Issues for Community-based Sustainable Resource Management and Conservation: Considerations for the Strategic Action Programme for the International Waters of the Pacific Small Island Developing States

Volume 1: A Synopsis of Information Relating to Marine Protected Areas

by Michael Huber and Kerry McGregor

Technical Report 2002/01

Participating Countries in the International Waters Programme

Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

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FOREWORD

The South Pacific Regional Environment Programme (SPREP) has been involved in many large regional initiatives since it was established in 1982. Among the more notable are the National Environmental Management Strategies, State of Environment Reports, regional preparations for the United Nations Conference on Environment and Development in Rio de Janeiro in 1992; the South Pacific Biodiversity Conservation Programme which also started in 1992 and concluded in 2001, preparations leading up to the World Summit on Sustainable Development scheduled for Johannesburg, South Africa in 2002 and this programme, the Strategic Action Programme for the International Waters of the Pacific Small Island Developing States (IWP).

The IWP is novel in many respects. It is the first large programme in which several Pacific regional organisations, united under the umbrella of the Council of Regional Organisations in the Pacific (CROP), are formally collaborating. While SPREP is the executing agency, responsibilities for the execution of the oceanic component of the Programme rest with the Secretariat of the Pacific Community (SPC), based in New Caledonia, and the South Pacific Forum Fisheries Agency (FFA), which is based in Solomon Islands. These two organisations are providing the science and the management advice respectively to assist the 14 countries participating in the Programme develop comprehensive conservation and management arrangements for the region's major renewable resource, tuna.

The Project Coordination Unit (PCU) of IWP is based at the SPREP Secretariat in Samoa. It is responsible for the implementation of the coastal component of the Programme. The objective of this component is to design and implement a project in each of the 14 participating countries that seeks to address priority environmental concerns in respect of coastal fisheries, marine protected areas, waste management or the preservation and conservation of freshwater resources. The focus of the projects, termed pilot projects in the Project Document, is to promote increased community involvement and responsibility for local resource management and conservation initiatives.

The Programme is an ambitious one. Involving 14 countries stretching over 30 million square kilometers of the western central Pacific, and working principally in isolated rural communities, there are bound to be many challenges encountered as the Programme is implemented over the next four years. Nevertheless, if in that short time frame we can learn more about processes that will motivate and support local communities to take a more proactive role in the sustainable utilisation and conservation of their renewable resources, we will have made a significant contribution to the future well-being of the Pacific region and the ecosystems it supports.

This report is one of six reports produced at the start of the Programme and, as such represents the first major output for the Programme. This series of reports seek to synthesize all the available information for each of the priority areas of interest to the IWP - coastal fisheries, marine protected areas, waste and freshwater as they relate to tropical island ecosystems, particularly in the western and central Pacific. The reviews of these four technical areas are supplemented with complementary reviews, in separate volumes, of economic issues to be considered in planning and implementing community-based sustainable resource management and conservation initiatives in island ecosystems, and of lessons learned from previous national and regional projects and activities related to the future areas of work for the IWP. Not only do these documents provide a useful reference for practitioners working on the priority environmental concerns of the region in relation to each of these four areas of interest but they also provide a comprehensive snapshot of our understanding of these critical issues in the region in early 2002.

As a result, these reports will provide a useful reference for understanding the baseline situation that existed in the region at the start of the IWP. They provide a valuable reference against which the situation in 2005 may be assessed. This will be a measure of whether progress was made in addressing these pressing issues during the Programme or if we continue to threaten the future of our fragile environment through poor management of the natural systems and resources with which we are blessed.

SPREP looks forward to working with participating countries on the successful execution of this Programme.

Tamari'i Tutangata
Director
SPREP

INTRODUCTION

Background

The member countries and territories[1] of the South Pacific Regional Environment Programme (SPREP), at their 8th Annual Meeting in October 1995, endorsed a project to prepare the Strategic Action Programme (SAP), under the International Waters focal area of the Global Environment Facility (GEF).

The GEF was created in 1994 to fulfill a unique niche – that of providing financing for programmes and projects to achieve global environment benefits in four focal areas: biodiversity, climate change, international waters, and ozone layer depletion - and in land degradation as it relates to these focal areas.

According to the GEF definition, international waters include oceans, large marine ecosystems, enclosed or semi-enclosed seas and estuaries as well as rivers, lakes, groundwater systems, and wetlands with trans-boundary drainage basins or common borders involving two or more countries. The ecosystems and habitats associated with these waters are essential parts of the system. Because the global hydrological cycle links watersheds, the atmosphere, estuaries, and coastal and marine waters through transboundary movement of water, pollutants and living resources, international waters extend far inland and far out to sea.

The Pacific region's premier political body, the Pacific Islands Forum, at its Annual Session in September 1996, requested SPREP to coordinate development of the project. Formulation of the SAP, funded by GEF through project development funds (PDF Block-B), began in April 1997. The SAP was to combine the following activity areas:

- Integrated conservation and sustainable management of coastal resources, including freshwater resources;
- Integrated conservation and sustainable management of oceanic resources;
- Prevention of pollution through the integrated management of land- or marine-based wastes; and
- Monitoring and analysis of shore and near-shore environments to determine vulnerability to environmental degradation.

The basis for developing a Programme focus in these areas is found in the joint regional position prepared by Pacific island countries for the 1992 United Nations Conference on Environment and Development (UNCED), the simultaneous preparation of National Environmental Management Strategies (NEMS) by Pacific island countries between 1990 and 1996, as well as the Action Plan for Managing the Environment of the South Pacific Region (1997-2000).[2]

A Regional Task Force (RTF) was established to oversee preparation of the SAP. It was composed of one representative from the Governments of Fiji, Marshall Islands, Samoa, Tonga, and Vanuatu, with additional members from the Pacific Islands Forum; SPC, SPREP, the three GEF Implementing Agencies (the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), and The World Bank (TWB)), two international non-governmental organisations (the World Conservation Union (IUCN) and The Nature Conservancy (TNC)), and one private sector representative (Fiji Dive Operators Association, recommended by the Tourism Council of the South Pacific (TCSP)). The Asian Development Bank (ADB) and the Economic and Social Commission for Asia and the Pacific (ESCAP) also participated.

Work undertaken during the SAP formulation process resulted in the identification of three priority transboundary concerns related to International Waters:

- degradation of their quality;
- degradation of their associated critical habitats; and
- unsustainable use of their living and non-living resources.

The SAP was reviewed and subsequently endorsed by the Heads of Government of the Pacific Islands Forum at its Session in Rarotonga in 1997. Refinement over a period of almost two years resulted in GEF Council approval of the SAP in August 1999. Execution by SPREP commenced in early 2000.

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[1] American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, France, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United States of America, Vanuatu and Wallis and Futuna.

[2] Revised in late 2000 as the Action Plan for Managing the Environment of the Pacific Islands Region (2001-2004) adopted by the 11th SPREP Meeting, Guam, USA, 9-12 October 2000.

The International Waters Programme (IWP), or Strategic Action Programme (SAP) in GEF parlance, is designed to assist Pacific island countries[3] improve regional capacity for management of transboundary water resources and create improved management structures to address environmental degradation and ensure the long-term sustainability of ocean fisheries in the Western and Central Pacific ecosystem. The IWP also intends to promote improved integration of environmental concerns into local, national and regional policy, and improved water quality and the conservation of key coastal and ocean ecological areas.

The GEF and UNDP view the "pilot" or "demonstration" nature of the 14 projects to be implemented under the national components of the IWP as providing the basis for future funding opportunities from GEF facilities for participating countries. The IWP, as a Strategic Action Programme, is considered an initial step leading to the development of Medium-Sized (up to US$1 million) or Full Projects (in excess of US$1 million) for technical assistance, capacity building or investment. Such projects may be regional or national in scale. As a result, the later stages of the IWP are likely to devote considerable effort to analyzing the results of the IWP to assist countries with the formulation of follow-up activities supported through the GEF and alternative sources of financing assistance.

Key Elements and Assumptions

The Project Document is formulated on the basis that the International Waters in the Pacific region are subject to threats that give rise to transboundary concerns. During the formulation of the IWP, threats were examined from the perspective of critical species and their habitats and living and non-living marine resources. Identified threats include:

- pollution of marine and freshwater (including groundwater) from land-based activities;
- the long term sustainable use of marine and freshwater resources;
- physical, ecological and hydrological modification of critical habitats; and
- unsustainable exploitation of living and non-living resources, particularly, although not exclusively, the unsustainable and/or inefficient exploitation of coastal and ocean fishery resources.

The IWP formulation process examined each threat in a legal, institutional, socio-economic and environmental context. The ultimate root cause underlying imminent threats was identified as deficiencies in management. Factors contributing to the management root cause were grouped into two linked subsets: a**)** governance, and b) understanding.

The governance subset was characterised by the need for mechanisms to integrate environmental concerns, development planning, and decision-making. The understanding subset was characterised by the need to achieve island-wide ecosystem awareness through improved education and participation. Island-wide awareness and participation will facilitate the development and implementation of measures to protect International Waters.

The IWP analysis revealed a set of information gaps required by decision-makers to responsibly address ultimate root causes and respond to imminent threats. Particularly important is the lack of strategic information presented in an appropriate manner to decision-makers, resource users, managers and communities to evaluate costs and benefits of, and to decide among, alternative activities. Improving information input and exchange at the regional, national, and community levels is an objective of the Programme.

The IWP provides for targeted actions to address the root causes of degradation of International Waters. The actions are to be carried out in two complementary, linked consultative contexts: Integrated Coastal and Watershed Management (ICWM) and Oceanic Fisheries Management (OFM). Through the ICWM and OFM approaches, the IWP suggests a path for the transition of Pacific islands from sectoral to integrated management of International Waters as a whole, the evolution of which is essential for their protection over the long term.

The IWP will place priority on liaising with donors who are active in the region to plan and coordinate regional and national development assistance for International Waters to address imminent threats and their root causes more effectively. The IWP is designed to provide a framework for overall national and regional planning and assistance for the management of International Waters and provide a catalyst for leveraging the participation of other donors in the project.

[3] The 14 countries participating in the IWP are: Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

The Project Document acknowledges that all sustainable development issues related to International Waters cannot be addressed at once. Therefore, four high priority areas have been identified for immediate intervention:

- improved waste management;
- better water quality;
- sustainable fisheries; and
- effective marine protected areas.

Targeted action within these activity areas is proposed in five categories:

- management;
- capacity building;
- awareness/education;
- research/information for decision-making; and
- investment.

Institutional strengthening is included under management and capacity building.

The principal components of the IWP, as described in the PD, are summarised in Table 1.

Table 1. A summary of the principal components of the IWP including the broad Programme objectives and activity areas designed to address priority environmental concerns of participating countries.

Goal	To achieve global benefit by developing and implementing measures to conserve, sustainably manage and restore coastal and oceanic resources in the Pacific Region [Integrated sustainable development and management of International Waters]
Priority Concerns	Degradation of water quality • Degradation of associated critical habitats • Unsustainable use of resources
Imminent Threats	Pollution from land-based activities • Modification of critical habitats • Unsustainable exploitation of resources
Ultimate Root	Management deficiencies • Governance • Understanding
Solutions	• Integrated Coastal and Watershed Management, and • Oceanic Fisheries Management. (ICWM), (OFM)
ICWM Activity Areas	• Improved waste management • Better water quality • Sustainable fisheries • Effective marine protected areas
OFM Activity Areas	• Sustainable ocean fisheries • Improved national and regional management capability • Stock and by-catch monitoring and research • Enhanced national and regional management links
Targeted actions	• Management/institutional strengthening • Capacity-building/institutional strengthening • Awareness/education • Research/information for decision-making • Investment

UNDP is the GEF Implementing Agency and SPREP is the Executing Agency, on behalf of other CROP agencies associated with the Programme, the SPC and FFA.

This Review

This review is one of six reviews that were compiled during the early stages of IWP implementation for two reasons. The first is to provide a source of current information for practioners – principally those practioners associated with the implementation of the pilot projects in each of the participating countries as it relates to the areas of primary interest to the IWP (waste, freshwater, marine protected areas and coastal fisheries). To provide as much practical benefit as possible, these reviews are supplemented with additional synopses of information concerning economic issues and lessons learnt in the design and implementation of community-based sustainable resource management and conservation initiatives.

The second reason for these reviews is to provide a snapshot of what is known about each of the four areas of primary interest to the IWP in 2001 and early 2002. This is done to provide a baseline overview of available information in the areas of primary interest at the commencement of the Programme. As a result, any review of these areas of interest towards the end of the Programme, in 2005, will have a useful reference for assessing change in relation to the management and conservation of these resources in the Pacific region.

This is the first of the six reviews. It was prepared by Mike Huber and Kerry McGregor who comprehensively reviewed activities and current thinking in relation to marine protected areas (MPAs) and their application to the management and conservation of coastal resources. While the focus of the review is the Pacific islands region, their presentation is supplemented with examples from other ocean regions. The review examines resource conservation and related habitat issues, management approaches, governance, and past and current priorities in respect of marine protected areas at the national level within the 14 countries participating in the Programme and regional initiatives relating to marine protected areas.

The second volume addresses issues relating to the conservation and management of freshwater resources in the Pacific islands region. It was prepared by Tony Falkland who provides a review of published and other information relating to freshwater quality, supply, management and conservation. The review places emphasis on community-based issues associated with the conservation and sustainable management of freshwater resources, reflecting the planned focus of subsequent pilot projects that may be instigated under the International Waters Programme.

The review by Leonie Crennan and Greg Berry, the third volume, provides an examination of issues relating to waste reduction, pollution prevention and improved sanitation in the Pacific islands region, and elsewhere, as it relates to the objectives of the International Waters Programme in terms of promoting management for improved waste reduction initiatives in communities. It summarises activities that have attempted to address low cost/no cost alternatives to reduce loadings of solid and liquid wastes, particularly in coastal and watershed communities where quality of drinking water resources is at risk. Information includes a review of priority waste concerns in Pacific island communities, management and governance issues, and options for increased community responsibility for managing waste problems.

In the fourth volume, Paul Dalzell and Don Schug review current information relating to sustainable coastal fisheries in the Pacific islands region and elsewhere as it relates to the objectives of the Programme in terms of promoting capacity building for improved resource management responsibility in communities. Information presented includes a review of coastal fisheries in the Pacific region, discussion of resource management and governance issues, customary marine tenure (CMT), the role of MPAs and past and current priorities in respect of the sustainable management of coastal fisheries at local, provincial, national and regional scales. Their review includes consideration of gender issues and women's activities in the coastal zone including the role of women in subsistence and artisanal fisheries in the 14 countries participating in the Programme. They also discuss cases that illustrate particular issues in community-based management of subsistence and artisanal fisheries; including government support for community actions.

Padma Lal and Meg Keen present a review of economic issues that should be considered in the design, implementation, monitoring and evaluation of community-based resource management and environment conservation projects in island ecosystems – the fifth volume. They describe economic issues that require detailed consultation with community members during the design, implementation and monitoring of projects such as those to be supported under the Programme. This includes the identification of institutional issues, socio-economic implications for communities (benefit/cost analysis and cost effective analysis), and suggested strategies for promoting broad community participation and support in conservation and sustainable resource use initiatives (incentives and transaction costs).

In the sixth and final volume in this series, Jenny Whyte and her colleagues at the Foundation of the Peoples of the South Pacific International and affiliated organizations provide a review of information relating to lessons learned and best practices for resource and habitat conservation and sustainable management initiatives in the Pacific islands region. The review focuses on community-based (participatory) issues associated with the conservation and sustainable management of resources and habitats in island ecosystems with emphasis on the four focal areas for the International Waters Programme (sustainable coastal fisheries, marine protected areas, community-based waste reduction and preservation of freshwater resources). Issues are considered in context of the entire project cycle - from project planning and design; selection of sites; method of community entry; community baseline assessments; participation of communities;

the role and participation of governments and, if they are involved, external agencies, NGOs and development assistance agencies; education and awareness activities, completion and exit considerations such as alternative income generation, and monitoring and evaluation. The review considers social, cultural, economic, environmental, administrative, managerial, legal and political dimensions of such projects.

As a supplement, each author was asked to consider examples of what a pilot project might look like. As a result, at the conclusion of each review, three examples of community-based initiatives that may serve as a model or a template for a pilot project are presented.

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Last but not least, thanks go to Rosanna Galuvao for her efforts in keeping the project going while Project Coordination Unit staff were absent for long periods on duty travel in the region.

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Kerry McGregor is a partner in Global Coastal Strategies, a Brisbane-based consulting company specialising in coastal and marine environmental assessment and management. She received a B.Sc. in Geography and Biology and an MSc in physical Geography from the University of Auckland. Kerry worked in public liaison and technology transfer for New Zealand's Department of Scientific & Industrial Research from 1984-87, and in 1988 moved to the University of Papua New Guinea to lecture in geography and ecology. She subsequently worked in marine biological research and scientific administration at the Orpheus Island Research Station and more recently has developed and taught courses in coastal and marine environmental science at the Moreton Institute of TAFE in Brisbane. Kerry has broad research and consulting experience including the documentation of traditional knowledge of climate in PNG, reviews of the potential impacts of climate change and sea level rise in PNG and the Federated States of Micronesia, the development of information baselines for scientific, conservation, and development initiatives in the Pacific, the preparation and documentation of coastal management workshops, and the processing of environmental monitoring data. Most recently she has been involved in the community-based monitoring of seagrass beds in Moreton Bay, near her bayside home. Kerry is a talented artist, specialising in Gyotaku and fish paintings, and is a former television actress.

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1. Overview

The Strategic Action Programme for International Waters of the Pacific Islands Region (IWP) is a 5-year project to build regional capacity for the management and sustainable use of marine resources in the South Pacific. The IWP, which is scheduled to conclude in 2005, is funded by the Global Environment Facility (GEF), with parallel contributions by the Secretariat of the Pacific Community (SPC), Forum Fisheries Agency (FFA), and South Pacific Regional Environment Programme (SPREP). It is being implemented by the United Nations Development Programme (UNDP) and executed by SPREP.

Among the high-priority areas of activity identified by the IWP is the development of effective marine protected areas (MPAs), which is of direct relevance to addressing two of the three overarching transboundary concerns identified by the IWP: the degradation of critical habitats and unsustainable resource-use. MPAs are widely promoted as a useful tool for managing the marine environment; indeed, some authors consider them essential (e.g. Allison et al., 1998; Kelleher, 1999; Roberts, 1998). There is a large and growing number of MPA initiatives in the Pacific island region. Proponents of MPAs claim a range of benefits from them. These include (a) in situ benefits that are a biological response to protection, including the conservation of fisheries stocks and species, protection of habitats and spawning stocks, reduction of growth overfishing, improved recruitment to fished stocks, maintenance of genetic diversity and the genetic characteristics of fisheries stocks, and enhanced biological recovery from disturbance and (b) ex situ benefits including reduced user conflict, enhanced social cohesion, increased local control over resources, simplified environmental management (e.g. reduced data collection needs in multi-species fisheries), easier enforcement, insurance against management failure, and the provision of control areas for scientific research and assessment (Agardy, 2000, in prep; Lauck et al., 1998; Palumbi, 2001a; Roberts and Hawkins, 2000; Roberts and Polunin, 1993a; Salafsky et al., 1999; Salm et al., 2000; Trexler and Travis, 2000).

This report was commissioned by SPREP to review available information about MPAs in the Pacific Islands region. SPREP also commissioned concurrent reviews of (a) past, current and planned country activities relating to potential IWP activities, (b) natural resource economic issues in community-based natural resource management and conservation initiatives, (c) freshwater quality and watershed management issues, (d) sustainable coastal fisheries, (e) waste management and pollution prevention, and (f) lessons learned and best practices in integrated coastal watershed conservation and management initiatives in the Pacific islands region.

In the course of preparing the present report, one of the authors (MEH) participated in a symposium entitled "Determining the conditions under which locally-managed marine reserves are effective tools for conservation: Results from projects in the Pacific". The symposium was conducted on 4 June 2001 at the 10th Pacific Science Inter-Congress in Guam. The symposium presentations and discussions were important inputs to the preparation of the report.

This report emphasises the 14 Pacific Island Countries participating in the IWP[1]. Information presented in the report includes international experience with MPAs, the status of MPAs in the participating countries, and general lessons learned about factors in the success and failure of MPA initiatives. Case studies from Polynesia, Micronesia, and Melanesia are presented, and resources available to those interested in the development of MPAs in the Pacific are identified. Finally, various types of project activities that might be undertaken under the IWP are outlined.

This report also emphasises community-based MPA initiatives. Community participation in coastal resource management and conservation is widely accepted as essential to the success of MPAs (Gubbay, 1995a; Kelleher, 1999; Salm et al., 2000; Wells and White, 1995; White et al., 1994). It is, in fact, a more important factor in the capacity to manage MPAs than a country's development status (Ticco, 1995). Community involvement is particularly important in Pacific Island Countries because of the high degree of local control that people have over marine and coastal resources (see section 2). The report does not attempt to repeat recent literature reviews of MPAs (NRC, 2001; Palumbi, 2001a; Polunin, in press; Rowley, 1994) or manuals for practitioners (Gubbay, 1995a; Kelleher, 1999; King and Lambeth, 2000; Roberts and Hawkins, 2000; Salm et al., 2000), which readers may consult for additional detail.

2. The Pacific islands regional context for MPAs

The Pacific islands context for environmental management and sustainable development has been reviewed elsewhere (e.g., SPREP, 1992; RoundTable, 1998; UNEP, 1999). Several aspects are directly relevant to the development of effective community-based MPAs.

The region's 370 high islands and more than 2200 low and atoll islands (Wright, 1993a), scattered over an area of some 30 million km^2, are geographically remote not only from the rest of the world but also from each other. This makes transportation and communications difficult and expensive.

The small land mass and, on the smaller islands, poor agricultural soils create a very high dependence upon marine resources, to the extent that the use of marine resources often represents the only practical alternative both to meet subsistence needs and for economic development. Dependence upon marine resources is highest on the small atoll islands of Micronesia (Preston, 1997). Even in the relatively land-rich countries of Polynesia and Melanesia, however, coastal communities often have a high dependence upon marine resources because (1) even in these countries many coastal villages are on small islands and (2) even on the large islands fishing communities may lack access to good agricultural land (Dalzell et al., 1996).

In rural areas the reliance on subsistence lifestyles is especially high. About 80% of the total inshore fisheries catch in the region is used for subsistence, and the proportion is higher on smaller and more remote islands (Dalzell, 1993; Dalzell et al., 1996). The much smaller commercial inshore catch is almost entirely by artisanal fishers, for whom fishing often represents the only opportunity to participate in the cash economy. Except for bêche-de-mer and a few other invertebrate species harvested for their shells (trochus, green snail, and pearl shell) artisanal fisheries are also predominantly for domestic consumption. The importance of subsistence and artisanal coastal fisheries is magnified by the high nutritional value of local seafood relative to available imported foods, and many Pacific Island governments actively encourage people to eat more fish (King and Lambeth, 2000; Preston, 1997).

In urban areas there are more, and more diverse, opportunities for formal employment and participation in the cash economy. Even in urban areas, however, there usually is still a portion of the population that is at least partly dependent upon subsistence fishing for food supply or income. Artisanal inshore fisheries are typically most intense near urban markets, often resulting in overexploitation (Johannes, 1998a; Wright, 1993b). There are often user conflicts between traditional inhabitants of the area and outsiders who have moved to the town. Broad-scale threats such as pollution, watershed degradation, coastal construction, and shipping activity also tend to be more serious near urban centres.

Countries in the region have high population growth averaging 2.2% annually; only Niue has had negative population growth (UNEP, 1999). Economic growth has not kept pace, so that GDP per capita is generally declining and there is evidence of declining standards of living as indicated by conventional measures (UNEP, 1999). Nonetheless, the availability of marine and other natural resources and traditional resource management and social support systems still allow rural Pacific Islanders to enjoy a high degree of "subsistence affluence" (Preston, 1997).

There is increasing concern, however, that this subsistence affluence is under threat. Population growth, the advent of cash economies, and the introduction of efficient modern fishing gears all place increased pressure on living marine resources. Destructive fishing methods (Veitayaki et al., 1995), reef and beach mining, mangrove deforestation, solid waste dumping, and other practices degrade both habitats and fisheries. Land-based activities that increase sedimentation, nutrient input, and other forms of pollution are also a concern at both the governmental and village levels. Priority threats to coastal habitats and resources identified in recent regional assessments (RoundTable, 1998; UNEP, 1999) include:

- over-exploitation of inshore fisheries;
- destructive fishing methods;
- loss of mangroves and seagrass beds due to deforestation, reclamation, and other activities;
- destruction of fringing reefs and beaches from sand and gravel mining, dredging, coastal construction, blasting of reef passages, and ship groundings;
- eutrophication from sewage and agricultural fertilisers;
- sedimentation resulting from deforestation and other causes;
- solid waste dumping, especially in urban areas; and
- chemical pollution from mines and industrial facilities.

Although Pacific islands governments recognise these problems, the incorporation of coastal management and planning processes and issues into national development planning is generally weak. Where it exists it tends not to be implemented because poorly developed communication among government departments, political decision-makers, institutions and organisations outside the public sector, and communities. Furthermore, the capacity of government agencies to effectively manage coastal environments is weak. The combination of high population growth and low economic growth makes it difficult simply to keep up with basic human development needs such as health and education. As a result, the human and financial resources available to fisheries, environment, and related agencies are severely constrained. In the case of fisheries agencies the available resources are usually concentrated on oceanic fisheries and a few inshore fisheries with high export potential, almost to the exclusion of subsistence and artisanal fisheries (Dalzell et al., 1996; King and Fa'asili, 2001; Preston, 1997).

Pacific reef fisheries exploit a very large number of finfish species with a wide variety of gears (Dalzell et al., 1996; Johannes, 1998a; Wright, 1993b; Wright and Richards, 1985). These characteristics make them inherently difficult to manage (Munro and Fakahau, 1993a). Large predatory species, especially groupers, snappers, and emperors, are prone to depletion because of their high catchability and the fact that fishers can maintain satisfactory catch rates of other species when these species have been depleted (Munro and Fakahau, 1993b; Russ, 1991). Overfishing is also a problem in export fisheries for sedentary invertebrates, primarily trochus, bêche-de-mer, green snail, pearl shell, and giant clam (Dalzell et al., 1996). Large predatory reef fishes tend to be site-attached, as of course are sedentary invertebrates, a characteristic that increases the prospects for their protection within small fishery reserves (see section 4).

The weak capacity of government agencies, emphasis on offshore fisheries in government policies, large number of fishers in highly dispersed locations, multi-species, multi-use nature of the fisheries, increasing human populations,

and commercialisation and commoditisation of inshore fisheries have resulted in a general failure of conventional, centralised fisheries management in the Pacific (Adams, 1998; Dalzell et al., 1996; Johannes, 1998b; King and Fa'asili, 2001; MacKay, unpubl.; MRAG, 1999).

This does not mean that coastal fisheries have gone unmanaged (Doulman, 1993; Johannes, 1998a, b; Ruddle, 1998). Rather, coastal resources are under the legally recognised or de facto control of local communities. Most places have a history of traditional resource management systems based on the private, group ownership of marine areas under customary marine tenure (CMT). The implications of traditional systems and CMT for marine resource management and conservation in the Pacific are diverse, complex, and highly site-dependent and have been discussed extensively elsewhere (e.g., Adams, 1998; Baines, 1989, 1995; Doulman, 1993; Hviding and Ruddle, 1991; Johannes, 1978, 1982a, 1998; MRAG, 1999; Polunin, 1984; Ruddle, 1994, 1998; Wright, 1985). Several points of particular relevance to MPA development, however, may be made.

Although traditional management systems in the Pacific have been weakened, in most places they continue to function at some level (Johannes, 1978; Ruddle, 1993; Chatterton, 1999). Given their cultural familiarity and acceptance they are often the most realistic basis for managing marine resources. In many parts of the Pacific, traditional taboos (prohibitions of various types) on fishing in certain places effectively create reserves, and are therefore the traditional measure of most direct relevance to MPAs. However, traditional systems employ a range of other measures that when applied to a defined area represent a form of community-based MPA management (Johannes, 1978; MRAG, 1999). Most recently established community-based MPAs are based on existing traditional systems. They often combine a core taboo area within a larger fishing area that is under other local management rules or influence.

The private ownership of marine areas and the resources they contain under CMT, whether recognised in law or not, makes the customary holdings of descent groups (clans) or individual villages the natural units for marine resource management and MPA establishment. These holdings are often fairly small, and the high dependence upon marine resources means that communities will often be unable to set aside more than a small portion of their fishing grounds in no-take areas. This, and limitations on the time that can be devoted to management activities by essentially volunteer local residents, means that community-based MPAs in the Pacific are generally small, on the order of a few km2 or less.

