. The plan will include conservation measures and restrictions on specific human activities in certain areas. This "zoning" of marine areas is intended to eliminate damaging practices, and protect and restore the most sensitive habitats of the reef.

Zoning of marine areas previously open to all users at all times has been a difficult concept on which to reach agreement. For the Florida Keys NMS, the first step was to consider the types of zones which might be useful, what they might accomplish and where they should be located. This was challenging enough, but the next step of drawing boundaries on a map was also contentious. Good data on the uses and their impacts is still needed. Following that, open debate and compromise are needed. Some groups want

⁴ Marine Sanctuaries Review Team, "National Marine Sanctuaries: Challenge and Opportunity, A Report to the National Oceanic And Atmospheric Administration", February 2, 1991, p.14,15.

⁵ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

⁶ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

substantial "no-take zones" or "replenishment zones" to provide sites in which a full compliment of species can be established, believing this is a critical time to make a commitment to the marine environment. Others see the replenishment zone strategy as unproven and perhaps unfair in the absence of proof.⁷

Replenishment zones have been proposed in the western part of the sanctuary. They are designed to provide for larval dispersal and recruitment, with the predominant current in the Gulf Stream flowing from west to east over the reef. It is hoped that even if they are too small to serve as fish stock areas (as scientists have warned), they will provide areas for high biological diversity, where natural interactions occur without disturbance or removal. Also, the replenishment zones are far away from population centers, to reduce the likelihood of traffic and the need for enforcement presence.⁸

One replenishment zone proposed in the draft plan is a four mile wide zone from shore out to a lighthouse, which is designed to include a transect of marine habitats. The restrictions represent a compromise devised by the Advisory Committee. No diving is allowed within the zone, but poling for bone fish is allowed on a catch and release basis out to 12' of water. From 12' to 60', the zone is closed to all fishing except traps. This is an example of 'gear separation', whereby use of certain gear is acceptable in certain zones, but not in overlapping zones.

The Nature Conservancy has undertaken its own program for the Florida Keys, as well as being on the Sanctuary Advisory Committee. The Nature Conservancy's mission in marine systems, as in terrestrial systems, is to maintain its science-based decision-making. TNC identifies and carries out research for specific management questions, provides technical assistance to other agencies, provides training in resource management and conservation of biological diversity, and applies scientific information in support of public policy, and to influence policy.⁹

Where traditional land protection is not possible, as in marine waters, TNC's goal is to influence marine users and managers to implement stewardship practices. In Florida, all land uses affect the sea. One specific goal, stated by a Conservancy scientist is that "in any marine protected area, 30-40% of the area should be set aside for conservation replenishment. So we try to establish this and document the effects of these areas."¹⁰ TNC is working to establish management practices which ensure that the reef can support an economy of compatible uses.¹¹ TNC's specific actions or projects have included:

- The purchase of a laboratory on Long Key in early 1991, "now the Keys marine laboratory provides the first comprehensive facilities and equipment available to scientists working in the Keys."¹²

⁷ Florida Keys NMSP, "Zoning Meetings Inspire Deep Debate", *Sounding Line*, Monthly newsletter of the Florida Keys NMSP, Vol 1&2, December 1992-January 1991, p.4.

⁸ Rob Finegold, Florida Keys NSMP, pers. comm., 4/93.

⁹ Kathleen Sullivan, Marine Ecologist; Professor, Department of Biology, University of Miami; contractor, Florida Chapter of The Nature Conservancy, pers. comm., 4/93.

¹⁰ Kathleen Sullivan, pers. comm., 4/93.

¹¹ Mark Robertson, The Nature Conservancy Florida Keys Initiative, quoted by Donald Cameron Torrance, "Deep Ecology: Rescuing Florida's Reefs" (Cover story), *Nature Conservancy Magazine*, July/ August, 1991.

¹² Torrance, Donald Cameron, 1991, p.15.

- A data base of marine species is being compiled for the Heritage Program, covering where species occur, their conditions and potential stresses.¹³
- A survey of people with long term experience (20 years or more) in the Keys, to get their anecdotal information on past use patterns and the history of development in the keys. This is needed to improve the quality of information and reduce hearsay.¹⁴
- A survey of boats and their activities, including a five hour overflight each week to identify boat types and their locations throughout the keys. This data is entered into a geographic information system, with a grid of one kilometer units. Maps will result, showing where different types of boaters were during all use periods-summer, winter, holidays, work days, weekends, to serve as a baseline for management. The state has already used this grid to design a new oil response plan for reporting of incidents. The grid may also help in deciding how to spend compensation funds from ship groundings on mitigation.¹⁵
- A master map of marine habitats off of south Florida (Biscayne Bay and Florida Bay).
- Protection of almost 2400 acres of land in the Keys since 1987.¹⁶
- Work on water quality problems in the mainland watershed, and county-wide comprehensive planning and growth management for the Keys.

TNC is looking closely at the zoning schemes discussed above and using biological parameters to measure diversity. They are assessing how 20-25 biotic factors are significant at the ecological community level and the species level.¹⁷ One project is seeking to determine the population status of various species of coral, and rank corals of the western coastal Atlantic to nominate some species to the endangered species list. Presence/ absence data is useful for this purpose.

Another project is attempting to: (a) measure stresses such as sedimentation, diseases, coral bleaching, algal blooms, fish kills, and (b) determine whether reduction of that threat can be documented. Some threats can't be reduced (hurricanes), other threats can be reduced (non-point source pollution), but the reduction is hard to measure as a result of any given program. To ensure continued biological diversity in a sanctuary, a long-term maintenance and conservation program needs to be in place. Biological diversity may be enhanced by restoration, such as the replanting of mangroves on damaged shorelines.¹⁸

To monitor and enforce marine resource management strategies, a combination of state and federal enforcement officials are deputized to enforce a very large number of existing regulations. Marine use regulations are in place in the two previously existing national marine sanctuaries (Looe Key NMS and Key Largo NMS), Everglades National Park, Biscayne National Park, Great White Heron National Wildlife Refuge, Key West National Wildlife Refuge, and John Pennekamp Coral Reef State Park. The resource management agencies are attempting, through the sanctuary planning process, to simplify their regulations and make them as consistent as possible.

¹³ Torrance, Donald Cameron, 1991, p.15.

¹⁴ Kathleen Sullivan, pers. comm., 4/93.

¹⁵ Kathleen Sullivan, pers. comm., 4/93.

¹⁶ Torrance, Donald Cameron, 1991, p.15.

¹⁷ Kathleen Sullivan, pers. comm., 4/93.

¹⁸ Kathleen Sullivan, pers. comm., 4/93.

Once the Florida Keys NMS plan and zones are in place, additional enforcement presence will be needed. This will probably be done by state people, with state and federal funding. But given the difficulty of covering the expansive area of the sanctuary, a major thrust will be to educate users about the need for conservation and best management practices for achieving it.¹⁹ Both education and enforcement will be easier tasks if the agencies succeed in making their regulations more consistent.

Participation

The NMSP legislation requires the formation of an Advisory Committee to guide the development of each sanctuary. The Advisory Committee for this sanctuary has been a very active one, and effective leaders on issues of local concern, of which there are hundreds. When a measure is proposed for the management plan, the Committee members discuss it, then take it back to their constituents for further review. Hundreds of people are developing and promoting best management practices for land and water based uses. While consensus is not required in development of the management plan, it is the only process which will ensure long-term support of sanctuary policies, so it has been used in Advisory Committee operations.

