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COASTAL RESOURCE MANAGEMENT PLANNING

IN THE

U.S.-AFFILIATED PACIFIC ISLANDS.

by

Peter J. Rappa and Bruce J. Miller

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INTRODUCTION

Rapid change is coming to the Pacific islands of the former U.S. Trust Territories. As a result of population expansion, growing pressures for development, and the introduction of new technologies, the coastal resources of these Micronesian states are increasingly subject to major stresses related to expansion of infrastructure, including dredging for harbor expansion, reef runway construction, and road building. These projects, while necessary for long-term economic development, are often damaging to the coastal environment. Mitigation of unnecessary impact on the coastal environment is the major intent of a recently formed University of Hawaii Sea Grant Extension Service program on coastal resources management in the Pacific region. This program capitalizes on the expertise of United States, regional, and island agencies in a multidisciplinary cooperative effort to protect Micronesia's most important resources.

MOTIVATION

The U.S.-Affiliated Pacific Islands

The U.S.-affiliated Pacific islands consist of several island groups (Figure 1) with divergent political status and levels of development (Table 1). These islands include the Territory of Guam, the Federated States of Micronesia

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University of Hawaii at Manoa
Sea Grant Extension Service
1000 Pope Road, MSB 205
Honolulu, HI. 96822

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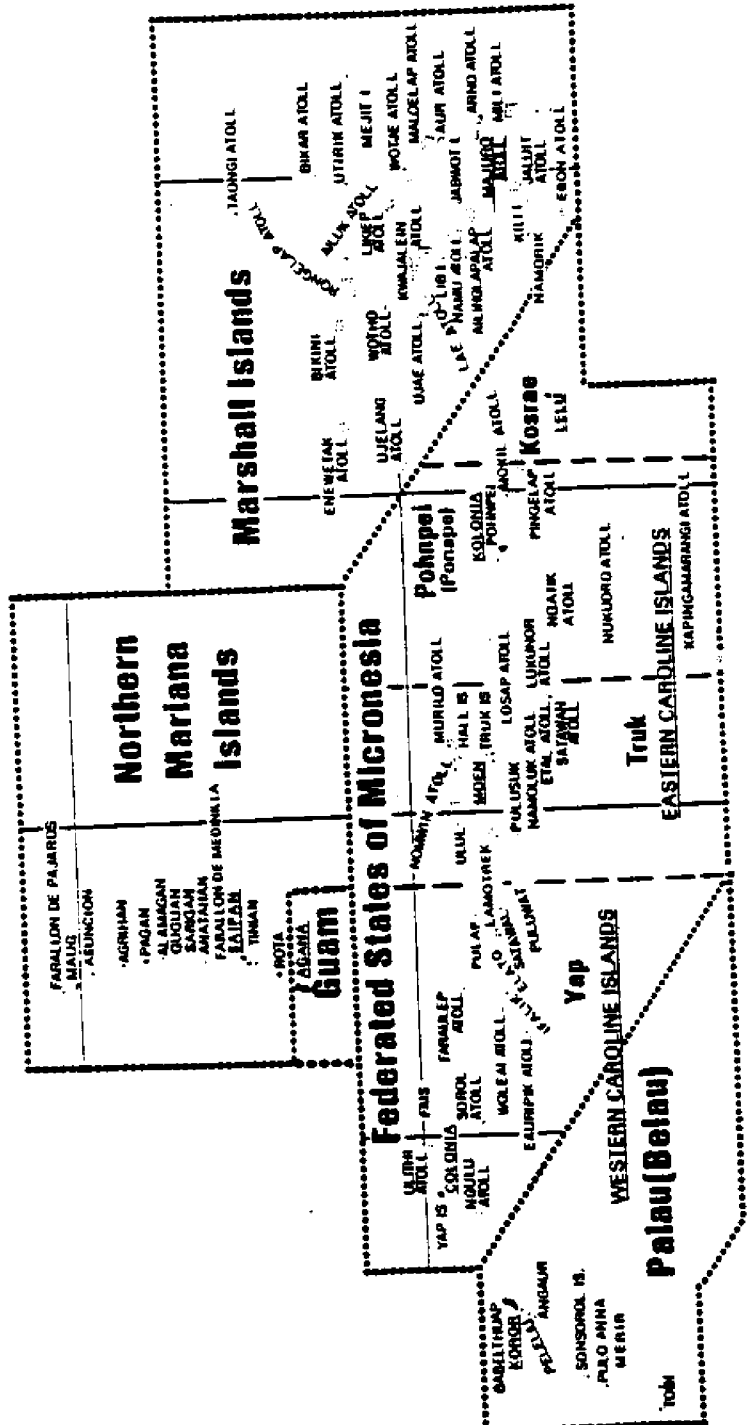


