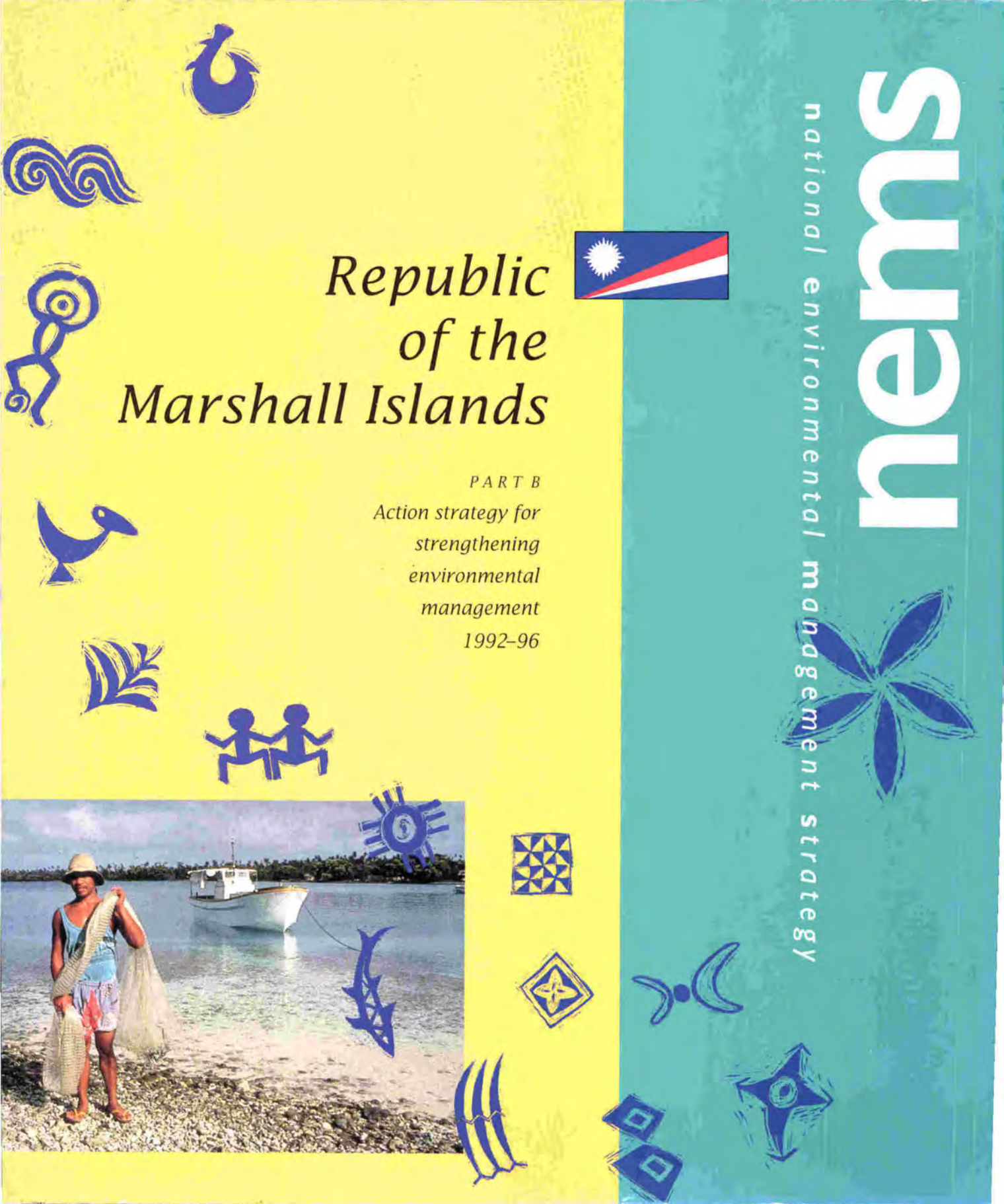


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of the
Marshall Islands*



*PART B
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environmental
management
1992-96*

national environmental management strategy
nems



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Republic of the Marshall Islands

national environmental management strategy

PART B
*Action Strategy for Strengthening
Environmental Management
1992-1996*

*Prepared under the Supervision of
The National Task Force on
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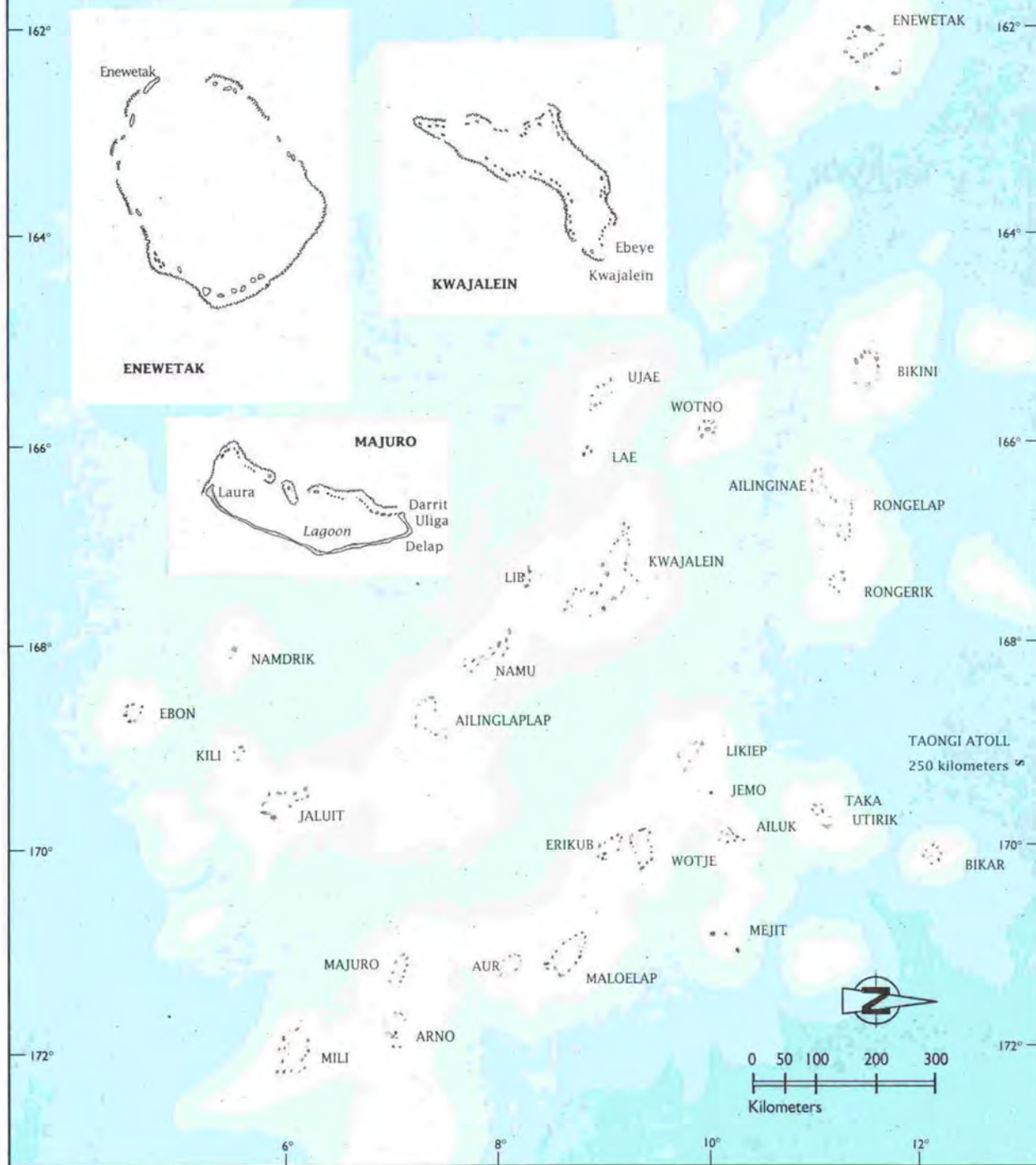
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IUCN
The World Conservation Union



nems

Republic of the Marshall Islands



Foreword

For the first time in the world's history, all the nations of the world are turning their attention to ensuring better environmental management and protection. The United Nations Conference on Environment and Development called for all nations to look inward, examining priorities and assessing the sustainability of their actions.

Under the guidance of the National Task Force on Environmental Management and Sustainable Development (Task Force on EMSD), the Republic of the Marshall Islands also examined its shortfalls, its aspirations, and its capabilities with respect to environmental protection and development.

The findings and recommendations of the Task Force on EMSD are presented in Republic of the Marshall Islands: National Environmental Management Strategy Part A: State of the Environment Report 1992. This document, Part B of the National Environmental Management Strategy (NEMS), logically follows the findings of Part A. Specific, implementable plans of action for achieving the national environmental management priorities stated in Part A are presented herein.

To be implemented simultaneously with the Second Five Year Development Plan, 1992-1996, the programs described in this document will require external funding and technical assistance. This document was presented at the United Nations Conference on Environment and Development as a template of the nation's needs for strengthening environmental management during the next five years. To the extent possible, costs associated with the programs have been estimated.

This is a very exciting time in world history, as nations turn some of the attention and resources previously focused on warfare and arms buildup to peaceful ways of maintaining environmental quality. Together with Part A, this document embodies the firm commitment of the Republic of the Marshall Islands to pursuing sustainable development, and to supporting global conventions which aim to integrate environmental conservation and development efforts.

It is with great pleasure that I present this Action Strategy, which has been produced by the cooperative effort of high-level leaders in both the public and private sectors.



The Honorable Amata Kabua
President, Republic of the Marshall Islands

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This Action Strategy, Part B of the National Environmental Management Strategy, owes its existence to the excellent consultative process established between all arms of government, together with external agencies and the private sector, in the form of a National Task Force on Environmental Management and Sustainable Development, under the chairmanship of Mr Jiba Kabua, Secretary of Foreign Affairs. The Task Force guided the NEMS process through the preparation of the State of the Environment Report, then through the National Seminar on Environmental Management (October 9-11, 1991), and then the development of environmental management strategies for the period 1992-1996.

The NEMS program in the Marshall Islands forms one facet of a program of Regional Environmental Technical Assistance (RETA) for five nations of the Pacific — the Republic of the Marshall Islands, Cook Islands, Solomon Islands, Federated States of Micronesia and the Kingdom of Tonga. Funded primarily by the Asian Development Bank, with additional financial support from the East-West Center and the World Conservation Union (IUCN), the program is being implemented by the South Pacific Regional Environment Programme.

While numerous individuals have contributed generously of their time and invigorated the authors of the Action Strategy with their enthusiasm, to list all is impossible. At the same time, it would be remiss if due acknowledgment were not given to the especially

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Ministry of Transportation & Communications

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Peace Corps

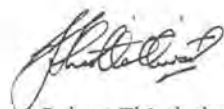
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David Sheppard
RETA Team Leader



Martha J. Crawford
RETA consultant



Robert Thistlethwaite
RETA consultant

Message from the ADB

The Asian Development Bank is pleased to associate in assisting one of the Pacific region's most ambitious undertakings — the preparation of National Environmental Management Strategies (NEMS) in a number of Pacific countries. This assistance has been provided through a Regional Technical Assistance grant to the South Pacific Regional Environment Programme (SPREP). The World Conservation Union (IUCN) has also collaborated in providing technical advisory services.

Our involvement reflects two factors. Firstly, our confidence in SPREP as one of the prime sub-regional, environmental organisations in the Asia Pacific region. The Bank has been pleased by the way in which SPREP has cooperated closely with member governments in addressing environmental issues in island countries and by the caliber of SPREP's staff work as well as the work of the national task forces which guided the country level activities.

The second factor is a commitment by the Bank to sustainable development. We are acutely aware of the vital importance of economic development for the Pacific Island countries and are equally concerned for the limited natural resources and often fragile nature of the environment of these countries. It is thus critical

that development continues, but in a manner which is truly sustainable ecologically. Only by following such a course of action can the quality of life currently enjoyed by Pacific people be assured for future generations.

The need for sustainable use of natural resources has been the underlying theme of the NEMS documents. The preparation of NEMS has been a challenging task and has involved a wide range of government and non-governmental organizations in each country. The nature of the issues and the complexity of the challenges faced have been great. As ever, Pacific countries have risen to the challenge and I believe the commitment shown in the development of the Strategies is a true reflection of the intimate bond which Pacific Island peoples have with their environment. Nonetheless, this "commitment" and "challenge" has now to be put to visible action programmes.

The Asian Development Bank welcomes the publication of the National Environmental Management Strategy for the Republic of the Marshall Islands. It is an important event for environmental management in the Republic of the Marshall Islands and the Bank will be pleased to consider ways and means of assisting with its implementation.



Dr Kazi F Jalal
Chief, Office of the Environment
Asian Development Bank

Message from SPREP

We Pacific Islanders share a common aspiration for economic development and improved living standards for our people. However, we are aware that this development cannot be at the cost of the environment. We have lived in close harmony with our island environment for thousands of years and we are well aware of its importance to our way of life. We face the complex challenge, in common with many other countries of the world, of achieving economic development in a way which will not significantly affect our environment. This major challenge must be addressed if our Pacific way of life is to survive.