Conflicts, such as between users, between public and private rights, and between conservation and development, are resolved by everyone being at the table of the Advisory Committee meetings to work through the issues and make compromises. But "there are not that many use conflicts, given that the Florida Keys is one of the most heavily regulated areas on the planet already. If there is a conflict, it is that there are too many regulations and agencies involved."²⁰

The sanctuary planning process is an effort of multiple jurisdictions to participate and cooperate on a regional basis. "The Florida Keys is at the convergence of three bodies; the Atlantic Ocean, the state of Florida and the Gulf of Mexico. The NMSP is attempting to merge the many overlapping and contradictory environmental and marine regulations in force there. Fisheries are managed by the South Atlantic Fisheries Management Council, the Florida State Marine Fisheries Commission, and the Gulf of Mexico Fisheries Management Council, plus the National Marine Fisheries Service Regulations overlap these. As one sanctuary planner said, "you name it, there's a fishery regulation about it." In addition there are two national parks, six state parks and aquatic preserves, and two national marine sanctuaries in place already. People have asked for one cohesive set of regulations for the latest layer of management; they want the the Florida Keys NMS to address the conflicting regulations problem."²¹

Fishing organizations have been reluctant to support this and other sanctuaries, fearing that their right to fish in the area will be suddenly withdrawn, or familiar fisheries management practices will change. An early issue in this sanctuary's development as well as others is the resistance fishermen have to another agency gaining management authority over fisheries. Fishermen are familiar with the Magnuson Fisheries Conservation and Management Act, and the regulatory authority it affords to the National Marine Fisheries Service and regional fisheries management councils. Florida fishermen have been "virulently opposed" to the NMSP getting involved in replenishment areas, because they see that as the fisheries management business and they don't think the NMSP belongs there. This issue has been resolved with two draft policies: 1. Any action which could be

¹⁹ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

²⁰ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

²¹ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

construed as a fisheries management measure will go before the appropriate fisheries management council(s) for their action. 2. The NMSP reserves the right to restrict gear types in certain areas of marine resource value.²² Often fishermen have offered creative solutions, based on their extensive experience with the resources.

Separate from the participation by the Advisory Committee, the participation by the public has been substantial. According to one planner, the Florida Keys NMS Planning Office has invited and received five times as much public comment as is required by law (i.e. the National Environmental Policy Act).²³

Many entities have advanced the program through their own actions and through partnerships. Investigators from many universities have performed marine research. Industry representatives such as fishing, shipping, or recreational interests have participated.

Governmental agencies have contributed a great deal to the sanctuary program. Cooperative management in the Looe Key NMS and Key Largo NMS is good, such as between the NMSP and the National Park Service. In Florida, a state sanctuary office focuses state resources on the sanctuary. NOAA and TNC are collaborating on the survey of long-time Keys users. The Florida Department of Natural Resources and TNC are collaborating on the survey of boaters described above. Florida's Sea Grant program was very helpful on initial research questions.

Non-governmental conservation organizations have also had an important role. The Advisory Committee is an NGO, required by legislation. The members strive to maintain productive use of the Keys, and incorporate suggestions of their constituents into the management plan.

TNC has played several roles, as described above. TNC has generated baseline data and other scientific information for more effective response to management questions. TNC has brought in outside scientists as needed to advise on specific questions. TNC staff and contractors have positioned themselves to be selected for advisory boards. In addition to its scientific role, TNC has worked aggressively, even in political arenas, to influence land and marine uses which threaten the biological integrity of the reef ecosystem.

The Center for Marine Conservation (CMC) has organized thousands of constituents in support of conservation measures in the sanctuary. The Coral Reef Coalition is an association of environmentally-oriented user groups which advocate conservation measures. Unfortunately, fishermen are not engaged in the coalition, but have their own interest group which is often diametrically opposed to the Coral Reef Coalition. The Organization of Florida Fishermen (OFF) has represented commercial fishing interests, generally to prevent over-regulation of their fisheries.

Many social and / or economic development organizations will comment on the draft management plan once it is released in mid-summer. They have not participated in crafting specific strategies for resource management in the draft plan.

²² Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

²³ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

Evaluation and Key Elements of Success

To determine what measures of evaluation should be used, and to develop a 'Research Action Plan', three research workshops have been held with Florida's Rosensteil School of Marine Science. Over 150 scientists have contributed to this. The success of the sanctuary management program will be evaluated every five years. Individual components of the program may have different time horizons. For example, scientists will have to assess whether the protective zones have worked after a certain period of time - perhaps five to ten years - and if not, what alternative actions are needed.

A complicated question is the fact that water quality is now seen as the single dominant factor in the decline of fisheries. Florida Bay is an historically rich estuary which has been despoiled by water management policies since the 1920's. There is a mandate from Congress to turn this around, but it will be very hard to determine which program resulted in improved water quality.²⁴

Several key ingredients have contributed to the success of the program overall.

- **Public Involvement**. The approach has been to address problems on a comprehensive marine ecosystem basis, coordinating all government agencies, and engaging broad public debate. Difficulties are best resolved by key interested parties being at the table. The zoning measures developed in the Florida Keys NMS planning process are distinct from all other attempts at zoning in the U.S. "Maybe other less populous areas can 'just do it', but no other sanctuary has gone through the gut wrenching public consensus regarding zones."²⁵

- **Consistent Program Leadership**. The first planner hired for the Florida Keys NMSP believes one key to success is that the central people involved must be consistent and reasonable in their approach. They must be engaged in "the fabric of the community", so the public sees them in action and can learn to trust them. Part of the leadership role is showing the ability to balance all interests.²⁶ The Florida Keys Advisory Committee is very powerful in its participation. "The members provide guidance, and a sounding board for ideas and grievances. They are not resource management professionals, and sometimes they want things which can't be done, but that is all part of the balancing process."²⁷

Some weaknesses or flaws have been found in the program, from which other program leaders can learn.

- **Insufficient Outreach**. The NMSP has not been able to adequately reach the entire public with information about the purposes of the sanctuary. The absence of valid information has allowed for many preventable misunderstandings due to rumors, etc. The NMSP is rooted in early experience with smaller sanctuaries, and the Florida Keys program discovered a much larger scale of educational needs.²⁸

- **Disorder from Congressional designation**. This is not the "normal" process intended in the original sanctuary legislation. When Congress stepped in to designate the sanctuary, public expectations and fears were created before the sanctuary program staff could provide

²⁴ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

²⁵ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

²⁶ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

²⁷ Rob Finegold, Florida Keys NMSP, pers. comm., 4/93.

²⁸ Bill Harrigan, pers. comm., 9/92.

concrete information. The normal process entails a much more rational development of the sanctuary management plan, with designation as a final outcome of public involvement.

Several big challenges lie ahead for the success of the program.