Figure 1. Map of the U.S.-affiliated Pacific (Source: Hawaii Geographic Society reprinted with permission)

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(FSM), the Commonwealth of the Northern Mariana Islands (CNMI), the Republic of Belau, and the Republic of the Marshall Islands (RMI).

TABLE 1.

STATUS, SIZE AND POPULATION OF U.S.-AFFILIATED PACIFIC ISLAND STATES.

NAME	POLITICAL STATUS	AREA (m ²)	No. OF ISLANDS	EST. POP. IN 1985
Guam	Unincorporated U.S. Territory	212	1	120,000
FSM	FAS*	271	607	94,000
	Kosrae	42	5	6,700
	Pohnpei	134	163	29,700
	Truk	49	290	47,200
	Yap	46	149	10,400
RMI	FAS	66	1,225	39,000
CNMI	Commonwealth	184	21	20,000
Belau	FAS	196	350	15,000

* FAS: Freely Associated States

FSM, CNMI, RMI, and Belau were formerly part of the U.S. Trust Territory of the Pacific Islands. Held in trust by the United States under a United Nations mandate at the conclusion of World War II, they were managed by the U.S. Navy from 1947 to 1952 and then until 1986 by the U.S. Department of Interior through a High Commissioner stationed on Saipan. CNMI was the first to settle its political status, becoming a commonwealth,

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similar to Puerto Rico, in 1976. FSM, RMI, and Belau completed their status negotiations in 1986 and have signed or are in the process of signing a Compact of Free Association with the United States. This compact gives the new states, often termed freely associated states (FAS), control of all internal and external affairs except for defense, which remains under the control of the United States.

Guam remains an unincorporated territory of the United States, ceded by Spain in 1899 at the conclusion of the Spanish-American War. Guam has an elected legislature and governor, control of most internal affairs, and is subject to all U.S. laws and requirements.

Identifying the Problem

Availability of land-based resources in Micronesia is limited by the shortage of flat arable land on high islands and the lack of soil on low coral islands. Therefore, islanders have traditionally utilized resources available within their narrow coastal zones for most of their food, construction materials, and utensils. For this reason, coastal resources such as mangrove forests, reef flats, and lagoons have played a dominant role in the subsistence of Pacific island communities.

Recently, these coastal ecosystems have been subject to increasing degradation from a variety of uses, including coastal transportation (road construction along the shoreline, ports, and airfields on reefs), sewage and solid waste disposal, reef flat dredging, sand mining, and impacts (soil erosion and reef siltation) resulting from changing land uses. According to Maragos and Elliot (1985), the reefs on most Pacific islands are now considered freely available resources, open to dredging or filling, which results in an overall decline in the usefulness of coral reefs for other purposes.