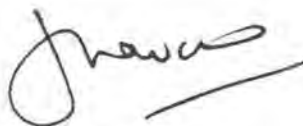
The development of National Environmental Management Strategies (NEMS) has been a major tool in addressing these issues. This development was made possible through the generous financial and technical assistance of the Asian Development Bank and the World Conservation Union (IUCN). This assistance is gratefully acknowledged.

This NEMS is a practical document which aims to identify the major environmental issues in the Marshall Islands and the priority environmental programs which

are required to address them. The emphasis has been on ownership of the NEMS by the government and people of the Marshall Islands. The process which has resulted in the preparation of the NEMS has involved many participants and has been directed by a National Task Force on Environmental Management and Sustainable Development, comprising relevant government and nongovernmental organizations in the Marshall Islands.

The NEMS process has proved most useful in raising awareness of environmental issues. In the wake of the United Nations Conference on Environment and Development (UNCED) the NEMS also provides the foundation for implementing much of Agenda 21 in the Marshall Islands. However, the success of the NEMS exercise will ultimately be judged by its implementation. If the NEMS Report sits on a shelf and gathers dust, then the exercise has failed.

SPREP looks forward to working with the Republic of the Marshall Islands and with other regional and international organizations in the implementation of the NEMS.



Vili A. Fuavao
Director
South Pacific Regional Environment Programme

Acronyms & abbreviations

ADB	Asian Development Bank	HPO	Historic Preservation Office
AIDAB	Australian International Development Assistance Bureau	INC	Intergovernmental Negotiating Committee
Alele	Alele Museum, Inc.	IOIA	Interior & Outer Islands Affairs (Ministry of)
AOSIS	Alliance of Small Island States	IPCC	Intergovernmental Panel on Climate Change
ARP	Aquaculture Research Program	IUCN	World Conservation Union (IUCN)
CCA	Coast Conservation Act	JICA	Japanese International Cooperation Agency
CIP	Capital Improvements Project	KADA	Kwajalein Atoll Development Authority
CITES	Convention on International Trade in Endangered Species	KALGov	Kwajalein Atoll Local Government
CMI	College of the Marshall Islands	MALGov	Majuro Atoll Local Government
COM	College of Micronesia	MEC	Marshalls Energy Company
Compact	Compact of Free Association between the RMI and US	MIA	Marshall Islands Aquaculture
CTSA	Center for Tropical & Subtropical Aquaculture	MIDA	Marshall Islands Development Authority
CZM	Coastal Zone Management	MIDB	Marshall Islands Development Bank
DOI	Department of the Interior (US)	MIJ	Marshall Islands Journal
EEZ	Exclusive Economic Zone	MIMRA	Marshall Islands Marine Resources Authority
EIA	Environmental Impact Assessment	MIVA	Marshall Islands Visitors Authority
EIS	Environmental Impact Statement	MWSC	Majuro Water & Sewer Company
EMSD	Environmental Management & Sustainable Development (as in Task Force on EMSD)	NEMS	National Environmental Management Strategy
EPA	Environmental Protection Authority	NEPA	National Environmental Protection Act
ESCAP	Economic & Social Commission for Asia & the Pacific	NOAA	National Oceanic & Atmospheric Administration
EWC	East-West Center	NPCC	National Planning Coordination Committee
FFA	Forum Fisheries Agency	NTA	National Telecommunications Authority
FSM	Federated States of Micronesia	OEA	Office of Economic Adjustment
GDP	Gross Domestic Product	OPS	Office of Planning & Statistics
GEF	Global Environment Facility		
GNP	Gross National Product		

OTEC	Ocean Thermal Energy Conversion	USP	University of the South Pacific
PCBs	Polychlorinated Biphenyls	WHO	World Health Organization
PIMRIS	Pacific Islands Marine Resources Information System	WMO	World Meteorological Organization
PIN	Pacific Islands Network	WQML	Water Quality Monitoring Laboratory (of RMIEPA)
PSC	Public Service Commission	WWF	World Wildlife Fund
R&D	Resources & Development (Ministry of)		
RETA	Regional Environment Technical Assistance Project		
RMI	Republic of the Marshall Islands		
RMIEPA	Republic of the Marshall Islands Environmental Protection Authority (also EPA)		
RSP	Rural Sanitation Project		
SPC	South Pacific Commission		
SPREP	South Pacific Regional Environment Programme		
TNC	The Nature Conservancy		
T&C	Transportation & Communication (Ministry of)		
TTPI	Trust Territory of the Pacific Islands		
UH	University of Hawaii, Manoa		
UN	United Nations		
UNDP	United Nations Development Programme		
UNCED	United Nations Conference on Environment & Development		
UNEP	United Nations Environment Programme		
UNFPA	United Nations Fund for Population Activities		
USAKA	United States Army at Kwajalein Atoll		
USDA	United States Department of Agriculture		
USEPA	United States Environmental Protection Agency		
USFWS	United States Fish & Wildlife Service		

Introduction

Prepared as the culmination of the process of formulating a National Environmental Management Strategy (NEMS), this Action Strategy outlines the key programs deemed necessary to address the major environmental issues facing the Republic of the Marshall Islands during the five-year period 1992–1996. For full understanding, this document is best read in conjunction with the Republic of the Marshall Islands NEMS Part A: State of the Environment Report 1992. The culmination of a six-month period of consultation between Marshallese leaders and environmental specialists regarding environmental management needs, the State of the Environment Report comprehensively describes the nation's most pressing environmental problems and resource-use conflicts, and identifies priority areas for response.

A National Task Force on Environmental Management and Sustainable Development comprising the Permanent Secretary or Director of all relevant government agencies oversaw the development of the State of the Environment Report and hosted the first ever National Seminar on Environmental Management, October 9–11, 1991 in Majuro. This National Seminar brought public and private sector leaders together to discuss the findings of the State of the Environment Report and to plan appropriate response strategies. Distilled from issues identified in the State of the Environment Report and responses developed at the National Seminar, this Action Strategy represents a uniquely Marshallese plan for the protection and sustainable development of the environment. Although intrinsically important as the first truly prospective attempt to manage the nation's environment, the special significance of this Action Strategy lies in the fact that representatives from all sectors played active roles in its development.

Reflecting the wide variety of environmental problems facing the nation and the perceived need to involve a range of agencies in environmental management activities, the aim of this Action Strategy is broad. The document is organized into four chapters,

and sets forth strategies and programs for addressing issues as diverse as hazardous waste management and sea level rise. In the first chapter, the principles and mechanisms which will guide the implementation of the Action Strategy are explained. Composing the bulk of the document, the second chapter outlines the proposed strategies, and briefly describes programs for their implementation. The third chapter contains detailed program profiles for programs described in Chapter 2 which are deemed suitable for soliciting donor agency support, as part of technical cooperation programs. Lastly, the fourth chapter contains a table which summarizes the programs by subject area and shows their ranking in order of priority, as established by the National Task Force on Environmental Management and Sustainable Development.

The programs outlined herein target public education, training, technical assistance and infrastructure development. Total cost of the programs which are profiled in this document reach approximately \$10 million. All monetary values are given in 1992 US dollars.

Principles for implementation



1.1 Marshallese ownership

The implementation and further development of the Action Strategy for Environmental Management will at all stages be directed by the government and people of the Marshall Islands. Marshallese "ownership" of both the process and the product is imperative. Already, several aspects have been incorporated into the process to foster this principle. These have included the close involvement of senior government officials and the oversight of the National Task Force on EMSD. At all stages, the local consultants and residents of Majuro employed by the RMIEPA have sought to encourage support and commitment from key persons in the public and private sectors. Continued government support will be critical in the implementation phase of the NEMS. In many cases, relevant government agencies will be required to demonstrate their commitment in financial terms by funding specific projects which fall under their responsibility.

Established by Cabinet in 1991, the National Task Force on EMSD has performed an extremely valuable and constructive role in developing the NEMS. It is crucial that this role continues during the implementation phase of the NEMS (1992-1996), with the Task Force overseeing the execution of specific programs and periodically evaluating overall progress towards Strategy implementation. Accordingly, conversion of the Task Force on EMSD into a permanent Environmental Advisory Council, under the terms of the National Environment Protection Act (1988), is highly recommended.

1.2 Cross-sectoral involvement

The scope of the environmental problems facing the Marshall Islands necessitates a cross-sectoral approach, involving a range of authorities in environmental management programs. Although the RMIEPA is designated as the lead agency in the environmental arena, it is not alone in this arena. A number of other

agencies with important environmental responsibilities must be closely involved in the implementation of the NEMS. These agencies can best develop their environmental roles by maintaining close liaison and cooperation with other relevant agencies, and by nominating officers to represent departmental interests in the environmental forum. Specifically, representation and involvement at both the permanent secretary level, perhaps through the National Task Force on EMSD, and the program officer level, perhaps through training programs and working groups, will be of paramount importance during the implementation of the first NEMS, 1992-1996.

1.3 Regional cooperation

A number of agencies are active in environmental management in the Pacific. The major regional organization is the South Pacific Regional Environment Programme (SPREP) which offers considerable expertise in the area of environmental management. SPREP can provide a regional perspective on some of the issues of concern to the Marshall Islands. In several instances the problems confronting the Marshall Islands are faced by other countries in the Pacific, and approaches tried elsewhere may be applicable here. In addition, a number of regional programs will be implemented through SPREP in the next five years, including the Biodiversity Program and the Climate Change Program. Through SPREP, the Republic of the Marshall Islands can become closely involved with these important initiatives. As a source of expertise and a clearing house for appropriate technologies, SPREP can be of valuable assistance during the implementation of environmental programs in the Marshall Islands.

In addition, a number of bilateral and multilateral donor agencies such as the Asian Development Bank (ADB) and the Australian International Development Assistance Bureau (AIDAB) offer assistance in the development of environmental programs. Several non-governmental organizations including the World Wild-

life Fund (WWF), The Nature Conservancy (TNC), and the World Conservation (IUCN) are also active in this area. Under the Compact of Free Association, the Republic of the Marshall Islands has access to assistance from the US Environmental Protection Agency (USEPA); the US Departments of Interior (USDOI), Agriculture (USDA), and Fish and Wildlife (USFWS); the National Oceanic and Atmospheric Administration (NOAA), Sea Grant; and the Pacific Islands Network (PIN). Such agencies should be closely involved in the development and implementation of environmental programs in the Marshall Islands, wherever possible.

1.4 Environmental Impact Assessment

Throughout the Pacific, there is an increasing awareness of the importance of Environment Impact Assessment (EIA) as a step preliminary to the implementation of development projects. By offering an opportunity for the environmental impacts of development proposals to be considered at an early stage of project development, EIA allows the incorporation of environmental protection factors into project implementation. As such, EIA has been recognized as a significant factor in ensuring that sustainable development occurs in Pacific countries, and has been declared mandatory by a number of donor agencies including the Asian Development Bank.

As indicated in the Part A: State of the Environment Report 1992, and in discussion at the National Seminar on Environmental Management, the need for EIA is clear in the Marshall Islands. Although some legal provisions have been made in national Acts, EIA policies and procedures are poorly developed at present.

It is thus recommended that formal procedures be developed at the national and local levels to incorporate EIA procedures into decision-making processes. Appropriate training which is practically oriented and addresses major environmental issues will also be necessary to establish such procedures.

1.5 Central involvement of the RMIEPA

The RMIEPA is the lead environmental agency in the Marshall Islands. To maximize its effectiveness during the implementation of the NEMS, it must be equipped with the appropriate skills and infrastructure. Specifically, its role as a key liaison and coordinator, both between the various agencies in the Marshall Islands and between the Republic and international and regional environmental organizations, must be strengthened. It is also imperative that the RMIEPA be adequately represented on all relevant planning and development bodies, such as the National Planning Coordination Committee (NPCC), and the Board of the Marshall Islands Development Bank.

1.6 Periodic progress evaluation

The Task Force on Environmental Management and Sustainable Development should conduct annual reviews of progress. Evaluations of progress should be used to direct the next year's activities toward Strategy implementation.

Action strategies

Twelve strategies are presented below, along with brief sketches of programs for their implementation. Specific programs deemed appropriate for solicitation of external funding are denoted by an asterisk (*) in the margin. For these selected programs, detailed program profiles are presented in Chapter 3, below. All program profiles may be found in Chapter 3 by their cross-referenced number.





Strategy I Anticipating sea level rise

Background

In the international forum, the atoll nations of the Pacific have repeatedly expressed concern over the threat posed by projected sea level rise to their sovereignty and uniqueness as distinct cultures. When addressing the United Nations in September 1991, the Honorable Amata Kabua, President of the Republic of the Marshall Islands, unequivocally stated that global warming is the most formidable problem facing the Republic. As discussed in NEMS Part A (Chapter 3, Section 3.2.1, "Climate change and sea level rise"), scientific data supports this assertion.

Response strategies including accommodation, protection and retreat options could help the nation to cope with the anticipated effects of sea level rise. Such response strategies should be based on quantitative data which describes projected physical, ecological and socioeconomic impacts. Long-term studies are required to establish time-series databases for use in developing and implementing such response strategies. As a relatively highly developed atoll, Majuro offers the world a unique opportunity to establish a scientific laboratory in one of the world's most vulnerable habitats.