There are, of course, exceptions. In Palau communities have declared entire atolls as fisheries reserves (Smith et al., 2001). Communities in, for example, Vanuatu and Cook Islands have declared taboos over their entire customary fishing grounds (J. Evans, pers. comm.; Johannes, 1994, 1998a). This is generally only possible if a community can gain access to areas held by other communities, which is more likely for subsistence than artisanal fishing (e.g., Cooke and Moce, 1995). It may also disproportionately affect some members of the community. King and Fa'asili (1999a) note, for example, that placing a large proportion of a community's fishing area in a reserve would prevent women from gleaning reef flats while young men could access offshore grounds.

Various authors have noted that CMT may serve political rather than conservation functions, such as resolving resource access disputes between competing groups, and also that preventing access by outsiders is a common motivation for communities to establish MPAs, that modern assertions of CMT may be made opportunistically in the expectation of future benefits such as commercial royalties, and that disputes over CMT boundaries are a common reason for the failure of community-based MPAs (Aswani, 1997; Hviding, 1998; Lokani and Seeto, in prep.; Manele, in prep., MRAG, 1999; Polunin, 1984; Ruddle, 1998; Smith et al., 2001; Whyte, et al., 1998). Clearly, CMT is a central issue for the future of MPAs in the Pacific.

3. Marine protected areas: definitions and objectives

Different authors and organisations use a variety of poorly and inconsistently defined terms to refer to the assorted types of MPAs (Agardy, 2000). One widely used definition is that of the IUCN, which defines an MPA as "any area of intertidal or subtidal terrain, together with its overlying waters and associated flora, fauna, historical and cultural features, which has been reserved by legislation or other effective means to protect part of all of the enclosed environment" (Kelleher, 1999). Under this broad definition any defined marine area subject to some form of resource management intervention might be considered an MPA. The IUCN definition has limited utility for the specific purposes of fisheries management, because any fishing ground subject to any form of fisheries management might be considered a form of MPA.

In fisheries management the core debate relative to MPAs centres on evaluating the desirability of harvest refugia or "no-take reserves" (NTRs). These are areas where the harvest of one or more species is entirely prohibited as an alternative to conventional fisheries management2. Thus, the fisheries management literature explicitly or implicitly tends to reserve the term "marine protected area" to refer to NTRs, one of the most restrictive forms of MPA. At the same time, there has been opposition in some circles to recognising NTRs established for fishery management as MPAs (Kelleher, 1999). This is difficult to justify not only in general but particularly in the Pacific where fisheries enhancement is usually a primary local motivation for MPA establishment.

This report uses the term "marine protected area" (MPA) in the broadest sense of the IUCN definition, except that fishing grounds subject only to conventional fisheries management and no other specifically area-based conservation or resource management regime are not treated as MPAs. "No-take reserve" (NTR) is used to refer to areas where the

extractive use of living marine resources is banned. Unless specifically stated otherwise, the ban on extractive use is assumed to apply to all species. MPAs in which controlled fishing and other uses are allowed are called "multiple-use MPAs".

3.1 Objectives of MPAs

MPAs have been established in various parts of the world for reasons that range from providing recreational areas for the general public to totally protecting pristine environments from human influence. The design of MPAs depends critically on their objectives, and they are often categorised accordingly. The IUCN defines six categories of protected area based upon the objectives of management (Table 1). These may not encompass some forms of MPA, for example small networks of community-based fisheries reserves (King and Fa'asili, 1998, 1999a, b). In practice, MPAs are usually established for one of two reasons: to restore, maintain, or enhance fisheries production or to conserve biological diversity and ecosystem function (Kelleher, 1999). Palumbi (2001a) recognises a third general objective, that of protecting some special feature of particular ecological or cultural importance, but in most cases this constitutes a subset of the biological conservation objective.

Communities, particularly in the Pacific islands, may have motives for establishing MPAs other than their expected environmental benefits (MRAG, 1999). Such objectives include conflict reduction, reinstatement of custom and traditional authority, reinforcement of local control over resources, exclusion of outsiders, and expectations that goods and services will be attached to MPA establishment (Aswani, 1997; King and Fa'asili, 1999b; Lokani and Seeto, in prep.; Polunin, 1984; Salafsky et al., 1999; Smith et al., 2001; Whyte et al., 1998). Establishing an MPA may conserve resources regardless of the community's motivation, but this is not automatically so (MRAG, 1999; Polunin, 1984).

The two main environmental objectives of fisheries enhancement and nature conservation are sometimes viewed as conflicting. In particular, biodiversity MPAs are often opposed on the grounds that they will reduce fisheries yields. The two objectives are not, however, inherently contradictory. The maintenance of healthy habitats, for example, is generally beneficial to fisheries and maintaining healthy stocks of target species often has ecological benefits.

Nonetheless, the benefits of an MPA will be enhanced if it can achieve multiple objectives. This is in fact the case for many community-based MPAs in the Pacific islands region, which often have the dual objectives of enhancing local fisheries while conserving biodiversity and ecosystem integrity. These objectives, however, may have different relative importance to the various parties involved. Communities and fisheries agencies typically have fisheries enhancement as a primary motive for MPA establishment, though they often recognise the ecological benefits of healthy habitats and the social benefits of successful community-based projects (Salafsky et al., 1999, in press; World Bank, 2000). Non-governmental organisations, international donors, and environment agencies often place more emphasis on biodiversity and ecosystem conservation, while recognising the contributions of healthy coastal fisheries to sustainable development. Similarly, communities are most interested in local benefits while outside organisations may focus on national, regional, or global benefits. For example, the assessment of "conservation value", a common criterion for project site selection, is usually made on the basis of national, regional, or global patterns of biodiversity or species population status, considerations that are largely irrelevant to local communities.

There is, unquestionably, sufficient common ground to allow productive partnerships between communities and supporting organisations. External players should, however, both make their objectives transparent to communities and recognise that long-term success depends upon meeting community objectives (Margoluis et al., 2000; White et al., 1994; Whyte et al., 1998).

The objectives of MPAs also vary depending on whether benefits are expected inside or outside the protected area (Palumbi, 2001a). Increases in the size or abundance of target species within an NTR do not by themselves enhance fisheries, because fishing is prohibited within such reserves. NTRs established for fisheries enhancement therefore have the primary objective of improving catches outside the reserve. Unlike fisheries reserves, the objectives of ecosystem MPAs may relate to benefits either inside or outside MPA boundaries. Examples of benefits that might be derived within MPAs include protecting critical habitat or enhancing attractiveness to tourists. Benefits that might accrue outside MPA boundaries, often referred to as "regional benefits", include maintaining regional biodiversity and broad-scale ecosystem functions.

3.2 General Models of MPA Management

No two MPAs are exactly alike in the details of how they are managed, but there are three general models of MPA management. Centralised management involves a "top-down" approach where a central authority, usually a government agency, is responsible for MPA planning, management, and enforcement. Community-based management is a "bottom-up" approach where local communities set the objectives, establish the MPA, and manage it. Collaborative management, or co-management, lies somewhere between these two approaches, with communities sharing responsibility for management with government agencies and/or other external organisations based on mutually agreed goals and objectives. Co-management and community-based management can be considered together as "local management" (Parks et al., in prep.)

These three general models represent a spectrum of management approaches rather than discreet categories (Fig. 1). Public consultation is almost universally recognised as necessary to the success of even centrally managed MPAs, for example (Gubbay, 1995b; Kelleher, 1999; Salm et al., 2000; Wells and White, 1995). The spectrum of management models varies not just in the extent to which communities are consulted or informed, but more importantly in how much actual authority and responsibility they have for managing an area.

Table 2 shows the conditions that favour central or local management, based on an analysis of 37 MPA projects in the Asia-Pacific region (Parks and Salafsky, in prep.) Generally similar conclusions have been reached by other authors (e.g., Wells and White, 1995; White et al., 1994). Conditions in the Pacific islands region clearly favour local management, and community-based approaches have been increasingly recognised as appropriate for marine resource management and conservation in Pacific islands countries (e.g., Adams, 1998; Adams and Ledua, 1997; Doulman, 1993; Johannes, 1998a; King and Fa'asili, 2001; King and Lambeth, 2000; Munro and Fakahua, 1993a). The overwhelming experience in the region is that local management approaches are essential to the success of conservation efforts in general and protected areas in particular in the Pacific islands region. This has been formally endorsed by Pacific islands governments in the Action Strategy for Nature Conservation in the Pacific islands region for both 1994-1998 and 1998-2002 (SPREP, 1994; RoundTable, 1998). It is also embodied in the approach if the coastal component of the IWP. This report therefore focuses on locally-managed MPAs.

Community participation and ownership are central to all forms of local management (Beltran, 2000; Kelleher, 1999; King and Lambeth, 2000). The appropriate roles and responsibilities of central government and other external agencies, i.e. the degree of co-management, will, however, vary depending upon similar considerations to those shown in Table 2. In general, fully community-based MPAs work best where communities are small, cohesive, and closely dependent upon marine resources, and where the MPA itself is small and the environmental threats direct and internal ((Pollnac, in prep.; Wells and White, 1995). Examples of such threats are resource overexploitation and the use of destructive fishing methods by members of the community. The need for government and other external involvement becomes greater as community size and diversity, size and complexity of the MPA, being protected, and threats from outside the community increase.

As described below, Pacific island communities usually need support to establish and maintain effective MPAs. Governmental and/or other external agencies and organisations have a service role in providing information, advice, resources, and other assistance even in fully community-based MPAs where all responsibility and authority for planning, implementation, and enforcement rests with the community (Johannes, 1998a; King and Lambeth, 2000; MRAG, 1999; Parks et al., in prep.)

4. MPAs in theory and practice

As noted above, MPAs are claimed to produce a variety of benefits. Theory and circumstantial evidence provide considerable support for these claims, but they have not been rigorously tested (Palumbi, 2001a). Of the more than 1000 MPAs that have been established, Crowder et al. (2000) found only 28 whose biological effects have been scientifically evaluated in peer-reviewed literature. Halpern (in press), whose review included grey literature, found 69 quantitative studies of the biological effects of MPAs. No study provides unequivocal evidence that an MPA enhanced adjacent fisheries yields. Some studies have not collected baseline data prior to MPA establishment, many have not monitored biological changes outside the MPA, and few have monitored yields from adjacent fisheries. There appear to be no biological studies of MPA effects that have included control sites outside the expected sphere of influence of the MPA. Similarly, very few studies have evaluated the socio-economic effects of MPAs.

MPAs also have certain disadvantages (NRC, 2001). Even if the effects of MPAs are beneficial in the long-term, their establishment involves short-term losses to resource users. Restricting uses within an MPA may divert pressure to areas outside it, intensifying impacts there. This is a common objection to the creation of NTRs for fisheries management. To protect some species, reserves would have to be impractically large. Furthermore, the effectiveness of MPAs usually relies upon complementary management measures taken outside the protected area (see section 4.4.6). While this is not necessarily undesirable it can be argued that if such complementary measures were effective MPAs would not be necessary.

The establishment of an MPA can create inequities by disproportionately affecting some groups in surrounding communities. This is a particular concern in the Pacific. Restricting the use of a given marine area, for example, may greatly affect the area's customary owners, who are often its principle users, but have relatively little impact upon other people in the vicinity. In addition, different sectors of Pacific islands communities often use coastal resources in different ways and may be affected differently by MPA establishment. Gleaning in intertidal areas, for example, is often performed by women, who would therefore be more affected by a tabu over inshore waters than men who fish offshore.

4.1 No-take reserves and fisheries management

Although other forms of MPA have the potential to enhance fisheries, for example by maintaining critical habitat, it is NTRs that are of most interest to fisheries managers. Like conventional fisheries management measures, the objective

of NTRs is to release a portion of the target population from fishing mortality. NTRs are of little direct benefit to fisheries unless stocks are overexploited (Holland and Brazee, 1996; Sladek Nowlis and Roberts, 1997; Sladek Nowlis, 2000). By definition, underexploited or optimally exploited stocks do not require management intervention to reduce fishing mortality, though there may be indirect benefits of protection such as the maintenance of habitats or ecological processes (see section 4.2).

The one effect of MPAs that is widely supported by scientific data, both from the Pacific (Evans in prep., Lincoln Smith et al., 2001; MacKay, unpubl.; MRAG, 1999; Ponia et al., 1999; Smith et al., 2001; Tawake and Aalbersberg, in prep.; Tawake et al., in press; Wantiez, et al., 1997) and elsewhere (Halpern, in press; NRC, 2001; Palumbi, 2001a; Polunin, in press; Roberts and Hawkins, 2000), is an increase in the size, abundance, and to a lesser extent species richness of exploited species within NTRs. Abundance within NTRs typically at least doubles and may increase by as much as fifteen times (Roberts and Hawkins, 2000; Stoner and Ray, 1996). On average, the mean size of exploited species increases by about 30%, biomass by 250%, and species richness by 30% (Roberts and Hawkins, 2000). Site-attached and heavily exploited species, in particular large, predatory reef fishes (especially groupers, snappers, and emperors) and sedentary invertebrates, are most likely to exhibit such increases.

Increases in abundance, biomass, and diversity are commonly observed even in small reserves on the order of 1 km^2 less, and even in reserves on the order of 0.1 km^2 (Halpern et al., in press; Jennings, 1998). The effects are often seen soon after NTR establishment, within 1-3 years or even less, but greater gains may be achieved by longer periods of protection. Russ and Alcala (1996a) observed a linear increase in the abundance and species richness of large predatory reef fishes in an NTR at Apo Island, Philippines, over a period of twelve years, with abundance after 12 years of protection nearly four times that after three years. Pacific islanders have long been aware of the rapid buildup of biomass in NTRs. Harvest tabus were, and still are, widely used to allow stock buildup in anticipation of communal harvests for special occasions such as village feasts.

Increases in size, abundance, and diversity within MPAs are not universal, however, at least on short time scales. Over three-year time scales some species of exploited invertebrates failed to recover in NTRs in Palau and the Solomon Islands, probably because of recruitment failure, although other species did recover (Lincoln-Smith et al., 2001; Smith et al., 2001).

4.1.1 Seeding and Spillover

To benefit fisheries any increase in target species biomass that occurs within an NTR must result in the export of individuals of target species from the reserve to the fishing ground. The objectives, design, and function of NTRs depend to a large extent upon the life history stage at which individuals are exported. One possibility is seeding, in which the NTR exports eggs and/or larvae to enhance recruitment in surrounding areas. The other is spillover, in which post-recruitment individuals (juveniles and/or adults) move out of the NTR. "Seeding" and "spillover" are sometimes used interchangeably, but the distinction has important implications for MPA design and function.

NTRs are thought to be especially beneficial in seeding because there is often an exponential relationship between size and fecundity, so that the increased size of target species that usually occurs inside NTRs results in a disproportionate increase in reproductive output. Egg production from Nassau grouper per unit area, estimated from size-frequency data, was six times higher in an NTR than in adjacent fished areas, for example (Sluka et al., 1997). Thus, the protection of relatively few large spawners within NTRs may help sustain populations as a whole. The benefits may be greater when spawning success is a function of population density (Sánchez Lizaso et al., 2000). This may occur, for example in fishes that form spawning aggregations or in sessile invertebrates such as giant clams, for which NTRs that protect broodstock may be essential to re-seeding adjacent areas (e.g., Bell, 1999).

Increased reproductive output of populations within an NTR will benefit a fishery only if recruitment to the fishery is dependent upon larval supply and larvae from the NTR are transported to and recruit in the fishing grounds. For most fisheries, and certainly in the Pacific islands, there is little information on either larval limitation or larval distribution patterns, so the extent to which these conditions apply is not known. A few field studies do provide evidence for a seeding benefit from NTRs. Distributions of Queen conch larvae in the Bahamas indicate that the Exuma Cay NTR acts as a larval source for fished areas downstream (Chiappone and Sullivan Sealy, 2000; Stoner and Ray, 1996). Following the creation of species-specific NTRs at Verata, Fiji, the biomass of broodstock of the bivalve Anadara antiquata increased in reserve areas, and the abundance of small individuals increased in both reserve and fished areas, which is consistent with a seeding effect (Tawake and Aalbersberg, in prep.; Tawake et al., in press). In addition, recent studies indicate a higher degree of larval retention near larval source areas than previously assumed (see section 4.1.1).

Spillover of juveniles and adults from NTRs into surrounding areas may be either density-independent or density dependent. Density-independent spillover occurs as individuals regularly move in and out of the reserve in foraging and other daily activities or in periodic movements such as migration to spawning sites. This will generally not benefit fisheries. It essentially extends fishing mortality inside the reserve boundary, making the NTR effectively smaller, since individuals can still be caught even if their home ranges are centred within the reserve (Bohnsack, 2000, Walters, 2000). It reduces the

build-up of biomass inside the reserve, and therefore opposes the seeding effect. This depends on the species' vulnerability to fishing and mobility relative to the size of the reserve (Kramer and Chapman, 1999; Rowley, 1994; Walters, 2000).

Unless NTRs are large, density-independent spillover will negate any protective effects for highly mobile species such as coastal pelagic fishes (Bohnsack, 2000). Much smaller NTRs can be effective for site-attached species. This includes large predatory reef fishes and sedentary invertebrates, the species most likely to be overexploited in Pacific islands coastal fisheries. Small NTRs will not, however, provide effective protection even for normally site-attached species if a high proportion of a population periodically moves outside the reserve and is targeted by fishers (Sladek Nowlis and Roberts, 1999). This is why the importance of including reef fish spawning aggregation sites is increasingly recognised (Chiappone and Sullivan Sealy, 2000; FSM, 2001; Johannes, 1998b; Sánchez Lisazo et al., 2000; Smith et al., 2001).

In density-dependent spillover, individuals move out of the NTR to the adjacent fishing ground in response to population increase and resultant competition for resources within the NTR. A dense core population remains inside the NTR that can continue to provide emigrants to fished areas. Density-dependent spillover can enhance fisheries in which there is growth overfishing because emigrants from the NTR enter the fishery at a larger size. Furthermore, benefits from seeding are not negated because a spawning stock of large individuals remains inside the NTR, assuming that large adults are less likely to emigrate than smaller individuals. Thus, density-dependent spillover has the potential to benefit adjacent fisheries, but it will not occur until after biomass builds up within the NTR.

Tagging studies, decreasing gradients in target species abundance moving away from NTRs, and the fact that fishers often redirect effort to reserve boundaries show that spillover from NTRs occurs (Bohnsack, 1998; Kramer and Chapman, 1999; Rakitin and Kramer, 1996; Roberts and Hawkins, 2000; Sluka et al., 1997). Evidence that spillover is density-dependent, however, is equivocal (Sánchez Lizaso et al., 2000). Spillover may be minimal highly site-attached fishes (Holland et al., 1993; Tupper and Juanes, 1999), and will obviously not occur in sessile invertebrates such as giant clams and precious corals. Habitat discontinuities such as areas of soft bottom between reefs may act as barriers to spillover of mobile species. The best field evidence for density-dependent spillover is an observed correlation of biomass within and outside the NTR at Apo Island (Russ and Alcala, 1996a). This occurred only in the ninth year of protection and only within 300m of the reserve boundary. Although fishers commonly concentrate effort near NTR boundaries there is little evidence that higher catch rates there compensate for the loss of fishing grounds.

Modelling studies indicate that seeding is more likely to be effective than spillover in enhancing surrounding fisheries, and that the benefits of spillover will occur primarily near reserve boundaries and when fishing mortality outside the reserve is high (Bohnsack, 2000; DeMartini, 1993; Holland and Brazee, 1996; Man et al., 1995; Polacheck, 1990). The relative benefits of spillover versus seeding depend, however, upon the spawning stock-biomass relationship, target species mobility, degree and type of overfishing, level of juvenile fishing mortality, and other factors.

4.1.2 Evidence that NTRs enhance fisheries yields

Quantitative evidence for or against a fisheries benefit from NTRs is very limited. Polunin (in press) considers it inconclusive, although a consensus statement recently released by a large group of leading marine scientists says that the weight of the evidence favours a benefit (NCEAS, 2001). Increased biomass of large predatory fishes (Carangidae, Lethrinidae, Lutjanidae, Serranidae) outside the Apo and Sumilon Island reserves in the Philippines correlated with increases within the reserves (Alcala, 1988; Russ and Alcala, 1996a, b). Actual catch rates were not measured but interviews with fishers indicated that yields also increased (Russ and Alcala, 1996a). McClanahan and Kaunda-Arara (1996) found that CPUE approximately doubled within three years of closure of 65% of a coral-reef fishing ground in Kenya. Total yield from the fishery decreased by nearly half, however, because fishing effort declined in proportion to the area closed (i.e. by about 65%) as fishers moved to other grounds or occupations, options that are not often available to Pacific island fishers. In another Kenyan study, Watson et al. (1997) found increased reef fishery yields adjacent to one protected area but not another, in which there was evidence of poaching.

Tawake and co-workers (Tawake et al., in press; Tawake and Aalbersberg, in prep.) report from Fiji not only that abundances of several invertebrate species increased in harvest areas following the protection of a seagrass area by species-specific tabu but that village women reported CPUE increases of as much as 500% for the bivalve Anadara antiquata and increased fishing incomes of 20%. These benefits may not arise solely from the NTR because other measures such as a ban on destructive fishing methods were applied to the fishing grounds.

The positive response of fishing communities provides indirect evidence that NTRs enhance yields. In many places communities have decided to establish an NTR after hearing positive reports from a neighbouring community that has done so (Table 3). It is also common for communities to extend the period of temporary harvest tabus or to make the rules governing NTRs more restrictive. At Verata, for example, tabus on seagrass and mangrove areas were initially species-specific. The harvest bans for the tabu areas were extended to all species when the communities involved decided that the tabus on harvesting individual species were not effective because fishers were usually non-selective, retaining essentially everything that was caught (Tawake and Aalbersberg, in prep.)

4.1.3 NTRs versus conventional fisheries management

Modelling studies indicate that NTRs can increase production under the right conditions but are unlikely to do a great deal better in optimising fisheries yields than effectively implemented conventional fisheries management (e.g., Bohnsack, 2000; Hannesson, 1998; Hastings and Botsford, 1999; Holland and Brazee, 1996; Man et al., 1995; Sladek Nowlis, 2000; Sladek Nowlis and Roberts, 1997, 1999). Under some model conditions NTRs result in reduced yields unless measures are taken to prevent the displacement of effort into the adjacent fishing ground, i.e. unless total effort in the fishery is reduced. Other conditions that favour NTRs as an alternative to conventional management in models include a high level of exploitation prior to NTR establishment, inclusion of a spawning stock biomass - recruitment relationship, low target species mobility, the absence of juvenile fishing mortality, and Allee effects (i.e. a reduction in fitness at low population density due, for example, to reduced spawning success).

These considerations are beside the point. Effective conventional fisheries management has not been implemented in Pacific islands coastal fisheries, and given the limited capacity of governments and the difficulty of centrally managing highly dispersed, multi-use, multi-gear fisheries almost certainly never will be (Johannes, 1998b). The advantage of NTRs is that their implementation and enforcement are easier and better suited to community action than conventional fisheries management. Often established by traditional tabu (see Annex 4), they are easily understood by both traditional leaders and the general community, and therefore more likely to gain community support.

It is often asserted that reserve design is less data-dependent than conventional fisheries management. In fact, optimal reserve design requires information that is every bit as difficult to obtain, and sub-optimal design is not without risk (see section 4.4). Nonetheless, the risk that catastrophic fisheries failure will result from inaccurate or inadequate information is almost certainly much less than in conventional management. Models suggest that MPAs act as insurance against the failure of conventional management, can prevent stock collapse at very high levels of overexploitation, and can stabilise annual catches in fluctuating environments by maintaining a richer age structure (Dahlgren and Sobel, 2000; Hall, 1998; Holland and Brazee, 1996; Lauck et al., 1998; Quinn et al., 1993; Sladek Nowlis and Roberts, 1999). These effects may explain why fisheries in which there is some natural habitat refuge from fishing mortality tend to be more robust (Dugan and Davies, 1993). Even very small NTRs (1% of the fishing ground) can theoretically reduce directional selection for characteristics such as small size and slow growth that may be selected for by fishing, and a 20% NTR can eliminate it entirely (Trexler and Travis, 2000). It is unlikely, though, that this is a significant issue in Pacific Islands coastal fisheries.

4.2 Conservation MPAs

There is broad scientific consensus that MPAs are valuable tools for nature conservation, although quantitative evidence of this is lacking (NCEAS, 2001; NRC, 2001; Palumbi, 2001a; Polunin, in press; Roberts and Hawkins, 2000). The existence of ecological benefits within MPAs appears straightforward: the recovery of heavily exploited populations within NTRs, for example, has conservation value in and of itself. Furthermore, increases of non-target species have occasionally been observed inside NTRs (e.g., Russ and Alcala, 1989; Tawake et al., in press).

The protection of target stocks within NTRs may also have broader ecological benefits to the extent that the selective removal of certain species alters ecological processes such as trophic cascades or competitive relationships. Sluka et al. (1996), for example, found that the increased abundance of heavily exploited Nassau grouper in an NTR in the Bahamas correlated with reduced abundance of smaller grouper species. In Kenya, a population increase in an urchin released from predation by overexploitation of a triggerfish led to increased reef bioerosion and resultant decreases in topographic complexity, algal cover, and fish diversity relative to an NTR (McClanahan, 1994; McClanahan and Arthur, 2001). Conversely Jennings and Polunin (1997) found that the removal of predatory reef fishes in Fiji had no effect on prey biomass or diversity. The ecological relationships among coastal marine species in the Pacific islands are far too poorly understood to predict the possible effects of MPAs upon them.

MPAs that reduce or eliminate destructive practices such as blast fishing, destructive trawling, excessive mangrove cutting, or diver damage will clearly benefit habitat quality and thus presumably biodiversity, fisheries, and other values. No-use zones on Red Sea reefs have less coral damage and higher coral recruitment than adjacent reefs subject to intense dive tourism, for example (Epstein et al., 1999). Where damage to habitats has already occurred, the time scale for recovery will often be longer than for species targeted by fisheries because of the longer recovery times for habitat-creating species such as corals and mangroves (Palumbi, 2001a).

MPAs are often established to achieve broader ecosystem benefits outside the MPA boundaries by providing larval sources, protecting vulnerable life history stages or critical areas such as nursery or spawning grounds, or preserving ecosystem functions, for example the sediment trapping function of mangroves. The only direct evidence for such benefits other than for exploited fisheries stocks is the recovery of some sea turtle populations following the protection of nesting sites, but again studies are almost non-existent (Palumbi, 2001a).

4.3 Ancillary benefits of MPAs

Effective MPAs provide important ex situ benefits not directly related to fisheries or conservation. MPAs often reduce use conflicts. Maintaining relatively undisturbed natural environments has value in education and scientific research. MPAs are often established to enhance tourism. The large predatory fishes that typically build up inside NTRs, for example, increase the attractiveness of coral reef sites to divers (Williams and Polunin, 2000). Even in the absence of any biological changes tourists may perceive a site as more attractive simply because it enjoys some protection (Polunin, in press).

A benefit of MPAs that should not be underestimated is their role as a catalyst for environmental awareness and stewardship, a key lesson in recent studies (Biodiversity Conservation Network, 1999; World Bank, 2000). This can happen at a number of levels. Most of the villages participating in the Samoan Fisheries Division extension programme, for example, have established both NTRs and other management measures on fishing grounds outside the reserve (see section 6.1). It may well be that the broader measures have more effect than the NTRs, which are very small, but the NTRs are probably a key element. As a defined place, the NTRs are tangible and provide a focus for activities such as community monitoring or maintaining markers that may enhance MPA success in and of themselves (Pollnac, in prep.; Tawake et al., in press). Since the recovery of degraded resources is likely to occur fastest within NTRs, they may give communities early evidence of benefits from good environmental management. At the next level, the establishment of MPAs consisting of small core NTRs within larger community managed areas may catalyse the establishment of larger, multiple use MPAs, as appears to be happening in Samoa (section 6.1) and Kimbe Bay (section 6.2). Finally, successful community-based MPAs can influence national conservation and development policy (Russ and Alcala, 1999; Tawake et al., in press).

4.4 MPA Design

4.4.1 Larval and recruitment dynamics

The effectiveness and optimal design of both fisheries and conservation MPAs critically depends upon patterns of larval transport and recruitment. The long planktonic larval stages of most marine species gives them the potential for long-distance dispersal. Marine populations have therefore largely been assumed to be "open", that is, dependent upon an external larval pool derived almost entirely from distant sources rather than self-recruiting (Caley et al., 1996; Cowen et al., 2000).

Long-distance dispersal and an open population structure have several implications for MPAs. Unless MPAs are of a size comparable to the scale of larval dispersal, they are unlikely to sustain viable populations unless distant, upstream larval sources are maintained. Similarly, MPAs will not be effective as larval sources unless located upstream of suitable settlement sites. Long-distance dispersal also reduces the chances that elevated reproductive output from MPAs will enhance fisheries and biodiversity locally, because larvae will settle outside of the local area. An exception may be species such as giant clams and trochus that have short larval spans and may recruit locally at the level of individual reefs (Dalzell et al., 1996).