This rapid degradation of coastal resources points to an urgent need for comprehensive coastal management planning in these areas. According to the U.S. Congress Office of Technology Assessment (OTA), one of the major constraints to development in the U.S.-affiliated Pacific islands is the lack of resource planning (OTA, 1987). In fact, insular resources management specialists (Maragos et al., 1983) state that the planning process has "the greatest potential for effective management on a regional basis". The program which the University of Hawaii Sea Grant Extension Service has initiated in cooperation with the U.S. Army Corps of Engineers, the University of Guam Sea Grant Program, the South Pacific Regional Environmental Program, and local Micronesian governments, provides the necessary framework for comprehensive planning and management of coastal resources in Micronesia.

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PROGRAMMATIC RESPONSE

Each Micronesian state is currently at a different stage relative to the development and management of its coastal resources, and this factor was taken into account at the time we proposed our coastal resource management program.

As a result, application of the program is divided into three phases:

1. data collection
2. plan compilation
3. plan implementation

Only the phases appropriate for a particular island state are proposed to be undertaken for that state. For example, because Guam and CNMI already have coastal zone management programs developed under the Coastal Zone Management (CZM) Act of 1972, only phase three activities related to plan implementation are proposed. Although not strictly linear, each phase of the program can be best undertaken if the previous phase is completed. A number of activities are called for in each phase, each of which is explained in greater detail below.

Data Collection

Central to the development of an effective coastal resource management plan is the compilation of accurate information for each island under consideration. Throughout most of Micronesia, information on resource availability and use is difficult to find, or unavailable. Statistical records such as fish harvesting, water quality, sand and coral extraction, and other similar types of data used by U.S. coastal managers to inventory resources are just beginning to be collected throughout most of Micronesia. Where this is the case, we have organized data collection surveys to gather the necessary information. Data collection surveys will eventually be completed by UH Sea Grant Extension Service for FSM, RMI, and Belau. These surveys involve a search for relevant literature; field based activities including interviews with resources users and government agencies; and a field survey of coastal and nearshore areas.

Decisions on the types of data collected are guided by consideration of the important planning issues facing each of the islands. These issues, which will be addressed in the eventual management plan, are expressed by local government officials to program leaders. Though different for each island, they typically include feasibility of commercial fishing and siting of major construction projects. The types of data needed and field activities necessary to collect data for addressing the issue are decided by the survey team and island officials,

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and compiled into a workplan prior to engaging in data collection. Planning issues and field methods used in our Majuro Atoll coastal inventory are presented in Table 2.

Literature Search

Most information for this part of the Pacific is contained in what is known as "gray literature" -- documents that are unpublished and not ordinarily cataloged in library indices. Gathering this background material involves sifting through library holdings and personal collections, networking with agencies and researchers working in the region, and visiting the islands in search of in-house reports, plans, or studies. The search often results in useful background information about the subject island as well as a general idea of what information will have to be gathered through later field reconnaissance.

Interviews with Resource Users

Group and individual interview sessions with experienced resource users can quickly gather information on the traditional, subsistence, and artisanal uses of reef resources. Johannes (1981a,b) has used interviews to determine ethnomarine biological information on tropical coastal fisheries in the Pacific and has described their uses for resource management. Abbreviations of Johannes' method has been successfully incorporated into coastal inventories by Holthus (1985) and Rappa (cited in University of Hawaii Sea Grant College, 1988).

The interviews are arranged through the local marine resource office on each island. Groups of 3 to 20 resource users representing a village or municipality are asked to indicate on maps the areas where various types of resources are harvested or extracted in their region. To supplement this information, participants are asked to describe resource problems and whether the abundance of each resource category is increasing, declining, or remaining the same. Each interview session lasts three to four hours on average and is conducted in the native language. Not surprisingly, most users interviewed are local fishermen, because fish are the most important marine resource in Micronesia.

As a result of the interviews, areas considered by the islanders to be valuable for actual or potential marine resource utilization are clearly delineated on coastal maps. This information is then used to create a resources inventory atlas of the island.

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TABLE 2.

PLANNING ISSUES, TYPES OF DATA NEEDED, AND SURVEY ACTIVITIES USED IN MAJURO ATOLL COASTAL INVENTORY.