Goals

- 1) To support efforts of regional organizations such as the Alliance of Small Island States (AOSIS) which seek to raise concern for the possible consequences of sea level rise.
- 2) To participate actively in the Intergovernmental Negotiating Committee established by the United Nations to develop a Convention on Climate Change.
- 3) To develop strategies for response to sea level rise as projected by the IPCC, based on long-term, quantitative studies.
- 4) To integrate implementation of these response strategies with development plans, taking all feasible measures to alleviate the effect of sea level rise on the land and the people.

Programs

**1.1 Establishing a center for climate change studies*

This program will establish a center for national and regional investigation of the physical, economic, ecological and sociopolitical impacts of projected climate change.

1.2 Planning for sea level rise

This program will develop response options to projected sea level rise, taking into account probable physical, ecological and socioeconomic impacts (pipeline).



Strategy 2 Strengthening environmental education programs

Background

As discussed in NEMS Part A (Chapter 3, Section 3.1.6, "Education") the majority of the environmental challenges facing the nation are the results of modern processes, and necessitate modern solutions. The present lack of public awareness of environmental issues undermines conservation efforts. As effective

long-term environmental management will require an informed and supportive public, this strategy seeks to expand environmental education programs and to achieve higher levels of interagency coordination of education efforts.

Goals

- 1) To increase public awareness of environmental issues.
- 2) To increase public support for environmental management efforts.

Programs

**2.1 Strengthening RMI Environmental Protection Authority Education Unit*

This program will strengthen the existing public education program at the RMI Environmental Protection Authority by establishing a well-equipped media center and training staff in desktop layout, video dubbing, underwater photography, public speaking and other media.

2.2 Establishing interagency environmental education board

To establish an interagency board, with representatives from the Ministries of Education, Social Services, Health and Public Works as well as the RMI Environmental Protection Authority, Marshall Islands Marine Resources Authority and Majuro Atoll Local Government, which oversees and coordinates environmental education programs.

**2.3 Expanding vocational training in environmental management*

This program will expand existing vocational training programs to include topics relating to sanitation and vector control, and to make this training available to atoll preservation officers, fisheries extension officers, water plant operators and laboratory technicians.

**2.4 Training teachers in environmental education*

This program will develop lesson plans and teaching aids which incorporate environmental education into core courses, and will train teachers in their use during annual in-service teacher training program.



Strategy 3 Improving disposal of solid & hazardous waste

Background

Complete discussion of issues relating to the accumulation of solid and hazardous waste on land and in water is contained in NEMS Part A (Chapter 3, Section 3.2.2, "Solid waste accumulation"). In summary, solid waste accumulation and poor landfill design contribute to the eutrophication of coastal waters, the contamination of groundwater, and the spread of vector-borne diseases. Hazardous materials such as poly-

chlorinated biphenyls (PCBs) and cyclogen emulsifiers, stockpiled in four different atolls, are inadequately protected from the elements. Disposal of hazardous wastes generated on a daily basis by the urban centers (such as used automobile oil or batteries) is generally inadequate. Also, infectious wastes from the nation's two hospitals are burned by faulty incinerators.

Goals

- 1) To improve collection and disposal systems for both solid and hazardous waste, and to reduce the waste stream.
- 2) To improve landfill design and operation in Majuro, Kwajalein, Jaluit and Wotje atolls.

Programs

***3.1** *Improving hazardous waste disposal system*

This program will develop and implement:

- 1) a system for the secure storage, regular collection and safe disposal of hazardous wastes by incineration, and
- 2) the non-polluting disposal of hazardous wastes.

***3.2** *Improving solid waste disposal system*

This program will improve systems for the collection and disposal of solid wastes, the management of landfills and garbage pits, and the operation of incinerators.

***3.3** *Establishing anti-littering public education campaign*

This program will launch a public education campaign to reshape public attitudes concerning the disposal of waste.

***3.4** *Establishing a gabion assembly unit*

This program will investigate the feasibility of establishing a small gabion assembly unit in the Marshall Islands to meet domestic needs.

***3.5** *Establishing mandatory deposit on aluminium cans*

This program will encourage recycling of aluminium cans by passing local ordinances in both urban centers which require a five-cent deposit per can at time of purchase. To enhance efficacy of existing recycling efforts.



Strategy 4 Improving sewage disposal & management

Background

Inadequate sewage disposal causes eutrophication of coastal waters, pollution of ground wells, and the spread of vector-borne diseases, among other environmental problems. As stated in NEMS Part A (Chapter 3, Section 3.2.5 "Eutrophication and pollution of coastal waters"), there is a lack of public awareness of

these issues, and infrastructure for sewage disposal is inadequate. This strategy aims to improve the effectiveness of sewage disposal and management systems through public education and capital works programs.

Goals

- 1) To improve sewage disposal infrastructure in both urban and rural areas.
- 2) To raise public awareness of environmental issues stemming from improper disposal of sewage.

Programs

*4.1 Expanding sewerage capital works

This program will:

- 1) construct water seal toilet facilities at all public schools presently lacking them,
- 2) construct sewerage hookups at the two docks on Majuro and one dock on Ebeye, so that ships in port can access the public sewer system,
- 3) purchase sewage trucks for Majuro and Ebeye which can be used to transfer waste from septic tanks to the public sewerage system, and
- 4) provide technical assistance to outer atoll communities for construction of toilets for each household.

*4.2 Improving sewerage outfall design

This program will:

- 1) investigate the efficiency of the present sewerage outfalls on Majuro and Ebeye, and recommend design improvements (pipe-line), and
- 2) upgrade/extend the sewerage outfalls.

4.3 Repairing sewage treatment facilities on government ships

This program will effect repair to the sewage treatment facilities of the government's three field trip (micro-class) ships.

4.4 *Conducting environmental hygiene education campaign*

This program will design and conduct a comprehensive public education campaign, emphasizing the public health problems associated with inadequate sewerage facilities, poor solid waste disposal, and insufficient water supply.

***4.5** *Expanding housing improvement loan program*

This program will establish a line of credit through the Marshall Islands Development Bank to finance low-interest loans for the construction of toilet facilities.



Strategy 5 Enhancing fresh water supply

Background

As explained in detail in NEMS Part A, fresh water problems are twofold: supply is one major issue, and water quality is the other. For a discussion of water quality issues see NEMS Part A (Chapter 3, Section 3.2.4, "Contamination of fresh water supply"). Strict rationing of water resources is necessary because collection and storage facilities are inadequate. The development of new industry which will require large volumes of water (such as fish canneries) intensifies the need to address this problem. Enhancement of the fresh water supply is therefore of high priority for sponsoring sustainable development.

The public water supply is already supplemented by individual roof catchment systems, but cisterns are generally far too small for the average household size.

The Housing Act requires the construction of water catchments on new buildings but this requirement is not always met. Also, many older houses and most public buildings and churches have neither gutters nor cisterns. No special lending provision to encourage construction of water catchments presently exists.

Current plans for augmenting the public water system on Majuro include tapping the Laura groundwater lens (with an anticipated daily yield of an additional 400,000 gallons); and investigating the feasibility of constructing a floating catchment system in the Majuro lagoon (at an estimated cost of \$22 million). A decision to purchase a desalination plant for Majuro atoll was made in early 1992.

Goals

- 1) To augment the supply of potable water to both urban and rural communities.
- 2) To enhance safe usage of groundwater on outer islands for domestic supply.

Programs

***5.1** *Extending rural sanitation project*

This program will extend the outer island rainwater catchment construction program to each house in the proposed regional centers of Jaluit and Wotje atolls.

***5.2** *Expanding urban rainwater catchment construction program*

This program will make the main urban centers of Majuro and Ebeye more self-reliant with respect to potable water supply.

***5.3** *Extending rainwater catchment maintenance training to outer islands*

This will involve instituting a major training program in the outer islands on:

- 1) the maintenance of rainwater catchments to avoid pollution risk, and
- 2) water conservation. (Such training would also be an element of all construction programs, for example, Program profiles 5.1 and 5.2.)

***5.4** *Expanding water quality monitoring program*

This ongoing program will be further strengthened to permit extension of periodic sampling to urban household rainwater cisterns.

***5.5** *Establishing groundwater assessment program*

This program will:

- 1) determine lens sizes and characteristics in the populated outer islands,
- 2) determine safe rates of utilization to reduce risk of saltwater intrusion, and
- 3) prepare optimal placement plans for new groundwater wells.

***5.6** *Extending loans for outer island rainwater catchments*

This program will encourage the purchase or construction by householders of larger and better-designed rainwater cisterns.

***5.7** *Establishing a cistern manufacture facility*

This program will augment the capacity of private industry to fabricate larger, portable, fiberglass cistern designs for use in the household water catchment programs.

5.8 *Improving the water distribution system in Majuro*

This program will improve the existing water distribution system to allow eradication of illegal “tap-ins”.



Strategy 6 Managing marine and coastal resources for sustainability

Background

Exploitation of marine resources, both renewable and nonrenewable, is targeted for future emphasis by the current national development policy. In the face of dwindling revenues from the sale of copra, and diminishing funds under the Compact of Free Association, the nation has set the priority of developing reef and pelagic fisheries, and mariculture farms.

As explained in NEMS Part A (Chapter 3, Section 3.2.6, "Destruction of coral reefs"), coral reef degradation, especially in Majuro and Kwajalein, is already a major environmental issue facing the nation. Major contributors to the degradation include suction and bucket dredging, sandmining, and boat and ship anchorages. Also, landfilled causeways linking several islets

of Majuro atoll cause stagnation of the lagoon water, and consequent loss of marine life.

Although the Marine Resources Authority Act (MIMRA Act) allows for the development of marine conservation regulations, none are presently in existence. Also, recent reef fisheries development projects do not include any provisions for resource conservation. No marine resource database exists, and time series data for scientific assessment of resource management is not maintained. In this setting, the potential for over-exploitation is evident. This strategy attempts to redress some of these shortcomings, by better equipping the nation to make wise resource-use decisions.

Goals

- 1) To improve data collection on resource exploitation.
- 2) To strengthen control of marine resource exploitation.

Programs

***6.1** *Establishing a marine resource management information system (MARIS)*

This program will develop:

- 1) a marine resource management information system, with mapping capabilities, to aid the decision-making process for sustainable management of marine resources, and
- 2) a database for the MARIS, storing information on type, abundance and location of marine resources.

***6.2** *Developing marine resource conservation regulations*

This program will develop and enforce:

- 1) marine conservation regulations pursuant to the MIMRA Act, regulating the exploitation of renewable resources, establishing size and season limits, and defining rotation schemes, and
- 2) legislation controlling the mining of sea bed minerals.

-
- 6.3** *Creating network of fisheries extension agents* This program will establish a network of fisheries extension agents in outer atolls, to offer technical assistance and serve as resource persons providing marine conservation education and coordinating routine data collection.
-
- *6.4** *Strengthening Division of Lands & Surveys* This program will collate and organize all existing maps of topography, bathymetry and cadastrals as well as aerial photographs and satellite imagery, in order to aid the planning of fisheries and mariculture projects, and to ensure informed decisions relating to coastal zone management.
-
- *6.5** *Improving causeway design in urban areas* This program will conduct a pre-feasibility study to assess various possibilities for improving the design of existing causeways on Majuro and Ebeye (including culverts and bridges) to improve the exchange of water between lagoon and ocean (flushing).
-
- *6.6** *Establishing coastal zone management program* This program will develop coastal zone management plans for Majuro, Kwajalein, Jaluit and Wotje pursuant to the Coast Conservation Act 1988. A master plan for the extraction of construction materials will be included in each plan, designating the most suitable locations for dredging and sandmining activities, and specifying suitable design for inter-island causeways and bridges.
-
- 6.7** *Developing marine biodiversity conservation program* This program will involve active participation in the South Pacific Regional Environment Programme's marine turtle conservation program and the South Pacific Commission's tuna tagging program.
-
- 6.8** *Promoting giant clam & trochus mariculture* This program will promote the mariculture of heavily exploited species such as giant clam and trochus. It will strengthen community outreach and the mariculture farmers cooperative by providing educational programs at the Likiep Demonstration Center.



Strategy 7 Enhancing the social & built environment

Background

Encompassing all aspects of the way of life of the people of the Republic, issues impacting the social and built environment include population growth and public health as well as housing, urban planning, and demographic trends. (See NEMS Part A, Chapter 2, Section 2.2.2, "Urbanization", and Chapter 3, Section 3.1.4, "Zoning laws and building specifications" for discussion of housing conditions and urbanization.)

A root cause of many environmental issues, the nation's population growth rate (4.2 per cent per annum) is among the highest in the world. As explained in NEMS Part A (Chapter 2, Section 2.2.1, "Rapid population growth"), current demographic trends are dominated by rapid population growth and urbanization. Today, two-thirds of the population

live on roughly ten per cent of the nation's land area (approximately 45 per cent of the nation's population lives on Majuro atoll and 21 per cent on Ebeye Island). And, despite initial national efforts to curb population growth, the average woman still bears eight children.