- Congressional Intent. One challenge is to maintain the original Congressional intent of the sanctuary program, which was for "preserving or restoring such areas for their conservation, recreational, ecological or esthetic values"²⁹ Some critics of the current sanctuary planning process fear that all sanctuaries will be compromised for all uses. In addition to the public process of compromise, all sanctuary proposals from NOAA go to the Office of Management and Budget and get distributed to the other resource agencies for comment and revision. As internal federal agency controversies play out, the NMSP draft management plans often lose punch and language, as each agency deflates elements which might interfere with their agendas, such as outer continental shelf oil and gas development.³⁰
- Progress despite scientific uncertainty. There tend to be differences of opinion about the causes and effects of environmental disturbance. If action is withheld until full consensus is reached among scientists, the opportunity to reverse trends of degradation may be lost.³¹ Management zones can be difficult to define legally and geographically. A scientific approach is needed, with fair review and reconsideration if necessary.
- Long term commitment. As in bioserves, marine sanctuaries need a long-term maintenance and conservation program to ensure continued protection of the resources. According to the sanctuary program's former chief, "a sanctuary should be: a visible organization, with good staff (a manager, educators, a research director, and on-the-water staff); long-term water quality monitoring; operational connections such as with private clubs, to get shoreside facilities; and a good funding foundation." Each sanctuary should be integrated into other institutions in the area, such as aquariums, schools, and universities to have a continual presence for people in the region.³²
- Outreach. One of the biggest challenges of all sanctuary strategies will be continually reaching an enormous public with adequate notification, education and then enforcement, when necessary.
- Evaluation. Monitoring of results will be important to determine whether the management schemes are effective for the resource, and equitable for all users. If they are not working, they will need to be revised.

²⁹ 16 U.S.C., Sec.1432(a)(1972).

³⁰ Bill Harrigan, Former Chief, NMS pers. comm., 9/92.

³¹ Bill Causey, quoted by Torrance, Donald Cameron, 1991, p.15.

³² Bill Harrigan, Former Chief, NMS pers. comm., 9/92.

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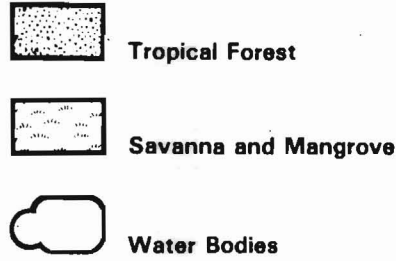
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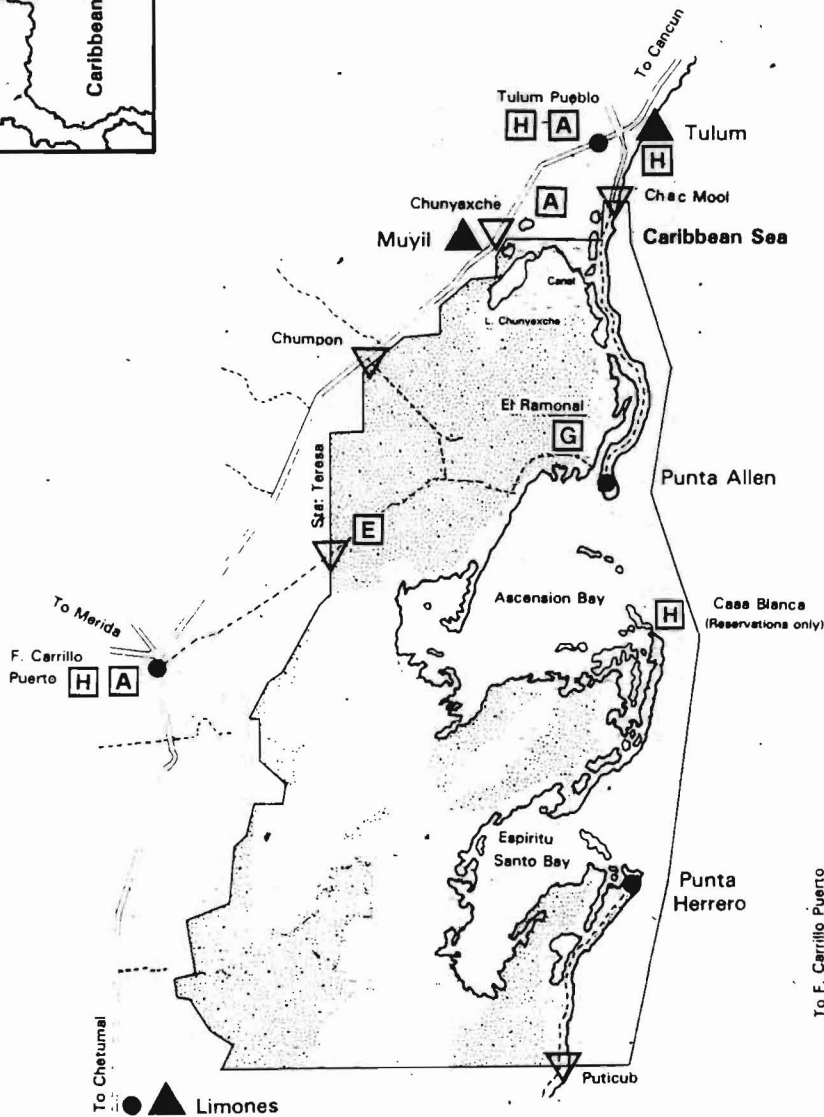
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2. Elizabeth Moore, Site Evaluation List Manager, National Marine Sanctuary Program (Washington, DC) Tel. (202) 606-4126.
3. Rob Finegold, Program Specialist, Florida Keys National Marine Sanctuary Program Planning Office, NOAA (Miami, FL) Tel. (305) 743-2437.
4. Terry Sullivan, Public Affairs Director, The Nature Conservancy Florida Keys Initiative (Key West, FL) Tel. (305) 296-3880.
5. Kathleen Sullivan, Marine Ecologist; Professor, Department of Biology, University of Miami; contractor, Florida Chapter of The Nature Conservancy (Miami, FL) Tel. (305) 284-3013.
6. Maureen Eldridge, Habitat Conservation Specialist (working on the Florida Keys NMSP), Center for Marine Conservation (Washington, DC) Tel. (202) 429-5609.

Sian Ka'an International Biosphere Reserve

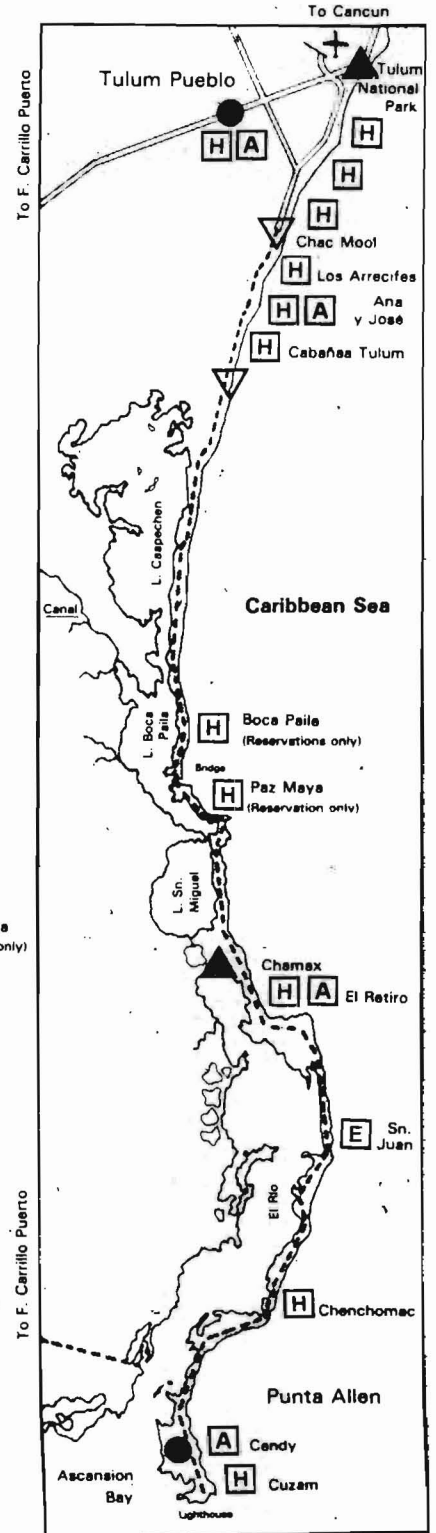
Quintana Roo, Mexico



- Entrance Station
- Research Center
- Demonstrative Farm
- Archeological Site
- Lodging
- Food
- Town
- Paved Road
- Unpaved Road



Sian Ka'an Biosphere Reserve



Northern Coastal Zone of the Reserve
Scale 1: 250 000

APPENDIX G.