Planning Issue	Types of Data Needed	Survey Activities
Commercial Fishing	Magnitude and distribution of present infrastructure requirements	Interview local fishermen Literature review
Sites for quarrying and dredging potential	Environment impact of past activities Present environment conditions sites	Literature review Marine biological survey of available lagoon and ocean sites
Designating marine and reserves	Criteria for site selection Characteristics of potential sites	Marine and terrestrial survey of sites
Water circulation and problems within the lagoon	Current, water circulation and weather patterns in the lagoon	Conduct current and erosional circulation study
Siting docks and boat ramps	Type and extent of environmental impacts	Environmental survey of potential sites
Siting shoreline construction for resort and residential uses	Location and magnitude of planned construction Type and extent of environmental alternate sites	Interview with government planners and land owners Environmental survey of potential sites

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Resource Survey

A survey of the physical and biological resources found in the nearshore and coastal waters of each island in the program is then conducted by the survey team. The team usually consists of four to eight members with backgrounds in fisheries, marine biology, terrestrial biology, engineering and archaeology.

Field stations are carefully chosen to obtain a fairly even geographic distribution and sampling of the variety of reef and shore environments found on each island or atoll. In most cases, stations are also established near areas where the local government has expressed an interest in conducting some infrastructure development such as a harbor, fishing dock, or tourist facility.

The surveys are usually qualitative in nature. Each team member records and sketches data on specific organisms or groups of features, as well as information on the relative abundance of algae, corals, other invertebrates, fishes, and reef features. In general, larger and more conspicuous species tend to dominate the records. The amount of time spent at each station is determined by the relative complexity of the reef environment, water quality, weather and sea conditions, and safety considerations.

When completed the resource survey provides specific information on reef physiography, substrate types, estimates of coral cover, relative fish species abundance, shoreline vegetation, historical and cultural sites, and unusual or outstanding feature. The survey also provides insight into the relative health of the coastal ecosystem, and acts as a check on the information obtained from the interviews.

Results

Data collection activities not only result in an inventory of important coastal resources, but also provide information on current and planned resource utilization for each location surveyed. Location of selected resources is graphically depicted in an atlas prepared for each island, while detailed descriptions of those resources are compiled into an inventory report. The atlas and inventory report together contain much of the baseline information coastal resource managers need to develop management plans.

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Plan Compilation

During the second phase of the program, appropriate island governments are assisted in the development of coastal resource management plans. Guam and CNMI already have coastal zone management plans developed and approved under the CZM Act, but CZM authority does not currently extend to Belau, FSM, and RMI. Thus, the highest priority of this program has been to assist these freely associated states.

Coastal resource management plans in developing Pacific nations need to realistically reflect current expectations for economic development. If they don't, overemphasis on preservation of existing ecosystems may doom the plan. According to Holthus (1987), "in developing nations, it is unrealistic to remove large coastal areas from use, either temporarily, while studies are conducted, or permanently as preserves." However, unregulated resource use for short-term economic gain will surely lead to the destruction of resources base, and management plans must be solidly based on the "wise-use" principle.

A sound management plan in the freely associated states, requires an integration of traditional knowledge and uses, modern marine scientific research, and the reality of development. Three main goals have been identified by Holthus (1987) to guide the development of management planning.

1. Maximize sustainable multiple use of coastal resources for traditional pursuits, subsistence requirements, and development activities consistent with conservation goals
2. Conserve biological resources and ecological integrity of coastal ecosystems;
3. Devise mechanisms to decide among conflicting uses of coastal resources.

These goals provide the general framework for coastal resource management in the region.

It is important to note the wide variation in physical, social, and economic characteristics of the island states. For example, each of the four states of FSM is significantly different from the others in size, population, language, and culture. RMI is significantly different from FSM, the former composed of atolls and low coral islands, while the latter consists mostly high islands. Some islands have been more successful at preserving their traditional customs than others. Thus it is important to develop management regimes that recognize the uniqueness of each of the areas.