The wide-ranging implications of these factors include high levels of urban unemployment, a general breakdown of traditional values, and increased demand for education and health services. These problems call for an effective and coordinated response. A National Population Policy developed during 1991, which aims to reduce the population growth rate while encouraging a more even population distribution, will be implemented during the period of this Action Strategy, 1992-1996.

Goals

- 1) To increase awareness of the environmental impacts of population growth and rapid urbanization among decision makers.
- 2) To implement policies aimed at minimizing the impact of population growth and urbanization on the environment.
- 3) To implement appropriate systems of urban planning, including zoning and building codes, which minimize the adverse environmental impacts of urbanization.

Programs

- | | |
|-------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| *7.1 <i>Expanding population education campaign</i> | This program will develop public education campaigns, focusing on the environmental impacts of population growth. |
| 7.2 <i>Integrating population & environment issues</i> | This program will ensure representation of appropriate environmental agencies on population related committees. |
| *7.3 <i>Investigating alternate energy sources</i> | This program will examine the feasibility of developing alternative energy sources, with particular reference to photovoltaic systems and OTEC. |
| *7.4 <i>Developing consumer protection program</i> | This program will develop a system in the Marshall Islands to monitor domestic and imported food products for bacterial contamination. |



Strategy 8 Protecting special areas & species

Background

Although the Marshall Islands offers important natural sanctuaries to seabirds and turtles, there is currently no framework for the establishment of nature parks and reserves. Thus, areas of special conservation significance, such as the northern atolls of Bikar and Taongi, are afforded no formal protection.

For the conservation of such areas, there is a need to develop a legal framework which is sensitive to the Marshallese system of land tenure. Any attempt to establish a protected areas system must feature mechanisms which sufficiently compensate landowners for the non-development of their land. In general, the declaration of reserves would be seen as an attempt to remove the land from the control of landowning groups.

The concept of "eco-tourism" has evolved as one process by which landowners are encouraged to conserve their natural resources, while still reaping economic benefit from their land. This scheme has

enjoyed success in some countries, as it does not compromise the ultimate managerial control of the customary owners. Projected tourist activities in the Marshall Islands would be mainly sea-oriented, including scuba diving, fishing, sailing, and enjoying sea food.

Recognizing the potential for tourism development, the Republic in 1991 created MIVA, the Marshall Islands Visitors Authority as a sub-unit of the Ministry of Resources and Development. MIVA has initially targeted the development of small-scale tourist accommodations on outer islands. Funding for such development is being extended by the MIDB. As a fledgling organization, though, the capacity of MIVA requires strengthening in the areas of administration, publicity and coordination. (See NEMS Part A, Chapter 3, Section 3.2.8, "Over-exploitation of renewable resources"; Chapter 1, Section 1.4, "Endangered species"; and Appendix 3, "State of the cultural environment", for related discussions.)

Goals

- 1) To protect special ecosystems, sites and species, with special attention to those already identified by resource inventories.
- 2) To foster the long-term maintenance of biodiversity within the Marshall Islands.
- 3) To enhance the capability of the Marshall Islands Visitors Authority to develop eco-tourism in the outer atolls.

Programs

8.1 Developing nature conservation legislation

This program will develop enabling legislation for the establishment of a nature parks unit within the RMI to have specific responsibilities for the identification and management of protected areas in the Marshall Islands (pipe-line).

***8.2** *Establishing network of protected areas*

This program will:

- 1) develop systems of reserve protection appropriate to existing conventions of land tenure and customary usage, and
- 2) create a network of marine and terrestrial protected areas of special scientific, historical or scenic significance.

8.3 *Creating interagency conservation body*

This program will further develop coordinating mechanisms between the RMIEPA and the MIMRA with relevant international and regional conservation programs such as the SPREP Biodiversity Program, to enhance natural resource protection efforts in the Marshall Islands.

***8.4** *Developing eco-tourism*

This program will develop a range of initiatives aimed at strengthening the capability and capacity of the Marshall Islands Visitors Authority to promote eco-tourism in the outer atolls.



Strategy 9 Protecting cultural values & practices

Background

As explained NEMS Part A (Appendix 3, "State of the cultural environment") traditional Marshallese culture is rooted in reef exploitation and agroforestry cultivation. Respect for and close harmony with the environment was a central component of this lifestyle. The values of sharing and cooperation were emphasized and many unique skills, such as traditional Marshallese navigation, were perpetuated.

Urbanization and the emergence of the cash economy have contributed to a general erosion of traditional values. Also, the use of the Marshallese language is decreasing and many important skills are being lost.

Although these trends are most noticeable in urban areas, they are also evident in outer atolls.

Generally, existing programs aimed at conserving and promoting Marshallese language and culture have originated from the Alele Museum and the Historic Preservation Office. In addition, these two agencies recently took measures to protect sites of special significance to Japanese, American, or German visitors, dating from World War II and from the earlier Japanese and German colonial occupations (See NEMS Part A, Appendix 2, "History and government structure" for historic details).

Goals

- 1) To protect the unique culture of the Marshall Islands.
- 2) To apply customary knowledge to contemporary land and marine management practices.
- 3) To enhance the use and development of the Marshallese language.

Programs

- | | |
|-----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.1 <i>Developing cultural resource management plans</i> | This program will develop and implement national and local cultural resource management plans (pipeline). |
| 9.2 <i>Developing cultural resource regulations</i> | This program will develop and implement: <ol style="list-style-type: none"> 1) regulatory procedures for identifying, ranking and protecting cultural and historical resources, and 2) permitting procedures to monitor access to historical sites and the export of cultural and historical resources (pipeline). |
| 9.3 <i>Establishing historic site register</i> | This program will develop a National Register of all historic and cultural sites. |

- | | |
|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| *9.4 <i>Developing cultural resource education programs</i> | This program will develop curricula and training programs for educators and trainers relating to cultural resource management. |
| *9.5 <i>Assessing modern applications of traditional knowledge</i> | This program will involve the preparation of a feasibility study on the application of traditional knowledge and technology to contemporary management practices. |
| *9.6 <i>Documenting cultural resources</i> | This program will document cultural resources including local resources, skills and knowledge (pipeline). |
| 9.7 <i>Establishing network of cultural preservation officers</i> | This program will establish a network of atoll cultural preservation officers at the community level (pipeline). |



Strategy 10 Strengthening environmental legal instruments

Background

Environmental instruments are the means by which environmental action is taken. Such instruments empower management tools (such as environmental impact assessment, monitoring and regulation) and establish delivery mechanisms, including institutions and procedures. As discussed in NEMS Part A (Chapter 5, Section 5.2.3, "Ensuring environmentally responsible decision making"), improved interagency coordination, the further development of legal instruments, and institutional strengthening are required for further strengthening environmental management.

An unqualified success of the NEMS process in the Republic of the Marshall Islands has been the formation and operation of a high-level Task Force on EMSD. The opportunity exists for that Task Force to be redesignated as an Environmental Advisory Council to the EPA, under the National Environment Protection Act. Such a move would do much to ensure the continuance of the greatly improved communications on environmental matters between government departments, and between the public and private sectors, which were established by the NEMS process.

To further strengthen open communications throughout government, it would be advisable for each ministry or local government to select motivated staff whose role it would be to ensure that the environmental values associated with each agency's area(s) of functional responsibility are upheld. That is, each agency would establish a "watchdog" environmental unit, a focal point for communication with EPA. Meeting on a regular basis, representatives from each environmental unit could serve as a subcommittee to the Environmental Advisory Council.

As explained in Part A, the legislative base for mandatory EIA exists although regulations have not yet been promulgated, and EIA procedures have not yet been formalized (NEMS Part A, Chapter 3, Section 3.1.1, "EIA procedures"). There is an immediate need to develop EIA procedures through a consultative process engaging all relevant government agencies. Legal regulations are also needed to facilitate the enforcement of environmental protection stipulations when necessary. Integration of these regulations with customary law should specifically be investigated.

Institutional strengthening and capacity building is required in the RMIEPA and the MIMRA, the two agencies with primary responsibility for environmental management. The environmental planning and management capabilities of both agencies are severely constrained by inadequate funding and by an undersized, although dedicated, cadre of environmental specialists. At RMIEPA the technical and professional staff are very thinly spread over a range of environmental protection areas including water quality monitoring (3), public information (2), technical advice (1), legal counsel (1), solid waste (1) and earthmoving (vacant). At MIMRA, marine resource management program has yet to be formally developed. Additional human resources and financial support are needed for both agencies.

Goals

- 1) To incorporate environmental planning and impact assessment integrally with all government policy and program development.
- 2) To develop and consistently apply Environmental Impact Assessment (EIA) procedures.
- 3) To redress legislative and regulatory deficiencies through development of appropriate environmental instruments.
- 4) To develop appropriate penalties for environmental damage, taking into account traditional penal customs and codes.
- 5) To strengthen the institutional capabilities of the Republic necessary to achieve national and regional environmental goals.

Programs

10.1 *Transforming National Task Force on EMSD into Environmental Advisory Council*

This program will:

- 1) transform the Task Force on EMSD into an Environmental Advisory Council under the National Environment Protection Act, and
- 2) establish environmental units within all government ministries to serve as a subcommittee of the Environmental Advisory Council.

***10.2** *Developing standard Environmental Impact Assessment (EIA) procedures*

This program will:

- 1) establish EIA as an appraisal mechanism to be applied to all development proposals as routinely as economic and financial appraisals, and
- 2) establish simple guidelines for using EIA.

***10.3** *Strengthening capabilities of environmental institutions*

This program will strengthen the institutional and infrastructural capability of the nation's main environmental agencies, the EPA and the MIMRA, and train staff selected for participation in environmental units in all government ministries.

***10.4** *Reviewing efficacy of existing environmental legal instruments*

This program will identify and analyze legal issues relating to the environment, making recommendations as to means to increase the efficacy of existing legislation and regulations to meet environmental management needs.



Strategy 11 Managing agricultural resources for sustainability

Background

Representing less than 0.01 per cent of the nation's total area, land is critical for the support of human life and for economic development. Furthermore, the characteristic poor quality of soil is a major constraint to agricultural development. There is a need for careful management to ensure that the finite land resources of the Republic can be managed on a sustainable basis. Several environmental concerns arise from agricultural activities. Generally, the underdeveloped soils of the atolls inhibit agricultural development (See NEMS Part A, Appendix 1, "Additional Environmental description"). Pig and chicken farming creates effluent which is of environmental concern. Also, the use of

pesticides in agriculture may have adverse effects on the environment, although little is currently known about residue levels and the long-term impacts on the Marshall Islands environment.

Quarantine controls on the importation and inter-island movement of plants and animals are currently inadequate, constituting a significant risk for the introduction of agricultural pests and diseases. Although small-scale, previous attempts at building up soil through composting have been successful. A number of agricultural extension agents have been posted in the outer islands to support agricultural program activities.

Goals

- 1) To establish a national soil conservation program, including a community outreach component.
- 2) To expand agricultural production to meet domestic consumption and export needs.
- 3) To develop markets for agricultural products on Majuro, Ebeye and Kwajalein.

Programs

11.1 Improving quarantine enforcement

This program will improve the enforcement of quarantine regulations.

11.2 Developing natural resource information systems

This program will develop relevant natural-resource information systems, to assist rational land-use decision making.

*11.3 Establishing soil conservation education program

This program will develop a public education campaign directed at encouraging soil conservation methods and composting.

***11.4** *Training Agricultural
Extension Officers*

This program will train agricultural extension agents in composting, soil conservation, and fundamental environmental and nature conservation principles to enhance their management skills and environmental extension role.

***11.5** *Researching appropriate pest
control methods*

This program will involve research on pest control methods suitable for the Marshall Island environment.

***11.6** *Developing pesticide
regulations*

This program will:

- 1) develop and enforce national pesticide regulations to control the importation, storage, use and disposal of pesticides, and
- 2) prepare and distribute lists of banned, controlled, and restricted pesticides.



Strategy 12 Anticipating environmental emergencies

Background

Although fierce storms rarely travel through the Marshall Islands, they are devastating when they do occur. The Disaster Preparedness Committee established after the 1979 flooding of urban Majuro is a permanent body which mobilizes as soon as storm warnings are received. Strengthening of this committee would help to minimize the impacts of future storms.

Likewise, the possibility of a major marine oil spill may seem remote, given the track record. But, since oil

tankers do travel over the jagged reefs of the Marshall Islands every month, the possibility for such an occurrence does exist. Environmental planning must take into account this possibility, and consider measures to minimize the impacts on marine resources in the event of such a spill. (See NEMS Part A, Chapter 3, Section 3.2.9, "Potential environmental emergencies" for related details.)

Goals

- 1) To develop an oil spill response capability through (a) supporting efforts to develop a regional capability to respond swiftly to a major oil spill, (b) training local staff in oil spill response procedures so they can play an effective role in the event of a response action.
- 2) To raise level of government preparedness for coping with the aftermath of a typhoon or major storm.

Programs

12.1 Training technicians in oil spill response

This program will continue the conducting of workshops by the US Coast Guard on oil spill response, involving personnel from all relevant public and private agencies.

12.2 Acquiring oil spill response equipment

Under this program, necessary equipment will be procured and other infrastructure developed which will better permit an early initial response by the government to a major oil spill.