PROGRAM: Sian Ka'an International Biosphere Reserve

LOCATION: On the eastern side of the Yucatan Peninsula, Mexico, in the Mexican state of Quintana Roo, on the Caribbean Sea, south of Cancun.

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Origins of the Program

In 1983, a research institute in Quintana Roo, the Mexican state where Sian Ka'an is located, published a series of baseline studies on Sian Ka'an. The Governor of Quintana Roo then nominated the site to the Mexican Federal Government for designation as a Biosphere Reserve. Not only was Sian Ka'an designated a Mexican Biosphere Reserve in 1986, it was also designated an International Biosphere Reserve by UNESCO.

The Governor also had the vision to establish a non-governmental organization, 'Amigos de Sian Ka'an' (Friends of Sian Ka'an) to "support the Reserve, channel external funds to it, facilitate problem solving, coordinate community work, foster public support for it, and ensure continuity in the Reserve's program implementation".¹ Early work at the reserve focused on studying the spiny lobster population in the vicinity of Sian Ka'an, and the potential for ensuring a long-term supply for the fishermen.

Characteristics of the Setting

The outstanding natural treasures of Sian Ka'an include: part of the second longest barrier reef in the world (Australia's Great Barrier Reef is the longest); coastal lagoons; mangrove islands; coastal dunes; nesting by green, loggerhead, hawksbill and leatherback turtles; and 75 species of waterbirds including the frigatebird. One third of the Sian Ka'an 1.3 million acre Biosphere Reserve is comprised of coral reefs and coastal lagoons. The name, "Sian Ka'an" is Mayan for "where the sky is born".

An early concern at the time of designation was the possibility that the population of spiny lobster (*Panulirus argus*) could be overfished locally. This could jeopardize the livelihood of the two Mayan lobstering communities located within the Reserve boundaries, cause an ecological imbalance and cause a shift of harvest pressure to other marine or terrestrial resources.

A second concern is coastal development and tourism. One source reports, "The principal potential economic value and also the greatest threat to the integrity of the reserve is high density development for tourism along the coast from Tulum to Punta Allen" (the northern coast of the reserve). There is "acute national and local interest in the development potential of the entire coastal zone" surrounding Sian Ka'an.² Tourism pressures have been mounting, spurred by the beaches and reefs, and the 140 hotels located nearby. Despite the fact that "more than 99% of the 1.3 million acres of the Reserve is federally owned", there are privately owned parcels on the Reserve's coast which "appear very attractive as sites for hotel development".³ High density tourism can bring with it water

¹ McCaffrey, Dennis and Helena Landazuri, "Wildlands and Human Needs: A Program Evaluation", World Wildlife Fund/ USAID, September 30, 1987, p.81.

² The Nature Conservancy, "Sian Ka'an Biosphere Reserve Conservation Action Plan: USAID/ TNC Parks in Peril and Global Climate Change Program 1992-1994.", p. 4,6.

³ The Nature Conservancy, p.4.

table changes, coastal water pollution, loss of habitat and reef alterations, in addition to social or cultural changes.

Fewer than 1,000 people live within the Reserve boundaries of Sian Ka'an in largely rural, coastal, and fishing-oriented Mayan settlements. There is no intensive agriculture or industry, but there is the potential that some uses may increase and alter natural resource values. Approximately half of the residents are lobster fishermen, most of whom live in the peninsula village of Punta Allen. Lobsters are the most important resource in the region, recognized by authorities as important to foreign trade. These fishermen catch, process and sell lobster for export and have relatively good incomes from their work, allowing them to live above poverty level. The Reserve residents are nonetheless interested in bettering their economic opportunities.

Other uses within the Reserve include "small scale tourism consisting of family-run cottages and several fishing lodges, and small Mayan farms and orchards. There are also some single-family logging operations and an undetermined amount of uncontrolled logging".⁴ Outside the Reserve to the north are coastal tourist developments including Cancun and Cozumel. There are other population centers to the west and south.

Organizational Structure of the Program

For Sian Ka'an, there are several programs underway which pertain to coastal and marine resource management. Four will be discussed in this report:

- The UNESCO Biosphere Reserve Program,
- Mexico's Biosphere Reserve Program,
- Amigos de Sian Ka'an's work as the private partner of the Mexican Government, and
- The Nature Conservancy's work in Sian Ka'an, as a "Parks in Peril" project.

The UNESCO Biosphere Reserve concept is a primary focus of this report. According to Agardy and Robertson-Vornhes, "as of mid-1990, the designation of "biosphere reserve" within the framework of the [Man and the Biosphere] MAB Programme has been given to 283 sites located in 72 countries around the world. Only a very few of these sites concern coastal areas which nevertheless are becoming increasingly the parts of the world where mankind is interacting with the biosphere."⁵

Marine systems present special management challenges such as: how can sensible jurisdiction or boundaries be established in a fluid medium? What strategies are needed to conserve different forms of marine life, from sedentary benthic communities to species which are entirely planktonic? Fundamental scientific questions are unanswered. As two marine scientists state it, "...we can have little confidence in our ability to define independently viable subsets of large marine systems."⁶ Recommendations on how to plan and implement Biosphere Reserves are being developed now.

Two organizations lead the Sian Ka'an Biosphere Reserve: the Mexican Government and the state of Quintana Roo jointly manage the Reserve, with municipal governments participating; and Amigos de Sian Ka'an is the non-governmental organization (NGO) which coordinates private sector participation, as mentioned above. The Mexican government (the Secretary of Social Development within the Secretariat of Urban

⁴ The Nature Conservancy, p.3.

⁵ Agardy, M.T., and Jane Robertson Vernhes, "Establishing Biosphere Reserves in Coastal Areas", Draft Manuscript for Man and the Biosphere Digest, 1991, p.2.

⁶ Kenchington and Agardy, p.41.

Development and Ecology) is key because of the national and political importance it brings to the Reserve. Amigos is key because of the constituency and continuity it provides.

Funding is from many sources, most of which are located outside the Reserve. Upon designation, the Mexican Federal Government funded the Reserve at a minimal level: \$20,000 for one staff person, an office, and a jeep. Staff and support has been added since. It is not clear whether any UNESCO funds have flowed to Sian Ka'an since designation.

Amigos de Sian Ka'an has been central in procuring continued funding from many private foundations, businesses and individuals. The Nature Conservancy's Mexico Program has supported staff salaries in Mexico since at least 1987, and the Maine Chapter recently provided another installment of contributions. World Wildlife Fund has supported several individual projects. Earthwatch has provided workers to a scientific institution ("CIQRO") for lobster research. USAID Mexico and USAID Parks in Peril have supported various activities.

Program Goals and "Action Plans"

The goal of biosphere reserve planning is to protect a large area to ensure the biological diversity and ecosystem functions of, in this case, the forests, watersheds, savannahs, mangroves, wetlands, lagoons, and coral reefs of Sian Ka'an. The philosophy is to consider the whole system ("holisticly") including the natural, social, political, governmental and economic systems.