Recent studies, however, indicate that larval retention near spawning areas and local recruitment may be more common than previously thought (Black, 1993; Black et al., 1991; Cowen et al., 2001; Jones et al., 1999; Swearer et al., 1999; Warner et al., 2000; Wolanski et al., 1997). Small community-based NTRs on the order of one to a few km^2 will probably still be dependent upon external larval sources (Jennings et al., 1996). Larval retention will, however, increase the local benefits from NTRs, while possibly reducing the broader ecosystem benefits.

Marine habitats may also be linked by source-sink relationships whereby some areas have net production of larvae while others have net settlement. In marine systems these relationships may be determined largely by location relative to prevailing currents. Complex local hydrodynamics might also determine sources and sinks at fine scales (Stockhausen et al., 2000). Habitat quality may also be a determining factor: high-quality habitats presumably favour increased growth and reproduction and are therefore likely to act as larval sources, and low-quality habitats as sinks (Crowder et al., 2000). Increased habitat quality within MPAs could enhance their status as sources. Conversely, density-dependent processes could reduce it. The increased abundance of piscivorous grunts in a Barbados NTR, for example, led to increased predation on new recruits (Tupper and Juanes, 1999).

The effectiveness of MPAs as larval sources also depends upon whether populations are limited by larval supply and recruitment, or by post-settlement, density-dependent processes such as predation and competition. Caley et al. (1996) conclude on the basis of demographic models that all open marine populations must be influenced by recruitment to some extent. To what extent, however, remains unknown, as does the degree of density dependence (Sánchez Lisazo et al., 2000).

Larval and recruitment dynamics and population regulation are very poorly known and difficult to study, and will vary widely among species. We are as unlikely to have the information needed to design biologically optimal reserves as we are to have the data needed to design optimal fisheries regulations. Furthermore, socio-economic factors will be at least as important to the success of MPAs as biological ones. It has therefore been suggested that attempts to optimise MPA design be abandoned, or at least that MPA establishment not be delayed pending further study, and that instead reserves be

established more or less opportunistically based on available information wherever possible (Crowder et al., 2000; Johannes, 1998b; Roberts, 2000; Stockhausen et al., 2000). This is probably the only realistic approach in Pacific Island Countries. It means, however, that an MPA design that works well at one location may not work at all when replicated at another (Stockhausen et al., 2000).

The establishment of MPAs in the absence of detailed scientific information is not without risk. Ineffective MPAs impose the opportunity costs of losing resource use and development opportunities. They are also likely to alienate communities. Even beneficial MPAs involve short term costs from the loss or restriction of use of the area. While optimal MPA design is unrealistic, application of some basic principles is likely to enhance their success.

4.4.2 Size of MPAs

As noted in section 4.1 even very small NTRs allow the recovery of sessile and site-attached species. Considerably larger MPAs are needed for biodiversity and fisheries conservation. A somewhat arbitrary and increasingly controversial figure that 20% of coastal areas should be protected has often been recommended as a target for governments (Boersma and Parrish, 1999; FSM, 2001; Plan Development Team, 1990; US Coral Reef Task Force, 2000). Fisheries models generally suggest that 20 to 30%, but in some models up to 80%, of fishing grounds need to be in NTRs to enhance yields, and 30 to 60% to achieve risk reduction (NRC, 2001). Studies suggest that a proportion of area protected in the range of 10 to 35% is appropriate for habitat and biodiversity conservation (NRC, 2001). These proportions may, however, be overestimates because most models only address fishing mortality and do not consider the benefits of protecting critical areas such as spawning and nursery grounds (NRC, 2001).

In practice, the size of locally-managed MPAs and NTRs in the Pacific Islands will usually be determined by social factors including the size of the area over which the community exercises influence (e.g., via CMT), their degree of dependence upon marine resources, governmental policies related to the role of communities in management, and the availability of alternative sources of food and income (Parks et al., in prep.) Where alternatives exist, communities may wish to make their entire sea area an NTR (Evans, in prep.; King and Fa'asili, 1999a; Johannes, 1998a). This is probably unlikely in most places and as noted by King and Fa'asili (1999a) may be unfair if only some members of the community have access to alternatives.

Smaller MPAs are needed where other management measures are in place outside the MPA. Very small reserves may be effective, beyond their biological merits, if they catalyse effective management in the rest of a community's area (see section 4.3). It should also be noted that NTRs are most effective when stocks are severely overexploited, and in the relatively lightly exploited fisheries in many Pacific Islands Countries the benefits may be modest or take a long time to accrue (Adams, 1998; Jones et al., 2001). As a result, high expectations of large NTRs may not be met. For these reasons it is probably best that community-based NTRs start small and be coupled with broader management of fished areas.

There has been considerable scientific debate whether it is preferable to have a single large reserve or several small ones of the same total area. This is probably irrelevant to individual community-based MPAs in the Pacific, since few communities will hold large enough areas to contemplate establishing more than one MPA. In the broader context, however, it is worth noting that a single large MPA will provide protection for more mobile species, promote biomass buildup and therefore seeding, and by virtue of a low perimeter-to-edge ratio reduce spillover. Multiple small NTRs will have opposite effects.

4.4.3 Location of MPAs

An important consideration for MPAs is to site them in high-quality habitats. Creating NTRs at larval sink sites could divert fishing effort to adjacent larval sources, resulting in decreased rather than increased population growth (Crowder et al., 2000). To the extent that larval sources and sinks are determined by habitat quality, protecting high-quality habitats will reduce this risk. Where communities have local knowledge of important spawning, recruitment, or nursery sites these are good candidates for protection. Similarly, spillover is likely to follow gradients from low- to high-quality habitats, so that fishing in high quality habitat surrounding a low-quality NTR can efficiently extract biomass from the NTR (Kramer and Chapman, 1999).

To enhance the seeding effect it makes sense to place MPAs upstream of suitable larval settlement sites. Small MPAs are unlikely to be viable in isolation from larval sources, so attempts should also be made to place them downstream of similar habitats that might act as larval sources, and to prevent the degradation of such source habitats. Coastal communities usually know local circulation patterns well enough to predict likely larval flows, if not larval duration, retention, or limitation. MPAs should also be placed to enclose as broad a range of habitats as possible because many marine organisms move between habitats at different life history stages, for example from mangrove and seagrass nursery areas to reefs or from shallow to deep reef areas. Habitat diversity is also a good surrogate for species diversity (Ward et al., 1999).

If it is known whether seeding or spillover is the primary objective, the MPA can be designed accordingly. Spillover and the resultant loss of spawning stock can be reduced by placing MPAs in bays to reduce the boundary perimeter or by taking advantage of natural barriers to movement (Sladek Nowlis, 2000). Conversely, locating MPA boundaries within contiguous habitat may enhance spillover (Chiappone and Sullivan Sealy, 2000).

The social dimensions of MPA location are important. MPAs should not be put in places where restriction of use causes undue hardship. Decisions about MPA location should consider the needs of all groups in the community. It is also beneficial to place MPAs where the location and geography facilitate community surveillance (Johannnes, 1993; Parks et al., in prep.; Pollnac, in prep.) This will also make the MPA more visible. Remote sites are expensive and difficult to patrol (e.g., Patris in prep.)

4.4.4 Need for Networks

There is a general scientific consensus that networks of MPAs covering large geographic areas, and including both a representative spectrum of habitats and replicate areas of similar habitats, will provide the greatest benefit to both fisheries and conservation (Chiappone and Sullivan Sealy, 2000; NCEAS, 2001; Dayton, et al., 2000; Murray et al., 1999; Roberts, 1995, 1997a, 2000; Sladek Nowlis and Roberts, 1997; Palumbi 2001a, b). Networks can act to link larval sources with settlement areas as well as habitats used by organisms at different life history stages. Biodiversity is most likely to be conserved by protecting a variety of habitats. Networks are also a bet-hedging strategy against biological uncertainty, natural variability, and the possible collapse of individual MPAs due to management failure or catastrophe.

Individual communities in the Pacific Islands are unlikely to establish MPA networks, but the experience has been that when one community establishes an NTR or other form of MPA neighbouring communities tend to follow suit (Table 3), so that networks tend to form organically. This is a significant benefit of a community-based approach based on CMT systems.

4.4.5 Temporary versus permanent NTRs

The establishment of community-based NTRs in the Pacific has often involved the enactment of tabus. Following traditional practice, these tabus have usually been established initially for periods of at most 2 years, although the tabu period is often subsequently extended (Table 3, Annex 4). In other cases harvest bans on different species are alternated. At Otang Java, Solomon Islands, for example, harvest tabus on trochus and bêche-de-mer are enacted in alternating years (Kile, in prep., Lam, 1997).

Temporary closures are a common tool with established value in conventional fisheries management. Like any measure that reduces fishing mortality, temporary harvest bans will benefit overexploited fisheries, especially if the closure is long enough in duration to allow escapement into reproductive size classes.

Permanent NTRs, however, will generally provide greater benefits than temporary ones (NCEAS, 2001; Roberts and Hawkins, 2000). Temporary closures are unlikely to deliver two important benefits of permanent NTRs: (a) the proportionately greater larval production achieved by allowing some individuals to grow to large size, and (b) the recovery of habitat-forming organisms such as corals, mangroves, and seagrass, which typically take longer to recover than fished stocks. Temporary reserves are also unlikely to result in density-dependent spillover, except for species that recruit and grow rapidly. Furthermore, temporary closures will provide temporary benefits: fisheries rapidly return to pre-closure conditions when re-opened (Russ and Alcala, 1996a; Sladek Nowlis, 2000). A detailed study of customary management regimes in Melanesia (MRAG, 1999) concluded that this is the case for traditional tabus.

4.4.6 The need for complementary measures

The connectivity of marine environments means that MPAs will not conserve marine resources and biodiversity in the absence of complementary measures. The designation of an area as an MPA cannot protect it from the effects of pollution or invasive species (Agardy, in prep.; Allison et al., 1998; Boersma and Parrish, 1999; Simberloff, 2000). Fisheries models invariably indicate that the effectiveness of MPAs in increasing yields and reducing risk is greatly enhanced by if not dependent upon the reduction of fishing mortality in fished areas (NRC, 2001). MPAs will usually be unable to maintain viable populations of most species unless external larval sources and nursery sites are maintained, as well as flows of food, nutrients, and so on. The need for complementary environmental measures outside MPA boundaries generally increases with decreasing MPA size. MPAs networks and embedding core NTRs within larger multiple-use MPAs, both of which are used at the community level in the Pacific, address these issues to some extent but are not enough. Broader management structures, such as Integrated Coastal Management to reduce the negative impacts of land-based activities and maritime safety regimes to reduce risks of ship groundings and pollution emergencies, are also needed (World Bank, 2000).

4.4.7 Baselines and participation in project design

As explained elsewhere in this report, community participation in and ownership of MPA initiatives is essential to their success in the Pacific, but at the same time communities need external partners. The establishment of effective partnerships and design of successful, community-based MPAs requires adequate baseline information about community

perceptions and motivations, local decision-making processes, patterns of resource use, traditional knowledge and management systems, demographics, development and investment history, and a range of other socio-economic characteristics, all of which are community-specific. A lack of adequate baseline information is a frequent cause of failure of conservation initiatives in the Pacific (McCallum and Sekhran, 1996, 1997; Schoeffel, 1997; Siwatibau, 1999; Whyte et al., 1998, 1999).

Gathering socio-economic baseline assessments is important not only for the information generated but also as a process in and of itself. The assessment process can help build trust between the community and external partners and ensure a common vision and understanding of goals, roles, and responsibilities (Bunce, et al., 2000; Salm et al., 2000; Whyte et al., 1999). Communities feel alienated from the process, on the other hand, when decisions are imposed on them rather than being reached through consensus (Whyte et al., 1998). The use of appropriate participatory techniques for community entry and assessment, therefore, is absolutely critical. A number of authors discuss participatory appraisal and planning methods and their appropriate application (e.g., Bunce et al., 2000; Chatterton, 1999; Grant, 1996; King and Lambeth, 2000; Mahanty, 1995; Siwatibau, 1999; Whyte et al., 1998, 1999).

Biological baseline information is also important to MPA design. As described above, good decisions about the size, placement, and management rules of MPAs depend upon an understanding of the local environment. Good biological baseline information may also help avoid unrealistic expectations for resource recovery and other environmental benefits from MPAs (S. Miller, pers. comm.) As with the collection of socio-economic baseline information, biological baseline assessments that include full community participation are a critical part of the process of partnership building.

Finally, the establishment of baselines, both socio-economic and biological, are essential first steps in the establishment of monitoring programmes.

4.4.8 Monitoring and evaluation

Communities constantly monitor their marine resources, management systems, and social conditions in an informal way. More formal monitoring, however, provides feedback on management success, informs decisions on future action, and builds the capacity of communities to assess and respond to change (Mahanty, 1995; Margoluis and Salafsky, 1998; Salm et al., 2000; Wells and White, 1995).

Socio-economic monitoring of projects serves several functions, including assessing the impacts of projects on communities, assessing project effectiveness, and capturing lessons learned for application elsewhere (Mahanty, 1995). Mahanty (1995) makes the important points that not only should community-based socio-economic monitoring be participatory, but that the effectiveness of community participation should itself be monitored, for example to determine if communities are satisfied with their roles. The techniques used in participatory monitoring are similar to those used in participatory assessment and appraisal (e.g., Bunce et al., 2000; Chatterton, 1999; Grant, 1996; King and Lambeth, 2000; Mahanty, 1995; Siwatibau, 1999; Whyte et al., 1998, 1999).

For environmental monitoring, simple, inexpensive, community-based techniques can produce scientifically valid data (King and Lambeth, 2000; Tawake and Aalbersberg, in prep., Tawake et al., in press), and standard techniques are becoming increasingly available. The Global Coral Reef Monitoring Network, for example, has developed community monitoring techniques for its Reef Check programme in which some Pacific islanders have been trained. The Australian Seagrass Watch programme has developed similar techniques for seagrass areas and recently received funding from the Packard Foundation to extend the programme to the Pacific Islands.

Monitoring to rigorously test scientific hypotheses about MPAs requires highly sophisticated experimental designs, and often specialist expertise (Jones et al., 2001; Lincoln-Smith, et al., 2001; Palumbi, 2001a). While they may be scientifically valuable, it is questionable whether the benefits of such sophisticated monitoring programmes justify their cost in the context of the IWP.

Beyond its value in providing information, community monitoring provides environmental education and stimulates discussion of environmental issues and solutions. It can also be useful in integrating modern scientific and traditional knowledge for management purposes (Bunce et al., 2000; Kostka, in prep., Parks et al., in prep.) Monitoring and other activities may enhance the success of an MPA in and of themselves by keeping people actively involved and enhancing the sense of ownership (Pollnac, in prep.) It is important that communities control monitoring, for example by choosing which organisms to monitor (Parks and Salafsky, 2001; Tawake and Aalbersberg, in prep.) Furthermore, it should be accepted that the community and not external partners own the data. Communities may well be willing to share the data but it must be their choice.

At the management and policy levels, the IUCN has produced general guidelines for evaluating the effectiveness of protected areas (Hockings et al., 2000). In principle these could be applied at levels ranging from specific sites and projects through to regional and global systems of protected areas but they have not been tested in the Pacific. The Pacific Islands RoundTable for Nature Conservation has developed a general framework for monitoring implementation of the 1999-2002 Action Strategy for Nature Conservation in the Pacific Islands (RoundTable, 1999). On the basis of specific criteria (Box 1) the framework identifies 19 indicators of progress toward achieving specific intended outcomes of the Action Strategy, many of which relate to the number, characteristics, and effectiveness of conservation areas. A database is

being developed to track two of the identified indicators, namely the number, type, year established, and size of protected areas based on IUCN categories and the number of community-based conservation areas (Shanefelter, 2001).

5. Inventory of MPA activities in IWP countries

Traditional measures such as tabus and limited access under CMT have existed for thousands of years in the Pacific. The history of conventional MPAs is much shorter. The first MPA in the Pacific was established in 1956 for the Ngerukewid Islands (70 islands) in Palau, but real attempts to manage it extend back only about 2 decades. As in the rest of the world, the initial approach to establishing MPAs in the Pacific was sometimes a top-down process where government agencies identified and declared a protected area with little community involvement. There was also often a lack of realistic planning for the development and ongoing management of protected areas, with the result that a number of MPAs have been nothing more than "paper parks" with no real existence beyond their inclusion in various reports or proposals. This problem is by no means unique to the Pacific and applies to most regions of the world (Kelleher et al., 1995; McClanahan, 1999).

As is the case for fisheries management, the emphasis for MPAs has shifted from centralised "conventional" management to community-based and collaborative management. Community-based protected areas are by no means exempt from the "paper park" syndrome. A notable example of this is the Wildlife Management Area (WMA) system in PNG. WMAs are areas that are formally designated, usually at the request of the customary landowners, for the conservation of specified wildlife species (Asigau, 1989). Management rules are established and enforced by landowners through a landowner committee. Unfortunately, most WMAs have essentially ceased to function, largely because the responsible government agency lacks the capacity to support the communities involved (Huber and Baines, 2000; P. Hunnam, pers. comm.; Jenkins and Kula, 2000). The common characteristics of the three marine WMAs that do appear to be working are ongoing support by NGOs and the availability of alternative development opportunities, namely dive tourism (A. Jennings, pers. comm.)

5.1 Site-specific MPA activities

The number of MPA activities in the countries participating in the IWP has grown rapidly in recent years and continues to grow. Annex 4 is a compilation of all available information on MPAs in the participating countries, including not only the published and grey literature but also information available on the internet (Annex 3). The inconsistent level of detail of the information provided about different MPAs in Annex 4 is a direct reflection of the uneven reporting of MPA experiences in the Pacific region. Blank cells in the Annex indicate that the relevant information was unavailable. Where information such as interest groups or stakeholders has been omitted from the report, this simply reflects the quality of the information available to the authors and in no way reflects the relative importance of stakeholder groups. Where all cells for an MPA in Annex 4 are blank, except the site name, this reflects that the area is listed in a compilation of MPAs (e.g., Bleakley, 1995; RoundTable, 1998) but no other information about the site was available. Many such cases are likely to be "paper parks".

None of the compilations that examined (Bleakley, 1995; RoundTable, 1998; Whyte, 1998) overlap completely and none includes all of the MPAs listed in Annex 4, which inevitably must omit some existing MPAs. Failed MPAs are probably under-represented due to reporting bias. Furthermore, successful attempts are most often reported by external partners, particularly conservation organisations, rather than by communities, so that self-sufficient community MPAs without external partners may not be reported. In describing the Makogai marine reserve in Fiji, for example, Adams (1998) notes that it is not included in recent MPA lists and speculates that this is "perhaps because it is not legislated, or perhaps because it was negotiated and supported by the Fisheries Division rather than the conservation service". Similar cases elsewhere in the Pacific may be omitted from Annex 4.

Over 80% of the more than 130 MPAs listed in Annex 4 are primarily community-based but supported by various external organisations including development and environment organisations, donor agencies, local, national, and international NGOs, and in some cases national government agencies. Of the 14 countries participating in the IWP, only Nauru has no recorded MPAs. Niue, Marshall Islands and Tuvalu each have only one. The vast majority of MPAs in Annex 4 have the primary objective of fisheries management, although external partner organisations probably have other objectives such as biodiversity conservation. The few projects involving multiple-use MPAs or integrated coastal management approaches are in the early stages of development or have had implementation problems (Annex 4).

The IUCN categories of MPAs shown in the "other comments" column are those provided by the cited where information sources, but no attempt is made in this report to assign IUCN categories independently. Where different sources listed different IUCN categories for the same MPA the category shown in Annex 4 is that provided by the most recent source.

5.1.1 Country summaries

A brief overview of MPA initiatives in the 14 countries participating in the IWP follows (readers are referred to Annex 4 for a more detailed summary of country activities):

Cook Islands

Trochus sanctuaries have been established at Aitutaki, Manuae, and Palmerston Islands, all involving individual island councils and various ancillary management measures. A national park has been established at Suwarrow Atoll. Six ra'ui (tabu) areas have been declared on Rarotonga, which in turn have influenced the declaration of a ra'ui on Aitutaki.. The ra'ui were initiated by the Koutu Nui, a formalised group of traditional leaders, with support from NGOs, the private sector, government agencies and local communities.

Federated States of Micronesia

There are State trochus sanctuaries in Pohnpei, Chuuk, Kosrae and Yap. Pohnpei State has initiated several marine and mangrove sanctuaries under the Marine Sanctuary and Wildlife Refuge Act (1998), but none of these are yet being actively managed. Lenger Island Marine Reserve (see section 6.3) is currently the only community-based MPA in Pohnpei. There are no community-based MPAs in Chuuk or Yap, but the FSM government is keen to foster NGO development and conservation partnerships because budgetary restrictions have diminished its capacity for natural resource management and conservation (FSM, 2001). In Kosrae, the Utwe-Walung Marine Park is supported by the South Pacific Biodiversity Programme (SPBCP) and has been operating since 1995. The Kosrae Integrated Resource Management Project closely follows the approach developed by SPBCP for the Utwe-Walung Marine Park (F. Martel, pers. comm.)

Fiji

Bleakley (1995) states that conservation efforts in Fiji appear to concentrate on terrestrial areas and at a national level this is still true. Fiji has no national marine parks although Astrolabe Bay is worthy of consideration (WWF web site). The two officially recognised marine reserves in Fiji are Makogai Island, under the jurisdiction of the Ministry of Agriculture, Forestry, and Fisheries, and the first legally recognised community-based reserve at Ono Island, Kadavu. Waqainabete and Rupeni (2001) list a number of community-based reserves that are not government-recognised, as well as several proposed MPAs involving various interest groups including the Fiji Fisheries Department, WWF, USP, local communities and business concerns.

The Verata Tikina project includes several community-managed and monitored MPAs that include species-specific and full NTRs established by traditional tabu within larger management areas, and alternative income generation (AIG) through bioprospecting. It involves partnerships between local communities, various NGOs and USP and has been used as an example to promote establishment of similar projects elsewhere in Fiji.

Kiribati

Kiribati has two marine conservation areas, Kiritimati and North Tarawa. Both areas have been adopted as SPBCP projects. The current status of the Kiritimati Conservation Area is unknown. SPBCP funding for the North Tarawa Conservation area terminates in 2001 and a transition strategy for project continuation has been prepared for both areas (SPBCP, 2001a).

Marshall Islands

Jaluit Atoll, the only MPA recorded for the Marshall Islands, is the most recent conservation area established by the SPBCP in 1999.Because this MPA is still in its infancy there is no transition strategy to date.

Nauru

No MPAs are recorded.

Niue

No MPAs are recorded. Nevertheless, fishing may be regulated by the customary measures of fono (a traditional tabu prohibiting entry for fishing or harvest of any resources, living or non-living) or tapu (apparently a less restrictive and/or not area-based form of traditional tabu). Both fono and tapu, are supported by the Domestic Fishing Act 1995 (Hicks, 1998). The Huvalu Forest Conservation Area, an initiative of the SPBCP and the Niue Environment Unit together with local villages, contains certain fishing areas such as Tauta (a sea track and fishing ground) which are fono. In these areas the use of fish poisons and spear fishing are tapu and use of nets is restricted (Hicks, 1998).

Palau

Most MPA initiatives in Palau are State/community projects covered by state legislation and initiated since 1994 (Smith et al., 2001). "All these areas were established due to a local concern over depleted resources or habitat, and over diminishing control" (Smith et al., 2001). The exceptions are the Ngerukewid Islands and the Ngerrumekaol grouper spawning area, which are covered by both national and state legislation. Conservation areas are initially established with customary authority, such as a bul, which in most cases is reinforced with state legislation. The different states provide varying degrees of ongoing support for the MPAs (Smith et al., 2001). The future of most of the areas is uncertain past the

end of the bul and Smith et al. (2001) identify, among other things, the need for management plans and parallel national legislation to support conservation areas.

Koror State has the most active marine conservation programme. Koror State Conservation Officers actively monitor fish and benthic communities in State waters and enforce the conservation areas and fishery reserves (Golbuu, 2000). A local NGO, The Palau Conservation Society, and The Nature Conservancy (TNC) are actively promoting multiple-use management strategies for the Rock Islands Conservation Area, which is one of Palau's premier tourist attractions. The SPBCP supports both the Rock Islands Conservation Area and the Ngeremenduu Conservation Area on Baldeobab. SPBCP has prepared transition strategies for both of these Conservation Areas (SPBCP 2000c, d). The Palau International Coral Reef Centre, which opened in 2001, was established with the mandate to "provide information and assistance to Palau traditional chiefs in their role of managing reefs and implementing traditional management practices".

Papua New Guinea

Attempts to establish national marine parks in Papua New Guinea have not been successful. The Horseshoe Reef Marine Park was gazetted by the Lands Department in 1981 but never declared under the National Parks Act (1982) because of disputes over customary tenure. Nanuk Island Park (East New Britain Province), the only Provincial marine park, has also been unsuccessful. A number of international and national NGOs are actively promoting the establishment of MPAs, all of which are community-based WMAs, ICAD projects, or conservation areas.

The WMAs were mostly established in the 1970s and 1980s. They have had limited success at best due to a lack of government support, community awareness, enforcement of management rules. Few offenders are prosecuted and there is often confusion over the regulations and associated penalties (Jenkins and Kula, 2000).

In contrast, recent conservation efforts are characterised by NGO-supported, community-based initiatives. Many of these, for example the Milne Bay ICAD project and renewed efforts in the Maza WMA, are still in their infancy. Others, such as Kimbe Bay (see section 6.2), are continuing with ongoing support from local business and donor agencies. The long-term success of these projects is yet to be determined and depends largely on the commitment of local communities and their desire and ability to work together. Local politics, particularly with regard to customary tenure, unrealistic expectations, cargo cultism, the lure of immediate cash returns for resource exploitation, disputes over the ownership and control of assets belonging to community projects, and lack of ongoing maintenance and support to communities have been identified as negative factors in Melanesia (Schoeffel, 1997; Whyte et al., 1998).

Samoa

Samoa's only national MPA is the Palolo Deep marine reserve. As of May 2001, 65 villages have established fisheries management plans under the Fisheries Division Extension programme, of which 57 have established NTRs (see section 6.2). The Sa'anapu-Sataoa Conservation Area has had limited success but there is support for its continuation (SPBCP, 2000a; see section 6.1). IUCN is executing a GEF project to establish large multiple-use MPAs in the Aleipata and Safata districts, the latter of which includes the villages of Sa'anapu and Sataoa. The only other recorded conservation area in Samoa with a marine component is the Uafato Conservation Area being established by the Uafato Village Council in collaboration with the O le Siosiomaga Society, a local NGO, and SPBCP.

Solomon Islands

There are at least six community-based fisheries reserves in the Solomon Islands (SPREP, 2001). The Arnavon Islands Community Marine Conservation Area consists of a core NTR surrounded by a larger multiple-use MPA. It involves three villages and a variety of agencies and organisations, mainly BCN and TNC. It is also an SPBCP project with a transition strategy (SPBCP, 2000f). There are a number of on-line documents detailing the Arnavon Islands project and lessons learned (Annex 3). WWF has a project at Marovo Lagoon which has emphasised ecotourism as an AIG activity. WWF's conservation project at Simbo Island currently has no marine component but the opportunity exists to extend the project into marine areas. The East Rennel World Heritage site is the first such site in the insular Pacific.

Tonga

Six of the eight listed MPAs in Tonga have been established under the Parks and Reserves Act (1995) and the Birds and Fish Preservation Amendment Act (1974), which are administered by the Ministry of Lands, Survey and Natural Resources. Tenure in all of these belongs to the state. Current management status of these reserves is unknown but according to the UNEP-WCMC database there is no active management in the Ha'atafu Beach Reserve, apart from notice boards proclaiming the rules, and this may also be the situation in the other state reserves. There appears to have been some local community opposition to establishment of at least some of these areas e.g. the Pangaimoyu reef reserve. Community-managed projects in Tonga include giant clam sanctuaries established by the Ministry for Lands, Survey and Natural Resources but run by local communities, and the SPBCP Ha'apai Conservation Area (SPBCP, 2001b).

Tuvalu

Tuvalu has a single MPA at Funafuti atoll, established under the SPBCP in collaboration with the Funafuti Town Council. Funding for the project terminates in 2001 and a draft transition strategy (SPBCP, 2000e) has been prepared.

Vanuatu

With the exception of the President Coolidge and Million Dollar Point Reserve, all of the MPAs in Vanuatu are community-managed areas under customary tenure arrangements, supported in many cases by the Fisheries Department. Some of these appear to be quite successful while others have failed, largely as a result of division within communities and CMT disputes between communities. Detailed accounts are provided by Johannes (1994, 1998a), Naviti and Aston (2000) and Whyte et al. (1998). There is a reference to the "Vatthe Marine Conservation Area" in one compilation (RoundTable, 1998), but no reference to marine components of the Vatthe Conservation Area in its SPBCP transition strategy (SPBCP, 2001c).