Specific programs for strategy implementation

Detailed program profiles for selected programs briefly described in Chapter 3 are presented below. The profiles are designed to serve two functions. First, as templates which can be further expanded and used as the basis for program proposals, they are expected to be useful to the government. Second, as an indication of possible projects to be implemented under the strategies described in the previous chapter, they are expected to be useful to donor agencies. By no means exhaustive nor fully developed, the profiles are presented as guiding frameworks.

All monetary values are given in 1992 US dollars. A fiscal year spans the period October 1 – September 30; FY 1992 refers to the fiscal year 1991–1992.



Program profile 1.1

Establishing a center for climate change studies

- Aim and scope** To establish and equip office and laboratory facilities for use by the world scientific community in studying the impacts of projected climate change and sea level rise.
- Description** The program seeks to establish research facilities in Majuro for use by the global scientific community in studying the possible effects of climate change on low-elevation atoll nations. A partnership arrangement with a major university would help to ensure the continuity of studies at the center.
- Cost estimates** Funding is sought for an initial period of three years. With one-time costs of \$175,000 and recurrent expenses of \$25,000 per year ($\$25,000 \times 3$), total funds sought are \$250,000.

Item	Cost \$US	
	One-time	Recurrent per year
Building with labs & equipment	175,000	
Operation & maintenance		25,000
Total cost \$US 250,000		

- Executing agencies** RMI Environmental Protection Authority and College of the Marshall Islands.
- Potential benefits** Would place the Marshall Islands in the forefront of those countries actively supporting research on the global climate change issue.
- Potential issues** Nil.
- Processing/timing** FY 1993.

Program profile 2.1

Strengthening Republic of the Marshall Islands Environmental Protection Authority Education Unit

Aim and scope	To strengthen the existing public education program at the RMI Environmental Protection Authority.
Description	The importance of public education for the achievement of environmental goals in the Marshall Islands is a recurrent theme in Part A: State of the Environment Report 1992. As the lead agency for environmental management in the Marshall Islands, the RMI Environmental Protection Authority currently has an environmental education unit which carries out activities such as the preparation of materials for school children and making regular radio broadcasts on environmental issues. Although the achievements have been significant, the effectiveness of the program is greatly constrained by a lack of trained staff and proper equipment. This program seeks to enhance the effectiveness of this educational program through the provision of technical assistance to provide staff training and develop appropriate educational materials, and through the purchase of needed equipment to support ongoing education efforts.
Cost estimates	Funds sought include one-time costs (\$50,000) and recurrent costs for two years (\$70,000 x 2), totaling \$190,000.

Item	Cost \$US	
	One-time	Recurrent per year
Technical Assistant — 2 years		50,000
Equipment & supplies <i>including video & underwater cameras</i>	50,000	
Printing <i>booklets, poster, bumper stickers, etc.</i>		20,000
Total cost \$US 190,000		

Executing agencies	RMI Environmental Protection Authority and Ministry of Education.
Potential benefits	<ol style="list-style-type: none"> 1) Increased community awareness of environmental issues. 2) Enhanced long-term capability of RMI Environmental Protection Authority to plan and implement environmental education programs. 3) Increased involvement of individuals and community groups in environmental programs.
Potential issues	Coordination with South Pacific Regional Environmental Programme, Sea Grant, and Pacific Islands Network.
Processing/timing	FY 1993 – FY 1996.

Program profile 2.3

Expanding vocational training in environmental management

- Aim and scope** To expand existing vocational training programs to include areas such as vector control and the construction of septic tanks and water catchments.
- Description** This program will train staff from various ministries in a range of environmental areas. The focus will be on the development of practical skills among those that are directly involved in program implementation. Staff to be involved will include atoll preservation officers, fisheries extension officers, water plant operators and laboratory technicians. This training will involve the use of external trainers but will call on local expertise whenever possible. Trainers will be expected to develop educational materials for use in the courses, and train RMI Environmental Protection Authority personnel in their use prior to the termination of the technical assistance period.
- Cost estimates** One-time project costs are \$30,000. Eighteen months of technical assistance (\$45,000 x 1.5) will cost \$67,500. Total funding sought is \$97,500.

Item	Cost \$US	
	One-time	Recurrent per year
Technical Assistant		45,000
Materials	10,000	
Travel costs	20,000	
Total cost \$US 97,500		

- Executing agencies** RMI Environmental Protection Authority and Office of Planning and Statistics.
- Potential benefits**
- 1) Increased delivery of practical environmental projects such as construction of septic tanks.
 - 2) Increased level of community health.
 - 3) Enhanced work force skills.
- Potential issues** The development of this course will require close liaison between the RMI Environmental Protection Authority and the Office of Planning and Statistics. There is potential for the involvement of a number of agencies in an advisory role, such as the East-West Center and the South Pacific Commission.
- Processing/timing** FY 1992 – FY 1994.

Program profile 2.4

Training teachers in environmental education

- Aim and scope** To develop environmental education materials and train teachers to use them.
- Description** Because teachers play a vital role in shaping community attitudes to the environment, it is important that they be endowed with the skills to teach environmental science. This program addresses the need to develop these skills through two avenues. First, it seeks to develop lesson plans and teaching aids for environmental education at elementary, secondary and post-secondary levels. Secondly, it seeks to develop teaching skill through the development and incorporation of an "environmental education" component into the existing summer in-service teacher training program, which is operated by the College of the Marshall Islands and the Ministry of Education. Curricula will be developed, based on the development of environmental education teaching aids specifically tailored to the Republic of the Marshall Islands.
- Cost estimates** This one-year program involves \$45,000 of one-time costs, and \$45,000 of recurrent costs. Funding is sought for one year of the program, totaling \$90,000.

Item	Cost \$US	
	One-time	Recurrent per year
Technical Assistant to develop teaching materials — 12 months		45,000
Printing & materials	40,000	
Workshop costs	5,000	
Total cost \$US 90,000		

- Executing agencies** Ministry of Education, with RMI Environmental Protection Authority.
- Potential benefits**
- 1) Increased awareness of environmental issues among younger generations.
 - 2) Heightened ability of teachers to teach environmental material.
 - 3) Strengthened working link between RMI Environmental Protection Authority and Ministry of Education.
- Potential issues** Coordination with Pacific Islands Network and Sea Grant activities.
- Processing/timing** FY 1992 – FY 1995.

Program profile 3.1

Improving hazardous waste disposal system

- Aim and scope** To institute a system for the collection and safe disposal of hazardous wastes generated in the Republic.
- Description** This program calls for:
- 1) the commissioning of short-term technical advice on provision of suitable containers for storage of hazardous wastes generated daily at scientific laboratories and garages,
 - 2) development of procedures for safe collection and storage for disposal, and
 - 3) supply and installation of suitable incinerators for disposal of hazardous and contagious wastes.
- Cost estimates** One-time project costs are estimated at \$215,000. Operation and maintenance for an initial period of two years totals \$60,000 (\$30,000 x 2). Total funding sought is \$275,000.

Item	Cost \$US	
	One-time	Recurrent per year
Technical Assistant — 21 days	15,000	
2 incinerators supply & installation	200,000	
Operation & maintenance incinerators		30,000
Total cost \$US 275,000		

- Executing agencies** Ministry of Health Services and RMI Environmental Protection Authority.
- Potential issues** Special attention to air pollution aspects of the incinerators is required.
- Processing/timing** FY 1993.

Program profile 3.2

Improving solid waste disposal system

Aim and scope	To improve systems of solid waste collection and disposal, the management of landfills and garbage pits, and the operation of incinerators.
Description	The program entails: <ol style="list-style-type: none"> 1) advice on appropriate design and maintenance of landfills, 2) provision of equipment for collection and management of solid waste, 3) investigation of affordable approaches to the disposal of bulky wastes such as old cars, 4) an expansion of the current RMI Environmental Protection Authority solid waste monitoring program to Ebeye, Jaluit and Wotje.
Cost estimates	Funding for an initial two-year period totals \$350,000. Recurrent costs (\$50,000 x 2) account for \$100,000, while one-time expenses for equipment total \$250,000.

Item	Cost \$US	
	One-time	Recurrent per year
Technical Assistant <i>Waste Disposal Engineer, develop & institute improved waste disposal & management programs — 2 months</i>		20,000
Expansion of RMIEPA solid waste monitoring program to Ebeye, Jaluit and Wotje <i>hire 3 technicians</i>		30,000
Supply of 6 garbage trucks	250,000	
Total cost \$US 350,000		

Executing agency	Majuro Atoll Local Government, Ministry of Public Works, Marshall Islands Development Authority.
Potential benefits	Provides long-term solution to chronic solid waste accumulation problems which are already well-developed in Majuro and Ebeye, and can be expected to grow in Jaluit and Wotje.

- Potential issues** Hiring the Waste Disposal Engineer under the Technical Assistance Program must to be timed with the purchase of garbage trucks.
- Processing/timing** The need is urgent. Processing of funding requests to support the acquisition of garbage trucks and dumpsters should receive highest priority to permit implementation in FY 1993.

Program profile 3.3

Establishing anti-littering public education campaign

Aim and scope To foster the concept of littering and improper disposal of wastes as anti-social behaviors through education programs, anti-littering penalties and other inducements.

Description Program includes:

- 1) technical assistance to design and assist in delivering a public education campaign about littering and disposal into lagoons and oceans,
- 2) development of communally appropriate and culturally sensitive approaches to enforcement of anti-littering regulations.

Cost estimates Funding for an initial period of two years is sought, totaling \$50,000. Of this total, \$30,000 represents one-time costs, while \$20,000 reflects estimated recurrent costs for two years (\$10,000 x 2).

Item	Cost \$US	
	One-time	Recurrent per year
Technical Assistant design education campaign — 3 months	30,000	
Materials for campaign		10,000
Total cost \$US 50,000		

Executing agencies RMI Environmental Protection Authority with Majuro Atoll Local Government and Kwajalein Atoll Development Authority.

Potential issues Should be implemented together with Program 3.5

Processing/timing Community consultation on issue to commence with FY 1992; engagement of consultants/TA to commence FY 1993.

*Program profile 3.4***Establishing a gabion assembly unit**

Aim and scope	To investigate the prospect of producing gabions locally, as a small private business venture, for use in the landfill programs on Majuro and Ebeye.
Description	Economic and financial feasibility study of the manufacture/assembly, preferably in a regional center (Jaluit or Wotje), of plastic-coated gabions to engineering specification for use in landfill containment and other coastal protection needs.
Cost estimates	Estimated cost of \$US 20,000 for feasibility study with full economic, financial and environmental appraisal.
Executing agencies	Division of Manufacturing and Trade of the Ministry of Resources and Development, with Marshall Islands Development Authority.
Potential issues	Nil.
Processing/timing	FY 1992.

Program profile 4.1

Expanding sewerage capital works

Aim and scope	To improve the management of sewage through a major capital works program.				
Description	<p>This capital works program seeks to address the present shortcomings of sewage disposal systems in the Marshall Islands through four specific activities:</p> <ol style="list-style-type: none"> 1) construction of water seal toilet facilities at all public schools presently lacking them, 2) construction of sewerage hookups at the two docks at Majuro and at the one dock at Ebeye, 3) purchase of sewage trucks for Majuro and Ebeye which can be used to transfer waste from septic tanks to the public sewerage system, and 4) provision of technical assistance to outer island communities for construction of toilets for each household. 				
Cost estimates	All costs foreseen are one-time, and total \$400,000.				
	Item	Cost \$US			
		<table border="0" style="width: 100%;"> <tr> <td style="width: 50%;"></td> <td style="text-align: center;">One-time</td> <td style="text-align: center;">Recurrent per year</td> </tr> </table>		One-time	Recurrent per year
	One-time	Recurrent per year			
	Installation of water seal toilets at schools \$5,000 per unit x 50 schools	250,000			
	Construction of sewerage hookups	50,000			
	Purchase of 2 sewage trucks	80,000			
	Technical Assistant	20,000			
	Total cost \$US 400,000				
Executing agency	Capital Improvements Project.				
Potential benefits	<ol style="list-style-type: none"> 1) Improved water quality. 2) Improved public health. 3) Teaching children to utilize toilets. 				
Potential issues	Nil.				
Processing/timing	FY 1992 – FY 1995.				

Program profile 4.2

Evaluating sewerage outfall design

Aim and scope	To investigate the efficiency of the current sewerage outfalls on Majuro and Ebeye and recommend design improvements; and to upgrade/extend the outfalls.
Description	In both of the urban centers of the Marshall Islands, the adequacy of current sewerage outfalls requires re-evaluation, particularly in light of recent population growth and the planned extension of the manufacturing sector. Several factors could affect the future efficiency of the present systems. First, a planned fish cannery and transshipment facility could greatly increase waste-water effluent being discharged by the Majuro sewerage outfall. Second, a planned causeway between Ebeye and Gugeegue Islands could prevent lagoon flushing of the Ebeye sewerage outfall, located on the lagoon side of the island. The potential effects of these possibilities require assessment, and necessary outfall design changes should be made accordingly.
Cost estimates	Investigation of efficiency of current outfalls, 21 days of engineering technical assistance, \$US 50,000.
Executing agency	Capital Improvements Project.
Potential benefits	1) Improved public health. 2) Improved management of waste. 3) Improved water quality.
Potential Issues	This program deals only with needs assessment; detailed costing for sewerage outfall modification, if required, would be prepared subsequently.
Processing/timing	FY 1993.