Within the Sian Ka'an Biosphere Reserve boundary there are 183, 200 hectares of "shallow marine habitats including estuaries and the area of coral reefs extending for 180 km along the coast within the reserve."⁷ At Sian Ka'an, all user groups with a claim have 'standing'. Working with local economic interests is very important to establishing a long-term conservation program in Sian Ka'an. There are at least five elements of the program pertaining to marine resources: education, marine management, fisheries, water quality, and coastal zone management. Brief summaries follow.

- Environmental awareness goals: Educate all residents, users and managers about the unique environmental values of the Reserve. Activities: Environmental education has become an increasingly important function in management of the Reserve.⁸ Tours to the Reserve sponsored by Amigos at first included members, donors, journalists and researchers with the message of Sian Ka'an's unique resources. Since 1990, the tours have been expanded to include local residents and other tourists, to inform even more people about the natural values and the conservation projects. An underwater interpretive trail is planned for the reef. An environmental education program for 10,000 elementary school children and their teachers has been set up for two courses: wetlands; and marine and coastal ecosystems.
- Marine management goals: Understand the diverse marine resources and what is necessary for sustained productivity. Determine the level of marine uses which can be allowed and where they are appropriate. Activities: Amigos has been conducting a reef inventory and reef management study, the results of which will go to the Reserve authorities for regulating uses of the reef. Indicators of the ecological "health" of the reef are being studied in order to track any changes which occur over time. Also, Amigos

⁷ The Nature Conservancy, p.3.

⁸ Amigos de Sian Ka'an, Bulletin, Vol. 9, December 1991.

sought funding to study a stretch of the reef north of Sian Ka'an, the Cozumel Marine Natural Reserve.⁹

• Fishery goals: Ensure a long-term lobster fishery for local residents of the Reserve, by establishing a harvest level which can be sustained. Also, "Increase and diversify the local production, in benefit of the local inhabitants".¹⁰ Understand the role of sport fishing in the Reserve. Maintain good working cooperation with the fishing lodge owners and lobster coop members. Activities: An early study by Amigos and oceanographers determined that lobster productivity and the fishing effort was at approximately sustainable levels. So an increase in take could have jeopardized the long-term supply. The coop set up a system to limit each lobsterman's take. The shallow lagoon in which lobstermen operate their traps was divided into lots for members. Membership is tightly controlled. A limit of traps per lot is set. A percentage of profits is gleaned for coop plant investments.

Amigos is supporting a study on recruitment of lobster larvae to the area, and natural fluctuations in population. Hurricanes and other natural cycles can effect catches, so the lobstermen want to know as much as they can before taking out loans or investing in their plant. One year they invested \$2 million into a freezer facility, following which the catch declined. This made loan repayments difficult.¹¹ For sustainable harvest potential, Amigos is supporting projects on sharks, stone crab, blue crab, several fish species, and black coral. For sport fishing, Amigos began a study in 1991, in view of sport fishing's important economic value to the region over the past 25 years.¹²

• Water quality goal: Ensure a high level of water quality for the natural systems and the uses of Sian Ka'an's coast. Activities: The watershed study will look at land uses and related sources of water pollution. The data will be provided to officials for land use management and protection of a core zone.

• Coastal zone management (CZM) goal: Establish a "carrying capacity" for human population and activity on Sian Ka'an coastal lands. Activities: A survey of coastal values and threats is being conducted. Results will be provided to officials for controlling coastal development impacts. Mangrove restoration is being attempted.

Enforcement of laws in the reserve is done in various ways, with an emphasis on education, as government controls have not been successful in the past. Enforcement of the lobster fishery is done with the peer pressure of coop members in the two villages. Members who violate coop rules are ousted from the coop. If a fisherman is not a member of the coop and he attempts to harvest lobsters from the coop area, coop members will identify him, take enforcement action and ensure that he leaves the area.¹³

To conserve biological diversity, approximately 80% of the Reserve area is "core" area, intended for significant protection from human activity. The remaining 20% is "buffer" area, in which sustainable uses are allowed. Outside the Reserve boundaries is a

⁹ Amigos de Sian Ka'an, Vol.10, June 1992, p.16.

¹⁰ Amigos de Sian Ka'an, Vol. 9, p.25.

¹¹ Joe Quiros, TNC Project Manager for Sian Ka'an, and Co-Director, TNC Mexico Program (Phoenix, AZ), pers. comm., 4/93.

¹² Amigos de Sian Ka'an, Bulletin, Vol. 9, December 1991.

¹³ McCaffrey, Dennis and Helena Landazuri, p.75.

"cooperation" or "transition" area, where Reserve practices are applied as much as possible, to further protect the Reserve. The guiding principle is to allow natural systems to function. If a species or community is at risk, threatened by human activity, the objective is to omit the risk by identifying alternative practices to meet human needs. To make decisions with an ecosystem-wide perspective, there is a strong emphasis on management-oriented scientific research. Baseline monitoring and other research results are used to establish harvest limits and sewage discharge loads.

As of this writing, several of this author's questions about the Reserve boundary are unanswered, such as: why was the seaward boundary established where it is? How much of the coral reef is encompassed, does the boundary extend to a certain depth contour beyond the fore reef? Does the core area include marine and brackish water areas? What specific laws are in place regarding specific marine activities? Sometime more than a year ago, local interests requested an extension of the boundary out around the reefs.¹⁴ What is the status of this request?

Participation

The common premise of the initiatives at Sian Ka'an is that effective conservation depends on strong local leadership. Toward this aim, Amigos de Sian Ka'an - as an autonomous organization - has increased its outreach in recent years.¹⁵

Resolution of conflicting uses appears to be addressed primarily through education. Where a destructive use or practice is identified, Amigos attempts to work with the resource users to identify non-destructive alternatives.

A strength of the participation program is the number of outside parties supporting Sian Ka'an. A weakness is the degree of local involvement to date. The idealistic target is to engage all those people involved in the watershed or coast. Not all are capable of contributing, however, and may not want to.¹⁶ At first, Amigos was not well regarded by other potential cooperating or participating entities, such as universities and fishermen. This probably inhibited progress on conservation goals of the Reserve. Early observations identified communication gaps between Amigos and local residents.¹⁷ In contrast, the 1992 Amigos' Bulletins appear to be very open and communicative. Much of the current participation is ascribed to Amigos' outreach, with hope for an increasing amount of local leadership in the future.¹⁸

Many entities have served various roles in the marine program and have advanced the program through partnerships and initiatives. Scientific institutions have led important inquiries to establish harvest levels and management strategies. For the watershed study mentioned above, a scientific institution and an NGO are cooperating with Amigos de Sian Ka'an to obtain adequate biological and hydrological data on land uses. Amigos will focus on social and economic aspects of watershed management. Best management practices are likely to result.

¹⁴ Tundi Agardy, Conservation Scientist, World Wildlife Fund (Washington, DC), pers. comm., 4/92.

¹⁵ Joe Quiros, TNC, pers. comm., 4/93.

¹⁶ Joe Quiros, TNC, pers. comm., 4/93.

¹⁷ Dennis McCaffrey, Senior Project Manager, TNC Latin America Division (Arlington, VA), pers. comm, 3/93.

¹⁸ Joe Quiros, TNC, pers. comm., 4/93.