5.2 Overarching MPA activities

In addition to the individual more or less site-specific activities listed in Annex 4 there are a number of overarching initiatives at the national and regional levels. These activities seek both to improve the effectiveness of local MPAs, for example through the sharing of information and resources, and to extend the benefits of local MPAs more widely by establishing networks and replicating success to additional sites. Such leveraging of benefits is of course a common goal of many programs and organisations active in the region but several specifically target the development of effective MPAs.

5.2.1 South Pacific Biodiversity Conservation Programme (SPBCP)

The SPBCP provides support to Pacific Island countries to develop and manage conservation areas. The programme promotes biodiversity conservation while allowing for the sustainable use of resources. Community involvement, and ultimately community ownership, are integral features of SPBCP projects. SPBCP has established MPAs or conservation areas with significant marine components in FSM (Kosrae), Kiribati, Marshall Islands, Palau, Samoa, Solomon Islands, Tonga and Tuvalu (see Annex 4). Funding for most of these terminates in 2001 and SPBCP has prepared transition strategies for the projects beyond the termination of SPBCP funding (SPBCP, 2000a-f, 2001a-c). While the goal is that the projects will become self-sufficient, most if not all projects require an additional period of external assistance before they achieve sustainability.

5.2.2 Pacific Islands RoundTable for Nature Conservation

The RoundTable was formed in 1998 in response to a call by the Sixth South Pacific Conference on Nature Conservation and Protected Areas for more active coordination and collaboration among regional and international agencies active in conservation in the region. The RoundTable is a forum in which most of the major regional and international organisations can share "ideas, experience, information, and knowledge on how best to address the main issues of nature conservation facing the region" (RoundTable 1999). Major activities of the RoundTable to date are to finalise the Action Strategy for Nature Conservation in the Pacific Islands region (RoundTable, 1998), initiate a monitoring program to assess implementation of the Action Strategy (RoundTable, 1999), develop an inventory of ongoing and planned conservation activities in the region to help identify critical gaps, and support working groups on specific issues, including sites, threats, national reporting, capacity building, polling/awareness, and education (RoundTable, 1999).

5.2.3 MPA Learning Portfolio

With support from the Packard and MacArthur Foundations, the World Resources Institute (WRI) and Foundations of Success (FOS) are coordinating the development of a "learning portfolio" of locally-managed marine protected areas (LMMAs) in the Asia-Pacific region (Parks and Salafsky, 2001). The goal of the learning portfolio is to network LMMA projects in the Indo-Pacific region in order to share experiences and resources, and to test assumptions about the conditions that favour local management. The learning portfolio was initiated in August 2000 with a workshop in Fiji involving representatives from 10 Pacific Islands MPA projects3 and another in the Philippines involving 12 MPA projects in Indonesia, Malaysia, and the Philippines. In October 2000 the two groups participated in a workshop at the International Coral Reef Symposium. Some participants met again in June 2001 during the 10th Pacific Science Inter-Congress, which included a symposium on LMMAs sponsored by WRI (see section 1). The number of projects included in the portfolio has increased from the initial 22 projects (Parks et al., in press. in prep.) Both WRI and FOS have established web sites for information exchange and dissemination (Annex III).

5.2.4 US Coral Reef Task Force and the All-Islands Group

The US Coral Reef Task Force was established by Presidential decree in 1998. It involves 11 US federal agencies and the governors of US states, territories, or commonwealths that have responsibilities for corals reefs. In the Pacific the current activities of the Task Force are limited to American Samoa, Guam, Hawaii, and the Northern Mariana Islands, but activities may be extended to other US-associated Pacific Islands countries (G. Davis, pers. comm.) A goal established by

the Task Force is the protection within NTRs of 20% of the coral reef area under U.S. jurisdiction by 2010. At present about 10% of US reefs are in NTRs, but much of this is in "easy" areas such as remote, uninhabited atolls (Koltes, 2001). The 20% goal has influenced policy in the US-associated countries participating in the IWP.

Part of the Task Force is the US All Islands Coral Reef Initiative Coordinating Committee, which is composed of government representatives from American Samoa, Guam, Hawai'i, the Northern Marianas, Puerto Rico, and the U.S. Virgin Islands. The All Islands Committee has had considerable influence in shaping the activities of the Coral Reef Task Force to better reflect the needs and concerns of small islands.

6. Case Studies

6.1 Safata, Samoa

Three partially overlapping projects in the Safata District on the south coast of Upolu exemplify various features that are common in community-based MPA initiatives in the Pacific Islands. The first is the Sa'anapu-Sataoa Conservation Area (SSCA). The area was identified by a 1991 scientific survey as a high-priority area for biodiversity conservation containing the best remaining mangrove forest in Samoa (Park et al., 1992). The conservation area is under the customary ownership of two villages, Sa'anapu and Sataoa. Both are larger than most Samoan villages, and are divided into coastal and inland settlement units (Thistlethwaite and Huber, 1995). The biological environment is a mangrove forest, lagoon, and barrier reef complex that supports subsistence fisheries and an important artisanal fishery for mangrove crabs (Scylla serrata), as well as tourism. The SSCA was established to address the degradation of the mangroves from clearing, solid waste dumping, and destructive fishing methods (SPBCP, 2000a).

When the results of the 1991 survey were presented to them, the communities indicated their support for conservation, which they reaffirmed when the Division of Environment and Conservation (DEC) submitted a successful project proposal to the SPBCP in 1994 (SPBCP, 2000a). Project activities focused on raising environmental awareness, controlling environmentally unsound practices, and alternative income generation, initially growing ginger and ecotourism. A complementary ICM project proposed for the area to address broader watershed and development issues (Thistlethwaite and Huber, 1995) did not eventuate.

SPBCP funding for the SSCA terminates in 2001. The draft transition strategy (SPBCP, 2000a) indicates that although the communities recognise benefits from conservation and strongly support continuation of the project, the SSCA has had serious problems. These are largely due to a lack of community ownership. Community ownership and ongoing management of the SSCA was a primary objective of the project, but it was designed so that DEC initially played the lead role. Over the course of the project SPBCP also developed an important advisory role due to its physical location near the site and limited capacity in DEC. Once the project was established as "belonging" to DEC and SPBCP it proved difficult to transfer ownership and responsibility to the communities. In addition, inadequate biological and socio-economic baseline data were collected (S. Miller, pers. comm.; N. Stacey, pers. comm.)

Resulting impediments to the success of SSCA have included unrealistically high initial expectations of project benefits, internal conflicts within communities, a lack of tradition for the two communities to work together, communication problems, conflicts and poorly defined roles of the conservation area coordinating committee (CACC) and village fonos, the lack of capacity in DEC to fulfil its defined role, lack of project continuity due to frequent turnover of the conservation area support officer (CASO), and a lack of transparency in financial management. Ginger growing largely ceased. Ecotourism activities declined and those that continued operated as a private rather than community enterprises with resultant social conflicts.

There was some improvement in 1999 when a new CASO re-emphasised the roles of the communities. A new ecotourism plan was established which among other things took into account the villages' desire to work independently rather than together. Issues such as business management capacity, marketing, some aspects of product quality (e.g. the impact of free-range pigs on the mangroves and their attractiveness to tourists), unrealistically high expectations, and potential community conflict need to be addressed as part of the overall community ecotourism strategy (SPBCP, 2000a).

The second project is a national community-based fisheries extension project undertaken by the Fisheries Division (FD), with AusAID support, in which several Safata District villages are participating. Planning and staff training commenced in 1995 and field operations in 1996 (King and Fa'asili, 1999a). The project focused from the beginning on ownership and responsibility for management interventions by individual villages, and recognised the fono as the primary local authority while allowing participation by other sectors of the village.

The extension process begins with an expression of interest from a village (King and Fa'asili, 1999b). Fisheries extension officers then meet with the fono to provide information to allow the village to decide whether or not to participate. If the decision is 'yes', a series of meetings of different village groups is held to discuss fisheries problems and possible solutions. These discussions were structured in the form of a rapid historical appraisal of recent changes in fisheries and the environment and the construction of problem/solution trees. Then an advisory committee with representatives from the different groups is formed. After several meetings the advisory committee and extension officers conduct a "stroll-through environmental assessment" to further the discussions and evaluate alternative actions (King and Fa'asili, 1999b). The

advisory committee, with the assistance of extension officers, prepares a draft management plan for consideration by the fono. Once approved by the fono the plan takes the form of an agreement between the community and the FD specifying the resource management and conservation undertakings of the community and the support to be provided by the Fisheries Division, which consists primarily of technical advice and assistance (King and Fa'asili, 1999b). A Fisheries Management Committee (FMC) is formed to implement the plan.

Throughout the process, the extension officers' skills in facilitating (but not leading) community discussions and promoting a sense of community responsibility for management are emphasised at least as much as technical knowledge (King and Fa'asili, 1999b; King and Lambeth, 2000). Technical inputs are focused on assisting communities with evaluating the likelihood of success of alternative actions, avoiding unrealistic expectations, and providing information on request rather than on recommending courses of action (Fa'asili and King, 1997; King and Fa'asili, 1999a, b). The pace of the process is set by the communities.

The extension process commenced in 54 villages nationwide in the first 16 months of operation (Fa'asili and King, 1997), growing to 65 villages after two years (King and Fa'asili, 1999b). Nine of these villages rejected the process, which was discontinued in another four when extension officers felt there was a lack of community commitment. Of the 52 remaining villages, 44 had produced Village Fisheries Management Plans. Measures adopted in the Plans include enforcement of national laws for minimum size limits or against destructive fishing practices, imposition of more restrictive minimum sizes, further bans on fishing practices, gears or removal of beach sand, removal of crown-of-thorns starfish (COTS) or rubbish, protection of mangroves, and re-introduction of giant clams. Thus, each of the community fishing areas can be considered to be an MPA under the IUCN definition4. Unexpectedly, 81% of villages decided to establish NTRs within the larger managed area (King and Fa'asili, 1999b). These NTRs are very small, the largest being only 0.18 km2, but together form a network with the potential to link larval sources with settlement sites and foster recruitment to surrounding areas (King and Fa'asili, 1999a). It took an average of about 3 months for a village to produce an approved management plan.

The programme has continued to grow, with 72 villages participating as of May 2001, of which 65 have completed their management plans and 57 have established NTRs (M. King, pers. comm.). On the basis of such indicators as conducting FMC meetings, community knowledge of the management plan, and enforcement of rules, 21 villages are doing very well at management (overall score > 85%) and only 4 are doing poorly (< 55%; King and Lambeth, 2000; M. King, pers. comm.) Rules established in the management plans are internally enforced by the community, but where outside violators are a concern villages have sometimes formalised the rules as village by-laws, which allows them to be enforced upon outsiders through the court system (Fa'asili and Kelokolo, 1999). In some cases, however, the community becomes frustrated with the pace of the courts and takes enforcement into its own hands, creating potential conflicts (Fa'asili and Kelokolo, 1999).

Sa'anapu village is participating in the extension programme, but Sataoa is not. Initial undertakings by Sa'anapu include mesh size limits, bans on the use of explosives, bleach, fish poisons in fishing, on smashing coral, and on exporting bêche-de-mer, the removal of COTS and rubbish, and the establishment of a village reserve (NTR) in which giant clams have been stocked (King and Fa'asili, 1999b). Four other villages in the Safata District are also participating in the programme and have established management plans that include similar undertakings (King and Fa'asili, 1999b). Mud-crab farming has recently been initiated, and is seen as supportive of the continuation of the SSCA (SPBCP, 2000a). The proposed introduction of tilapia aquaculture and attendant likelihood of the release of tilapia into the mangroves, however, have led to misunderstandings and conflicts among DEC, FD, SPBCP, and the local villages (M. King, pers. comm.; F. Martel, pers. comm.; S. Miller, pers. comm.)

The final project is the Samoa Marine Biodiversity Protection and Management Project, a World Bank-implemented GEF project being executed by IUCN. The project aims to establish large multiple-use MPAs in the Safata and Aleipata districts that include core protected areas for coral reefs, mangroves, and seagrass beds. The Safata component involves all 9 villages of the Safata district, including Sa'anapu and Sataoa. A social assessment performed at the project inception stage (IUCN, n.d.) recognised that the villages had little tradition of working together, but devised a strategy of working at the district level where there was some history of cooperation, for example for hospitals and secondary schools.

Much of the design and implementation of the Samoa Marine Biodiversity Protection and Management Project is based on lessons learned from the SSCA. Right from the design phase the project stressed customary practices and the authority of traditional leaders. The collection of adequate baseline information and establishment of appropriate, transparent financial mechanisms have been emphasised. The project has sought to minimise unrealistic expectations and emphasise links with the existing Fisheries Division extension programme (IUCN, n.d.) It has also cooperated with the SPBCP Sa'anapu-Sataoa project and a variety of other organisations.

A March 2001 project evaluation (World Bank, 2001) of the Samoa Marine Biodiversity Protection and Management Project concluded that the project thus far has exemplified best practice both in its collaboration with District Committees and in building partnerships with other projects and agencies. The evaluation also identified a number of key lessons learned, as follows (World Bank, 2001):

- Appropriate MPA financial mechanisms and sustainability need to be designed and implemented early in the management-planning phase of the MPA;

- MPA baseline assessments should incorporate both socio-economic survey as well as biodiversity surveys and obviously require more than one source of expertise/consultant;
- As MPA projects become successfully implemented they will naturally attract interest from other donors and potential partners that could contribute to MPA objectives and adequate Project Team time needs to be available to realize such useful partnerships. Partnerships with other programs can lead to a more highly integrated development at least cost;
- Project designs need to include provisions requiring an environmental assessment for any major developments that may affect the MPAs;
- District Committees by nature are expected to address a range of development issues affecting their sites. As MPAs mature they are seen as natural vehicles and used as an integrated mechanism for advancing integrated ecological sustainable development across the sites;
- Community-based MPA projects do not act in isolation of other government or non-government initiatives. Project designs should earmark part of the project budget (e.g. 10 per cent) to unplanned integrative mechanisms and procedures to link the MPA with wider development issues that could contribute to successful MPA implementation;
- All major stakeholders should be engaged from the beginning of the project since it's critical to build partnerships due to the work requirement of the MPA;
- Volunteerism should be encouraged in community-based projects and compensation should not be encouraged for services that ultimately will be the responsibility of the community;
- Progressive delegation of tasks to the village community leaders should occur early on in a project in order to develop a sense of project ownership;
- Problems, which threaten the harmony of the community, should be discussed and resolved immediately; and
- Understanding of existing tourism interests and issues by communities e.g. District Committees is important in MPA development prior to detailed work on ecotourism opportunities. Relationships with existing private sector interests e.g. tourism operators need to be developed through good participatory processes before detailed opportunity assessments are made.

6.2 Kimbe Bay, Papua New Guinea

Kimbe Bay lies on the north coast of New Britain, in the Islands region of PNG. The Bay harbours coral reefs of exceptional physiographic and biological diversity, as well as mangroves, seagrass beds, and other marine resources (Holthus, 1995). There are concerns, however, about reef damage from the use of explosives and derris root in fishing, declines in the abundance of exploited fishes and invertebrates, and the effects of sediments and other pollution from land-based sources including logged areas, oil palm plantations, and Kimbe town, which is more or less centrally located on the shore of the Bay. The employment opportunities provided by the oil palm and logging industries, and growth of Kimbe town, have brought large numbers of outsiders into the area who often fish on the reefs, to the concern of the customary owners.

During the 1980s these concerns led the owners of Walindi Plantation Resort, a small resort west of Kimbe with an international reputation as a diving destination, to begin discussing environmental issues and the conservation value of Kimbe Bay with communities around Walindi, the West New Britain Provincial Government, and scientists in PNG and Australia. The resort supported some preliminary scientific surveys that confirmed Kimbe Bay's exceptional biodiversity, and the area began to attract interest from conservation organisations both within PNG and overseas.

In the early 1990s a local NGO, Mahonia na Dari, was formed to promote environmental awareness and action in the communities around Kimbe Bay who are the customary owners of the reefs. In partnership with TNC, the European Union, the resort, and others, a small education and research centre was built at Walindi. The centre adopted a strategy that stresses the role of education in promoting environmental awareness and discussion in local communities, and in 1995 developed an ambitious programme of developing curricula and teaching materials for local schools, educational activities for school children at the research centre, and community environmental awareness programmes for people of all ages.

Simultaneously the centre was used to support a series of studies, for example, a Rapid Ecological Survey in late 1994 (Holthus, 1995) and an Ecotourism Report in 1996 (Brown and Mayer, n.d.), that substantially improved the knowledge base of the area. Complementary activities including a sustainable forestry ("wokabout sawmill") project funded by the European Union were also based at Walindi, although not directly tied to Mahonia na Dari's programme. The resort, as an active member of the PNG Diver's Association, played a leading role in developing an environmental Code of Practice for the dive tourism industry and installed permanent moorings at regular dive sites to reduce anchor damage. The partnership proposed the creation of a Kimbe Bay Marine Conservation and Management Area (KBMCMA) using a community-based approach.

In 1996, more than a year after Mahonia na Dari commenced its education and awareness programmes, the local village of Kilu Tamare expressed interest in establishing a management programme for the reefs under its tenure. Mahonia na Dari initiated an "ad hoc, opportunistic consultative process" to provide the necessary support to the community (Lokani and Seeto, in prep.). The process began with informal discussions with leaders and elders, which led to a series of targeted discussions to help the community identify its chief concerns and alternative solutions, and decide on a course of action (Lokani and Seeto, in prep.). In 1997 the community decided to completely close four inshore reefs to fishing, and to ban the use of derris root and explosives on the 20 other reefs under their customary control. The MPA operated without a formal basis in legislation until 1998, when legislative support was provided under the Fisheries Act, 1998 (Lokani and Seeto, in prep.).

Scientific monitoring of the closed reefs has been inconclusive, at least in part because of the effects of mass coral bleaching and mortality during the 1997-98 El Niño (Jones et al., 2001). The community, however, perceives that the number of fish on the closed reefs has increased and that they are less wary of divers (Lokani and Seeto, in prep.), and even that pelagic fish catches have improved (A. Smith, pers. comm.).

Hearing of the positive perceptions of the Kilu Tamare MPA, two other villages invited Mahonia na Dari and TNC to assist them in establishing similar MPAs. Both communities identified destructive fishing methods, declining fisheries resources, and incursions by outsiders into their traditional areas as important concerns (Lokani and Seeto, in prep.). Both villages have decided to follow a similar strategy to that at Kilu Tamare, closing a few inshore reefs to fishing and developing management rules for other parts of their areas. One community, Ruango, has identified four reefs for closure and formed a management committee to develop additional management rules, coordinate the management of the area, and disseminate information about the MPA. Patanga village is in the process of forming a management committee to select the reefs to be closed to fishing and develop other management rules (Lokani and Seeto, in prep.). While biological monitoring at Kilu Tamare has thus far been performed under contract by an Australian university, community-based monitoring programmes are being developed for Ruango and Patanga at the request of the communities, who wish to monitor the closed reefs themselves (Lokani and Seeto, in prep.).

Several other villages in the area have also expressed interest in establishing MPAs (A. Smith, pers. comm.) Lokani and Seeto (in prep.) have concluded that there is considerable local interest in establishing community-based MPAs, but that communities need guidance and assistance in order to take action. None have as yet taken full management responsibility.

Although the MPA at Kilu Tamare functioned for two years without it, legislation is needed to support the long-term maintenance of local MPAs in Kimbe Bay, to enhance enforcement of community management rules, especially against outsiders, and to support the larger-scale KBMCMA, which is now proposed to encompass the entire bay including some offshore components (Lokani and Seeto, in prep.). The KBMCMA is not envisioned as superseding the MPAs that individual villages have established, but rather to encompass them in a framework that can respond to such broad-scale threats as shipping and land-based activities. A co-management model is envisaged for offshore areas beyond a network of community-based MPAs based on customary ownership (Lokani and Seeto, in prep.)

The reefs that communities have selected for closure are inshore reefs that have relatively low biodiversity compared to other reefs in Kimbe Bay (Holthus, 1995), and would not necessarily be the first choice of Mahonia na Dari and TNC for protection (Lokani and Seeto, in prep.). On the other hand, they are among the reefs most threatened by land-based activities, overfishing, and destructive fishing practices. Communities have selected them because declining resources and habitat damage are most apparent there, and because their proximity to the village makes enforcement easier (Lokani and Seeto, in prep.). Thus, while the objectives of the communities and external partners overlap, they may not always be the same.

6.3 Lenger Island Marine Reserve, Pohnpei

Pohnpei State in the Federated States of Micronesia (FSM) has rich and diverse coastal marine resources upon which its people depend. Despite a long history of traditional resource management, these resources are threatened by coral and sand mining, overfishing and destructive fishing practices, sedimentation and pollution from land-based sources, poorly planned development, and other pressures (CSP, 2000; FSM, 2001; Gawel, 1993). These threats result from population increase, the advent of a cash economy, the privatisation of communal land and marine holdings, and the decline of traditional management systems (Kostka, 2001; Raynor and Kostka, unpubl.). National conservation legislation and other government efforts to improve marine resource management have had little effect, because of capacity limitations and a lack of community consultation or ownership (CSP, 2001; Kostka, 2001).[5]

In 1999 the Conservation Society of Pohnpei (CSP), a local NGO, commenced a pilot project to establish a community-based NTR at Lenger Island, which lies adjacent to Kolonia, the capital of Pohnpei. Lenger Island was selected as a pilot site on several criteria (CSP, 2000), including:

- a very small (6 families), cohesive community with traditional leadership and high dependence on the surrounding reefs;

- reef communities which although partly degraded retain a high conservation value; and
- proximity to Kolonia, which enhances the value of the project as a demonstration site.

The approach taken to establishing the Lenger Island MPA builds to a large extent upon lessons learned from the work of TNC and SPBCP in the Pohnpei Watershed Conservation Area (F. Martel, pers. comm.). The project began with "community visioning" discussions that ranged beyond resource management considerations to include the community's broader goals and aspirations (e.g., education, lifestyle; Kostka, 2001). When the community decided that it wished to proceed, a marine survey was conducted that incorporated both the recording of local knowledge and formal scientific surveys in which community members participated. The scientific surveys generally confirmed local knowledge. The community and CSP jointly analysed the information and the community decided to establish an MPA. The MPA, with an area of about 4 km^2, encompasses all the island's nearshore waters and includes mangrove, seagrass, and coral reef habitats. Waste dumping, fishing with explosives or poison, and anchoring on reefs are prohibited within the MPA. About 40% of the MPA is designated as an NTR. The MPA was established and its boundaries marked in October 2000, and officially opened in March 2001 (M. Kostka, pers. comm.).

It has been decided that enforcement of the reserve's management rules requires formal legal status. The community and CSP have prepared a bill, to be submitted to the legislature, to include the Lenger Island MPA in the Pohnpei State Marine Sanctuary Act.

CSP has also helped the community develop two sponge farms, which were established in February 2001. While the farms meet the community's desire for a marine-based enterprise and are strongly supported, CSP recognises that the sponge farm alone will probably be inadequate for the communities needs and other enterprises such as ecotourism need to be explored (Kostka, 2001).

In 2001 CSP, with support from the Packer Foundation, commenced projects to adapt the Lenger Island process at three additional sites, each of which presents challenges not encountered at Lenger Island. The biodiversity (and in one case historical significance) of all three sites has been previously identified, and two of the sites incorporate areas that have been legislated as protected areas but have little or no active management by government agencies (CSP, 2000). The establishment of MPAs will be supported by general environmental education and awareness programmes.

CSP has identified the following lessons learned (Kostka, 2001):

- Pohnpei communities place high value on a healthy environment;
- communities are willing to accept responsibility for managing their resources, if they have ownership of the management regime and are provided with necessary support;
- in Pohnpei, community-based MPAs require formal recognition in legislation;
- the provision of alternative income opportunities is necessary for the success of MPAs;
- community-based approaches take time; and
- community-based initiatives can build upon existing information (e.g. previous scientific surveys) and frameworks (e.g. protected areas already recognised in legislation).

To this might be added that local NGOs can be valuable partners to communities and effective agents for change.

7. Synthesis

7.1 Lessons Learned

Consistent messages emerged from the examination of reports and case histories of individual MPA projects in preparing Annex 4. These are much the same as the conclusions of other recent analyses in the Pacific, notably those by Parks and Salafsky (in prep.) and Parks et al. (in prep.) of projects in southeast Asia and the Pacific, Whyte et al. (1998) of community-based management in Vanuatu, the World Bank (2000) of 31 coastal communities in Fiji, Palau, Samoa, Solomon Islands, and Tonga, and MacKay (unpubl.) of fish reserves in the Cook Islands, Fiji, and Samoa. They also concord with lessons learned internationally (e.g., Roberts and Hawkins, 2000; Salm et al., 2000; White et al., 1994). The references provided in the following distillation purely exemplary and not comprehensive.

Community-based MPAs appear to work in the Pacific. The top-down declaration of MPAs by Pacific Islands governments has generally resulted at best in "paper parks" (Evans, in prep.; Kostka, 2001; Parks et al., in prep.). Community-based initiatives, on the other hand, have resulted not only in management plans, marked boundaries, enforcement of rules, and other verifiable indicators of success (Johannes, 1998a; King and Fa'asili, 1999b; Parks et al., in prep.) but in community perceptions of resulting benefits (Table 3). In at least one case, Verata, there is quantitative evidence of fisheries and economic benefits arising from a community-based MPA (Tawake and Aalbersberg, in prep.; Tawake et al., in press). All observers agree that community control and ownership of the process from the very beginning is critical. Ownership is difficult to transfer from external partners to communities once a project is underway (section 6.1).

But they have not yet been sustained. On this point the perspective of this report is slightly different from those of most other reviews. Past initiatives have often failed because of conflicts within and between communities, unrealistic expectations, lack of support to communities, poorly conceived and executed assistance, and other factors (Whyte et al., 1998). Many lessons have been learned from this, and the need to develop long-term sustainability by building the capacity of communities to manage their resources and of local institutions to support them is widely recognised. The successful projects to date are mostly young, so the long-term sustainability of locally-managed MPAs in the Pacific has yet to be demonstrated.

Start small, scale up. As discussed above, many Pacific MPA initiatives have started out in one or a few villages, with small, temporary reserves, and/or by dealing with one or a few issues. This makes it easier to build consensus, limits unrealistic expectations, and requires fewer resources from supporting organisations (Parks et al., in prep.). Where communities have perceived benefits they have often extended the period of tabus and/or adopted more restrictive rules. Neighbouring communities have also often established MPAs. Networks of small community-based MPAs have helped stimulate the establishment of larger multiple-use MPA initiatives, though these are in the early stages of implementation.

MPAs can catalyse broader environmental management. This issue is addressed in section 4.3 but is important enough to reiterate and is confirmed by a recent studies (Biodiversity Conservation Network, 1999; World Bank, 2000).

Avoid unrealistic expectations. Unrealistic expectations and enthusiasm, followed by frustration and anger when expectations are not met, are a recurrent problem in the Pacific (Fa'asili and King, 1997; IUCN, n.d.; Whyte et al., 1998).

Alternative seafood and income sources are needed to compensate for the short-term losses of establishing MPAs and relieve pressure on resources (King and Fa'asili, 1999b; MacKay, unpubl.; Parks et al., in prep.). Ecotourism is the most common AIG activity, followed by alternative fisheries development. AIG opportunities provide motivation and reinforcement for conservation activities, but can also generate unrealistic expectations (SPBCP, 2000b; Whyte et al., 1998; World Bank, 2000). Most alternative income generation schemes efforts in the Pacific are not perceived to be successful or have limited replicability (Aalbersberg et al., 1999; World Bank, 2000). In isolated rural areas the replacement of subsistence fishing with cash income generation activities also has a risk of increasing cash dependence (Parks et al., in prep.).

Communities need external assistance. Sometimes an external stimulus for community discussion is needed, and this does not seem to compromise community ownership so long as the external role is one of facilitation and not coercion or control (King and Lambeth, 2000; Parks et al., in prep.). Once they decide to establish MPAs, communities have the will and initiative to do so but need technical and management guidance to achieve their goals (Johannes, 1998a; King and Fa'asili, 1999b; MRAG, 1999; Parks et al, in prep; Whyte, 1998, SPBCP, 2000e). Management strategies can be strengthened with formal government support (Johannes, 1998a; King and Fa'asili, 1999b: Whyte et al, 1998). External partners should, however, tailor their approach to the community rather than promoting their own agendas.