Program profile 4.5

Expanding housing improvement loan program

- Aim and scope** To establish a line of credit through the Marshall Islands Development Bank (MIDB) to finance low-interest loans for the construction of toilet facilities.
- Description** There are currently a large number of houses in the Marshall Islands that do not have toilets. This program aims to establish incentives for the establishment of toilets in as many households as possible. It would involve liaison with the Marshall Islands Development Bank and implementation of a small education program to promote the scheme.
- Cost estimates** Funds totaling \$210,000 are sought for the initial three years of the program. A one-time sum of \$150,000 is needed to establish a line of credit, and \$60,000 is need for the first three years (\$20,000 x 3).

Item	Cost \$US	
	One-time	Recurrent per year
Initial grant to establish line of credit at MIDB	150,000	
2 additional bank staff to process loans & maintain programme		20,000
Total cost \$US 210,000		

- Executing agencies** Marshall Islands Development Bank.
- Potential benefits**
- 1) Increased number of houses in the Marshall Islands with toilets.
 - 2) Improved public health.
 - 3) Improved water quality.
- Potential issues** Nil.
- Processing/timing** FY 1993 – FY 1995.

Program profile 5.1

Extending rural sanitation program

Aim and scope To extend the Rural Sanitation Program, originally funded by United States Environmental Protection Agency, to the newly designated regional centers of Jaluit and Wotje, constructing water catchments and toilets on a household-by-household basis.

Description Provide each house on Jaluit and Wotje which is not equipped with a rainwater catchment system or water-seal toilet with the necessary materials for self-help construction under supervision of a sanitation specialist. Currently about 50 houses lack these facilities. Houses currently equipped with water catchments would have cistern size increased to 1000 gallons, sufficient to supply basic drinking and cooking needs for the average household for 30 days (at 4 gallons per head per day). Training would be provided in catchment maintenance.

Cost estimate Funds totaling \$355,000 are sought for the program's initial three years. One-time costs are estimated at \$250,000, whereas recurrent costs are estimated at \$105,000 (\$35,000 x 3).

Item	Cost \$US	
	One-time	Recurrent per year
Construction of water catchments & toilets \$4,000 per house for 50 houses	200,000	
Supplies cement, fiberglass tanks, etc. \$1000 per house x 50	50,000	
Sanitation specialists 2 x \$15,000 per year		30,000
Travel Costs		5,000
Total cost \$US 355,000		

Executing agencies RMI Environmental Protection Authority and Ministry of Interior and Outer Islands Affairs.

Potential benefits	<ol style="list-style-type: none">1) Reduced reliance on limited groundwater resources, facilitating water-dependent development.2) Improved public health.3) Improved coastal and fresh water quality, reducing eutrophication and the spread of water-borne disease.
Potential issues	The Rural Sanitation Project which built toilets and catchments on Arno and Ailinglaplap from 1987–1991, has run out of funding. In order to utilize existing staff skills and maintain administrative continuity, this project requires immediate funding.
Processing/timing	FY 1992 – FY 1994.

Program profile 5.2

Expanding urban rainwater catchment construction program

- Aim and scope** To promote the self-reliance of the urban centers, Majuro and Ebeye, with respect to potable water supply.
- Description** The aim of the program is to finance the construction of 2,500 rainwater catchments over a five-year period (about 1700 on Majuro and 800 on Ebeye). The program would have an initial design element to develop specifications for improved types of rainwater catchment systems which are simple to install and have low maintenance requirements. A part of the program would be the initiation of a major training program covering 1) the maintenance of rainwater catchments to avoid pollution risk, and 2) innovative water conservation methods.
- Cost estimates** Total estimate of \$5.18 million, comprising a loan of \$5,000,000 which is drawn down over a five-year period, plus a technical assistance component of \$150,000 for water catchment design and training which is piggy-backed to the loan. A direct RMI contribution of \$100,000 is forecast for vehicles and other ancillary support.

Item	Cost \$US	
	One-time	Recurrent per year
Water catchment design	50,000	
Water catchment installation 2,500 catchments x 2,000	5,000,000	
Training program hiring 3 technicians & 1 trainer, travel & on-costs		100,000
Equipment & supplies		30,000
Total cost \$US 5,180,000		

- Executing agencies** Marshall Islands Development Authority and Capital Improvements Project on Majuro and Kwajalein Atoll Development Authority on Ebeye
- Potential benefits** 1) Reduced reliance of urban centers on limited fresh water lenses.
2) Expansion of urban water supply.

Potential issues Data used in making the above calculations was obtained from the Census of Population and Housing, 1988. Only some of the houses built since would have rainwater catchments, while very few would have cistern sizes of 1000 gallons. Thus, to have all households suitably equipped with water catchments, 2,500 is a low estimate.

Processing/timing TA component in FY 1993 and loan component in FY 1994.

Program profile 5.3

Extending rainwater catchment maintenance training to outer islands

Aim and scope	To institute a program of training in the outer islands on the maintenance of rainwater catchments to avoid pollution risk.
Description	This program complements proposed Programs 5.1 and 5.2 on water catchment construction in the regional centers of Wotje and Jaluit, and in the urban centers of Majuro and Ebeye. (This program would be initially directed specifically at those islands where regular sampling of cisterns by the RMI Environmental Protection Authority for water quality analysis is impractical.)
Cost estimates	Implementation of this training program is proposed over an initial two-year period, and involves the recruitment of a technician with water catchment maintenance expertise. Materials to modify existing catchments with screens and taps to allow cleaning will also be provided. Because of extensive air and boat travel to outlying islands, the travel component of costs is high. An approximate cost of \$240,000 (\$110,000 recurrent cost x 2 years, with \$20,000 for single purchase of equipment) is estimated.

Item	Cost \$US	
	One-time	Recurrent per year
Technical Assistant, water catchment expert — 2 years including on-costs & recruitment		60,000
Travel TA & 2 RMIEPA specialists		50,000
Ancillary equipment	20,000	
Total cost \$US 240,000		

Executing agencies	Ministry of Interior and Outer Islands Affairs with RMI Environmental Protection Authority.
Potential benefits	1) Improved public health on outer atolls. 2) Increased supply of fresh water, facilitating development.
Potential issues	Need for coordination of training effort with training elements of ongoing water catchment programs of the Rural Sanitation Program (see Program profile 5.1).
Processing/timing	FY 1992 – FY 1994.

Program profile 5.4

Expanding water quality monitoring program

- Aim and scope** To expand the current water quality monitoring program of the RMI Environmental Protection Authority to allow periodic sampling of urban household rainwater cisterns.
- Description** Through this program routine sampling and analysis of water stored in household cisterns in the Majuro and Ebeye urban areas would become possible. Sampling is currently only undertaken on request; any further sampling would be beyond the laboratory's capacity. The program will require the recruitment of an additional laboratory technician for the Majuro laboratory and the further expansion of the Ebeye laboratory.
- Cost estimate** Funding would be sought for a three-year period in the first instance, with recurrent costs of \$33,000 per year and one-time costs estimated at \$15,000. The estimated project total is \$114,000.

Item	Cost \$US	
	One-time	Recurrent per year
Salary of additional Technician		15,000
Travel		5,000
Equipment & supplies		10,000
Vehicle	15,000	3,000
Total cost \$US 114,000		

- Executing agency** Republic of the Marshall Islands Environmental Protection Authority
- Potential benefits**
- 1) Raise the level of awareness of the need for improved water storage maintenance and practices.
 - 2) Provide early warning of potential problems such as further outbreaks of typhoid fever.
- Potential issues** Ebeye samples requiring extensive analysis would be stabilized and flown to Majuro. However, some analytical procedures must be conducted within 24 hours of sample collection, necessitating strengthening of the Ebeye microbiological laboratory facilities.
- Processing/timing** Immediate FY 1993.

Program profile 5.5

Establishing groundwater assessment program

- Aim and scope** To promote safe and sustainable use of the groundwater lenses in populated outer islands.
- Description** Program includes the:
- 1) determination of lens size and characteristics in the populated outer islands, including estimation of safe rates of utilization to minimize risk of saltwater intrusion, and
 - 2) preparation of optimal placement plans for new groundwater wells with respect to the lens characteristics and location of likely sources of pollution.
- Cost estimates** Funding of \$490,000 for two years is sought. Recurrent expenses including the salary for a groundwater hydrologist, constitutes \$380,000 of this total (\$190,000 x 2), while commissioning of drilling equipment, and logistical support constitutes most of the balance. An initial sum of \$30,000 for the preparation of a detailed project proposal in FY 1993 is included in this total.

Item	Cost \$US	
	One-time	Recurrent per year
Groundwater Hydrologist — 2 years		150,000
Bore-drilling rig purchase	50,000	
Ship transportation rig & crew	30,000	
Preparation of program drilling & pumping tests	30,000	
Drill Crew 2 local hires		40,000
Total cost \$US 490,000		

- Executing agency** Capital Improvements Project.
- Potential benefits** 1) Improved planning for groundwater utilization in the outer islands.
2) Lower incidence of groundwater pollution.
- Potential issues** Nil.
- Processing/timing** FY 1993 for program design; implementation in FY 1994 – FY 1995.

Program profile 5.6

Extending loans for outer island rainwater catchments

- Aim and scope** To encourage the purchase or construction of larger, better-designed rainwater cisterns in the private sector.
- Description** This program is seen as a necessary backup to Program profile 5.2, which is concerned primarily with the installation of new water catchments for private dwellings which lack them. The aim of this program is to encourage the installation of larger rainwater cisterns in those households which have water catchments of inadequate size. By establishing a line of credit through the Marshall Islands Development Bank, the program will make soft loans available to householders specifically for this purpose.
- Cost estimates** Funding of \$1,030,000 is sought. Fiberglass cisterns costing \$1400 each are to be purchased for 1500 households, the total cost of such an upgrade program therefore being estimated at \$2.1 million. Initially, it is proposed that a line of credit of \$1 million be extended to the Marshall Islands Development Bank for lending to residents of Majuro and Ebeye. Recurrent costs for two years of administering the program are estimated at \$30,000 (\$15,000 x 2).

Item	Cost \$US	
	One-time	Recurrent per year
Establish line of credit, MIDB	1,000,000	
Administrative costs		15,000
Total cost \$US 1,030,000		

- Executing agencies** Marshall Islands Development Authority (technical aspects) and Marshall Islands Development Bank (loan appraisal and management)
- Potential benefits** 1) Increased self-sufficiency of private sector with respect to potable water.
2) Reduction of water shortage-related problems, including poor sanitation and lack of economic opportunity.
- Potential issues** Should be followed, in the period 1997–2001, by a similar activity in outer islands.
- Processing/timing** FY 1994 (establish line of credit and loan procedures);
FY 1995 (begin accepting loan applications).

Program profile 5.7

Establishing a cistern manufacture facility

- Aim and scope** To establish a facility in the Marshall Islands for the manufacture of portable, fiberglass cisterns for use in the household water catchment Programs (5.1, 5.2, 5.3, 5.6).
- Description** To make available to the private sector a government-subsidized soft loan to finance the manufacture of lightweight, portable water tanks of 1000-gallon and 2000-gallon capacity, to specification. This may require the adaptation of overseas designs to ensure tanks will be self-flushing. Purchase of multiple molds will be necessary to meet the volume of production needed.
- Cost estimate** Project cost is estimated at a total of \$130,000, including \$100,000 for establishing a line of credit with the Marshall Islands Development Bank, plus \$30,000 for development of design adaptations for appropriate cistern manufacture. There are no recurrent costs.

Item	Cost \$US	
	One-time	Recurrent per year
Establish line of credit with MIDB	100,000	
Develop design adaptations of cisterns	30,000	
Total cost \$US 130,000		

- Executing agencies** The Marshall Islands Development Authority together with the Division of Manufacturing and Trade of the Ministry of Resources and Development.
- Potential benefits**
- 1) Create jobs and stimulate local economy.
 - 2) Improve balance of trade.
 - 3) Increase national self-sufficiency.
- Potential issues** Immediate implementation is necessary to ensure a supply of cisterns necessary for implementation of the water catchment programs. Otherwise, the use of more expensive imported products will be required.
- Processing/timing** FY 1992.

Program profile 6.1

Establishing a marine resource management information system (MARIS)

- Aim and scope** To establish a resource management information system within the Marshall Islands Marine Resources Authority to maintain and provide ready access to database on marine resource location, abundance and condition.
- Description** Four-part institutional strengthening program to be implemented over a period of 24 months.
- 1) Purchase and installation of a management information system, with mapping capabilities and a marine resource database at MIMRA.
 - 2) Hiring of a resource information system specialist to provide technical assistance and train staff members in the use and maintenance of database and MARIS for a period of twelve months.
 - 3) Execution of baseline inventories of renewable marine resources by a qualified survey team, for each atoll targeted for commercial exploitation in immediate future (storing information in database).
 - 4) Development of programs for routine collection of marine resource data by fisheries extension officers, emphasizing the development of local capabilities for the long-term benefit of the program.
- Cost estimate** Funding totaling \$690,000 is sought for an initial two-year period of project implementation. \$570,000 of this sum represents one-time expenses associated with capacity building, while \$120,000 is designated for technical assistance.