The lobster cooperative has been working with Amigos and the Reserve strategies for some years. The lobstermen evidently accept the ways the Reserve may help to ensure a long-term fishery for them, particularly in regard to the productivity of the spiny lobster. If the constraints of the Reserve become too painful for them, however, they may not support marine resource management or the Reserve.¹⁹

As for tourism interests, the current President of Amigos de Sian Ka'an is a hotel owner. At least six hotels have supported Amigos in the past, as have other recreational users. Sports fishermen, such as the owner of the Orvis Company, and the lodge owners have supported Amigos, because of the outstanding sports fishing available in the vicinity of Sian Ka'an.

Non-governmental conservation organizations have served important roles in encouraging local efforts for "sustainable and compatible" development. Amigos is key to this compatible development concept. Their projects include "Ecotours" to the Reserve, and inquiries into sustainable harvest of many renewable resources in addition to lobsters, such as black coral, crocodiles, vines and butterflies.

The Nature Conservancy is working with Amigos to implement the Parks in Peril Project, which includes goals of compatible human use, improved farming practices, and applied research on wetlands, mangroves, the reefs, and wading birds. According to Joe Quiros of the Arizona Chapter, TNC supports Amigos in a "laissez-faire approach, with a lot of listening. On a given initiative, Amigos tells TNC what they see as the best course of action. If this seems reasonable, TNC risks it. For example, to determine a management strategy, a study might involve identifying sustainable levels of activity, and trying it out. It is an iterative process and eventually we know what works." This relationship is clearly built on trust, but it is also backed with a formal agreement between the president of Amigos' Board of Directors and TNC's Latin America Division.²⁰

World Wildlife Fund is funding specific elements of the long term plan, notably: 1. biological studies of the spiny lobster on which further management measures may be based, such as fishing areas, seasonal closures, size limits and catch limits, and 2. growth studies of palm plants, (including the chit palm which is traditionally used to construct lobster traps, and is locally endangered) on which sustained yield harvest may be based.²¹ The lobstermen have agreed to substitute cement slabs for the chit palm mats they have used traditionally. They have also agreed to not harvest chit palm for two years, to allow it to rebound, and to wait for results from the growth studies.

Evaluation and Key Elements of Success

Evaluation of program success is a big question for Sian Ka'an. There are no mechanisms in place yet for evaluation of the program overall. In the near future, more attention will be paid to standards and systems for measuring success. Joe Quiros has looked at many other models for biosphere reserve concepts. Many Sian Ka'an initiatives are experimental, using lessons from models and their successes, but TNC recognizes that this and every other conservation project with such broad goals requires its own

¹⁹ Dennis McCaffrey, pers. comm., 3/93.

²⁰ Joe Quiros, TNC, pers. comm., 4/93.

²¹ McCaffrey, Dennis and Helena Landazuri, p.72.

foundations and design. It is too early to know whether the approach of providing pecuniary incentives for local users will work, but it looks hopeful to TNC.²²

Several key ingredients have contributed to the success of the program overall.

- Effort over the long-term: The tenacity and commitment of Amigos de Sian Ka'an over the past ten years has allowed them to grow from a tiny grass roots conservation organization to an established entity, an official partner of the government, and an avenue for broad-based international support on many cooperative projects.
- International attention: The Biosphere Reserve designation has brought international attention to the site. In addition to being in the International Network of Biosphere Reserves, Sian Ka'an has been included on the UNESCO list of World Heritage Sites and featured in the article "La Ruta Maya" (The Mayan Route) in National Geographic in October, 1989.
- Conservation and economics: To meet the dual goals of upholding conservation and maintaining local Mayan economies, specific problems (such as overuse of the chit palm) have had to be addressed with tangible solutions (such as substituting cement for the palm, while the palm growth rate is studied) to benefit the resources and those who use them.
- Structure: The Biosphere Reserve program structure is adaptable to each site's circumstances. For TNC, the flexibility of working with one point of contact, the Executive Director of Amigos de Sian Ka'an, is very important. TNC and Amigos work... "as a small company, with room for entrepreneurial risk. We expect to fail sometimes. If we don't, we will know we are not sticking our necks out far enough."²³
- Education: As mentioned above, government controls aimed at resource conservation have not worked in this location in the past, so education of local users has been the key alternative.

A couple of weaknesses in the program are instructive for other efforts. For one, Amigos didn't arise out of local interests and was initially considered a group of outsiders from Mexico City. Cooperation with other entities was low at first. This may have slowed the momentum of the Reserve, as so much depended on Amigos' involvement with local interests.²⁴ For the Biosphere Reserve Program overall, some scientific barriers inhibit progress. Conflicting opinions between scientists have resulted in communication breakdowns, which has stumped certain programs.²⁵ Flaws or failures specific to the marine management and research elements of the program are unknown, as these elements are still not highly developed or tested.

The biggest challenges ahead for the success of the program include leadership, constituents, good data and stronger protection measures. According to Joe Quiros, "the success of the program will depend on people with leadership who can see the many sides

²² Joe Quiros, TNC, pers. comm., 4/93.

²³ Joe Quiros, TNC, pers. comm., 4/93.

²⁴ Dennis McCaffrey, TNC, pers. comm, 3/93.

²⁵ Joe Quiros, TNC, pers. comm., 4/93.

of a problem and work on it creatively, to negotiate on the basis of principles, to have vision, stand back and leave egos behind. And this may sound too simple, but these are *people questions*, not just natural systems questions."

A wider constituency needs to be developed so all residents and users of Sian Ka'an resources can be stewards of those resources. To date, there are numerous local supporters of the biosphere reserve, including the large hotels, some businesses and some marine resource users. Developing a good monitoring plan and convincing people of its merits will be critical to the marine protection scheme.²⁶ And, there are many good projects underway, but few protections in place against a serious external threat, such as oil development, or fishing pressure from outside the region.²⁷

²⁶ Susan Anderson, Co-Director, TNC Mexico Program (Tuscon, AZ), pers. comm., 3/93
²⁷ Dennis McCaffrey, TNC, pers. comm, 3/93.