The initial step in our planning process is receipt of a formal request from the top government official of a state or country. When the data collection is completed, a

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preliminary meeting is held between our program and island officials to determine current and potential coastal resource use conflict, composition of the planning team, and the timing for conducting field portions of the study.

After these issues are decided, we assemble the planning team. Teams are multidisciplinary, usually including people with expertise in fisheries development, marine biology, resource economics, tourism development, and other fields depending on the situation.

The information gathered during phase one of the program is used as baseline data for the plan. Additional required information is obtained during a site visit to the planning area. The purpose of the site visit is not only to gather information but also to facilitate interaction with local counterparts, other government officials, and the general public. This interaction is particularly important, because the plan's effectiveness is enhanced when it is developed with active input and feedback from local resource users and is reflective of islander wishes. Close interaction with government counterparts has an added benefit in that it makes these officials stakeholders in the resultant plan, since they have a hand in shaping it. The length of the site visit varies, but it must be sufficiently long to permit access to necessary information, and interaction with all major interest groups. A site visit of three weeks is planned for Kosrae and Yap States in the FSM.

At the completion of the site visit, the planning team prepares a draft outline of the plan with management recommendations. The draft is circulated through the local bureaucracy and the public for review and comment. Based on the review comments, a final draft is prepared and sent to the appropriate government body for implementation.

Plan Implementation

Implementation of the management plan is constrained not only by local acceptance, but also by limits on personnel, expertise, and funding, reflecting the social and political realities of resource management in the U.S.-affiliated Pacific islands. Management recommendations made in the plans often require substantial commitment of funding, facilities, and qualified personnel, and these are usually in short supply in this region of the world. Persuading island legislative bodies to commit precious financial and human resources to make the plan work is a difficult but nonetheless crucial activity.

Long-term prospects for the success of coastal resources management planning relies on an informed, educated, and supportive public and government (Holthus, 1987). Government staff members involved with resource planning, management, and enforcement

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should have at least a minimum level of specialized training and should be encouraged to take advantage of opportunities to increase their level of expertise. General education regarding marine conservation principles and practices must be provided for the schools and the public to reinforce the underlying concepts of the plan.

The final phase of the coastal resource management program addresses these concerns by providing support to the territory or country enacting a coastal resource plan. Chief among the support mechanisms is the stationing of extension agents in the region. In Guam, CNMI and FSM, we have already hired or are in the process of hiring coastal resource management-oriented extension agents.

The advantage of having an extension agent in each of the areas where coastal management plans are developed is that the agent works directly with government officials and other island leaders on plan implementation. The agents also help design training sessions to educate coastal resource managers, are instrumental in creating educational materials regarding marine conservation for the general public, and assure that marine conservation principles make their way into school curricula by working with island education departments.

Sea Grant also provides support for plan implementation through sponsorship of regional training activities. A 3-week training workshop on coastal resource management in insular areas, co-sponsored with the South Pacific Regional Environmental Program, was held in Pohnpei in July 1987. A series of workshops on environmental impact review for the U.S.-affiliated Pacific islands, organized by Sea Grant and the University of Hawaii Environmental Center, is scheduled to be given at six locations throughout Micronesia from June through August 1989. In addition to on-island seminars, Sea Grant uses satellite communication to broadcast marine resource management seminars to earth stations located throughout the Pacific.

Finally, Sea Grant has developed a number of materials such as posters and tide charts in the local languages to convey a conservation message, and a marine education curriculum is currently being developed for the freely associated states with cooperative program support.

PROGRAM PROGRESS TO DATE

Although our coastal resource management program is in its initial stages of application, a number of projects have been undertaken resulting in the publication of important coastal resource management materials. These first completed projects include:

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1. Pohnpei coastal resources atlas and inventory report and draft management plan
2. Yap coastal resources atlas and inventory report
3. Majuro and Arno Atolls (RMI) coastal resources atlas
4. Kwajalein Atolls, RMI coastal resources atlas and environmental report.

