CORAL REEF SURVEY AND MONITORING TRAINING COURSES

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Sub-Regional Training Course on Coral Reef Survey and Monitoring Techniques

in Vava'u, Kingdom of Tonga,
24 November–5 December 1997

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SPREP's Climate Change
and Integrated Coastal
Management Programme

SUB-REGIONAL TRAINING COURSE ON CORAL REEF SURVEY AND MONITORING TECHNIQUES

in Vava'u, Kingdom of Tonga,

24 November–5 December 1997

Conducted by:

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FOREWORD

Coral reefs are one of the most productive and biologically diverse of all marine ecosystems. They are a valuable resource for tropical coastal communities, providing social and cultural benefits as well as substantial economic benefits through industries such as fishing, tourism and recreation. It is recognised that, globally, coral reefs are becoming increasingly stressed. As much as 10 percent of the earth's coral reefs are significantly degraded and an even greater percentage is threatened (Wilkinson 1993). The major causes of coral reef degradation are typically linked to stresses induced by human activities.

Recognition of the particular problems facing sustainable development of coral reefs has led to the establishment of the International Coral Reef Initiative (ICRI) which aims to maintain the biological diversity, condition, resources and value of coral reefs and related ecosystems. An ICRI Pacific Regional Strategy was developed for the Pacific region at a course in Suva, Fiji, in late 1995. The ICRI Pacific Strategy 'Framework For Action' research and monitoring component recognises the need for standardisation and promotes the development of a Global Coral Reef Monitoring Network (GCRMN) under the Coastal Zone Module of the Global Ocean Observing System (GOOS).

The GCRMN is a bottom-up network, newly established in the Pacific region, which aims to improve management and sustainable conservation of coral reefs for people by assessing status and trends in coral reefs and making that information available in a readily understandable format. The GCRMN methods are documented in the *Survey Manual for Tropical Marine Resources* by English et al. (1997). This manual provides a set of methods for reef assessment that can be applied rapidly and efficiently over a wide area by people with different levels of scientific training. The manual contains several basic methods useful for reef assessment including the manta tow technique, the line intercept technique, visual fish census and the measurement of ambient environmental parameters.

SPREP, as the regional coordinating body for environmental issues in the Pacific, in responding to the needs identified by these global and regional initiatives, has organised sub-regional and national coral reef monitoring and assessment training courses in several areas of the Pacific. These courses have received widespread support throughout the region.

The success of these courses is largely due to the experience of the participants in working in the marine environment and their dedication to acquiring new skills. Such initiatives will enhance island nations' capacity to assess, monitor and manage their own coral reef resources. This series of reports summarises the outcomes of the training courses and offers recommendations for future work in this area.

Tamari'i Tutangata

Director, South Pacific Regional Environment Programme

PREFACE

A 'train the trainer' course in coral reef monitoring techniques was conducted at Vava'u, Kingdom of Tonga from 24 November to 5 December 1997. The techniques taught were standard methods that have been adopted by the Global Coral Reef Monitoring Network (GCRMN). The goals of this course were to provide the participants with the tools to conduct surveys of coral reef habitats in a systematic and standardised fashion. Participants were trained to use two methods, the manta tow and line intercept transect methods, to assess coral reef communities. Training was also provided in fundamental sampling design principles to allow rigorous application of these techniques. Continued application of these methods through time will allow changes in the coral reef habitats to be detected.

Australian Institute of Marine Science (AIMS) researchers, Mr Will Oxley and Mr Angus Thompson, conducted the training. As a result of this course, nine people from four Polynesian countries were trained in the manta tow and line intercept techniques for the assessment of coral reef benthic communities. They also received training in the use of databases to enter and store monitoring data.

SPREP and the Australian Institute of Marine Science would like to thank the Paradise International Hotel, Vava'u for providing facilities and support for this course; Beluga Diving for support of our diving operations; James Aston (SPREP's Coastal Management Officer), for initiating the course then planning and coordinating the in-country logistics. SPREP, acknowledges the Australian Agency for International Development (AusAID) for providing the funds to conduct this course. The authors also acknowledge other members of the AIMS Long-Term Monitoring Program for contributing to the course material.

LIST OF ACRONYMS

AIMS ..... Australian Institute of Marine Science
ARMDES ..... AIMS Reef Monitoring Data Entry System
AusAID ..... Australian Agency for International Development (formerly AIDAB)
COTS ..... Crown-of-thorns starfish
CRIOBE–EPHE ..... Centre de Recherches Insulaires et Observatoire de l'environnement
GCRMN ..... Global Coral Reef Monitoring Network
GOOS ..... Global Ocean Observing System
ICRI ..... International Coral Reef Initiative
IOC ..... Intergovernmental Oceanographic Commission
IUCN ..... World Conservation Union
LIT ..... Line Intercept Technique
LTMP ..... Long-Term Monitoring Program
MTT ..... Manta Tow Technique
SCUBA ..... Self-Contained Underwater Breathing Apparatus
UNEP ..... United Nations Environment Programme
UNESCO ..... United Nations Educational, Scientific and Cultural Organization
VCT ..... Visual Census Technique
WMO ..... World Meteorological Organization