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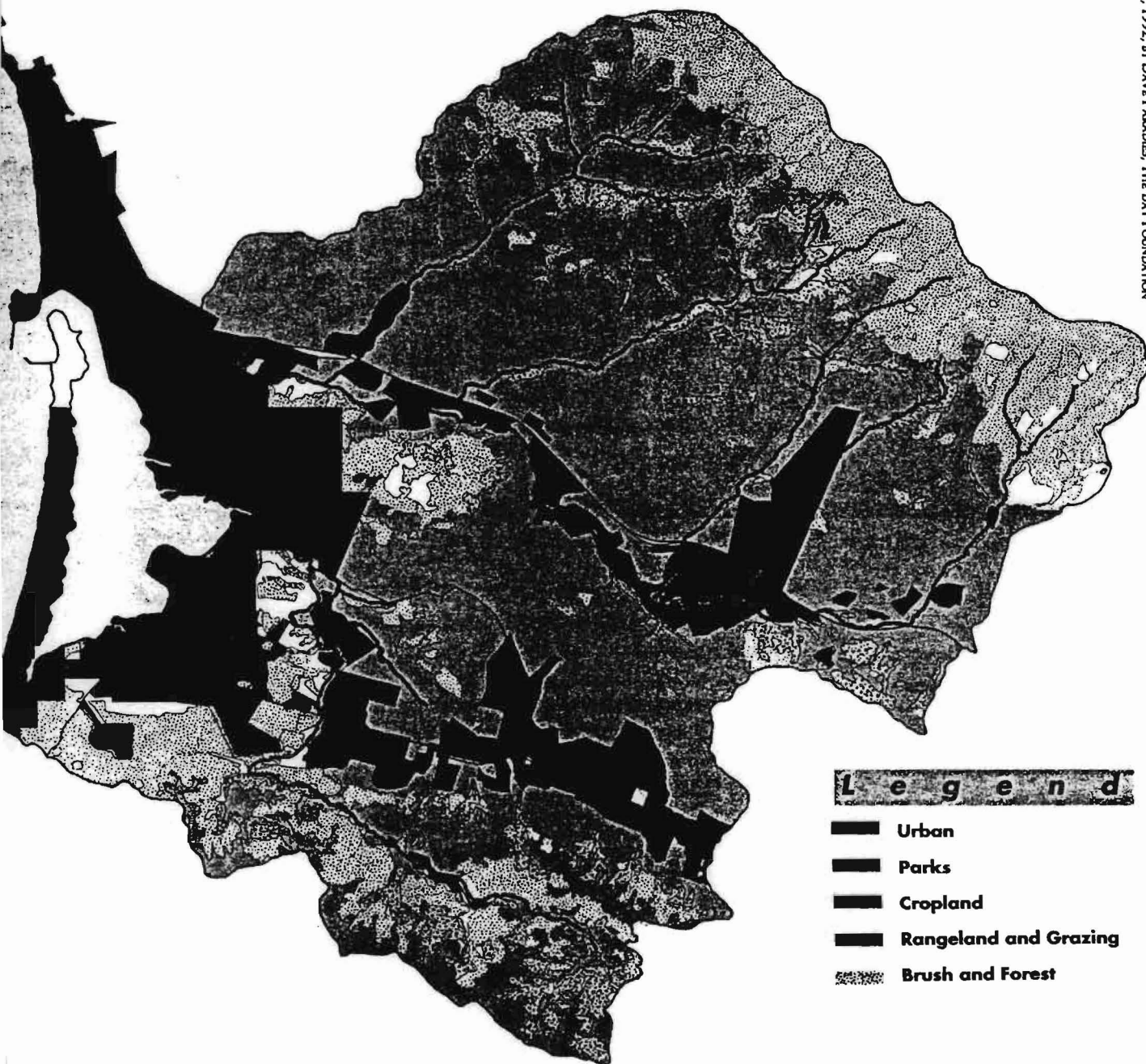
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3. Dennis McCaffrey, Senior Project Manager, TNC Latin America Division (Arlington, VA) Tel. (703) 841-4868.
4. Tundi Agardy, Conservation Scientist, World Wildlife Fund (Washington, DC) Tel. (202) 778-9725. (Fax is better, (202) 293-9211.)
5. Mason Morfit, Capital Campaign Director, The Nature Conservancy Maine Chapter (Brunswick, ME) Tel. (207) 729-5181.
6. Peter Larsen, Research Scientist, Bigelow Laboratory for Ocean Sciences (Boothbay Harbor, ME) Tel. (207) 633-2173.
7. Kathleen Sullivan, Marine ecologist, advising on Sian Ka'an Coral Reef Management Plan). Professor of Biology, University of Miami (Miami, FL) Tel. (305) 284-3013.

**Morro Bay Task Force Program
A Local Estuarine Watershed Initiative**

Map, 1992, by DAVE PARADES, THE BAY FOUNDATION



APPENDIX H.

PROGRAM: Morro Bay Task Force Program

LOCATION: Morro Bay, central California coast, halfway between Los Angeles and San Francisco

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Origins of the Program

The Morro Bay Task Force was formally launched in 1989, but it began over 20 years before. In 1966 a California Senate Resolution noted the valuable resources of Morro Bay and called for a protection plan. Watershed uses were impacting the bay through erosion and sedimentation, causing many habitat changes. There was no single entity to respond to the concerns, though many organizations with related missions had responsibilities in the watershed and bay. In 1975 a watershed report and plan was written, but not implemented, due to lack of local involvement in the approach by planning consultants.

Nine years later in 1986, a California Coastal Conservancy worker and an analyst at the California Coastal Conservancy revived the report and called a meeting to reconsider it. The Morro Bay Interagency Task Force formed in 1987, comprised of members of government agencies. In 1989, the Morro Bay Task Force formed, this time including members of business, industry and environmental organizations.¹ It has met quarterly since then as a forum for all activities relating to the health of the bay.

Characteristics of the Setting

There are many natural resources in the Morro Bay area around which participants can rally. Morro Bay ranks continually among the top five sites in Audubon's nationwide Christmas bird count, and is an overwintering area for 70 migratory bird species. Diverse wildlife populations occur or migrate through bay area. The next safe harbors for vessels are many miles north and south of Morro Bay on the California Coast.

Land use is agricultural in the bottom lands and uplands, with some urban uses along the shore. Significant, visible erosion in the watershed has been causing sedimentation of the bay, reducing and altering habitats. Natural assets to support a ranching economy and a rural quality of life are rare along the central California coast.

Organizational Structure of the Program

When it first formed in the late 1980s, the Morro Bay Task Force was composed of government officials. Then it expanded to a "multi-stakeholder" group, more representative of the many interests in the Morro Bay watershed. It has been staffed by a coordinator, based at the San Luis Obispo County offices. This has been a neutral setting for the coordination function. The Task Force is supported at the County government level, for the watershed and bay as a hydrologic unit.

As it grew, the program divided up its primary functions into three entities, the Task Force, the Friends of the Estuary, and the Bay Foundation. The Task Force works on planning, specific issues and recommendations. The Friends of the Estuary is a coalition of environmental groups advocating projects designed to benefit the estuary's health. The

¹ The Minnesota Project, "Protecting the Mississippi River: A report of seven 'water protection partnerships' located throughout the country as examples of multiple-stakeholder networks", September, 1992, p.13.

"Friends" does lobbying at the state and federal capitols. The Bay Foundation raises money and sponsors studies. Other important functions were served by the Coastal San Luis Resource Conservation District (RDC), the California Coastal Conservancy, and the U.S. Department of Agriculture's Soil Conservation Service (SCS).

The program been funded with County support for a part-time coordinator with funds from the Coastal Resources and Energy Assistance Program.² State support for land acquisition came from funds of the Coastal Conservancy and the Department of Transportation gasoline fuel tax.³ State funds for coastal conservation were also readily available during the early years of the program's development, from general obligation bonds. Other private, local, state, regional, and federal sources have been helpful.

Program Goals and "Action Plans"

Initially, the general goal of the program was to take actions to restore and protect the "dying" bay. Priorities were to control erosion and reduce sedimentation of the bay by restoring the sediment trapping functions of two wetland areas, Chorro Flats and Los Osos Creek. The Task Force also involved and educated the public and users of the watershed and bay about the resource concerns and measures they could take to contribute to the bay's restoration.

A consensus was reached on "Goals for the Watershed" by early 1989, aimed at "long-term conservation and enhancement of the Morro Bay and associated wetlands, nearshore, and watershed environments for all occupants and users, whether human, other animal, or plant".⁴ In the near future, the program participants plan to develop and implement a comprehensive conservation and management plan for the watershed and bay. This is based on the momentum created during an unsuccessful 1992 bid for designation of Morro Bay as a National Estuary Project. As one program leader noted, "Most of us understand that this is an incremental, evolutionary process."⁵

The program has advanced specific projects such as:

- Public education; a 9-day conference was held, resulting in a report, "State of the Bay".
- A series of articles was produced on estuarine topics in the local press, also called "State of the Bay",
- Teachers participated in a workshop to "bring estuarine principles into the classroom"⁶
- Best management practices were promulgated to reduce siltation from grazing lands, through use of "time controlled grazing" (moving cattle from one cell of range land to another, increasing revegetation and productivity),
- Trapping of eroded sediments in a sediment basins and wetlands upstream of the bay,
- Increasing communication. The Task Force has published six editions of "An Annotated List of Organizations with Responsibilities and/ or Interests in the Morro Bay Watershed".