Item	Cost \$US	
	One-time	Recurrent per year
Technical Assistant <i>management information systems specialist</i>		60,000
Computer equipment <i>including MIPS & GIS</i>	50,000	
Resource inventories	500,000	
Training programs for Fisheries Officers	20,000	
Total cost \$US 690,000		

- Executing agency** Marshall Islands Marine Resources Authority.
- Potential benefits**
- 1) Improved ability to make informed marine resource management decisions.
 - 2) Enhanced ability to maintain data in a continuous and uniform way.
- Potential issues** Should be coordinated with 1992 technical assistance package from Asian Development Bank, to establish a Project Management Unit at Marshall Islands Marine Resources Authority.
- Processing/timing** FY 1992 – FY 1995:
FY 1992 (install MARIS, collate existing information, train technical staff);
FY 1993 (conduct baseline inventories);
FY 1994 (train Fisheries Officers).

Program profile 6.2

Developing marine resource conservation regulations

Aim and scope	To obtain technical assistance for a period of five months to draft marine resource regulations which are sensitive to the national context, and legislation controlling mining of the sea bed.
Description	<p>Program seeks to:</p> <ol style="list-style-type: none"> 1) develop regulations pursuant to Marshall Islands Marine Resources Authority Act (MIMRA Act) which stipulate specific requirements for marine resource conservation to be incorporated into fisheries development projects, which are also sensitive to the land tenure system, and 2) develop legislation controlling mining of the sea bed for minerals.
Cost estimate	This six-month technical assistance project is estimated to cost \$US 60,000 . Housing and office facilities to be provided by the executing agency.
Executing agency	Marshall Islands Marine Resources Authority.
Potential benefits	Provide legal basis for a marine resource conservation program, with the authority to enforce against violators. Short-term funding could lead to a line-position for legal counsel.
Potential issues	Regulations developed should be sensitive to land tenure system. Should be implemented together with Program 6.1 to ensure local ability to implement and enforce the regulations is developed.
Processing/timing	FY 1992.

Program profile 6.4

Strengthening Division of Lands & Surveys

Aim and scope To strengthen the Division of Lands and Surveys of the Ministry of Resources and Development by expanding library of relevant maps.

Description Collation of all existing maps of the nation's bathymetry, topography, physiography and ownership lines. Assessment of future mapping needs with respect to planning resource conservation, coastal zone management, response strategies for sea level rise, and eco-tourism development.

Cost estimate Implementation of project over three months totals nearly \$30,000.

Item	Cost \$US	
	One-time	Recurrent per year
Technical assistance	15,000	
Travel & communication	7,000	
Purchase of maps & satellite imagery	5,000	

Total cost \$US 27,000

Executing agency Ministry of Resources and Development.

Potential benefits 1) Improved access to existing maps, enhancing ability to plan responses to sea level rise and to over-exploitation of marine resources.
2) Assessment of needs will provide direction for future mapping efforts.

Potential issues Nil.

Processing/timing FY 1993.

Program profile 6.5

Improving causeway design in urban areas

Aim and scope	To study the feasibility of improving the design of the present landfilled causeways on Majuro and Kwajalein atolls.
Description	Two-phase project: <ol style="list-style-type: none"> 1) pre-feasibility study to assess various options for improving design of landfilled causeways of Majuro and Ebeye, and 2) upgrade of causeways to improve the exchange of water between lagoon and ocean (flushing).
Cost estimate	
Phase I	Pre-feasibility study The pre-feasibility study, requiring an in-depth study of current and wind patterns, water exchange rates, and coastal processes, is to be implemented over a period of 2 months, at an estimated cost of \$US 50,000 .
Phase II	Improvement of causeways The cost of opening causeways and constructing culverts or bridges will be estimated by the pre-feasibility study. Initial estimates, to re-open four causeways on Majuro atoll, are about \$US 10 million .
Executing agencies	Marshall Islands Development Authority and Capital Improvements Projects.
Potential benefits	Improvement of causeway design could significantly reduce coastal erosion, improve lagoonal water quality, and reduce flooding of urban Majuro during storms.
Potential issues	Changes to landfilled causeways may affect settlers who have taken up residence on the causeways.
Processing/timing	FY 1993 – FY 1995 (pre-feasibility study and improvement of causeways).

Program profile 6.6

Establishing a coastal zone management program

- Aim and scope** To develop coastal zone management plans, pursuant to the Coast Conservation Act 1988, for the urban centers, Majuro and Ebeye, and the regional centers, Jaluit and Wotje.
- Description** The development of coastal zone management plans, taking into account inventories of coastal resources and their uses, development priorities and natural dynamics, for the two urban centers, Majuro and Ebeye, and the two regional centers, Jaluit and Wotje. Plans should designate suitable locations for dredging, sandmining and mariculture operations, and suitable design of inter-island causeways and bridges.
- Cost Estimate** The implementation of this technical assistance project over a period of 2 years is expected to total approximately \$160,000. \$150,000 represents the recurrent costs of technical assistance (\$75,000 x 2) and \$10,000 the cost of equipment.

Item	Cost \$US	
	One-time	Recurrent per year
Technical Assistant planner — 2 years		60,000
Travel		15,000
Equipment	10,000	

Total cost \$US 160,000

- Executing agencies** RMI Environmental Protection Authority, with Office of Planning and Statistics and Marshall Islands Marine Resources Authority.
- Potential benefits** Coastal zone management plans could lead to significant reductions in problems related to coastal construction and erosion, overcrowding and sanitation.
- Potential issues** Coastal zone management plan must be compatible with land tenure system, and must be developed in close consultation with traditional leadership.
- Processing/timing** FY 1992 – FY 1994.

Program profile 7.1

Expanding population education program

Aim and scope To develop a public education program focusing on the environmental impacts of population growth, as part of ongoing population education campaigns by the Ministry of Health Services and the Office of Planning and Statistics.

Description This program seeks to link population growth to environmental issues, as part of a broader education campaign. Technical assistance to design a program focusing specifically on the environmental impacts of population growth will be recruited. As part of the consultancy, educational materials and information programs will be designed.

Cost estimate The one-year program is estimated to cost \$65,000; \$45,000 for technical assistance and \$20,000 for materials and publicity.

Item	Cost \$US	
	One-time	Recurrent per year
Consultant — 1 year		45,000
Materials/publicity	20,000	
Total cost \$US 65,000		

Executing agencies RMI Environmental Protection Authority, with Office of Planning and Statistics and Ministry of Education.

Potential benefits

- 1) Increased awareness of the environmental impacts of high population growth rates.
- 2) Increased support for National Population Policy, resulting in lower birth rate.

Potential issues Requires close liaison between all executing agencies.

Processing/timing FY 1992 – FY 1993.

Program profile 7.3

Investigating alternate energy sources

- Aim and scope** To determine the feasibility of developing alternative energy sources, including photovoltaic systems and ocean thermal energy conversion (OTEC).
- Description** This program proposes a detailed review of the feasibility of extending the use of photovoltaic systems to all populated outer atolls, and of establishing an OTEC facility at Majuro. It further proposes to establish a demonstration unit of photovoltaic cells on an outer atoll, training residents in its use and maintenance.
- Cost estimates** Total costs for this short-term feasibility study are \$135,000. There is no recurrent cost component.

Item	Cost \$US	
	One-time	Recurrent <i>per year</i>
Feasibility study	40,000	
Training workshop, photovoltaic systems maintenance	5,000	
Installation of demonstration system	90,000	
Total cost \$US 135,000		

- Executing agencies** Ministry of Resources and Development.
- Potential benefits** Could lead to provision of a cheap, effective power source for outer islands.
- Potential issues** The expertise of the South Pacific Commission Rural Technology Program may be useful in implementation.
- Processing/timing** FY 1993 – FY 1995.

Program profile 7.4

Developing consumer protection program

Aim and scope To develop a program for routine monitoring of domestic and imported food products for bacterial contamination.

Description To develop legislation and a systemized program of food surveillance for bacterial contamination. Legislation would be developed to set regulatory standards in relation to food safety. High-risk foods would be monitored on a regular basis, including eggs and poultry from the government commercial poultry farm in Laura. In support of the program, one technician will be trained in food sampling and analysis.

Cost estimates The project total is estimated at \$110,000 over a two-year period. One-time expenses include provision of short-term legal consultancy, and equipment and supplies. Recurrent expenses totaling \$80,000 include the cost of training a technician at a regional university for two years (\$25,000 × 2), and the salary for an additional technician hired to implement the program (\$15,000 × 2).

Item	Cost \$US	
	One-time	Recurrent per year
Consultant		
<i>draft regulations — 21 days</i>	15,000	
Training of Technician — 2 years		25,000
Equipment & supplies	15,000	
Salary of Technician		15,000
Total cost \$US 110,000		

Executing agencies Consumer Protection Board and RMI Environmental Protection Authority.

Potential benefits Protection of the health of consumers, residents, business visitors and tourists from poisoning due to bacterial contamination.

Potential issues Nil.

Processing/timing FY 1992 – FY 1994.

Program profile 8.2

Establishing network of protected areas

Aim and scope To develop:

- 1) legal basis for the establishment of protected areas appropriate to the existing systems of land tenure and customary usage, and
- 2) a network of marine and terrestrial protected areas of special scientific, historical and/or scenic importance.

Description This program aims to develop a system of protected areas in the Marshall Islands. The initial stage will be development of the legal framework to provide protection to special areas. Identification of the most significant sites warranting protection will be the second step. The establishment of reserves may involve direct compensation to landowners, through direct remuneration or through subsidy of eco-tourism developments. An effective program of landowner education, to explain the rationale for the establishment of such reserves, will be required.

Cost estimates Total project cost is estimated at \$250,000, constituting one-time expenses only.

Item	Cost \$US	
	One-time	Recurrent per year
Consultant		
develop legal framework for protection — 30 days	15,000	
Identification of special sites	20,000	
Compensation payments to landowners		
establish trust fund	200,000	
Landowner education campaign	15,000	
Total cost \$US 250,000		

Executing agencies RMI Environmental Protection Authority, with Ministry of Resources and Development and Marshall Islands Marine Resources Authority.

Potential benefits Protection of important ecosystems and species.

Potential issues Some funding for this program may be available from the South Pacific Biodiversity Conservation Program, to be implemented through the South Pacific Regional Environmental Programme from 1993.

Processing/timing FY 1993 – FY 1996.

Program profile 8.4

Developing eco-tourism

- Aim and scope** To encourage, through commercially oriented tourism ventures, the conservation of natural resources and their sustainable use.
- Description** Through institutional strengthening of the Marshall Islands Visitors Authority, this program seeks to promote eco-tourism within the Republic, especially in the outer islands. External funding assistance is sought to achieve the following goals:
- 1) recruitment of two staff whose time is fully dedicated to tourism promotion,
 - 2) lease or construction of a small building in the vicinity of the Alele Museum as a Tourist Information Center,
 - 3) preparation of handout brochures on eco-tourism prospects within the Republic, and
 - 4) preparation of a special brochure on Marshallese customs to be given to all expatriates arriving at the airport.
- Cost estimate** Funding for an initial period of two years is sought, totaling \$190,000. Construction of the Tourist Information Center is estimated to cost \$50,000, and recurrent expenses including salaries, publications, and operation and maintenance is estimated to total \$140,000 (\$70,000 x 2).

Item	Cost \$US	
	One-time	Recurrent per year
Salary for 2 staff		40,000
Construction of building	50,000	
Lease of land		5,000
Maintenance of building & grounds		5,000
Publications		20,000
Total cost \$US 190,000		

- Executing agency** Ministry of Resources and Development.
- Potential issues** Nil.
- Processing/timing** FY 1993.

Program profile 9.4

Developing cultural resource education programs

- Aim and scope** To develop curricula and training programs for educators and trainers relating to cultural conservation.
- Description** This program seeks to increase the level of awareness within the community regarding the importance of cultural resources. Two paths will be pursued. There will be development of:
- 1) appropriate curricula for schools, and
 - 2) training programs for educators.
- Targeting school children and educators has significant potential for shaping long-term community attitudes towards cultural resource conservation.
- Cost estimate** This short-term technical assistance project is estimated to cost \$45,000. There are no recurrent costs.

Item	Cost \$US	
	One-time	Recurrent per year
Consultant to prepare educational materials & conduct teacher training workshops	30,000	
Materials & publications	15,000	
Total cost \$US 45,000		

- Executing agencies** Alele Museum and Historic Preservation Office, with Ministry of Education.
- Potential benefits**
- 1) Increased community appreciation of traditional culture.
 - 2) Increased awareness of the need for cultural conservation.
- Potential issues** Should be integrated with other cultural resource preservation programs.
- Processing/timing** FY 1993 – FY 1995.