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GLOSSARY OF TERMS

Abiotic	non-living
Acroporid / Acropora	category of a dominant form of reef-building coral in the IndoPacific area
Ambient environmental parameters	surrounding characteristics of the site including temperature, salinity, turbidity, light penetration, cloud cover and wind
Anthropogenic	produced or caused by humans
Assemblage	a collection of individuals, usually different types
Baseline study	first assessment of a situation against which subsequent changes are measured
Belt transect	a unit of data collection using transect lines of a fixed width
Benthic communities	groups of organisms living on the sea floor
Biotic	living
Data sheet	a paper form used to record field observations
Dichotomous	divided into two parts
Ecosystem	a dynamic complex of plant, animal, fungal and micro-organism communities and the associated non-living environment interacting as an ecological unit
Foliose	thin and leaf-like
Global Positioning System (GPS)	satellite-based navigation system
Habitat	area where organisms live
Leeward	side protected from the wind
Lifeform	external appearance of organisms resulting from the interaction of genetic and environmental factors
Line intercept transect	used to estimate the sessile benthic community of a specified area of coral reef
Manta tow technique	used to assess broad changes in the benthic communities of coral reefs where the unit of interest is the entire reef, or a large portion thereof
Monitoring	repeated observation of a system, usually to detect change
Non-*Acroporid*/non-*Acropora*	corals not belonging to the *Acropora* family
Population	all individuals of one or more species within a prescribed area
Qualitative	descriptive, non-numerical assessment
Quantitative	numerical, based on counts, measurements or other values
Reef crest	the highest point of the seaward edge of a coral reef
Reef slope	the face of a coral reef extending seawards from the reef crest
Replicate	a repeated sample from the same location and time
Sample	any subset of a population
SCUBA	self-contained underwater breathing apparatus
Soft coral	animal consisting of anemone-like polyps with eight feeding tentacles surrounding mouth
Survey	organised inspection
Transects	a line or narrow belt used to survey the distributions of organisms across a given area
Visual fish census	a method of assessing fish along a transect
Windward	side exposed to the wind

1 INTRODUCTION

The Kingdom of Tonga has previously indicated to SPREP that specialised short term training in reef ecology and the development of coral reef survey and monitoring skills is a priority for their country (Thistlethwaite et al. 1993, SPREP 1995, SPREP 1996). In recognition of the ongoing need for regional capacity building in coral reef survey and monitoring techniques, and to accommodate the particular requests of the Kingdom of Tonga, SPREP sought and received funding from AusAID to run a sub-regional course in Vava'u, Kingdom of Tonga. SPREP again requested that scientists from the Australian Institute of Marine Science run the course.

The choice of Vava'u was appropriate for several reasons. Two key reasons were that the area has well-developed coral communities and that a recently published strategic environmental assessment of plans for development in Vava'u called for monitoring of the marine environment in the Port of Refuge and around the outer islands of Vava'u (Onorio and Morgan 1996). Monitoring is seen as an important part of ensuring that the development of Vava'u and the tourist industry does not cause significant adverse impact on the marine environment.

The sub-regional training course held in Vava'u provided detailed training for participants in two of the standard methods promoted by the GCRMN, the line intercept transect method and the manta tow method. Participants were also introduced to the concepts of sampling design, a visual census method for reef fish monitoring and basic information on the crown-of-thorns starfish (COTS). Participants of the course came from Samoa, Cook Islands, French Polynesia and the Kingdom of Tonga. This report summarises the training course and includes recommendations for future training.

2 OBJECTIVES

The broad aim of the coral reef monitoring course conducted in Vava'u was to provide participants from four countries with the knowledge and skills to effectively monitor their coral reefs and thereby increase the national and global knowledge of coral reef systems. In order to achieve this aim a number of objectives were addressed:

(i) *Train participants in the correct implementation of standard techniques for assessing the status of coral reef benthic communities and provide the capacity for trainees to conduct future training programmes. The techniques taught in the course were developed by AIMS scientists and adopted by the United Nations Environment Programme-Intergovernmental Oceanographic Committee-World Meteorological Organization-World Conservation Union Meeting of Experts (1991) as the protocols for a Long-Term Global Monitoring Program;*

(ii) *Provide a data management programmme for the course participants and practical tuition in its use, emphasising correct methods for data handling, storage and basic analyses. The database programme AIMS Reef Monitoring Data Entry Systems (ARMDES) used in this course conforms to the UNEP-IOC-WMO-IUCN standard;*

(iii) *Present talks and elicit discussion on other relevant aspects of coral reef monitoring (including aims of monitoring, sampling design, reef fish populations, monitoring for management) in order to provide a broad understanding of the range of standard monitoring procedures used in the management and ecologically sustainable development of coral reefs; and*

(iv) *Train participants in the techniques and skills required to conduct training courses in their respective countries and provide resources to facilitate this process.*

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ANNEX IV LIST OF PREVIOUS CORAL REEF MONITORING COURSES

Sub-regional

Cook Islands—23 February to 11 March 1994

Saipan, Commonwealth of the Northern Mariana Islands—6 to 17 November 1995

Vava'u, Kingdom of Tonga—24 November to 5 December 1997

Orpheus Island, Australia—11 to 20 March 1998

Fiji—7 to 17 July 1998

Pohnpei, Federated States of Micronesia—19 to 30 October 1998

National

Port Moresby, Papua New Guinea—February 1996

Palau—4 to 15 August 1997

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