It has been very important to the Task Force members and other players to show successful results of these efforts. This has encouraged further action and cooperation.

² Steve Eabry, "Morro Bay", *California Coast and Ocean*, published by the State Coastal Conservancy in association with Romberg Tiburon Centers, San Francisco State University, Fall, 1992, p.14.

³ Steve Eabry, "Morro Bay", p.18.

⁴ Morro Bay Task Force, "Goals for the Watershed", 1989, p.1.

⁵ Bud Laurent, quoted by Steve Eabry, "Morro Bay", p.13.

⁶ Steve Eabry, "Morro Bay", p.20.

Stewardship is the basis of these management strategies. Enforcement is not emphasized, education and improved practices are.

For long-term economic uses of the marine resources, the practice has been to involve all interested parties. Businesses, industry and ranchers, have been engaged in planning. Instead of regulation and restrictions, ranchers are offered assistance to solve erosion problems. Conservation is accomplished by addressing threats to bay's natural functions and reversing the trends causing threats, if possible.

Participation

The coordinator of the Task Force recognized early on that failure to implement the earlier watershed management plan was due to inadequate public involvement. Open participation became the policy of the Task Force operations. Local leadership in planning and implementation is carried out by the 60 -70 agencies on the Task Force, and many other non-governmental entities representing local interests.

As mentioned above, consensus was reached on goals for the Morro Bay management effort. But the Task Force is not a decision-making body, rather a forum for raising and discussing issues and making recommendations. There is also a policy to work cooperatively on a regional basis, among multiple jurisdictions. An annotated directory of organizations was produced in its sixth edition this winter. According to its compiler at the County, it increases communication among the many Morro Bay entities.⁷

The Task Force encourages agencies with authority to make decisions with an ecosystem-wide perspective. Goals included gaining a comprehensive understanding of the ecosystem. Research needs were identified and studies conducted on an ecological basis. Also, the original primary problem in Morro Bay was a visible and system-wide one; erosion and sedimentation of the Bay. It involves the transport of material from the top of the watershed out into the bay so it is by nature an ecosystem-wide problem.

To develop and adopt best management practices in the watershed and bay, Task Force participants identified the need for information, hired a consultant to do a hydrologic study, then remedies for the problems were spelled out, and SCS worked with ranchers to adopt the erosion prevention measures.

Many organizations have had a role in Morro Bay programs, as described in the annotated directory of Morro Bay organizations mentioned above. According to the Task Force Coordinator, there have been strong roles by individuals in academic institutions, though the institutions are not officially supporting Task Force efforts. Hydrologists have studied the sediment flows in the watershed. The Bay Foundation of Morro Bay seeks funding and sponsors research. It established an Estuarine Research Library, open to the public, a high priority of the Task Force. Wildlife biologists study the endangered Kangaroo Rat on part of the watershed. Numerous scientists have written columns for the "State of the Bay" column.

Governmental roles have been as follows: The Morro Bay Task Force is the focal oversight organization which has maintained the vision and momentum for the numerous research, educational, site projects, fundraising, and lobbying efforts throughout the watershed and bay. San Luis Obispo County has been in the role of coordinating Task Force efforts. The California Coastal Conservancy has supported the watershed management projects substantially, engaging support of other agencies as well. The U.S.

⁷ Steve Eabry, pers. comm., 2/23/93.

Soil Conservation Service and the local Resource Conservation District have organized landowners to reach them with best management practices and gain their input. Farmers and ranchers in the area have a long-term bond with SCS as members of an SCS advisory board. Other state and federal agencies have provided in-kind services and funding.

Non-governmental conservation organization(s) have played important roles as well. Friends of the Estuary functions as the advocate of the environmental organizations in the Morro Bay area, specifically for projects designed to benefit the estuary. The Bay Foundation of Morro Bay receives and dispenses funds, for estuary projects. The estuarine research library for community use was created with cooperation from a local college and utility. Morro Coastal Audubon Society began management of a large marsh in 1988, with support from the State Coastal Conservancy. The World Wildlife Fund granted funds to a local organization for work on natural resources preservation and "sustainable" local development.

Evaluation and Key Elements of Success

To evaluate program success, the "Goals for the Watershed" provide the basis for designing evaluation measures. However, the goals are not stated with target dates or levels specifically enough to measure progress against them. For example, Goal III a: "Promote and perpetuate a healthy estuary including indicators such as an absence of toxics in shellfish, fish and wildlife and successful reproduction by steelhead, a productive nursery area for many fish species, and nesting waterbirds."

The goals are being updated this year, and could reflect more evaluation measures in the future. For example, eventually the volume of sediment transported into Morro Bay will be measurable, to determine success of sedimentation control efforts.

Key elements that have contributed to the success of the program overall include:

- **Program goals.** Two elements of success in the Task Force's first year were its "Goals for the Watershed, and a characterization of "Unanswered Questions and Research Needs", both of which were very important consensus efforts.⁸ "Good work is not lost, even if it takes time to come to fruition. The first watershed plan [the earlier effort in 1975] contained key elements it took ten years to implement."⁹
- **Action plans with good results.** "One successful project will engender another." For the task force to be effective, "its members had to keep a high level of interest, see results, and appreciate the common cause within their many perspectives."¹⁰
- **Participation and local leadership.** "Involve the public. Be flexible in your goals, to accommodate special interests and talents in the community." Local 'ownership' of the planning and results was essential for the efforts to be adopted publicly.¹¹ The program was built with a broad-based structure so no one organization could stop the momentum.

⁸ Steve Eabry, pers. comm., 2/23/93.

⁹ Steve Eabry, "Morro Bay", p.24.

¹⁰ Steve Eabry, "Morro Bay", p.16.

¹¹ Steve Eabry, "Morro Bay", p.14.

Dozens of agencies, commercial organizations, business groups and interest groups participate in the program.¹²

• Participation - the government's role. "The government's role is to find out what the community wants and help obtain it."¹³ Provide adequate access to information sources for all participants. Government officials can help make their agencies' information available to local interests who want to use it.

This review considers "the program" to have started in 1987. In regard to failures or flaws identified in the program, if the earlier 1975 watershed management plan is considered, a flaw in that stage was not involving the community or any parties which could implement the plan. In 1975, planners separated planning from politics, and "the plan was not even adopted by the agency that had paid for it. This was a good lesson for these planners' successors to take to heart...efforts to bring together the various agencies and interest groups could not succeed without full public involvement."¹⁴

In regard to future challenges, funding will be tighter than in the past. Progress will be slower with less funding, and interest in the program may therefore be challenging to maintain.

¹² Steve Eabry, former coordinator, Morro Bay Task Force, pers. comm., 2/23/93.

¹³ Pat Beck, San Luis Obispo County planner, quoted by Steve Eabry, "Morro Bay", p.13.

¹⁴ Steve Eabry, "Morro Bay", p.14.

Sources of printed reference information

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2. The Minnesota Project, "Protecting the Mississippi River: A report of seven 'water protection partnerships' located throughout the country as examples of multiple-stakeholder networks", September, 1992.

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