Supporting legislation is needed. Communities that have established MPAs usually decide that the MPA needs legal status to strengthen traditional authority, allow enforcement on outsiders, and enhance the sustainability of the MPA (Fa'asili and Kelokolo, 1999; Johannes, 1998a; Kostka, in prep.; Lokani and Seeto, in prep.; MacKay, unpubl.; Whyte et al., 1998). This is a delicate issue. However, communities may fear that formal declaration of an MPA will compromise their customary control over an area (Adams, 1998). Legal formalisation of CMT and traditional authority may enhance local control but it can also reduce flexibility, slow enforcement, and create conflict (Fa'asili and Kelokolo, 1999; Ruddle, 1998).

Success depends on effective partnerships. Co-management options must be carefully analysed and transparent. Too many or too few partners, and poorly defined roles, can slow the process (Parks et al, in prep; SPBCP, 2000a). If agencies lack capacity or authority to perform their designated roles communities get frustrated or lose interest, or the lead role may pass by de facto to others not mandated to perform it (Whyte et al., 1998; SPBCP, 2000a). [BOX 2}

Management structures must be socially appropriate, equitable, and transparent. Intra-community co-operation and participation is vital. Management regimes must consider the relative roles, rights, responsibilities, interests and power of community leaders, landowners, leaseholders, gender and age groups (Whyte et al, 1998). Management committees must be representative but not cumbersome (SPBCP, 2000e, 2001a). Perceptions of misuse of project funds or inequitable distribution of costs and benefits lead to disputes and failure.

Build awareness through education. Education often provides the impetus for communities to take and sustain action, and gives them tools to do so (MRAG, 1999). Education of school children is particularly effective (King and Fa'asili, 1999b; Kostka, in prep.; Lokani and Seeto, in prep.; Takesy, 2001). Education activities should start at the outset and continue throughout a project (Parks et al., in prep.)

Community monitoring is a powerful tool. Simple community monitoring techniques can provide scientifically valid information that is relevant to the community. Community monitoring reinforces social cohesion and a sense of ownership, and provides feedback on progress (Parks and Salafsky, 2001; SPBCP, 2000e; Tawake, et al., in press; Wells and White, 1995). It is also effective in environmental education and building capacity for environmental management.

7.2 Further conclusions in the context of the IWP

Most but not all IWP countries have ongoing MPA-related initiatives, but the total area protected remains small. There are opportunities for the IWP to intervene on several levels, depending upon the country and local situation:

- **facilitate new community-based MPAs** in areas where they are currently lacking and suitable models do not currently exist. This has the advantage of promulgating MPAs in new areas where they are needed. It also allows the application of lessons on best practice to be incorporated into project inception. It may, however, involve considerable up-front investment and higher risks than building upon existing efforts;
- **replicate successful community-based MPA approaches** in other areas. This reduces the risk of failure if the environmental and social situation in new project areas is similar to that in the project area being replicated;
- **assist the development of projects in the planning or early implementation stages** of development, of which there are many. This may help reduce replication of effort and build partnerships. Participating in projects that are already under development may, however, limit the scope to pursue the IWP's particular goals and approach;
- **develop or provide continuing support for more mature projects** that are not yet sustainable, such as the SPBCP conservation areas. This helps sustain successful efforts and reduces the risk of failure. Again this may limit the scope of the IWP's involvement, and the investment of resources in existing activities may slow the spread of MPAs into other areas where they are needed;
- **develop co-managed MPAs in urban areas** (see below); and
- **develop more comprehensive frameworks for existing locally-managed MPAs,** for example by encompassing them within a multiple-use MPA or ICM project. Ultimately this will be needed, because locally-managed MPAs are unlikely to be viable in isolation. The integration, or at least coordination, of different communities, however, presents a number of social and political challenges and may be premature at this stage of MPA development in the Pacific islands.

The large majority of locally managed MPAs in the Pacific are in rural areas. Rural conditions (small population, generally greater social cohesion and more intact traditional authority, often fewer environmental issues) favour the development of community-based MPAs. Urban areas, however, generally have the most degraded coastal environments and tend to have the greatest opportunities both for alternative income generation and for realisation of the recreational, educational, and scientific benefits of MPAs. The IWP may wish to consider an urban MPA project, but this will require a higher level of co-management and is more complex and risky than rural projects. Pilot projects in secondary towns (e.g., provincial seats, district centres) rather than national capitals may help reduce this risk, but it may also reduce the level of national government support available to projects.

Because the effectiveness of MPAs relies upon complementary measures, IWP pilot MPA projects should as much as possible integrate the other IWP focal areas. The sustainable fisheries focal area will usually if not always be directly relevant. The waste reduction and freshwater resources (in the context of watershed management) focal areas may also be relevant in many situations, particularly to the urban and/or multiple-use/ICM scenarios.

Although the need for alternative fishing and income generation opportunities and the economic sustainability of MPAs is widely recognised, and the private sector has been involved in a number of locally-managed MPAs, discussion of private-sector involvement is notably absent from much of the documentation on Pacific Islands MPA activities. The IWP may wish to explore ways to strengthen private sector involvement in MPA partnerships.

Finally, while the 5-year time scale of the IWP is long by the standards of development assistance projects, overwhelming experience in the Pacific is that developing self-sufficient, institutionally sustainable MPAs will take much longer. Project continuity can be enhanced by building upon existing activities and by developing strategies for project continuation beyond the life of the IWP from the outset of project design.

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Annex I: Model Community-Based Pilot Projects

1. Establishment of new community-based MPAs for fisheries and tourism

Communities bordering a coastal lagoon system are highly reliant upon subsistence fisheries and artisanal sedentary invertebrate fisheries for cash income. They are concerned about declining resources and increasing use of explosives and poison, and some have approached the Fisheries Department and/or a local NGO for assistance. The communities are also concerned that they are not benefiting sufficiently from the activities of a small dive resort that uses their reefs. The resort in turn is concerned that some villages have excluded them from access to their reefs, and about the impacts of fishing.

Objectives: Improved fisheries yields and village incomes. Reduced use of destructive fishing methods. More cooperation between the resort with community activities.

Total time frame: 3 to 5 years.

Project Activities (some concurrent):

- Community entry and participatory planning and baseline assessment to determine communities' desire to act, identify environmental problems, define objectives, management measures and processes, etc. Tools: participatory planning and appraisal techniques (e.g., Bunce *et al.*, 2000; Chatterton, 1999; Grant, 1996; King & Lambeth 2000; Siwatibau, 1999; Whyte *et al*., 1999). Preferably implemented with Fisheries Dept. and/or local NGO as lead agency. Time frame: 3 months – 2 years;
- If community decides to establish MPA, participatory design of MPA (location, size, management rules, enforcement procedures, etc. Tools as above with additional technical support from NGO(s) and/or Fisheries Dept. Time frame 3-12 months;
- Approach resort, assess willingness to participate, if willing initiate dialogue with communities (ongoing);
- AIG program: initial consultation by rural development expert to identify potential enterprises (1 month). Participatory assessment to determine potential options favoured by community (2-6 months). Economic feasibility studies of options by resort, NGOs, Fisheries Dept, consultants, etc as required, in collaboration with community (3 months). Identification of start-ups funding and investment needs (1 month) and sustainable funding strategies (3 months – 3 years);
- AIG implementation: 1 month – 3 years depending upon activities;
- Develop community monitoring programme. Time frame: 6-12 months total, primarily for community consultation and training. Technical aspects 1-2 months. Assess opportunities for resort-community collaboration (e.g. resort provides diver training and loan equipment for monitoring, communities monitor shallow areas while resort staff/guests monitor deep areas, resort provides logistic support, etc.); and
- Biological monitoring and programme evaluation: yearly or biennially.

Performance Indicators:

Management plan, marking of MPA boundaries, community knowledge of MPA existence and management rules, enforcement of rules, increased yields/incomes, environmental improvement or reduced rate of degradation, demonstrable cooperation between resort and villages, expressions of interest from other communities, management committee meets.

Other IWP Focal Areas:

Sustainable Fisheries

2. Multiple-use MPA in an urban setting

Coastal environments around a secondary town (e.g. provincial seat) are increasingly degraded. Intense artisanal fisheries for local consumption and export have led to widespread overfishing of sedentary invertebrates and some reef fishes, there is widespread destructive fishing, and hunting pressure on turtles is severe. Pollution from land clearing, sewage, solid waste, and small industry is increasing, and water in some areas is unsafe for seafood harvest and swimming. Mangroves are declining because of solid waste dumping, cutting for firewood, building materials, bêche-de-mer processing, and home sites. Conflicts between traditional resource owners and immigrants from other areas are increasing. Several government agencies and NGOs have offices in the town.

Objectives:

Cooperation of stakeholders in the development and implementation of a management plan, including establishment of an MPA. Improved environmental awareness as all levels, and incorporation of environmental considerations in town planning.

Total time frame: 10-20 years if no activities already underway

Project Activities (some may already be ongoing, many concurrent):

- Environmental education for schools, including curriculum and teaching materials development, teacher training, day or weekend courses for students, and/or peer-to-peer education. NGO to lead in collaboration with education department. Time frame 1-2 years;
- Awareness campaign for general public via radio, posters, cultural and entertainment events, and church, women's and youth groups. NGO to lead. Time frame 6-12 months;
- Upon request, participatory process within traditional villages as per project 1 to strengthen community management and control of customary areas, possibly including small NTRs near villages. Fisheries or Environment Dept., or NGO, to lead. Time frame 5 to 10 years (longer than project 1 because of broader range of threats, more complex issues);
- Build environmental management capacity of government departments and town planners via training, participation in other project activities, and mentoring. Strategy to devolve decision-making and enforcement to community as much as possible to reduce burdens on agencies and enhance interactions. IWP or Donor agency to lead. Time frame 5 years;
- Identify opportunities for private-sector investment in ecologically and economically sustainable enterprises. Encourage government policies that favour such investments. Lead agency as locally appropriate, with a strategy that planning agency takes responsibility as soon as possible. Time frame: ongoing;
- Develop parallel and multi-level structures for integrated planning, e.g. steering group involving agencies, NGOs, communities, private sector, with committees or coordinating mechanisms for each of these groups; and
- Develop strategies to accommodate town residents from other areas, e.g. designated recreation areas, consistent system of use fees paid to traditional owners, AIG programmes.

Performance indicators:

Creation and enforcement of NTRs and designated use development of management plan(s), meeting of coordinating bodies, private sector investment, production of education/awareness materials, improved water quality, environmental improvement, reduced conflict, increased environmental awareness.

Other IWP Focal Areas:

Sustainable Fisheries, Waste Management

3. Multiple-use MPA in rural setting

Assisted by an external partner many, but not all communities in a coastal area have established small community-based NTRs and complementary management rules for other areas of their customary sea areas. The number of communities involved has been slowly increasing as communities perceive benefits. Community motivation for participating was initially to enhance fisheries, but they have become concerned about other issues, including sedimentation from logging and/or agricultural intensification and pollution from a food processing plant. Communities find it difficult to address these problems individually but there are inter-community conflicts.

Total time frame: 5-10 years.

Objectives:

Develop a multiple-use MPA incorporating complementary terrestrial planning and management, without disrupting the existing system of village reserves or creating conflicts among communities.

Project Activities:

- Identify a number of candidate areas with a similar situation. Participatory appraisal as per project 1 to determine community interest, assess whether inter-community conflicts are manageable, and identify existing planning and decision making frameworks. Select receptive district(s) with good chance of success. Process to take particular care not to raise expectations and to make the relationship with the existing village reserve programme clear Time frame: 6-24 months;
- Environmental awareness and education, building upon existing reserve programme but focussing on broader-scale threats. Ongoing;
- Establish partnerships between government agencies, NGOs, donors, and communities, clearly establishing roles and responsibilities and ensuring that each partner has the capacity to fulfil its defined role. Time frame: 1-2 years;
- Build capacity for district-level decision-making and environmental management, strengthening existing mechanisms wherever possible. Develop and implement district-level management plan on the basis of integrated watershed and coastal management. Identify and prioritise land-based threats. Ongoing; and

- Develop and implement AIG and sustainable financing strategies with emphasis on diverse enterprises catering for the needs and interests of different communities, and that are complementary rather than competitive. Process as per project 1. Time frame: 5 years.

Performance indicators:

Management plan, operation and profitability of AIG enterprises, increased incomes, increased environmental awareness, absence of conflict with village reserve management systems, improved water quality, active operation of district-level planning and decision mechanism.

Other IWP Focal Areas:

Waste Management; Water Resources (re. watershed management).

Annex II: Resource People

Cook Islands

WWF Cook Islands
Partnerships in Conservation & Development
WWF South Pacific
P. O. Box 649, Tupapa, Rarotonga, Cook Islands
Phone: 682-25-093
Fax: 682-25-093
Contact: Jacqueline Evans
Email: jevans@wwfcooks.org.ck

Kiribati

Ministry of Environment and Social Development
Conservation Division
P.O. Box 234, Bikenibeau, Tarawa
Phone: 686-28000
Fax: 686-28202

Marshall Islands

EPA Majuro
Fax: 679-62 55202

Niue

Brendon Pasisi
Dept. of Agriculture, Forestry and Fisheries
P.O. Box 74, Alofi, Niue
Email: fisheries@mail.gov.nu

Pierre Labrosse and Being Yeeting
Integrated Coastal Fisheries Management Project
Secretariat of the Pacific Community
P.O. Box D5, 98848, Noumea Cedex, New Caledonia
Email: Pierrel@spc.org.nc
Beingy@spc.org.nc

Federated States of Micronesia

Conservation Society of Pohnpei (CSP)
P.O. Box 2461
Kolonia, Pohnpei, FM 96941
Phone: 691-320-5409
Fax: 691-320-5063
Email: csp@mail.fm
Contact: William Kostka

Andy Tafileichi
Yap Marine Resources Management Division
P.O. Box 251, Colonia, Yap, FSM.
Phone: 691-350 2294
Fax: 691-350 4494
Email: mrmdyap@mail.fm

Vanuatu

The Nature Conservancy
Peter Thomas
Email: peterejt@csi.com
George Myers, TNC
Email: tnc@welkam.solomon.com.sb

Fiji

WWF South Pacific Programme Office
Private Mail Bag, GPO Suva, Fiji
Phone: 679-315-533
Fax: 679-315-410
Email: general@wwfpacific.org.fj

Etika Rupeni
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WWF Fiji Partnerships in Conservation and Development
Phone: 679-315 533 or
Email: erupeni@wwfpacific.org.fj

S. Waqainabete
Ministry of Agriculture, Fisheries and Forestry
Fisheries Div.
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Phone: 679-361122
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marine@coralcay.org

Palau

Andrew Smith
Director,
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The Nature Conservancy
P.O. Box 1738, Koror, PW 96940, Palau
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Noah Idechong
Delegate
House of Delegates, Olbiil Era Kelulau (National Congress)
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Adalbert Eledui
Director
Department of Conservation and Law Enforcement
Koror State Government
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Palau Conservation Society (PCS)
P.O. Box 1811, Koror, PW 96940, Republic of Palau,
PHONE 680-488-3993
FAX 680-488-3990
Email pcs@palaunet.com.

Coral Reef Research Foundation at:
PO Box 1765, Koror, Palau PW 96940.
FAX: 680-4885513
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Papua New Guinea

Conservation Melanesia
Lester Seri
Conservation Melanesia
P.O. Box 735
Boroko, NCD
Papua New Guinea
Tel: 675-3232758
Fax: 675-3232773
Email: conmelpng2@global.net.pg

WWF Papua New Guinea
PO Box 8280
Boroko NCD
Papua New Guinea
Phone: 675-32503224 or 32309855
Fax: 675-325-3334
Email: wwfpng@dg.com.pg

Papua New Guinea cont'd

WWF Sepik Community Landcare Project
Private Mail Bag
Wewak
East Sepik Province
Papua New Guinea Phone:
Fax:
Email: (675) 856 1997 or 856 2690
(675) 8562211
wwfsepik@daltron.com.pg

WWF Transfly Daru Project
P O Box 199
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Conservation International
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M. Ewai
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Village Development Trust
Karol Kisokaw
VDT
P.O. Box 2397, Lae, Morobe Prov., PNG
Phone: (675) 472 1666
Fax: (675) 472 4824
Email:

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P.O.Box 697, Kimbe
West New Britain Province
Papua New Guinea.
Ph/Fax (675) 9834241
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Samoa

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Fax: 685-20037

O le Siosiomaga Society
P.O. Box 5774
Matatutu, Apia, Samoa
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Fax: 685-20429
Email: olssi@pactok.peg.apc.org

Peter Varghese
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Curriculum Development Unit
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Solomon Islands

WWF Solomon Islands
PO Box 97
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Western Province
Solomon Islands
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Nelson Kile
c/o World Resources Institute
Paramount Chief
Baehaiclan - Isabel Province
c/o Michelle Lam
SPREP, P.O. Box 240, Apia, Samoa
Phone: 685-201151
Fax: 685-20231
Email: nkkile@ipasifika.net

Solomon Islands Development Trust (SIDT)
Marine resource conservation outreach programmes
John Rowan
P.O. Box 147
Honiara, Solomon Islands
Phone: 677-23409
Fax: 677-21131

International/General

Gerald Davis
Chief
Division of Aquatic and Wildlife Resources
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Email: jparks@wri.org

Prof. Richard Pollnac
Dept. of Marine Affairs
University of Rhode Island
Kingston, Rhode Island 02881-0817, USA
Phone: 1-401-8745107
Fax: 1-401-8742156
Email: rpo4903u@postoffice.uri.edu

Training programmes in community-based monitoring techniques

Dr Stuart Campbell
Marine Plant Ecologist
Community Seagrass Research
Department of Primary Industries
Australia
Training in community-based monitoring techniques
for sea grass and other marine ecosystems.
ph 61-7-4035 0113
fax 61-7-4035 4664
Email: campbes@dpi.qld.gov.au

Reef Check
Gregor Hodgson
The Reef Check Foundation
1652 Hershey Hall
University of California at Los Angeles
Los Angeles, CA 90095-1496
USA
Education and training in community-based reef monitoring.
See Annex 3A: Internet
Phone: 1-310-794-4985
Fax: 1-310-825-0758
Email: Rcheck@UCLA.edu

Annex III: Internet Resources

A. Internet Guide To MPA Related Sites

Site name: **Bibliography of Marine Protected Areas Literature**
URL: http://www.oceansconservation.com/newenglish/library/bibliompa.htm
Institution: Fisheries and Oceans, Canada
Description: Bibliography of global MPA literature listed by author.

Site name: **Center for Marine Conservation**
URL: http://www.cmc.org
Description: US based organisation concerned with protecting marine ecosystems and conserving biodiversity.
Links:

- What We Do
- Marine Ecosystem Protection- has general information on marine reserves and sanctuaries

Site name: **Biodiversity Conservation Network**
URL: http://bcnet.org
Institution: Biodiversity Conservation Network
Description: The Biodiversity Conservation Network is part of the Biodiversity Support Program, which is funded by USAID. Note this website is no longer being updated as the BC Network project has finished but access to its publications will also be available through the Biodiversity Support Program site.
Links:

- Field Stories
  - Solomon Islands : Fish from the Arnavon Islands Marine Reserve
  - Fiji: Biodiversity Prospecting in the Seas around Verata Tikina
- Results
  - Patterns in Conservation – A Collection of BCN Writings : In Search of a Cure: Bioprospecting as a Marine Conservation Tool in a Fijian Community
  - Final Workshops : Presentation Summary: Successful Marine Workshop Held by BCN in Fiji ; Presentation Summary: Community-Based Conservation Enterprises In Melanesia
- Learning Materials
  - BCN Reports: See Fiji- Verata Tikina 3 reports; Getting Down to Business, the 1997 ; Community Resource Management at the Arnavons.

Site Name: **Biodiversity Support Program**
URL: http://www.bsponline.org
Institution:
Description: The Biodiversity Support Program (BSP) is a consortium of World Wildlife Fund (WWF), The Nature Conservancy (TNC), and World Resources Institute (WRI). BSP is funded through a cooperative agreement between WWF, the lead consortium institution, and The United States Agency for International Development (USAID). BSP's mission is to promote conservation of the world's biological diversity,
Links:

- Publications –in English (in the blue index panel to the left of the screen): There are a number of useful publications here which are available to view online, order, or download. Worth noting are:
  - Lessons from the Field, No. 1: Keeping Watch: Experiences from the Field in Community-based Monitoring *1998*
  - Measures of Success: Designing, Managing, and Monitoring Conservation and Development Projects
  - Beyond Fences Seeking Social Sustainability in Conservation: Volumes I & II *1997*
  - Indigenous Peoples and Conservation Organizations: Experiences in Collaboration *2000*

Site name: **Conservation International**
URL: http://www.conservation.org/
Institution: Conservation International (CI)
Description: Conservation International's home page.
Links:

- Table of Contents – follow links to pages of interest incl.
  - Oceans
  - Regional Programs

- or Index – browse subject headings in alphabetical order
- or Search – for subjects of interest

Site Name: **Conservation Melanesia**
URL: http://www.ngo.org.pg/conmel/
Institution: Conservation Melanesia Inc. (CM)
Description: CM home page. (CM) is a local NGO dedicated to environmental conservation and sustainable development in Papua New Guinea.
Links: Follow the links to various programmes inc. "Marine and coastal conservation".

Site name: **Coral Cay Conservation (CCC)**
URL: http://www.coralcay.org/
Institution: Coral Cay Conservation (CCC)
Description: CCC homepage. CCC is an independent organisation "dedicated to providing resources to help sustain the livelihoods of local communities and alleviate poverty through the protection and restoration of tropical forests and coral reefs".
Links:

- Fiji Project – Regular updates of community-based reef conservation project in Fiji. Project documentation incl. scientific programme available to download in pdf format

Site name: **The Coral Reef Alliance (CORAL)**
URL: http://www.coralreefalliance.org/
Institution: The Coral Reef Alliance
Description: CORAL homepage. CORAL is an NGO dedicated to coral reef conservation.
Links:

- Learn how you can help coral reefs
  - Coral reef organisations around the world (under heading "Ways to Help Coral Reefs") – A directory of NGO's working on coral reef issues around the world by country.

Site Name: **Coral Reef Research Foundation (CRRF)**
URL: http://www.justblue.co.za/CRRF.htm
Institution: CRRF Palau
Description: The Coral Reef Research Foundation (CRRF) is a non-profit organization whose purposes are research and education on coral reefs and other tropical marine environments. CRRF is presently undertaking a complete marine faunal survey of all Palau marine environments
CRRF in Palau also provides education and technical and scientific assistance services.

Site name: **Foundation for the South Pacific International**
URL: http://www.oneworld.org/fspi/
Institution: Foundation for the Peoples of the South Pacific Inc. (FSPI)
Description: Homepage for FSPI and NGO involved in community-based conservation projects throughout the Pacific.
Links:

- Program Sectors
- Affiliates - FSPI partners by country

Site name: **Foundations of Success (FOS)**
URL: http://www.fosonline.org/index.htm
Institution: Foundations of Success (FOS)
Description: FOS home page. "Foundations of Success (FOS) is an organization that seeks to improve the practice of conservation by working with practicioners to develop and communicate tested knowledge about what works, what doesn't, and why."
Links:

- locally managed marine area portfolio – Download report of meeting where representatives of 22 marine protected area projects from across the Indo-Pacific met to discuss developing a portfolio to examine success of these projects.

Site name: **GEF Pacific**
URL: http://www.gefpacific.org
Institution: Global Environment Facility
Description: GEF Funded projects in the Pacific
Links:

- Scroll down country menu to download relevant projects by country. Documents can be downloaded as pdf or zipped Microsoft Word files.
  - Environmental Conventions
  - GEF Links
- UNDP Pacific

Site name: **IUCN**
URL: http://www.iucn.org
Institution: The World Conservation Union
Description: IUCN homepage. Follow links to protected area sites.
Links:

- Protected Areas (under "Programmes" heading) – World Commission on Protected Areas
- Table of contents
  - Themes - marine
  - Regions - Pacific
  - Task Forces
  - WCPA Publications – several very relevant publications on protected areas available to download in pdf format incl. Parks magazine, Vol. 8, No. 2 -special issue on MPAs

Site name: **Marine Protected Areas and Marine Reserves**
URL: http://www.pond.net/~pcffa
Institution: Pacific Coast Federation of Fishermen's Associations
Description: Home page of PCFFA, a trade association of US west coast fishermen.
Links:

- The Debate on Marine Protected Areas – this page contains links to information on MPAs incl.
  - Scientific bibliography on MPAs and reserves
  - Books and resources
  - Other organizations advocating MPAs
  - Conferences
  - Other articles on MPAs

Site name: **Marine protected areas**
URL: http://www.environment.gov.au/marine/mpa/index.html
Institution: Australian Dept. of Environment
Description: Site describes Australia's marine protected areas programme.
Links:

- A National Representative System of Marine Protected Areas for links to useful documents including guidelines for establishing MPA's and a review of global MPA's by region "Global Representative System of Marine Protected Areas" downloadable in pdf format.
- Protecting Our Marine Environment for general introduction to MPA's.

Site name: **Marine protected Areas of the United States**
URL: http://www.mpa.gov/welcome.html
Institution: US Dept. of Commerce and US Dept. of Interior
Description: Provides general information on MPAs as well as MPAs in the USA
Links:

- MPA Library - has reference list with citations to articles, books, manuals, reference articles and proceedings; a searchable virtual library; links to MPA websites and institutions. Much of the information is global.

Site name: **MPA News**
URL: http://www.mpanews.org
Institution: University of Washington, School of Marine Affairs
Description: Newsletter on marine protected areas – analysis of current activities in MPAs globally, published monthly

Site name: **MPAs Bibliography**
URL: http://www.gulfofmaine.org/library/mpas/biblio.htm
Institution: Gulf of Maine Council, USA
Description: MPA database comprised of information related to MPAs including a searchable bibliography of published and non-published materials on MPAs in the Gulf of Maine region and around the world. Entries can be browsed by subject or region or word searched.

Site name: **NGO Steering Committee to UN Commission on Sustainable Development**
URL: http://www.csdngo.org/csdngo/index.htm
Institution: NGO Steering Committee
Description: Steering committee homepage.
Links:

- Alternative Treaties
  - #33. Marine Protected Areas – NGO treaty for MPAs

Site name: **The Pacific Biodiversity and Conservation Portal**
URL: http://www.pacificbiodiv.org/

Description: Homepage of the Pacific Biodiversity Planning Support Program. Sponsors are UNDP, UNEP, GEF and CHM; the website is managed by WWF- Pacific. There is a wealth of information contained in this site and many documents available to download.
Links: Follow links to

- BSAPS (Biodiversity Strategic Action Plans)
- Thematic Links incl. Marine Conservation, Indigenous Knowledge and others;
- Regional Conservation incl. Nature conservation action strategies, Conservation Areas
- Other Resources

Site name: **Pacific Islands Marine Resources Information System (PIMRIS)**
URL: http://www.usp.ac.fj/marine/
Institution: University of the South Pacific (USP) Marine Studies Program
Description: PIMRIS is a "formal marine information networking system (of regional institutions and Pacific Island countries) devoted to the collection, storage, retrieval, and dissemination of information on fisheries and other living and non-living marine resources in the tropical Pacific". PIMRIS can provide: Reference service; library consultancies; computer literature searches; current awareness contents services; interlibrary loans; training in library and information management; photocopies/document delivery; Marine/Fisheries Database on CD-ROM and literature searches are available on request.

Site name: **Palau International Coral Reef Center – The Palau Aquarium (PICRC)**
URL: http://www.palauaquarium.org/main.html
Description: PICRC homepage. PICRC is "a self-sustaining, nonprofit coral reef center and marine park that will provide a forum for coral reef studies, research and education. The Center is designed to assist in improving the management, use and conservation of Palau's and the world's marine environment, in addition to serving as a tourist attraction." PICRC is a joint project of the governments of the USA and Japan (through JICA).
Links:

- What's New – to follow progress on the aquarium construction.

Site name: **Palumbi Lab: Projects & Research**
URL: http://www.oeb.harvard.edu/palumbi/projects.html
Institution: The Palumbi Lab, Dept. Organismic and Evolutionary Biology, Harvard University
Description: Projects and research page.
Links: Design and Implementation of Marine Reserves – document on scientific aspects of MPAs and reserves. N.B. a similar document by Palumbi is listed in the downloadable documents list (Annex ???)

Site name: **Protected Areas**
URL: http://www.unep-wcmc.org/
Institutions: United Nations Environment Programme (UNEP) and World Conservation Monitoring Centre (WCMC)
Description: UNEP-WCMC homepage. UNEP-WCMC locates and compiles information on the protected areas of the world
Links:

- protected areas – There are many links to follow on this page incl.
  - Protected areas of the Pacific Islands – click on the arrow to link to a searchable database of Pacific protected areas by country. This is a subset of the global Protected Areas Database
  - Descriptive information on protected areas.
  - Information services developed by UNEP-WCMC.
  - Examples of reports and projects.