A complete list of projects in each jurisdiction is contained in Table 3.

In addition, as stated earlier, two extension agents were hired, one each for Guam and Pohnpei, to assist these governments in their resource management efforts. Each position is jointly funded by the University of Hawaii Sea Grant Extension Service and the island governments through the University of Guam and the Community College of Micronesia in Pohnpei. The Guam agent serves primarily in Guam but has assisted in coastal surveys in Yap and Kwajalein. The agent based on Pohnpei serves all four states of FSM but will shortly be joined by an extension agent based in Kosrae. An extension agent position is currently being advertised for CNMI, to be based in Saipan. This extension agent will work with both the Office of Coastal Resource Management and the Division of Fish and Wildlife on conservation and protection of marine resources through public education.

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A recent development that will greatly influence this program is the creation of the Pacific Island Network, designed to coordinate U.S. government marine and coastal technical assistance programs in U.S.-affiliated Pacific islands.

The network's immediate impact in the region will be through the provision of funds for additional resident extension agents on CNMI, RMI, Kosrae (FSM), and eventually Belau. The agent network will be co-coordinated by the Hawaii Sea Grant Extension Service and the Honolulu office of the National Marine Fisheries Service. Funds will also be provided through the network for conducting the two components of the coastal resource management program, the Kosrae coastal management study currently underway, and the Yap management plan study scheduled to begin in November 1989.

The network will eventually act as a funnel for all requests for assistance in the areas of marine and coastal affairs from Pacific island governments to the participating organizations, and will help reduce costly duplication of effort by making information available on the activities and plans of each of the participating agencies.

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TABLE 3.

**STATUS OF COASTAL RESOURCES MANAGEMENT PROJECTS
IN THE U.S.-AFFILIATED PACIFIC ISLANDS.**

Island Group	Survey	Plan	S.G. Agent	Educational Programs*	Special Projects
I. Guam	Completed	Completed	SG Ext./UOG	1, 2, 3, 4	—
II. CNMI	Completed	Completed	SG/CNMI Coastal Ext. Agent	1, 3, 4	—
III. FSM	Requested for all states	Requested for all states	SG/FSM Ext. Agent	1, 2, 3, 4, 5	—
A. Pohnpei Center	Completed	Draft Completed	(FSM)	1, 2, 3, 4, 5	Kolonia Urban Development Planning
B. Pohnpei Outer Islands	Not currently scheduled	—	(FSM)	1, 3, 4, 5	—
C. Yap Center	Completed	In progress	(FSM)	1, 2, 3, 4, 5	—
D. Yap Outer Islands	Requested by Yap, not yet scheduled	—	(FSM)	1, 3, 4, 5	—
E. Kosrae	Completed	June 1989	(FSM)	1, 2, 3, 4, 5	Kosrae Development Alternatives and Coastal Plan
F. Truk Center	Completed Moan only	Not currently scheduled	(FSM)	1, 3, 4, 5	Guam/UHSC See Cucumber Project
G. Truk Outer Islands	Requested, not currently scheduled	—	(FSM)	1, 3, 4, 5	—
IV. Republic of Belau	Requested by Belau, not scheduled	Requested	—	1, 2, 3, 4	—
V. Republic of the Marshall Islands	Requested by RMI	Requested	Proposal pending†	4, 5	—
A. Kwajalein	Completed	Requested	—	4, 5	U.S. Army, Kwajalein Atoll EIS
B. Majuro/ARNO	Completed	Requested	—	4, 5	—
C. Other Ralik and Ratak Chain	Requested	Requested	—	4, 5	—

*Numbers indicate the following: 1 = Tide Charts; 2 = Sealink; 3 = Conservation Posters; 4 = EIS Review Workshop; 5 = Coastal Resource Management Workshop

†Funded through NMFS

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