Program profile 9.5

Assessing modern applications of traditional knowledge

- Aim and scope** To prepare a feasibility study on the application of traditional knowledge and technology to contemporary resource management efforts.
- Description** The traditional culture of the Marshallese people centered around a balanced exploitation of natural resources, which ensured their long-term conservation. This controlled exploitation was based on a wealth of traditional knowledge with significant implications for resource protection. This program aims to determine how traditional knowledge could best be incorporated into contemporary management practices.
- Cost estimates** Total estimated cost for this short-term technical assistance request is \$60,000. There are no recurrent costs.

Item	Cost \$US	
	One-time	Recurrent per year
Consultant <i>to study methods of incorporating traditional knowledge into management regimens — 6 months</i>	45,000	
Materials/travel	15,000	
Total cost \$US 60,000		

- Executing agencies** Alele Museum and Historic Preservation Office.
- Potential benefits** 1) Improved management of resources.
2) Increased awareness of the traditional culture among younger generations.
- Potential issues** Nil.
- Processing/timing** FY 1993 – FY 1995.

Program profile 9.6

Documenting cultural resources

- Aim and scope** To document cultural resources including local resources, skills and knowledge.
- Description** A major constraint to the implementation of effective cultural resource management programs in the Marshall Islands is the lack of knowledge of existing cultural resources. This program will address this deficiency by documenting cultural resources using photographs, audio tapes, pen and ink renderings, and videos.
- Cost estimate** Initially, funding is sought for two years, bringing program total to \$125,000. Recurrent costs, including salaries and supplies, constitute \$100,000 of this total (\$50,000 x 2), and one-time costs for material, supplies and travel total \$25,000.

Item	Cost \$US	
	One-time	Recurrent per year
3 staff members to document resources		30,000
Equipment, materials, & travel	25,000	20,000
Total cost \$US 125,000		

- Executing agencies** Alele Museum and Historic Preservation Office.
- Potential benefits**
- 1) Improved information base for cultural resource management planning.
 - 2) Increased appreciation of Marshallese culture among younger generations.
- Potential issues** The collection of some cultural information may be sensitive so some information may have to remain confidential.
- Processing/timing** FY 1993 – FY 1995.

Program profile 10.2

Developing standard Environmental Impact Assessment procedures

- Aim and scope** 1) To establish Environmental Impact Assessment (EIA) procedures which are automatically applied to all development proposals, and
2) develop simple guidelines for undertaking EIA which can be understood and uniformly applied.
- Description** Under this program, an in-country workshop will be held at which a sub-committee of the Task Force on Environmental Management and Sustainable Development develops EIA procedures which involve RMI Environmental Protection Authority and the National Planning Coordination Committee. Such guidelines would include project classification for EIA treatment, appraisal procedures, Cabinet submission requirements, public consultation, and EIA funding procedures.
- Cost estimates** This one-time workshop is estimated to cost \$17,000.

Item	Cost \$US	
	One-time	Recurrent per year
EIA Instructor — 2 weeks	15,000	
Materials & publicity	2,000	
Total cost \$US 17,000		

- Executing agencies** RMI Environmental Protection Authority with assistance from South Pacific Regional Environmental Programme.
- Potential benefits** Greatly improved capacity to protect environmental values.
- Potential issues** Should be coordinated with development of coastal zone management plans (see Program profile 6.6).
- Processing/timing** FY 1993.

Program profile 10.3

Strengthening capabilities of environmental institutions

- Aim and scope** To strengthen the environmental management capabilities of the nation's main environmental agencies, the RMI Environmental Protection Authority and Marshall Islands Marine Resources Authority, through staff training. The program would also extend to training of designated personnel in other government agencies.
- Description** Under this program, a review of the institutional and infrastructural status of both the RMI Environmental Protection Authority and the Marshall Islands Marine Resources Authority will be conducted; weaknesses will be identified and recommendations for improvements made. Staff training needs will also be assessed and specific training programs developed through consultation.
- Cost estimate** This short-term technical assistance project is estimated to cost \$62,000.

Item	Cost \$US	
	One-time	Recurrent per year
Consultant <i>evaluate needs for institutional strengthening & design training programs — 21 days</i>	15,000	
Travel/accommodation	7,000	
Training programs	40,000	
Total cost \$US 62,000		

- Executing agencies** RMI Environmental Protection Authority and Marshall Islands Marine Resources Authority, with assistance from South Pacific Regional Environmental Programme.
- Potential benefits** Staff competent in Environmental Impact Assessment.
- Potential issues** Nil.
- Processing/timing** FY 1993 – FY 1995.

Program profile 10.4

Reviewing efficacy of existing environmental legal instruments

Aim and scope To identify legal issues relating to the environment, and to evaluate the adequacy of existing legislation for environmental management needs.

Description Technical assistance will be hired to:

- 1) review existing legislation and associated administrative procedures and structures relevant to environmental management,
- 2) critically evaluate the effectiveness of this legislation in addressing current environmental issues, and
- 3) recommend appropriate amendments, structures and procedures.

Cost estimate This short-term technical assistance project is estimated to cost \$22,000.

Item	Cost \$US	
	One-time	Recurrent per year
Legal consultant — 30 days	15,000	
Travel/accommodation	5,000	
Printing	2,000	
Total cost \$US 22,000		

Executing agencies RMI Environmental Protection Authority and South Pacific Regional Environmental Programme.

Potential benefits Identification of legal shortcomings and recommendations for their correction could lead to a strengthened framework for legal protection of natural resources.

Potential issues This program will be implemented under the umbrella of the Asian Development Bank-funded Regional Environmental Technical Assistance being provided to the Republic through the South Pacific Regional Environmental Programme.

Processing/timing FY 1992.

Program profile 11.3

Establishing soil conservation education program

- Aim and scope** To develop and implement a public education program directed at encouraging soil conservation methods and composting.
- Description** This program will develop a public information program encouraging soil conservation, and promoting composting as a method of soil production. Composting methods will be demonstrated at the Laura farm, and short seminars will be held for farmers from outer atolls. A central composting facility will be established for Majuro atoll, where organic waste will be shredded and composted rather than buried in the public landfill.
- Cost estimate** Funds are sought for an initial period of 2 years, totaling \$155,000. One-time costs associated with establishing the program constitute \$135,000 of this total, and recurrent costs are estimated at \$20,000 (\$10,000 x 2).

Item	Cost \$US	
	One-time	Recurrent per year
Trainer — 12 months	45,000	
Travel	10,000	
Equipment & materials	50,000	
Construction & maintenance central composting facility	30,000	10,000
Total cost \$US 155,000		

- Executing agencies** Ministry of Resources and Development, with RMI Environmental Protection Authority.
- Potential benefits**
- 1) Improved soil quality and enhanced agricultural production.
 - 2) Reduced organic waste stream.
 - 3) Increased public awareness of the benefits of composting and soil conservation in general.
- Potential issues** Sale of soil generated at the central composting facility could ultimately finance the operation of the facility.
- Processing/timing** FY 1993 – FY 1994.

Program profile 11.4

Training Agricultural Extension Officers

Aim and scope To provide further training to Agricultural Extension Officers, in order to enhance their abilities to implement agricultural programs, and to develop their abilities to function as broad-based environmental extension officers.

Description Agricultural Extension Officers, currently located in all populated atolls, offer advice on agricultural production, and assist in the implementation of specific agricultural programs. The potential importance of their role was highlighted at the 1991 National Seminar on Environmental Management and Sustainable Development, where it was noted that these officers could play a vital role as environmental extension agents. This program aims to develop their capacities in environmental management through short-term training workshops.

Cost estimate This workshop training program is estimated to cost \$45,000.

Item	Cost \$US	
	One-time	Recurrent per year
Environmental Management Trainer — 21 days	10,000	
Travel & per diem for participants	15,000	
Materials & equipment	20,000	
Total cost \$US 45,000		

Executing agencies Ministry of Resources and Development, with RMI Environmental Protection Authority

Potential benefits

- 1) Improved ability of Agricultural Extension Officers to implement agricultural extension programs.
- 2) Delivery of environmental management extension services in the outer atolls.

Potential issues Program requires close liaison between the executing agencies to ensure that the course adequately addresses both agricultural and environmental topics.

Processing/timing FY 1993 – FY 1994.

Program profile 11.5

Researching appropriate pest control methods

- Aim and scope** To determine most appropriate pest control methods for the Marshall Islands environment.
- Description** Agricultural pests and diseases hamper agricultural production. In 1991 an outbreak of coconut scale affected the coconut, breadfruit and banana crops on several atolls. Measures taken to combat the spread of this disease included the importation of predatory beetles. However, little is known about the most effective control measures for exotic pests and diseases. This program aims to determine the most appropriate pest control methods.
- Cost estimate** Funding for a two-year period is sought, at a total cost of \$180,000. Recurrent costs, including salaries, travel, and per diems, total \$150,000 (\$75,000 x 2), and one-time expenses for materials and equipment total \$30,000.

Item	Cost \$US	
	One-time	Recurrent per year
Research Officer salary & on-costs		50,000
Research Assistant		15,000
Travel & per diem		10,000
Materials & equipment	30,000	
Total cost \$US 180,000		

- Executing agency** Ministry of Resources and Development.
- Potential benefits** 1) Improved agricultural production.
2) Reduced use of pesticides.
- Potential issues** This project may have benefits for the control of exotic pests and diseases in other Pacific countries such as the Federated States of Micronesia.
- Processing/timing** FY 1993 – FY 1995.

Program profile 11.6

Developing pesticide regulations

- Aim and scope** To improve control of the importation, storage, use and disposal of pesticides in the Republic through regulations.
- Description** The RMI Environmental Protection Authority is in the process of developing pesticide regulations which feature lists of banned, controlled and restricted pesticides, stipulate labeling requirements, and provide for integration into regional pesticide control initiatives. This program would support technical assistance for the completion of this effort, and would also incorporate a training component, to teach workers the principles of safe handling and application of pesticides.
- Cost estimate** This short-term consultancy is estimated to cost \$35,000.

Item	Cost \$US	
	One-time	Recurrent per year
Consultant to finalize regulations — 15 days	5,000	
Travel & per diem for workshop participants	10,000	
Equipment & supplies	20,000	
Total cost \$US 35,000		

- Executing agencies** RMI Environmental Protection Authority, with the Ministry of Resources and Development.
- Potential benefits**
- 1) Increased awareness of the potential risks of pesticides among handlers.
 - 2) Improved technical expertise in handling, applying and storing pesticides.
 - 3) Improved worker safety and health.
- Potential issues** Program should be integrated with regional initiatives to control pesticide use.
- Processing/timing** FY 1993 – FY 1995.

Priorities for implementation

Faced with limited resources, it is necessary to rank programs in order of priority for implementation. As a multi-sectoral body, the National Task Force on Environmental Management and Sustainable Development (EMSD) was faced with the difficult task of setting these priorities. Representatives from all government agencies worked together to establish the matrix of priorities shown below. Part A: The State of the Environment Report 1992 attaches a sense of urgency to certain environmental problems, and that has also been reflected herein to the extent possible.



Strategies & programs in order of priority for implementation

Table 3.1 Strategies and programs in order of priority for implementation. Highest priority is given to coping with projected sea level rise, followed by issues relating to public health and renewable resource conservation.

Strategy	Program(s)	Total funding required \$US
S1 Anticipating sea level rise	P1.1	250,000
	P1.2	*55,000
S5 Enhancing fresh water supply	P5.1	355,000
	P5.2	5,180,000
	P5.3	240,000
	P5.4	114,000
	P5.5	490,000
S3 Improving solid & hazardous waste disposal	P3.1	275,000
	P3.2	350,000
	P3.3	50,000
	P3.4	20,000
S6 Managing marine resources for sustainability	P6.5	Phase I 50,000
		Phase II 10 mil
	P6.1	690,000
	P6.2	60,000

Strategy	Program(s)	Total funding required \$US	Strategy	Program(s)	Total funding required \$US
S4 Improving sewage disposal & management	P4.1	400,000	S11 Managing terrestrial resources for sustainability	P11.3	155,000
	P4.2	50,000		P11.4	45,000
	P4.5	210,000		P11.5	180,000
		P11.6		35,000	
S2 Strengthening environmental education	P2.1	190,000	S12 Anticipating environmental emergencies	P12.1	N/A
	P2.4	90,000		P12.2	N/A
	P2.3	97,500			
S10 Strengthening environmental instruments	P10.2	17,000			
	P10.3	62,000			
	P10.4	22,000			
S8 Protecting special spaces & species	P8.2	250,000			
	P8.4	190,000			
S9 Protecting cultural values & practices	P9.4	45,000			
	P9.6	125,000			
	P9.5	60,000			

* Funding already secured

About National Environmental Management Strategies — NEMS

Recent times have witnessed increasing threats to Pacific environments, coupled with an increasing awareness of the need for action. National Environmental Management Strategies (NEMS) are a measure of this awareness and a positive response to these threats.

NEMS, being developed in a number of Pacific countries, outline the major environmental issues faced by each country and identify the steps required to address them. There has been a strong emphasis on the identification of clear, fully costed programmes in each of these steps.

These NEMS have been developed in each country through a process of extensive in-country consultation and gathering of relevant background information. The end result is a document which "belongs" to the government and people of each country. The effective implementation of NEMS will be essential for sustainable development of the region and will involve all relevant organisations.



national environmental management strategy

nems