Site name: **Reefbase: A global Information System on Coral Reefs**
URL: http://www.reefbase.org/default.asp
Institution: Reefbase – a project of ICLARM
Description: Reefbase home page. ReefBase provides access to data and information on coral reefs and associated shallow tropical habitats. Their aim is to facilitate understanding of the relationship between human activities and the status and dynamics of these environments.
Links:

- Reef Status - This section provides reef status summary reports on global, regional and national scales. Follow the links to individual country or regional reports. It also includes the "State of the Reefs 2000" report from the Global Coral Reef Monitoring Network.

Site name: **Reef Check**
URL: http://www.reefcheck.org/
Institution:
Description: Reef Check home page. The Reef Check organisation train teams of volunteer scuba divers and snorklers in over 50 countries to monitor the health of coral reefs by performing Reef Check surveys. The survey results are used

to produce an annual report on the state of the world's reefs. Their global network of teams educates the public about the value of coral reefs, threats to their health and solutions to these problems. Reef Check provides tools for local communities to manage and protect their coral reefs.
Links:

- Publications: training manuals to download
- Methods: incl. site selection, design, reporting

Site name: **Seaweb**
URL: http://www.seaweb.org
Institution: Seaweb
Description: An organisation aiming to raise awareness of the world oceans.
Links:

- Background
  - Ocean Citations
  - Marine Protected Areas – a listing of recently published articles on MPA's by year from 1996-present, continuously updated.
- Resources
  - Resources and Links – an extensive listing of, and links to, ocean-related sites from around the world organized into organisations and issues/resources.

Site name: **Secretariat of the Pacific Community**
URL: http://www.spc.org.nc
Institution: The Secretariat of the Pacific Community (SPC)
Description: SPC Homepage
Links: Scroll down project homepage menu

- Coastal Fisheries
  - Links – to other Pacific organisations concerned with marine resources
  - Countries – information about marine resources in SPC member countries listed by country
  - Links to SPC publications incl. newletters; some are available online.

Site name: **SIDSnet – Small Island Developing States Network**
URL: http://www.sidsnet.org/
Institution: Small Island Developing States Network
Description: Homepage for Small Island Developing States Network – The Global Network for the Barbados Programme of Action
Links: Follow various links to countries or themes incl. Coastal and Marine. Also check out News and Highlights under relevant subject headings.

Site name: **SPREP**
URL: http://www.sidsnet.org/pacific/sprep/
Institution: SPREP
Description: Homepage of South Pacific Regional Environment Programme. The site is searchable.
Links: Follow links to:

- Project
- Publications
  - Publications on-line
  - Library and Information Resources Centre – searchable database
- Links – links to other Pacific regional organisations

Site Name: **State of the Reefs – Regional and Global Perspectives**
URL: http://www.ogp.noaa.gov/misc/coral/sor/sor_contents.html#toc
Institution: International Coral Reef Initiative Executive Secretariat
Description: International Coral Reef Initiative Executive Secretariat background paper.
Links: From Contents !Regional Perspectives: Pacific

Site name: **Tellus Consultants: Who's doing what with community field research in the Pacific Islands**
URL: http://www.tellusconsultants.com/projects.html
Institution: Tellus Consultants
Description: Site outlines examples of participatory efforts across a range of programmes in the Pacific islands.
Links:

- Fisheries
  - Community monitoring of fisheries

- Conservation Programmes
  - Giant Clam Sanctuaries of Tonga
  - Protected areas in Pohnpei, FSM
  - A Conservation Area in Samoa

Site name: **The Nature Conservancy (TNC)**
URL: http://nature.org/
Institution: TNC
Description: TNC homepage
Links:

- International – scroll down the international menu and click on the country of choice to see TNC programmes by country

Site name: **The US All Islands Coral Reef Initiative (CRI)**
URL: http://www.hawaii.edu/ssri/Is_CRI.html
Institution: US All Islands Coral Reef Initiative Coordinating Committee
Description: Homepage for the U.S. All Islands Coral Reef Initiative. The US All Islands Coral Reef Initiative Coordinating Committee is part of the US Coral Reef Task Force.
Links: Follow links to download the "Coral Reef Initiative Strategy" (Adobe Acrobat files), workshop reports and updates from the CRI.

Site name: **Traditional marine resource Management and Knowledge Information Bulletin**
URL: http://www.spc.org.nc/coastfish/News/trad/trad.htm
Institution: The Secretariat of the Pacific Community (SPC), Coastal Fisheries programme
Description: Issues of the bulletin back to 1992 available to download in pdf format. Some are also available as html files.
Links: Follow links back to SPC Coastal Fisheries Programme

Site Name: **UNEP-WCMC web site – see "Protected Areas"**

Site name: **United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)**
URL: http://www.unescap.org
Institution: United Nations
Description: UNESCAP homepage
Links:

- Environment and Natural Resources Development
  - Environment. General introductory statement on environment and resources in the Asia-Pacific region. Follow links such as;
    - Ministerial Conference on Environment and Development in Asia and the Pacific 2000
    - Pacific Islands - this site has a brief statement on the state of the environment in Pacific with links to in-depth reviews of each topic; an analysis of Pacific Island countries towards achieving sustainable development (section J Biodiversity Resources discusses conservation areas with links to information on marine conservation areas in Samoa, Vanuatu and Tuvalu)
    - Pacific Island Background Information - provides links to background information on the state of the environment, action programmes, national and international agencies involved in sustainable development activities in the Pacific Islands
    - Relevant pages including:
      - Coastal Fisheries
      - Conservation Areas
      - Conflicts Over Conservation Issues
      - Biodiversity Issues in the Pacific
      - Conservation and Community Participation in the Pacific Islands
      - Environmental Units and Agencies
      - Fisheries - various relevant pages listed under this heading
      - Vanuatu Community Giant Clam Sanctuaries
      - Tongan Community Giant Clam Sanctuaries

Site name: **United Nations Educational, Scientific and Cultural Organization (UNESCO), Environment and Development in Coastal Regions and Small Islands (CSI)**
URL: http://www.unesco.org/csi
Institution: UNESCO, CSI Program
Description: CSI homepage. The goal of CSI is to assist Member States towards environmentally sound, socially equitable and culturally appropriate development in coastal regions and in small islands.

Links:

- Activities
  - Summaries of activities by country – information on UNESCO activities by country.
  - Samoa – for information on the project "Education for sustainable village living, Saanapu and Sataoa villages, Upolu Island.

Site name: **United Nations System-wide Earthwatch**
URL: http://www.unep.ch/earthw.html
Institution: United Nations Environment Program (UNEP)
Description: Earthwatch program homepage
Links:

- Special Topics
  - Coral Reefs - UNEP initiatives on coral reefs
  - ICRAN - International Coral Reef Action Network - A global partnership for coral reefs concerned with good management practices and conservation See the directory of ICRAN partners and recommended ICRAN field sites.
  - Islands - Access to information on islands and small island developing states (SIDS) including links to documents and other island sites.
  - Island Directory - Compilation of geographic, environmental and socioeconomic data for 2000 islands in 150 countries, territories and administrative units with islands.
  - Small Island Environmental Management - A do it yourself course and training programme for people living on islands. The course includes sections on coral reefs, lagoons, mangroves, traditional management, research and monitoring techniques.
  - Links - Follow links to other island information resources in the UN system.

Site name: **United States Coral Reef Task Force (CRTF)**
URL: http://coralreef.gov
Institution: United States Coral Reef Task Force
Description: U.S. CRTF homepage. The CRTF was established in 1998 by executive order of the U.S. President and is concerned with the protection, conservation and wise management of coral reefs in the U.S. and its territories.
Links: Scroll down the homepage for "Table of Contents" and links to documents, references, news, contact information etc.

- CRTF Documents: PDF and HTML documents to download including "Coral Reef Protected Areas: A Guide for Management"
- References/Links- Useful references and general information about coral reefs including;
  - National Marine Sanctuaries – information about MPAs in the U.S.
- Table of Contents- click on subheadings for general information about coral reefs, threats to reef ecosystems etc.

Site name: **US Environmental Protection Agency Region 9 homepage**
URL: http://www.epa.gov/region09/
Institution: US Environmental Protection Agency
Description: EPA Region 9 (Pacific Southwest incl. Pacific Islands subject to US law)
Links:

- Cross-program activities
  - Pacific Insular Area Program – incl. Palau
  - Resource Guide
  - Coastal and Marine Management – Links to coastal and marine management organisations working in the US Region 9 Pacific Islands incl. Palau & Pohnpei. See also links to "Environmental Protection" and "Sustainable Development"
- Community-based environmental Protection. This page has a link to the site Community Based Approaches URL: http://www.epa.gov/ecocommunity
  - Bibliography - a bibliography of community-based environmental protection reports and publications - some are available to download in pdf format.

Site name: **World Wildlife Fund (WWF) South Pacific Programme**
URL: http://www.wwfpacific.org.fj/
Institution: World Wildlife Fund for Nature
Description: Homepage for WWF's Pacific programme.
Links:

- Countries we work in - click on a country
- Marine Ecosystems – links to WWF work in Fiji (Ono Is.), The Cook Islands and Solomon Islands.

- Links – to Pacific related websites
- WWF International for searchable database of resources, publications and programmes

Site name: **World Resources Institute (WRI)**
URL: http://www.wri.org
Institution: WRI
Description: WRI homepage. "World Resources Institute provides information, ideas, and solutions to global environmental problems."
Links:

- Global Topics
- Coastal and marine ecosystems – follow links to various topics incl. Biodiversity in Marine Ecosystems; Online Resources; People, Projects and Updates; and various pdf documents.
- See Also: related website **Foundations of Success** (FOS)

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Annex IV: Inventory Of MPA Activities In IWP Participating Countries

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
Cook Islands							Rarotonga Environment Act 1994-1995; Marine Resources Act 1989; Rarotonga Local Govt. Act, 1997; Marine Reserves Bill ?(proposed)			Source: Evans (1997)
Marine *ra'ui* (MPAs)	The following are all in Rarotonga. Tikioki/Akapuao *Ra'ui*, Titikaveka Village; Rutaki *Ra'ui*, Puaikura Village; Pouara *Ra'ui*, Matavera Village; vana/Aroko /Nukupre *Ra'ui*, Ngatangiia & Muri Villages.	*Ra'ui* areas range from 8 up to 60 ha. With the largest (Avana/ Aroko/ Nukupure) incl. 13 ha of motu Onero. Land-sea boundaries are defined by mean HT	Feb. 1998	Incl. lagoon and reef flat and intertidal habitats. The Avana/Aroko/Nukupure *Ra'ui* contains the only mudflats on Rarotonga.	Subsistence use of marine resources common. Fishing methods incl. netting, hook and line fishing, underwater spearing, use of SCUBA, invertebrate harvesting, use of gill nets and fish traps within the lagoon. Commercial uses incl. collecting	Koutu Nui (a formalised group of traditional leaders), MMR, WWF, private sector groups, local communities. Discussions following a 1997 report on parks, reserves and *ra'ui* in Rarotonga, funded by the NZODA (New Zealand Overseas Development Assistance) sparked renewed interest in *ra'ui* among the traditional leaders representing the Koutu Nui. At the	Community appointed wardens. In the Pouara *ra'ui*, regular fishers are also expected to report infringements	Management strategies vary slightly between *ra'ui* but they generally involve a complete closure to all forms of fishing & harvesting for periods of 6 months (in Rutaki where sites are rotated on a 6 monthly basis) to 2 years. Recreational activities such as swimming, snorkeling or surfing are generally	Two additional *ra'ui* have recently been declared in Rarotonga and the *ra'ui* period has been increased from 2 to 5 years in 2 of the areas. One small (0.8 km^2) no take reserve has been established (Feb. 2000). Contact: J. Evans , WWF Cook Islands	

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
		mark to 30m. depth. The areas are typically 400-600 m wide. Overall these areas covered approx. 15% of the Rarotongan lagoon.			aquarium fish and tourism.	request of the Koutu Nui, the World Wildlife Fund for Nature (WWF) further supported the establishment of *ra'ui* through the Cook Islands Partnership Project with funding for management plans. All the *ra'ui* are community managed with support from WWF and assistance with surveys and monitoring from The Ministry of Marine resources (MMR). WWF, MMR and private sector organisations have also supported educational and awareness activities for the *ra'ui*.		permitted (except in Rutaki where *ra'ui* are no-go areas) however water & jet skiing are banned. The success of each project is reviewed at the end of the *ra'ui* period based on MMR monitoring of the site		
Aitutaki marine reserves and trochus sanctuary	Southern Cook Islands. Marine reserves located at		1991 - 1994	Shallow lagoon (<11m) almost completely enclosed by barrier reef. Reserves contain	>80% households engage in fishing with 85% of catch for	The Aitutaki Island council established and manages the marine reserves and controls trochus harvest.		No fishing or taking of marine life in the designated reserves.	A new *ra'ui* has recently been declared on Aitutaki.	The Ministry of Marine Resources (MMR) operates a research station and hatchery at Aitutaki primarily for giant

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
	both of the southern corners of triangular-shaped barrier reef and at O'out in the NE lagoon area.			outer reef slope, reef top and lagoon habitats. The reserve at O'out encompasses a shallow estuarine area.	subsistence. Little commercial fishing except for occasional trochus harvest (1 week every 2 years).	Ministry of Marine Resources (MMR) provides advice and assistance with resource monitoring.		In addition, the whole of Aitutaki is effectively a reserve for trochus except during the tightly controlled harvesting periods. Outside the reserves local bylaws also restrict overall net size and mesh size of gill nets. As this was difficult to enforce the Island Council plans to totally ban gill netting and is looking for funding to implement a gill net buy back scheme. There are also local bylaws imposing quotas and/or size restrictions on various shellfish. Use of SCUBA for fishing or		clams and trochus. Sources: SPC Fisheries website. Adams (1998)

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
								shellfish collection is banned. Use of explosives or poisons banned.		
Manuae lagoon trochus sanctuary	Uninhabited atoll 50km SE of Aitutaki.		1991 - 1994	Manuae Island is a 7.4km^2 atoll with 2 coral sand islets and lagoon approx 7km x 4 km. The shallow lagoon has few patch reefs and is subject to large shifting sand banks.	Manuae is uninhabited but visited by Aitutakian fishermen					All regulations applicable to Aitutaki also apply to Manuae Source: SPC Fisheries website.
Palmerston lagoon trochus sanctuary			1991 - 1994		Hook and line fishing from boats or reef flat, trolling mainly on the leeward side of the island. Other activities include harvesting of pa'ua (*T. maxima*), lobster and occasionally green and turtles.	Palmerston Island Council.		P.Is. Council occasionally imposes partial *ra'ui* for parrotfish.		Source: SPC Fisheries website.
Suwarrow Atoll National Park		168 ha land area.	1978	A continuous reef surrounds lagoon with more than 40 motus. There is a broad reef flat	Currently none. The atoll is uninhabited. Trials were	Save our Suwarrow Group (SOS) instrumental in lobbying Govt. to preserve the atoll.	Yet to be determined.	Yet to be determined.	April 30 2001 SOS group released a concept management plan	IUCN Cat. IV. This area has been the subject of much debate and protest by local communities after

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
				(100-800m wide) with numerous patch reefs. Several of the motus are important nesting sites for turtle and birds.	carried out by MMR (Ministry of Marine Resources) for establishment of pearl farming industry.				for the atoll including proposals for a management plan, management committee. And re-declaration of the area as National Park.	Govt. proposals to allow 1/3 of the lagoon to be made available for pearl farming. Public pressure convinced the Govt,. to re-evaluate and eventually abandon the proposals. As no management plan has yet been developed for this national park it is uncertain whether the boundaries of the park include the lagoon area. Source: SPC Coastal Fisheries and Pacific Islands Report (University of Hawaii)
Federated States of Micronesia								Draft FSM Govt. Environment Sector Goal 1. to "Establish a network of effective community-managed, ecologically representative, and socially beneficial marine and		Source: FSM (2001)

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
				(100-800m wide) with numerous patch reefs. Several of the motus are important nesting sites for turtle and birds.	carried out by MMR (Ministry of Marine Resources) for establishment of pearl farming industry.				for the atoll including proposals for a management plan, management committee. And re-declaration of the area as National Park.	Govt. proposals to allow 1/3 of the lagoon to be made available for pearl farming. Public pressure convinced the Govt,. to re-evaluate and eventually abandon the proposals. As no management plan has yet been developed for this national park it is uncertain whether the boundaries of the park include the lagoon area. Source: SPC Coastal Fisheries and Pacific Islands Report (University of Hawaii)
Federated States of Micronesia								Draft FSM Govt. Environment Sector Goal 1. to "Establish a network of effective community-managed, ecologically representative, and socially beneficial marine and		Source: FSM (2001)

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
									or design of these areas. Contact: W. Kostka CSP	
Trochus sanctuaries			1991 - 1994					No-take zones for trochus.		Source: Round Table (1998)
Lenger marine reserve	5 minute boat ride from Kolonia (Pohnpei capitol city)	1.5 miles^2	2000	Mangrove forest, sea grass beds, ringing and patch reefs.	Heavily fished. Reefs impacted by anchor damage.	Community managed by Lenger Island community and the traditional chief with assistance from Conservation Society of Pohnpei CSP. Funding from Seacology. The community have been actively involved in planning the MPA, designations of zones and restrictions, construction and placement of reef markers and are helping to enforce the zones. They have also participated in setting up sponge farms as an alternative income	Enforcement is currently carried out by the local community. The MPA is not yet included in the Pohnpei State Marine Sanctuary Act but a bill to do so is due to be presented to the legislature. Once the MPA is recognised under the M.S. Act , community management will be bolstered by official enforcement	Within the MPA a (RA) restricted area (roughly 40%* of the total MPA) is set aside as a "no harvest area" Specifically there is no harvesting of any plant or animal life, coral, sand, rocks or minerals for commercial or sustainable use in the RA. No dumping, dynamiting, or harmful chemicals to be used in RA or MPA, no use of anchors on reefs in the RA or MPA – all boats	Boundaries for the reserve were established and a marine survey was completed in 2000 with the MPA officially opened on March 1, 2001. CSP continues to work with the local community to develop management guidelines, monitoring programme and alternative sources of income. For example, the community now has 2 sponge farms located within the MPA. Established in Feb. 2001, the farms now have	Popular weekend picnic spot for Kolonia residents. Community commitment to the project is high. Source: CSP (2000) *Estimate from map of MPA on CSP's Lenger Island Marine Protected Area fact sheet.

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
						strategy.	of the restrictions.	must tie up to mooring bouys. Reef markers which include signs proclaiming the MPA have been placed on the reefs edge to demarcate the area.	over 500 sponges with more than 800 expected by mid-July 2001. Weekly inspections of the lines and sponge cleaning is done by the community. Contact: W. Kostka CSP	
Nan Madol/Nen wen Nah Marine reserve	SE corner Pohnpei Island		1994 - 1998	Area includes Nan Madol ruins and is the islands main stingray spawning area. Area covers 4km^2 Reef flats, mangroves and lagoon		Protected by Madolenihmw traditional leaders.		None to date	Madolenihmw municipal govt. and other stakeholders approached CSP for assistance in setting up an MPA at this site. Plans are underway to begin round table discussions with local chiefs, landowners, municipal and state governments to discuss a management plan for the site. Contact: W. Kostka CSP	Source: CSP (2000)

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
Orulok Sanctuary			1998			Pohnpei State Govt		No management or enforcement to date		Source: CSP (2000)
Kehpera (Black Coral) Sanctuary			1995			Pohnpei State Govt. and local leaders				Initial resistance from local fishermen. However the observed recovery of marine life in this previously overfished area has led to widespread community support. Source: FSM (2001)
Enipein Marine Park and Mangrove sanctuary	Southern end Pohnpei		1998	Includes 9km^2 of mangrove forests		Pohnpei State Govt		No management or enforcement to date	CSP to work with local community and Kitti municipal Govt. to establish community management strategies for the area. Contact: W. Kostka CSP	The Nature Conservancy has been working on environmental education within local communities in the area since 1995. Local community derives income from tourist activities. Source: CSP (2000)
Pwudoi Sanctuary	Pohnpei		1998			Pohnpei State Govt		None to date	Recreational/ educational site. Mangrove boardwalk. Promoted as a tourist attraction.	Source: CSP (2000)
Minto Reef Marine Sanctuary	Pohnpei		1999			Pohnpei State Govt		None to date		Source: CSP (2000)
Kisin Nahmwen	Pohnpei		1999			Pohnpei State Govt		None to date		Source: CSP (2000)

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
Nangih stingray sanctuary										
Chuuk										
Chuuk State lagoon	Chuuk		1994 - 1998							Source: Round Table (1998)
Chuuk State underwater monument	Chuuk		1994 - 1998							Source: Round Table (1998)
Trochus sanctuaries	Chuuk		1994 - 1998			Chuuk State Govt.		No-take zones for trochus		Source: Round Table (1998)
Giant clam farms	Chuuk		1994 - 1998							Source: Round Table (1998)
Kosrae										
Okat trochus sanctuary	Kosrae		1994 - 1998			Kosrae State Govt.		No-take zones for trochus.		Source: Round Table (1998)
Utwe-Walung marine park	Kosrae Utwe and Tafunsack municipalities.		1994 - 1998	Coastal mangrove and marine ecosystems		Kosrae Dept. of Commerce and Industries (DCI) + lead agency; SPBCP; Kosrae Village Resort, and 13 member CA Co-ordinating Committee 10 from Utwe; 3 from Tafunsack)		The projects main activities centre around ecotourism e.g. mangrove and island tours in collaboration with Kosrae Village Resort.	SPBCP funding ceases by 2001 and a draft transition strategy has been formulated (SPBCP, 2000) Problems include a lack of interest by the Walung community as activities and decision making is dominated by Utwe landowners. According to	US Land Grant funding provided training in traditional canoe construction and tour guide training course to guide tourist through mangrove channel between Utwe and Walung villages. FSM and Kosrae State govts. provided funding for visitor centre outside Utwe village. Sources: Round Table (1998)

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									SPBCP (2000b) the future of the project depends on ongoing funding post 2001 and re-galvanisation of community support for the CA including addressing the imbalance issues, and strengthening of project management structure. Source: SPBCP, 2000	SPBCP(2000b)
Ring Te Suh, Maskelynes Islands			1994 - 1998							Source: Round Table (1998)
Yap										
Trochus sanctuaries			1994 - 1998			Yap State Govt.				Source: Round Table (1998)
Mile zone from island baseline										Source: Round Table (1998)
Fiji										There are several island nature reserves which may have an intertidal component but do not include the subtidal. Conservation

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										efforts appear to concentrate on the terrestrial areas. Source: **Bleakley (1995)**
Makogai Island	Lomaiviti Province		1987			Maintained under Fisheries (MAFF) jurisdiction – renewable 5 yr status. The island itself is government owned but the Tui Levuka (on behalf of his people) owns customary fishing rights to the lagoon and barrier reef.	The protected area is not formally legislated but is maintained by a written agreement between the Tui Levuka and Minister for Fisheries. Enforcement of the conservation strategies is difficult because of the large size of the area. The reserve is subject to occasional poaching from Viti Levuan commercial .fishermen	Originally the areas was to provide protection from casual fishing for the govt. operated clam hatchery on the island. Out of this original objective grew a more comprehensive co-management project (Adams, 1998). After initial concerns over Fisheries Div. involvement in the area, mainly concerning ownership and control of the area, agreement was finally reached in 1990 for 2 years. In 1992 the project was renewed and extended to 5 years with an option to	Further resources are needed to bolster management and enforcement of the reserve. Options include day trips for diving/snorkelling run from Levuka. The govt. hatchery on Makogai Is. has accommodation for visiting scientists. Bench fees could make some contribution to income generation from the area (Adams, 1998). Contact: Etika Rupeni , WWF, Fiji . S. Waqainabete, Fisheries Div.	Sources: Waqainabete & Rupeni (2001) Adams (1998)

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								terminate every 5 years following. ¾ of the island's reef area within the barrier reef is protected incl. 6 km of shoreline. The Memorandum of understanding with the Minister of Fisheries states that no commercial fishing licences will be issued covering the area and that subsistence fishing will be held in abeyance except for certain special occasions agreed in advance (Adams, 1998). The giant clam and turtle nesting areas enjoy complete protection even from fishing that is permitted		

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								elsewhere in the reserve.		
Verata Tikina	Eastern shore of Viti Levu	95km^2 qoliqoli (marine waters under customary control)	1996	Coral reefs, mangrove forest, seagrass beds and intertidal mud flats.	Subsistence use plus sale of beche-de-mer, mud lobster, clams and reef fish. Fishing access permits sold to outsiders. These were eventually banned - see management strategies.	Verata Tikina is a county of 7 villages. Community members have been working with the Biodiversity Support Program (BSP), Uni. Sth. Pacific (USP), Rainforest Alliance, Sth. Pac. Action Comm. For Human Ecol. and the Env. (SPACHEE), WWF and Fiji Dept. Env.		1996 Community members did resource assessments and prioritised their villages needs. They mapped villages, and identified problems. They developed action and monitoring plans and declared 2 (eventually 9) tabu (no-take) zones. Catch size limits were imposed as well as bans on issuance of fishing licenses, killing turtles and gill nets. Bioprospecting project was introduced for revenue generation.	Project is continuing with funding from MacArthur and Packard Foundations. There are now 9 villages participating in the community based management and monitoring. Contacts: W. Aalbersberg, USP A. Tawake, USP	Controlled harvesting allowed recovery of saltwater cockle (kaikoso) which was chosen as an impact indicator. Sources: Aalbersberg et al (1999) Biodiversity Conservation Network (BCN) website Biodiversity Conservation Network (1999) Tawake & Aalbersberg, (in prep) Tawake et al (in press)
Votua refuge areas		15 km^2							Replication site of Verata Tikina (above) Contacts: W.	Source: Tawake & Aalbersberg, (in prep)

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									Aalbersberg, USP A. Tawake, USP	
Nuhukau Island & Reef amenity reserve			1970							Source: Round Table (1998)
Ono Island	NE Kadavu Province	20 km^2	1998	Coral reefs including Great Astolobe Reef.	Subsistence fishing with increasing artisanal fishing. Local commercial fisherman used SCUBA and spear guns for fishing and beche-de-mer harvesting. Also used duva - a plant derived poison.	WWF and Waisomo Village community.		Return to customary management including tabu - no take- areas. Waisomo Village has declared 2 large lagoons (20 ha) off limits to fishing, diving and poisoning. The reserve will target the ecotourism market and other non-consumptive but revenue generating activities.	April 2000 the Ono Island District Council endorsed Waisomo Village marine conservation plan. The council planned to seek official registration of the site with the Fiji Dept. Fisheries Contact: Etika Rupeni , WWF, Fiji . S. Waqainabete, Fisheries Div.	Source: WWF Pacific Programme website
Tavarua Island						Locally managed reserve declared by resource owners but not legally regulated.		Primarily for tourist surfing area. Some sites reseeded with giant clams juveniles twice since 1996.	Contact: Etika Rupeni , WWF, Fiji . S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Manava Island			1992	Intertidal		Locally managed reserve declared by			Contact: Etika Rupeni , WWF,	Source:Waqainabete & Rupeni (2001)

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						resource owners but not legally regulated. Under jurisdiction of Tui Tavua			Fiji . S. Waqainabete, Fisheries Div.	
Treasure Island				Adjacent sand isles and barrier reef systems		Locally managed reserve declared by resource owners but not legally regulated.			Maintained by resort management largely for ecotourism. Contact: Etika Rupeni , WWF, Fiji . S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Turtle Island (Yasawa)				Reef systems		Locally managed reserve declared by resource owners but not legally regulated.		Giant clam stocks used to reseed area in 1997.	Maintained by resorts for ecotourism. Contact: Etika Rupeni , WWF, Fiji . S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Wakaya Island				Adjacent intertidal and barrier reef systems.		Locally managed reserve declared by resource owners but not legally regulated. Controlled by island management.			Contact: Etika Rupeni , WWF, Fiji . S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Verata Ucunivanua			1993	Part of the intertidal and adjacent reef systems.		Locally managed reserve declared by resource owners but not legally regulated.	Jurisdiction and maintenance under local custodians.	No fishing zones.	Contact: Etika Rupeni , WWF, Fiji . S. Waqainabete, Fisheries Div.	Reported improvement in fish sp. and other marine food resources. Source:Waqainabete & Rupeni (2001)
Yadua Taba				Island and adjacent		Locally managed	Maintained		Biological	Source:Waqainabete

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				reef systems declared as reserves.		reserve declared by resource owners but not legally regulated.	by the National Trust and customary custodians.		research underway to support possible application for world heritage status. Contact: Etika Rupeni, WWF, Fiji. S. Waqainabete, Fisheries Div.	& Rupeni (2001)
Namena Lala Resort	15 miles off SE coast of Vanua Levu		1987	Resort front and jetty areas declared a protected area by Resort management.	Area once had abundant fish stocks and other high value resources such as trochus, beche-de-mer and giant clams. Some of the sedentary resources fished out by poachers and through prolonged harvesting by Kubulau and Navatu fishers. Namena Barrier Reef has been the	Locally managed reserve declared by resource owners but not legally regulated.	Resort management supported by Fisheries Dept.	Fisheries Dept. have restocked the area with Giant clams.	The resort and traditional custodians propose that the whole marine area around the island incl. the barrier reef system, be declared as a marine reserve. Contact: Etika Rupeni, WWF, Fiji. S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)

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					subject of many disputes esp. over bait fish.					
Mamanuca coral reef conservation project	Island group off western coast of Viti Levu			Coral reefs inc. fringing and barrier reefs		Fiji Govt., local communities, Coral Cay Conservation (CCC), other stakeholders incl. tourism operators (Castaway Is. Resort, Subsurface Fiji)			Phase 1 – pilot project June-Aug 2001 incl. rapid resource assessment, conservation education & training programmes Phase 2- possible outcomes incl. establishment of Mamanuca Marine Parks Authority Contact: CCC	Source: CCC website
Daruwalu	Kadavu				Destructive fishing practices incl. use of chemicals, derris root, SCUBA, to target commerciall y important sp. such as trochus, pearl oyster and beche-de-mer.	WWF (Wells, 1998)		Intention to declare 5 km of shoreline and reefs as protected and to develop the area for ecotourism. Primary goal is to enhance and sustain fish stocks.	Proposed. Contact: Etika Rupeni , WWF, Fiji. S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Bukatatanoa	Near			35 km barrier reef	Poachers			Declare	Proposed.	Source:Waqainabete

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barrier reef.	Oneata Island, Southern Lau Group			supporting pristine coral ecosystem. Barrier reef is isolated but can be reached in approx. 1.5 hrs by motorboat from Oneata.	using SCUBA have systematically fished out highly targeted molluscs and holothurians			Bukatatanoa barrier reef systems marine reserve to protect fish, holothurians, gastropods and bivalve stocks esp. giant clams against overfishing by poachers.	Contact: Etika Rupeni , WWF, Fiji. S. Waqainabete, Fisheries Div.	& Rupeni (2001)
Fulaga	Southern Lau Group				Fish, giant clams, trochus, pearl oysters and holothurians have been locally overfished since 1987			Fisheries Dept. to select a site for protection of over fished sp.	Proposed. Contact: Etika Rupeni , WWF, Fiji. S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Vuata Ono (Ono-I-lau)	Southern Lau Group approx. 30 min by motor boat south of Oni-I-lau Is.			Productive barrier reef system.		Proposed by Oni-i-Lau people with assistance from Fisheries Dept.; Marine Studies Programme, USP; & WWF.		Declare the barrier reef as a complete marine protected site	Proposed. Contact: Etika Rupeni , WWF, Fiji. S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Tavenui	Vuna					Proposal by local custodians.		Declare a part of the marine area as reserve for protecting and enhancing fisheries stocks e.g. reseeding with giant clam,	Proposed. Contact: Etika Rupeni , WWF, Fiji. S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)

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								trochus and pearl oyster. Secondary goal is to promote eco tourism.		
Wailevu	Cakaudrove				Marine resources locally over fished.	Paramount Chief's proposal to Dept. Fisheries & other depts. With jurisdiction over marine environment.		To declare part of the traditional fishing area as marine reserve to enhance dwindling reef resources.	Proposed. Contact: Etika Rupeni, WWF, Fiji. S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Votua	Ba Prov.			Coastal mangrove and coral reef habitats.		Institute of Applied Science, USP.		Marine protected area proposed. Community action plans developed and awareness plans undertaken.	Proposed. Contact: Etika Rupeni, WWF, Fiji. S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Cuvu	Nadroga Prov.					The Fijian Resort, surrounding landowners in the tikina of Cuvu, and Foundation for Peoples of Sth. Pacific.		Develop community tabu sites and income generating alternatives incl. existing pilot coral farming project at the site.	Proposed. Contact: Etika Rupeni, WWF, Fiji. S. Waqainabete, Fisheries Div.	Source:Waqainabete & Rupeni (2001)
Kiribati										
North Tarawa Conservation Area (NTCA)	Tarawa Atoll, Gilbert Group	21.5 km^2 (terrestrial) 35 km^2 (marine)	1996	Lagoon, coral reefs. Valuable marine resources include beche de mer and bonefish. The area was	Commercial exploitation of inshore fisheries resources (continuing).	Lead agency is the Environment & Conservation Div. (ECD) of Kiribati Ministry of Environment & Social	The Environment Act does not provide for the protection of marine	Planning for the CA began n 1994 coming into effect in May 1996. Most management decisions are	SPBCP funding ceases end of 2001.T A draft transition strategy has been prepared (SPBCP, 2001a).	A previous USAID funded Tarawa Lagoon (now part of NTCA) Management plan included benthos and finfish assessments which

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				selected by the Kiribati Govt. because of its high biodiversity, the lagoon and coral reefs are resource rich, the diverse terrestrial and coastal habitats are relatively undisturbed and the site is close to South Tarawa.		Development (MESD). CA Co-ordinating Committee (CACC). SPBCP.	species and traditional resource mechanisms have broken down since colonial policies advocated open access to marine resources below mean high tide. This is reflected in the current legislation making traditional community management difficult.	made by ECD. The CACC has been ineffective which has been attributed to its large size (52 members), composition and infrequency of meetings (SPBCP, 2001a). Baseline surveys were conducted in 1977.but there has been no further analysis of the database. Bonefish stocks are the focus of conservation efforts in NTCA and there is a management plan for bonefish conservation. This incl. a ban on hunting 3 days before or after the full moon and gillnets and splashing techniques are banned.	There is currently no resource management plan for the NTCA North Tarawa users comply with the bonefish regulations but South Tarawa users do not (SPBCP, 2001a). SPBCP (2001a) recommends strengthening monitoring activities, amending the Environment Act to include marine species, increasing awareness and involvement of local communities, and expanding ecotourism opportunities. Contact: MESD Box 234, Bikenibeu, Tarawa SPBCP Project	contributed to 1977 baseline studies. Open access policy to marine resources, enhanced harvesting abilities incl. motorised boats and breakdown of traditional management because of the relocation and amalgamation of communities are cited as reasons for lack of community control over marine resources (SPBCP, 2001a). Source: SPBCP(2001a)

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									office, SPREP	
Kiritimati (Christmas Is.) conservation area	Line Islands		Prior to 1960	Coral reef, coastal scrub.		SPBCP since 1999.		SPBCP identifies ecotourism and game fishing as alternative income generating activities.	Unknown.	The wildlife sanctuary includes a number of islets that are closed areas e.g. Cook, Motu Tabu, Motu Upua, Ngaontetaake. The data from the UNEP-WCMC protected areas website does not list any subtidal components. Most of these islets appear to be bird sanctuaries. Bleakley (1995) however, lists the Kirimati WS as an MPA.
Marshall Islands										
Jaluit Atoll		70,100 ha	2000		Commercial harvesting of trochus and sea cucumber.	South Pacific Biodiversity Conservation Programme (SPBCP), SPREP; Rep. Marshall Islands Environmental Protection Agency (EPA)		Community MPA. Promotion of small scale tourism project as alternative income generating scheme.	All SPBCP programmes are currently being reviewed and lessons learned from the project are being documented. Contact: SPREP	Source: Round Table (1998) In addition a Japanese funded project aims to train Jaluit Islanders in deep-sea bottom fishing methods as an alternative to reef fishing. The project will incorporate conservation activities to complement the conservation/tourism project. Construction of fishing base facilities expected to

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										be completed in Feb. 2002 with community-based commercial fishing to begin March 2002. Source: Marshall Islands Journal (Oct 27, 2000 & Feb. 2, 2001) Documents available from SPBCP at SPREP include Marine Resource Survey of Jaluit Atoll; Report on the Ecotourism Development Plan for the communities of the Jaluit Atoll CA; Community-based tourism Development for Jaluit Atoll; A community-based tourism plan for Jaluit Atoll; Feasibility Assessment & support for community Ecotourism development; Concept and Project Preparation Documents.
Nauru										Bleakley (1995) lists no MPAs recorded
Niue										Jacob, 2000 cites Anibare Bay on the

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										eastern part of the island as a likely CA site which has local support.
Namoui marine reserve	South of Makapu Pt.	27.67 ha	1998	Intertidal reef flat and subtidal reef flat and slope to 50m isobath.	Important source of fish and molluscs.	The Government of Niue.		SPC carried out a visual census of the area (25 Nov. – 8 Dec) 1998. The survey was part of the Integrated Coastal Fisheries Management Project (ICFMaP). Results of the survey incl. a status report on species and formulation of a monitoring programme.	Contact: Bendon Pasisi DAFF, Niue Pierre Labrosse, SPC Being Yeeting, SPC	The Namoui Marine reserve was declared as a precautionary measure to protect the resources of certain coastal areas from potential over-exploitation and to preserve overall biodiversity Source: (Labrosse et al, 1999)
Palau						"With the exception of Ngerukewid Is. Wildlife Preserve and a seasonal no-fishing closure imposed in 1976 at Ngerumekaol spawning area, all the marine conservation areas in Palau are customary or state-based initiatives	State has ownership of coastal resources out to 12 miles from island baseline	Coastal waters are essentially an overlapping system of marine managed areas through customary, state and national authority systems (Smith et. al ., in press).	Contacts : Andrew Smith, The Nature Conservancy (TNC) Palau Conservation Society (PCS)	Source: Smith et al, (2001)

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						instigated since 1994" (Smith et al. 2001)				
Ngerrumekaol Grouper spawning area	Koror State	3.5km^{2}as of 1999	1976 then 1999			National and Koror State governments	National (1976) and Koror State (1999). legislation. PL-2-4; 24 PNCA 31. National Govt. and Koror State Conservation Officers patrol the area.	National law (1976) – no fishing April 1 to July 31. In 1999 State banned fishing year round, no hunting, disturbance or possession of any fish.		Source: Smith et al, (2001) Golbuu (2000)
Ngerukewid Islands	Situated within Palau barrier reef, Koror State.	1200ha (90ha terrestrial; 1110ha, marine)	1956	Includes the main Ngerukewid Is., several patch reefs, fringing reefs and a large body of open water.		This preserve is Koror State land but it is also a national MPA.	National (1956) and State legislation (1999). PDC 201 (24PNCA30) Palau National Govt. and Koror State Conservation Officers patrol the area.	A Management plan was published in 1989 (Thomas et al., 1989). And permanent monitoring sites set up. No habitation is permitted. Legislation states that the preserve is to be retained "in its present primitive condition where the natural plant and animal life		IUCN Cat. III Source: Golbuu (2000) and Smith et al, (2001).

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								shall be permitted to develop undisturbed." Source: UNEP-WCMC protected areas website No fishing, hunting, firearms or other weapons.		
Ngemelis Islands complex,	Koror State Between Bailechesengel, Cheleu, Lilblau, Dmasech, Ngis & Desomel	30km^2 30 km^2	1995 1999			Koror State	Koror State	1995 – no fishing within 1 mile of island complex. 1999 – no operation of motorboat between island complex.		Source: Smith et al., (2001)
Ngkisaol (Inlet) sardine sanctuary	Koror	.0008 km^2	1999			Koror State	Koror State	No hunting, fishing or disturbance of sardines.		Source: Smith et al., (2001)
Ngederrak reef,	Koror		2001			Koror State	Koror State	No hunting/fishing/removal or disturbance of any marine flora or fauna. Motorized watercraft banned.		Source: Smith et al., (2001)
Rock Islands conservation	Koror and Peleliu States		1997	500 rock islands. turtle nesting area, dugong, saltwater	Fishing and tourism.	Palau Conservation Society (PNC), The Nature	Koror State	Since 1994 there have been a number of ad	Koror State DCLE is developing a	Identified needs include resource baseline data, a more

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area (RICA)	Southern lagoon of main islands. Approx. 620 km^2 in Koror and 40 km^2 in Peleliu State.			crocodiles, 1400 sp. reef fish, 625 sp. coral. (WRI)		Conservancy (TNC), Koror State Dept. of Conservation and Law Enforcement (DCLE)		hoc measures to control activities within the area. Special use restrictions passed by Koror State in 1997. Twelve rangers since 1989. Dive permit system since 1994. Ngemelis and Dmasch Islands no fishing zones estab. 1995. (Smith *et al.*; in press). In 1979 PCS submitted a proposal to SPBCP – the Rock Islands CA – awareness and consensus building project (SPBCP, 2000c). The RICA is funded predominantly by Koror State with contributions from the SPBCP.	multiple-use management plan to ensure co-ordination of conservation efforts and best use of traditional, scientific and socio-economic information. (Smith et al.; 2001). Consultation is continuing with the general community of Peleliu to identify boundaries and formulate a management plan. The PCS acts independently as the lead agency in a co-ordinating role. Sources: SPBCP (2000c) Smith et al (2001) WRI Website	effective monitoring programme, identification of revenue opportunities to fund day to day management. (Smith et al.; 2001). Sources: Smith et al, (2001) SPBCP, (2000c)
Ngeremeduu Bay conservation	Aimelik, Ngatpang, Ngeremleng	98 km^2	2000			Aimelik, Ngatpang, Ngeremlengui	State Conservation Officers	According to management plan.	SPBCP funding ceases by 2001. A draft transition	SPBCP has conducted training for project staff incl. business

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area	ui States					States, CA Co-ordinating Committee with members from the 3 states, SPBCP.	patrol the area but continuity is an issue because of the high turnover of COs. PL6-2-4 (24PNCA31)	A small kayak tour operates within the CA as the first ecotourism venture.	strategy has been drafted (SPBCP 2000d). There is strong support for the CA from the traditional leaders however, some sectors of the community are worried that other development options, particularly the generation of cash income, will be limited by the CA. The transition strategy identifies the need to cultivate other partnerships e.g. with PCS, and secure ongoing funding post 2001. Awareness raising remains a priority for the future and there is community interest in further ecotourism development such as ecotrail tours and tourist	management, ecotourism, project administration and resource management planning. Source: Smith et al, (2001) Golbuu (2000) SPBCP (2000d)

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									lodges. Source: SPBCP (2000d)	
Trochus sanctuaries (21)	Nationwide		Prior to 1991			Individual states.		No trochus harvesting.		Source: Graham et al (1997)
Ngeruangel Reserve, Kayangel	Part of Kayangel State at the extreme northern end of the Palau archipelago 5nm NW of Kayangel Atoll	17 km^2 (Smith et al, 2001) 35 km^2 (Graham, 1997) All land and marine areas within ½ nautical mile of the seaward edge of the reef surrounding Ngeruangel.	1996	Ngeruangel is an uninhabited atoll	Fishing traditionally by community groups but becoming increasingly independent and commercial. Also seabird and turtle hunting. Recent Use: Commercial, artisanal and subsistence fishing. Turtle hunting. Harvesting of giant clams, trochus. Collection of seabird eggs, turtle eggs.	Kayangel State	Management authority Kayangel State Governor. Ngeruangel Reserve Act (1996) KYPL 7-02-96	1996 *bul* (taboo or closure) declared by the chiefly leadership of Kayangel over entire atoll effective for first 3 years then as per management plan. Currently limited specified activities under permit as per management plan. All activities within the reserve boundary require a permit issued by the Gov. Permitted activities subject to various restrictions	Source: TNC (2000) Ngeruangel Reserve management plan.	Source: Smith et al., (2001). Graham et al (1997)

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								include the following: visitation for non-extractive activities; fish harvest only for specified functions at specified time for limited period; catch and release sport fishing; limited diving and snorkelling; limited turtle harvest for specified state functions – no hawksbill. Permitted commercial harvest of trochus Monitoring and research activities permitted. Monitoring is carried out by the PCS including annual surveys of fish sp. and general habitat assessments.		

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								All other extractive uses not permitted also no introductions of new species, building fires on islets etc.		
Ngemai conservation area.	Ngiwal State	1 km^2	1997	Once a renowned site for sea urchins and sea cucumbers as well as a rich source of fish (Smith *et al.*, in press).	Heavy over harvesting lead to a significant decrease in availability of marine food resources.	Ngiwal State	Established by Ngiwal Governor and State Legislature (10 traditional leaders & 7 elected members). NSPL 7-004	Complete closure including to boat traffic for 5 years.	Closed until 2002 (5 yr term). Communities perceive an increase in fish schools. No state conservation officers oversee the area. In July 2000 the project received funding for the installation of 16 demarcation buoys, appropriate signage and training for 2 local community rangers to monitor the area. (Seacology website)	Dialogue with community and state is required to determine the future of Ngemai and monitoring programme needs to be reviewed Sources: Smith et al, (2001) Graham et al, 1997
Ngarchelong & Kayangel reef channels		90 km^2	1994				Ngarchelong & Kayangel Chiefs Traditional	No fishing in 8 channels April 1-July 31.		Source: Smith et al., (2001)

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							bul.			
Airai State conservation area 1	Mangroves from Ngermecherakl to Bkul Omdelchiil. Airai	1 km^2	1994	Mangroves		Airai State	Airai State	Only traditional subsistence and educational uses permitted.		Source: Smith et al., (2001)
Airai State conservation area 2		1 km^2	1997	Mangroves		Airai State	Airai State			Source: Smith et al., (2001)
Ngaraard mangrove conservation area,	Ngaraard	1.8 km^2	1994			Ngaraard State	Ngaraard State NSPL4-4	Only traditional subsistence and educational uses permitted.		Sources: Smith et al., (2001) Graham et al, 1997
Ngardmau conservation area system	Taki, Ngerchelchuus, Ngardmau State	7 km^2	1998	Reef flat		Ngardmau State	Ngardmau State	Complete closure to entry, hunting fishing for 5 years.	Closure until 2003.	Sources: Smith et al., (2001) Graham et al, 1997
Ebiil Channel conservation area,	Ngarchelong	15 km^2	2000			Ngarchelong State	Ngarchelong State	No entry, no fishing for 3 years. The state Governor is charged with conducting a 3 year monitoring programme and recommendation of a management plan to the state legislature for Ebilil and adjacent reefs.	Closed until 2003.	Sources: Smith et al., (2001) Golbuu (2000)
Papua New Guinea						The Nature Conservancy (TNC) , UNDP,	PNG Office of Env. & Conservation	Country-wide system of Wildlife	Under the National Parks Act (1982) parks	Proposed MPAs include Motupore Island WMA, Central

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						World Bank and Global Environment Facility (GEF) have created PNG Mama Graun Conservation Trust Fund (May 2000) to provide an ongoing source of in-country funding for conservation projects including marine resources and management in PNG and Solomon Islands. The MGCTF is independent of PNG Govt. and is managed by a board of 9 Directors. Conservation International (CI) has developed a "Marine Conservation Strategy for PNG" to advance a common national agenda for marine conservation (Mayer *et al.*, 2000) WWF is assisting	is the national agency responsible for conservation, environmental protection and management. Giant clams and corals are jointly managed with the National Fisheries Authority (NFA) See Hunnam et. al (2001) for list of relevant legislation	Management Areas includes a few marine and coastal sites but there are no formally gazetted marine national parks or marine conservation areas.	must be state owned land. Traditional marine tenure systems complicates establishment of marine parks because the state has to deal with a number of customary owners in any given area. Contacts: P. Lokani, TNC M. Ewai CI PNG Office Peter Hunnam	Prov.; Hansa Bay Marine Park, Madang & E. Sepik Prov.; Hiri East Coastal Zone Management Plan.; Aroma Coast Marine Conservation Program, Papuan Barrier Reef; BOMA marine Conservation Program, Papuan Barrier Reef. Sources: Hunnam, P. et al., 2001. Jenkins & Kula (2000)

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						local communities in mangrove areas including implementation of the Wildlife Management Area in the Kikori River Delta. WWF is also looking at the potential for a marine programme on the north coast particularly to support the wildlife management area at Sinub Island in Madang Lagoon (Wells, 1998). WWF is also working with landowners to revive management initiatives in the Maza wildlife management area – see below. Wells (1998) also lists WWF involvement in MPA projects in Collingwood Bay, Oro Prov. and Lasanga, Kamiala Island. Local NGO Conservation Melanesia (CM) proposes to				

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						develop a marine and coastal program with five basic components: • Scientific survey work linked with science training of nationals in marine survey, monitoring and management; • Community based development of Marine Protected Areas (MPA) including assessment, monitoring and management; • Marine policy: bioprospecting, fisheries, MPA development, women and marine resources; • Marine tourism: linking community participation with management and economic benefits; • Marine Education, Awareness, and Information campaign (CM website)				
Nanuk	Situated	12 ha	1973	Coral cay (4 ha),	Heavy	Provincial Park	Little or no		Picnic facilities	IUCN Cat. IV

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Island Park	between New Britain and New Ireland in the St. Georges Channel of E. New Britain.	(8ha marine)		associated reefs, mangroves and marine area.	fishing within marine park boundaries.	located on Govt. expropriated land.	enforcement due to general lack of govt. support for management of the area.		destroyed by vandalism, reported destruction of trees for firewood.	Source: UNEP-WCMC protected areas website Jenkins & Kula (2000)
Bagiai wildlife management area	Karkar Island, Bismark Sea, Madang Prov.	13,760 ha	1977	Central and eastern sections of Karkar incl. 2 small islands (Tuale & Mangamenek), coastal areas and reefs up to 2 km from shore. Nesting sites for birds and turtle, dugong present.		Customary owners.	Fauna (Protection and Control) Act, 1976. WMA administered by wildlife management committee comprising representatives from local villages. Little or no enforcement of rules.	Traditional methods of resource management. Hunting and fishing only completely unrestricted Dec-Feb. Firearms, commercially manufactured fishing nets, use of lamps for night fishing prohibited. Possible restrictions on mesh size of fishing nets and use of derris root poison.		IUCN Cat. I Impetus for establishing the area came from local people concerned with diminishing resources. There have been difficulties enforcing the rules and few offenders are prosecuted. General lack of understanding within the community of the function and purpose of WMA. Sources: UNEP-WCMC protected areas website Source: Jenkins & Kula (2000)
Maza wildlife management area, Western Province	Off the coast of Western Prov. in the Torres Strait to the	184,230 ha	1979	Management area is entirely marine with extensive reefs. Also includes large seagrass flats and mangrove	Dugong hunting, fishing.	Customary owners and WWF.	Fauna (Protection and Control) Act, 1976.	Dugong hunting with traditional methods (hand-harpoon from canoe) only. Length of	Info from UNEP-WCMC current as of 1990. 1998 WWF established a	IUCN Cat. VIII According to UNEP_WCMC database (as of 1986) dugong and turtle protection had been of

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	west of the Fly River. Boundary runs parallel to the coast and extends south to Wapa Reef. Daru and Bristow Islands within area.			areas.			WMA administered by wildlife management committee (members from 6 villages).	dugong must exceed 2.4m. Females and young totally protected. Fishing nets banned except for catching barramundi perch; limitations on mesh size.	program to support management initiatives in Maza and Tonda wildlife management areas as part of the TransFly Conservation Area strengthening project. There is an opportunity to extend the TransFly program to work on marine and coastal resource issues around Daru. An officer is based in Daru. AUSAID also had plans for a Coastal Zone Management Project for Western Prov. (Hunnam *et al.*, 2001) however these were cancelled in 2001. Contact: WWF PNG.	limited success. Customary owners complained of neighbouring communities using guns to hunt dugong, commercial fisherman using crowbars to break up reefs for crayfish., and incursions from outsiders catching prawns and crayfish within the management area. There is essentially no management activity at present (AIDAB, 1993; P. Hunnam, pers comm.) Source: UNEP-WCMC protected areas website
Ndrolowa	On Manus	5,850ha	1985	Marine component		Customary owners.	Fauna	Firearms,	WMA status is	IUCN Cat. III

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wildlife management area	Island, Manus Prov.	(some terrestrial)		consists of Lomucher Inlet, Paratau Bay, several islands, open water and reef areas. Reef platform drops steeply to 20m. Abundant octopi, cuttlefish, lobster and mud crab.			(Protection and Control) Act, 1976. WMA administered by committee with representatives from local villages. System of fines paid into a consolidated revenue fund.	explosives, poisons, chemicals, use of lamps for spear fishing at night, commercially manufactured fishing nets and spear guns prohibited. Traditional hunting methods only and only by traditional owners. Outsiders must purchase a licence.	largely ignored – use of all banned objects/hunting methods is commonplace.	Sources: UNEP-WCMC protected areas website Jenkins & Kula (2000)
Horseshoe Reef marine park	9 km east of Port Moresby (POM), Central Prov.	396 ha	Gazetted 1981 Lands dept.	Part of Papuan Barrier Reef, adjacent to Nateavu reef off Bootless Inlet. Area of barrier reef rich in hawksbill turtles, reef fishes, corals and marine invertebrates.	Fishing using monofilament gillnets, spear guns, blast fishing. Harvesting of shells.	PNG government. Customary owners.	None.	No management.	Boundary descriptions were reportedly completed in 1980 and the Park was gazetted by the Lands Dept. in July 1981. Subsequent declaration under the National Parks Act (1982) did not occur due to problems of traditional ownership.	Overfishing and lack of legal protection are major issues. Source: Jenkins & Kula (2000)
Kimbe Bay	New Britain	Several	Since	High diversity coral		Walindi Plantation		TNC and local	Four heavily	Source: The Nature

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marine conservation area		coral reef areas in the bay.	1993	reefs – 60% of all known Indo-Pacific coral species present (approx 320 sp. Coral, 870sp reef fish)		Resort, The Nature Conservancy (TNC), Mahonia Na Dari Conservation and Research Centre and the New Guinea Dive Association .		partners are working with local communities to establish several coral reef areas as protected zones. The New Guinea Dive Assoc. have installed 100 mooring buoys around the bay to help prevent anchor damage to reefs. Mahonia Na Dari Conservation and Research Centre conducts environmental education programmes for local high schools and supports local efforts to establish MPAs.	fished reefs designated as no-take areas declared by the National Fisheries Board Contact: P. Lokani, TNC	Conservancy and Hunnam et al., (2001).
Iomare marine wildlife management areas		3,837 ha	1987							IUCN Cat. VIII Source: Round Table (1998)
Long Island wildlife management	150 km east of Madang in Bismark	41,922 ha – not all	1977	North and NW beaches of Long Island are major	Fishing of limited importance.		Little or none – no prosecutions.	Hunting of turtles confined to those with	WMA status is effectively ignored. Locals	IUCN Cat. III Source: UNEP-WCMC protected areas

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area	Sea	marine		nesting beaches for green, hawksbill and leatherback turtles. Rich fringing reefs surrounding the island.	Hook and line or spears used rather than nets.			customary rights in that part of the island where they occur. Ban on turtle hunting in breeding season (May-July). Restrictions on sale of turtles.	are dissatisfied with WMA as it is seen to restrict their revenue earning opportunities.	website Source: Jenkins & Kula (2000)
Talele Islands nature reserve and provincial park	60 km wnw off n. coast of E. New Britain	40 ha	1973	8 low coralline islands on a loosely-connected steep-sided reef. Seabirds, turtle nesting beaches, mangroves, fringing and lagoonal reefs.			Located on Govt. expropriated land.	Lack of management or monitoring.	Uncertain.	IUCN Cat. IV Remoteness of site may offer some protection against anthropogenic damage. Source: Jenkins & Kula (2000)
Milne Bay marine integrated conservation & development (ICAD) project.			Since 1997			UNDP, GEF, Conservation International (CI), PNG Govt., in conjunction with local communities.	Since 1999 CI has carried out rapid resource appraisals of Milne Bay's biodiversity and is working with local communities to promote community-based conservation in the area. The bulk of	CI and UNDP have secured a GEF grant to fund formulation of a full project document 2000-2001. The aim is to establish a large-scale marine biodiversity conservation project, in conjunction with local communities, local, provincial	The GEF Milne Bay project document can be downloaded from the GEF pacific website. Contacts: G. Kula (CI)	Source: Hunnam *et al.*, (2001)

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							the funding for the project comes from GEF, with additional funds from UNDP and the PNG Govt.	and state govt. agencies; to support community-based conservation at 3 sites representative of the region's biodiversity and establishing conservation areas zones for strict protection and sustainable use.		
Papuan barrier reef corridor conservation program.	East Hiri to Paramana, Aroma, Boma-Cloudy Bay and eventually to Milne Bay					CI and local Planning and Development Committees.		Formation of a marine biodiversity corridor along 200 km of coastline by supporting and linking local coastal and management activities along the transect. Contacts – CI, POM office see above	Proposed.	Source Hunnam *et al.*, (2001)
Kamiala wildlife management area	60km SE along Huon Gulf coast from Lae. Part of	18,000 ha marine; 47,413 ha total	1996	27km of coastline with extensive reefs, mangroves, seagrass beds. 11 km long	Blast fishing still occurs due to nearby supply of	Village Development Trust (VDT) Lae with financial assistance from WWF.	No prosecutions – the WMA management committee is	Emphasis predominantly on sustainable forestry. Training centre	VDT activities ongoing incl. an outline proposal for a "Marine and Coastal	IUCN Cat. I Overfishing, land erosion and lack of coastal resource management are

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	Lasanga Islands, off Morobe coast.			leatherback turtle nesting beach. ~~Source:~~	WWII munitions. Harvesting of turtle eggs for consumption		effectively inactive.	and guesthouse have been built on Kaimiala Is. and a boat has been supplied to help local communities travel to & from Lae. Artisanal fishing venture established. A small (approx 1 km) no-take conservation zone for turtle eggs established.	Ecosystems Management Program" centred on Kaimiala but extending from Huon Gulf to the border of Morobe and Oro Prov and south to Tufi Fjords. Due to recent intervention by govt. and Wetlands International , the management committee declared a no-fishing zone on one of the more intact reef areas and extended the turtle conservation zone. Contacts: Karol Kisokaw , VDT, Box 2397 Lae, Morobe Prov, PNG A. Jenkins Wetlands International	immediate problems (Munday, 2000) Sources: Hunnam et.al., (2001). Jenkins & Kula (2000)
Sepik	Incl. Lower					WWF programme			Existing	Source: Hunnam *et al.*,

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Community landcare-Lukautim Graun	Sepik, coastal zone between Murik Lakes, Cape Wom, Sissano Lagoon and inshore islands.					with funds provided by the Dutch Government for a period of 6 years.			programme could be extended to systematically develop marine and coastal components (Hunnam *et al.*, 2001).	(2001)
Collingwood Bay integrated conservation and development area	NE coast of Northern Province	27,000 ha	1995 * 1998 (CM)	Extensive reefs, mangroves and seagrass beds.		ICAD area facilitated by the NGO Conservation Melanesia (CM) in association with local Maisin community.		Traditional conservation methods in place. Scientists from DEC and UPNG conducted preliminary marine and coastal resource assessment surveys. People from the local Maisin community were trained in basic marine monitoring techniques. Monitoring sites were established. Information from the monitoring	Developed in response to local community concerns about the effects of logging on coastal and marine resources. Contact: L. Seri (CM)	Source: Jenkins & Kula (2000)* CM website

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								programme will be used in a protected area development plan for terrestrial and marine resources.		
Crown Island wildlife management area	150 km east of Madang	5,969 ha. Boundary 1km from island baseline	1997	Fringing reefs rich in corals, fish, turtle, trochus and turbo shells.	As turtle harvesting is regulated in the nearby Rumba WMA, Crown Island is used as an alternative site.	Local community.	Little to none. Lack of support from govt. agencies and local authorities who are unfamiliar with regulations.	Established to manage use of subsistence resources among local communities especially trochus and turbo shell harvesting which is restricted to customary landowners.	WMA status is effectively ignored by local communities who see it as interfering with their cash generating opportunities. Overfishing and land erosion threaten coral reefs Jenkins & Kula (2000)	IUCN Cat. III Source: Jenkins & Kula (2000)
Kikori integrated conservation and development (ICAD) project	Kikori R. watershed beginning at L. Kotuku (S. Highlands Prov) to 20km into Gulf of Papua (Gulf Prov.)	undetermined	1994	Shallow intertidal and soft bottomed habitats. Mangrove habitats are important nursery areas for barramundi, prawns and other commercially important sp.		WWF-US directs conservation activities within the ICAD area, while being hosted by Chevron (oil company).		None in marine area.	Although there is a large marine component, conservation activities are terrestrial based – currently no management activities extend into the marine realm.	Source: Jenkins & Kula (2000)
Paring wildlife management area	N. Solomons Prov. Extends 1	44,240 ha	1990	WMA covers 70 km stretch of coastline and incl 11 major		Area established as response to pressure from landowners who in		Rules focus on controlling visitor use and access through	Local support for WMA initially high but ongoing civil unrest has	IUCN Cat. III Large size imposes considerable costs of maintaining

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	km from the coasts of Aroma, Kieta, Arawa. Loloko and Toniva			submerged reefs and 8 islands with fringing reefs.		1981 began to control access by outsiders and to protect customary resources.		permit system. Fishing and gathering by non-customary people controlled, fees for other activities, e.g. underwater filming.	effectively stopped all management activities.	management and monitoring requirements. Source: Jenkins & Kula (2000)
Sawataetae wildlife management area	N-central Normanby Is., adjacent to Etabu Bay, Milne Bay Prov.	700 ha	1978	Rich fringing reefs and extensive mangrove forests.	Fishing, trochus harvesting.	Landowner & leaseholder proposed project due to concern over indiscriminate and excessive shooting of birds esp. Egrets and Guria Pigeons.	Local people adhering to rules despite lack of govt. support.	Use of firearms to control birds damaging crops or to kill pigs allowed by traditional owners only. Cutting of mangroves and blast fishing prohibited. Use of root poison and pressure lamps for night fishing-allowed. Outsiders must seek permission to fish or gather trochus.		IUCN Cat. III Source: Jenkins & Kula (2000)
Simbine Coast wildlife management area	125km NW of Madang on the coast adjacent to Simbine Village	72.4 ha	1999	Fringing reefs with high levels of coral cover and high diversity of reef fishes. Turtles common.	Community concerns include declining fish stocks and destructive	Local community with continuing technical support from Wetlands International-Oceania and funding from New	Rules are respected by the local community.	No-take reserve managed by co-ordinating committee. Baseline data on fish and benthic species	Completed paperwork was submitted to the Office of Environment and Conservation in Feb. 1999 but the	Community support for the WMA is high and the co-ordinating committee continues to meet. Sources: Jenkins &

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					fishing practices.	England Biolabs Foundation and moral support of local SCUBA industry.		collected and re-surveyed in 2000. The community is interested in developing tourism as income generating activity.	WMA is yet to be gazetted. There is a strong possibility the area can be extended. Contact: A Jenkins, Wetlands International-Oceania	Kula (2000) Jenkins pers. com.
Sinub wildlife management area	Madang Lagoon	11.6 ha	1997	Fringing reefs with high levels of coral cover, soft coral gardens, diverse reef fishes.	Community concerns over declining fish stocks.	Local community with continuing technical support from Wetlands International-Oceania and funding from New England Biolabs Foundation and moral support of local SCUBA industry.	Rules are respected by the local community.	No-take reserve managed by co-ordinating committee. Yearly community monitoring of fish and benthos continues with observed increase in fish numbers after 1 year of closure. The community is interested in developing tourism as income generating activity.	Completed paperwork was submitted to the Office of Environment and Conservation in Feb. 1998 but the WMA is yet to be gazetted. Contact: A Jenkins, Wetlands International-Oceania	Community support for the WMA is high and the co-ordinating committee continues to meet. Other Madang Lagoon communities have approached the Sinub WMA committee for assistance to establish their own protected areas. Sources: Jenkins & Kula (2000) Jenkins pers. com.
Samoa										
Palolo deep marine reserve		137.5 ha	1979	A small land area, the deep, fringing reef & shallow inshore flats. The reserve extends seaward for 500 m.		Managed by Siaki Laban To'omalatai & family.	Administered by DEC.	Reserve was surveyed in 1994 and again in 1999.	Status of management plan unclear. There are possible plans to extend the reserve to	This is Samoa's only national marine reserve. Source: Skelton et. al (2000)

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									become a coastal marine park.	
S'anapu-Sataoa conservation area (SSCA)	Southern coast of Upolu	75 ha	1994	Mangrove wetland associated lagoon and catchment areas.	Threats incl. land clearance, rubbish dumping, pollution from washing detergents, use of dynamite and chemicals for fishing within mangrove area. Communities are concerned about increasing mangrove harvesting and over-fishing.	Div.. of Environment and Conservation (DEC) of Dept. of Lands, Surveys and Environment (DLSE) is the lead agency. .Sa'anapu and Sataoa villages contribute 6 members each to a CA Coordinating Committee. SPBCP.	SSCA is customarily owned by the two villages Sa'anapu and Sataoa.	DEC provides a Project Manager to co-ordinate activities. Focus of conservation is the mangrove wetland and its associated catchments and lagoons. An ecotourism Action Plan has been implemented with returns expected in first half of 2001. Other income generating activities include mud crab farming supported by Fisheries Div. Resource surveys have tended to be ad hoc and data has not been effectively used for	SPBCP funding ends 2001 and a draft transition strategy has been prepared SPBCP, (2000a) No management plan or resource management plan yet exists for the SSCA. The two villages involved have a history of tension and non-cooperation which poses a barrier to effective community management. Nevertheless there is unanimous support for continuing the project beyond the life of the SPBCP. Consolidating community support is a fundamental issue for	Support and commitment from local communities has been lacking as initial expectations were not met and there has been a lack of continuity in implementation of the CA. Villagers have reported an increase in diversity and abundance of fish sp. observed in the mangroves. Sa'anapu and Sataoa are also member villages of the IUCN supported Safata MPA (see below).Given the overlapping areas there is potential for greater co-operation between the two projects. Source: SPBCP (2000)

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								management.	continuation and success of the SSCA.	
Samoa-marine biodiversity, protection and management (including the Safata MPA)	Aleipata and Safata districts., Upolo Island	Approx. 9000 ha incl. Aleipata – 5000 ha; Safata – (400 ha).	1999	Aleipata – coral reefs, seabird nesting sites, turtle feeding and nesting grounds. Safata – large coral reef/lagoon/mangrove complex incl. Samoa's largest intact mangrove systems and a productive estuarine environment.	Over fishing of inshore fish stocks and marine invertebrates. Reefs are also impacted by habitat loss, pollution, and use of destructive fishing techniques such as chlorox and derris root poisoning and explosives. In addition marine and coastal environments have been severely affected by Crown-of-thorns infestations in the late 1980's, and 2 major cyclones in	GEF, World Bank(project ID=885), IUCN(implementing agency), AusAID, Samoan Dept. of Environment & Conservation, Fisheries Division, and Samoan Visitors Bureau with local communities in Aleipata and Safata districts (Aleipata – 11 villages, population 4000; Safata – 9 villages, population 3500).		A 5 year project to identify and establish multiple use MPAs that include community reserves established under the Fisheries Division Extension Programme. The project will protect critical sites for marine biological diversity, including coral reefs, mangrove and sea grass areas, within the core zones of large multiple-use MPAs. Phase 1 of the project incl. preparation of management plan, designing alternative income activities and	The project was launched in 1999 at a workshop attended by 47 village leaders from Aleipata and Safata Districts, their member of parliament, government and donor representatives.. A project manager was appointed in January 2000. Community-based resource management planning, monitoring and reporting activities are underway in the 20 participating villages. Awareness and eco-tourism initiatives are being accelerated in response to the challenges of managing	Sources: Skelton et. al (2000) SPBCP (2000a) (World Bank-GEF website – project details) Community support for the project is strong and communities play the leading role in project implementation. Individual villages work collaboratively at a district level to resolve cross boundary issues such as poaching, over fishing, zoning and integrated management. The project builds on experience from the SPBCP work in the S'anapu-Sataoa conservation areas.

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					1990 and 1991. In Aleipata District 75% of families engage in subsistence fishing and approx. 400 people rely on fishing as their main source of income. Figures for Safata are approx. 70% and 500 respectively.			capacity building. Phase 2 is concerned with implementing Phase 1 outputs. Many village fonos banned dynamiting, use of fish poisons and mangrove harvesting. Several villages have also created small no-take fish reserves. However, poaching by outsiders remained a threat and there was a need to sustainably manage larger areas which may be shared by several villages. The Aleipata/Safata project therefore aims to extend village initiatives to the district level in accordance with the proposed	community expectations. (World Bank-GEF website – project details)	

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								MPA boundaries. Project design emphasises local ownership and control, ensuring realistic community expectations, participation both within and outside traditional structures, building understanding and awareness, co-operation between Govt. agencies, strong linkages with Samoan Fisheries Program, equitable sharing of benefits and realistic time frame for project implementation.		
Fisheries Division Village Extension Programme						Samoa Fisheries Division, AusAID, individual communities.		Community-based fisheries project involving initial consultation	57 fish reserves have been established	Sources: Skelton et. al (2000) Fa'asili & King (1997) King & Fa'asili (1998, 1999a, 1999b)

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								within villages and resulting in a Village Fisheries management Plan (VFMP). The VFMPs set out resource management and conservation undertakings by the village and Fisheries Div. Servicing and technical support incl. resource surveys, technical advice on conservation and alternative sources of seafood. Community management strategies incl. enforcing government legislation, protection of mangroves, & partial or total bans on fishing activities.		M. King pers. com.
Uafato conservation	NE coast of Upolu	1306 ha	1994 -	Incl virgin rainforest,	The bay is an important	O le Siosiomaga Society and local		The fono appointed a	The fono is in the process of	Source: Tellus Consultants website.

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area			1998	coastline, coral reef and adjacent marine areas as well as Uafato Village. A fringing reef extends less than 300 m off the coast into the deep Uafato Bay. Corals on reef flat suffered heavy damage during cyclone Ofa in 1990 and had not recovered by 1997. Reef flat is coral and basalt rubble. Coral cover on upper reef slope reportedly returning in 1995. Extensive development of tabulate *Acropora* sp. on southern reef slope and variety of massive, branching and other corals in western bay area.	big-eyed scad fishery which is relatively unexploited. Most villagers (87%) regularly fish or harvest marine organisms for subsistence. Hand lines, nets, spears are used with most fishing done at night.	community. Technical advice from Dept. Agriculture Fisheries and Forests (DAFF). Dept. Env. & Conservation (DEC) has conducted ecological surveys and provides environmental education activities for Uafato. DEC continues to assist the village in setting up the conservation area, monitoring and providing tourist amenities. Western Samoa Visitors Bureau (WSVB) is helping develop ecotourism The Uafato fono (village council) oversees local planning and management. SPBCP, SPREP.		conservation area co-ordinating committee from local representatives. A project officer lives in the village a few days each week and holds regular conservation workshops.	establishing the conservation area. Contacts: O le Siosiomaga Soc DEC	
Solomon Islands						WWF is supporting community groups in Solomon Islands			Contact: WWF Solomon Is.	

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						conserve and sustainably manage their coastal & marine resources. The programme involves assessment, new venture development and capacity building phases. See Marovo Lagoon.				
Arnavon Islands community marine conservation area	Atoll complex situated in Manning Straits, midway between Choiseul and Santa Isabel Islands.		1980 * 1994 ♦	Lagoons, coral reefs, hawksbill turtle rookery, commercially important sp. incl. beche-de-mer, trochus, black & gold lip pearl oysters, and giant clams	Cash economy relied on harvesting commerciall y important sp. Three villages (Kia, Posarae & Waghena) used the resources on an open access basis. Higher prices for shellfish in 1980's resulted in over harvesting	♦SPBCP; The Nature Conservancy (TNC); Solomon Islands Ministry of Forests and Environmental Conservation (MFEC); International Center for Living Aquatic Resources Management (ICLARM) until July 2000; (Australian) Great Barrier Reef Marine Park Authority (GBRMPA); Arnavon Islands Management Committee (10	Six community Conservation Officers (CO's) – 2 per village - monitor the project. A project newsletter informs communities about offenders; offenders are referred to their respective community authority for punishment according to traditional	Initial 3 year closure of the area. Implementation of a management plan and a deep-water finfish enterprise (including fish co-op centres at Sire and Wagina) to provide communities with food and income.	Continued involvement of TNC to consolidate management strategies, monitor resources and expand conservation strategies to other areas incl. large areas of SW Isabel & NE Choiseul. Contacts: Peter Thomas, TNC and George Myers, TNC, Solomon Islands	* An international NGO with the approval of Solomon Is. Govt. created the Arnavon Wildlife Sanctuary. Managed by Peace Corps Volunteer with little consultation with local communities. Local politics between villages competing for resources lead to burning of the sanctuary's field station and eventual collapse of the sanctuary. A decade of hawksbill turtle exploitation followed. A survey by Ministry of Natural Resources and SPREP confirmed

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						members).	means; the Provisional Ordinance provides for fines or prison terms for individuals breaking regulations. In addition the Management Committee recommended that the CO's be authorised to issue citations and on the-spot fines.			a sharp decline in turtle numbers. Work to re-establish the conservation area began in 1992. Rapid resource assessment in 1993. Legal status conferred in 1994. Sources: TNC website Solomon Islands page; BCnet –annual report 1997 and "Community Resource Management in the Arnavons: a participation case story" SPBCP (2000f)
Narong marine reserve			1998							
Simbo Island participatory action research project			1998			WWF and local community.		Megapode conservation	Contact: WWF Solomon Is.	There is currently no marine component to this programme but this is a possible option.
Marovo Lagoon						WWF and Michi community		Ecotourism resort development	Contact: WWF Solomon Is.	
East Rennel World Heritage site		370 km ^{2} not all marine		Incl. islands and 3 nm seaward. Marine component				Ecotourism is promoted as alternative		First world heritage site in insular Pacific.

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				incl. large uplifted reef system.				income strategy.		
Otong Java								Community management system mostly covering commercial marine sp.		Source: SPREP (2001)
Ghizo marine protected/conservation area								To incl. ecotourism component.	Currently being established.	Source: SPREP (2001)
Hele Bar									Stakeholders first meeting Nov. 2000. Process continuing.	Source: SPREP (2001)
Alokan Island	Russel Islands					OFCF/Ministry of Fisheries initiative			Stalled.	Source: SPREP (2001)
Michi-Charapoana marine reserve system						Funded by NZODA			In the process of being established. Awaiting necessary legal instruments.	Source: SPREP (2001)
Tetepare Island		300 km^2							In process of being established.	Source: SPREP (2001)
Karaka	Vela Lavella							Community-based fisheries reserve/refugia		Source: SPREP (2001)
Nulu customary land	Rannonga							Community-based fisheries reserve/refugia		Source: SPREP (2001)
Boe Village	Choiseul Island							Community-based fisheries reserve/refugia		Source: SPREP (2001)

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Michi Village	Marovo Lagoon							Community-based fisheries reserve/refugia. Involves ecotourism		Source: SPREP (2001)
Tinge & Zaira	Southern Vangunu Island							Community-based fisheries reserve/refugia		Source: SPREP (2001)
Biche Village	Qatokae Island							Community-based fisheries reserve/refugia. Involves ecotourism.		Source: SPREP (2001)
Baraulu	Rovinia							Mangrove areas closed for restocking of *Anadara* and *Polymesoda* sp.		Source: SPREP (2001)
Nazareth	Marovo							Mangrove areas closed for restocking of Anadara sp.		Source: SPREP (2001)
Tonga										
Fanga'uta and Fanga Kakau Lagoons marine reserve	Main lagoons in the centre of Tongatapu – conservation area is the entire lagoon including the Holvea Straits all	2835 – 3243 ha	1974 Royal assent 1975	There is a shallow, estuarine embayment on the northern Tongatapu coastline. The 2 main branches of the lagoon are separated by a complex system of reefs and channels. Lagoon islands incl. Nukunuku Motu, Kanatea,	Several settlements are contiguous to the lagoon and have historically exploited lagoon resources. Fishing methods	State land. Responsibility of Fisheries Division, Ministry of Lands, Survey and Natural Resources.	1974 Birds and Fish Preservation (Amendment)	No discharge of effluent, toxic or noxious substances into the protected area. No construction of harbour, wharf, pier, jetty or other building works. No cutting or damaging	Contact: Ministry of Lands, Survey and Natural Resources. Box 5 Nuku'alofa	IUCN Cat. VIII Source: UNEP-WCMC protected areas website → Tonga

Name of Reserve by Country	Location	Approx Area	Date Estab	Habitat type Description	Resource Use Before Protection	Who's Involved?	Law/Enforcement	Management Strategies	Current Status/ Contacts	Other Comments
	mangroves and foreshore			Talakite, Mata'aho, Mo'ungatapu. The lagoon is an important nursery ground for many reef fish, a breeding ground for snappers and supports juvenile populations of grey mullet and penaeid prawns.	have incl. monofilament gill nets, arrowhead fish fences and commercial trawling for penaeid prawns. Mangroves are used for fuel and construction and littoral vegetation cleared for agriculture.			mangroves. Erection of fish fences, construction of traps banned. No trawling for fish or shellfish; no artisanal fishing of any kind; no boring, drilling or dredging. Subsistence fishing allowed.		
Ha'atafu Beach reserve	Western tip of Tongatapu off Niuaunofo Pt.	8 ha	1979	From beach to depth of 5 m into lagoon; incl. fringing reef.	Beach is a popular recreation area, small scale tourist resort adjacent to reserve.	State has tenure.	Parks and Reserves Act. Ministry of Lands, Survey and Natural Resources.	Notice boards indicate regulations prohibiting destruction or removal of marine life	No active management. Contact: Ministry of Lands, Survey and Natural Resources. Box 5 Nuku'alofa	IUCN Cat. IV Source: UNEP-WCMC protected areas website → Tonga
Hakaumam'o reef reserve	19 km north of Nuku'alofa	260 ha	1979	An isolated, exposed barrier & algal reef.		State has tenure.	Parks and Reserves Act. Ministry of Lands, Survey and Natural Resources.		Contact: Ministry of Lands, Survey and Natural Resources. Box 5 Nuku'alofa	IUCN Cat. IV No human settlement. Site is remote. Source: UNEP-WCMC protected areas website → Tonga
Malinoa Island park and reef	12 km NE of Nuku'alofa	73 ha – incl. 5 ha on	1979	Small island with fringing reef. Reserve ranges	Turtle nesting site, area rich in	State has tenure.	Parks and Reserves Act. Ministry	Notice boards indicate regulations	Contact: Ministry of Lands, Survey	IUCN Cat. IV Source: UNEP-WCMC

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reserve		island		from surface of island to 5 m depth.	fish, octopus, clams and other shellfish. Graves of 6 executed men are on the island.		of Lands, Survey and Natural Resources.	prohibiting destruction or removal of marine life Recreational use of the island is allowed.	and Natural Resources. Box 5 Nuku'alofa	protected areas website → Tonga
Pangaimoyu reef reserve	3 km NE Nuku'alofa & immediately N of Pangaimotu Is.	49 ha	1979	Shallow reef bounded on N (seaward side) by Piha Passage. Outer reef extends into Piha Passage. The reefs have reportedly suffered from overfishing and collecting by tourists, coral breakage and infection with blue-green algae.	Fish are abundant, giant clam & scaly clam present. Coral predominantly Acropora, approx. 12 genera of coral on reef edge; good coral cover in shallow water. Eel grass beds and mangroves.	State has tenure.	Parks and Reserves Act. Ministry of Lands, Survey and Natural Resources Apparently no means of enforcing regulations.	Notice boards indicate regulations prohibiting destruction or removal of marine life An underwater coral trail was established for tourist use in 1989. This may have later been destroyed by fishermen frustrated by prohibitions.	Contact: Ministry of Lands, Survey and Natural Resources. Box 5 Nuku'alofa	IUCN Cat. IV Source: UNEP-WCMC protected areas website → Tonga
Mounu reef sanctuary			Prior to 1991							
Monuafe Island park & reef reserve	6 km NE Nuku'alofa.	33 ha (incl. 2 ha island)	1979	Small sand island surrounded by sheltered, lagoon reef. Reserve ranges from surface of island to 5 m	Reefs have been damaged in the past by use of tu'afeo	State has tenure.	Parks and Reserves Act. Ministry of Lands, Survey and Natural	Reports in 1987 that an 8 m boat was acquired for patrolling the are.	Contact: Ministry of Lands, Survey and Natural Resources. Box 5 Nuku'alofa	IUCN Cat. IV

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				depth. Sand flats are rich in molluscs, giant clam, *Tridacna*, present. Reef is a small section of a diverse, rigorous reef – all Tongan coral sp. represented.	fishing method (breaking coral to scare fish into nets). No current info re reef status.		Resources.			
Ha'apai conservation area		10,000 km^2 incl. 62 named islands.		Littoral rainforest, lowland forest, montane scrub, freshwater wetland, coral reef, seagrass.		Ministry of Lands, Survey & Natural Resources (MLSNR) is the lead agency. The Head of the Environment Unit of MLSNR has overall management responsibility. Conservation Area Coordinating Committee (CACC) SPBCP.		The CACC is not deemed to have functioned effectively and there are proposals to replace this committee with an alternative body such as a society or trust (SPBCP, 2001b).	SPBCP funding ceases at end 2001. Possible income generating activities include; handicrafts, agroforestry, ecotourism, mariculture (clams), and agricultural diversification.	Source: SPBCP (2001b)
Community giant clam sanctuaries			1987				The sanctuaries were initiated by the Ministry for Lands, Survey & Natural Resources but are run	Earthwatch International volunteers carried out surveys and prepared educational material for local communities.	The first sanctuary was established Vava'u in 1987 Sanctuaries have been established in other areas and continue to be managed by local	Source: ESCAP website → Conference Hall→good practices suite examples→Integrating all stakeholders

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							by local communities.	Once the sanctuaries were established community pressure ensured the continued protection of the clams.	communities. Contact: Richard Chesher, at Tellus Consultants	
Tuvalu										
Funafuti atoll marine conservation area	15 km stretch along western rim of Funafuti atoll	3300 ha	1995	6 islets, lagoon, back reef, fore-reef and channel habitats.		Conservation Area co-ordinating Committee (CACC) oversees management of the area. CACC comprises representatives from Fisheries and Environment Depts. Funafuti Town Council, the Falekaupule (community elders) and the local fishermen's association. SPBCP has provided financial support. Funding has also come from Canada Aid, NZDOA, and the Funafuti Town Council,	Offenders of the CA rules are dealt with according to *maneapa* (local traditional government) rules.	Protected species incl. coconut crabs, seabirds, green & hawksbill turtles & many reef fish. Survey and monitoring programmes include a baseline survey and monitoring training programme (1997), bird survey and monitoring programme (1998), turtle monitoring (2000) In 1999 the CA was formally declared under the Conservation Areas Act,	The project currently employs 4 staff, 1 CASO, 2 Conservation Officers and 1 Biodiversity Conservation Officer. SPBCP funding ends in 2002 after a gradual phasing out over 2 years. A draft transition strategy has been prepared SPBCP (2000e). Source: SPBCP (2000e)	Source: SPREP→Casolink 8

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								1999. The project has recently began to consider alternative income generating measures such as ecotourism.		
Vanuatu										
Anawonjei Reef	Ancityum Island		1991			Community managed protected area set up under customary tenure arrangements. Ondec community	Customary tabu.	Protect marine resources	10 year term	Source Naviti & Aston (2000)
Anelgauhat Reef	Ancityum Island		1991			Community managed protected area set up under customary tenure arrangements. Anelgauhat community	Fisheries act	Maintain marine resources	10 year term	Source Naviti & Aston (2000)
Emua	Efate Island		1995			Community managed protected area set up under customary tenure arrangements. Emua & Saama village communities.	Customary tabu.	Tabu on reef .	3 year term.	Source Naviti & Aston (2000)
Erakor & Empten Lagoons	Efate Island		1997			Community managed protected area set up under customary tenure arrangements. Erakor Village	Customary tabu.	Tabu on harvesting marine resources for 1 year.	Tabu expires 1998 – current status unknown.	Source Naviti & Aston (2000)

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						community.				
Hideaway Island	Efate Island		1996			Community managed protected area set up under customary tenure arrangements. Mele Village community		Trochus stocking and marine reserve for 3 years	Current status unknown	Source Naviti & Aston (2000)
Ponkovio	Epi Island		1989			Community managed protected area set up under customary tenure arrangements. Ponkovio Village community	Customary tabu.	Tabu protecting marine resources	Current status unknown	Source Naviti & Aston (2000)
Nagha & Pincia protected area	NW Malakula Island		1994	Sandy beaches (turtle nesting); fringing reef.	Subsistence.	Community managed protected area set up under customary tenure arrangements. Wiawi Village community.	Customary tabu controlled by village Chief.	Marine & forest conservation. Resources can only be collected with the Chief's permission. Turtle nesting zone extends 100 m landward from the reef edge. Turtles are totally protected within this zone.	10 year term to 2004 with the option of extending this for a further term.	Sources: Naviti & Aston (2000) Whyte *et al.*, (1998)
Narong marine reserve	Between Malakula Island and Uri Island	100 ha 160 ha (Bleakley, 1995)	1992	Mangroves, reefs, sea grass.	Fishing, shellfish gathering, occasional mangrove cutting.	Community managed protected area set up under customary tenure arrangements. Selanamboro Village	Voluntary community project established by the community with the	The aim of the project is to protect the nursery area for giant clams. The reserve was restocked with	10 year term (initially 5 years)	Higher densities and larger sizes of shellfish and sea cucumber are observed within the reserve. Sources: Naviti & Aston (2000)

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							support of Chiefs and elders.	clams		Whyte *et al.*, (1998) (Bleakley, 1995)
Nawo Marine Konsevesen	Malakula Island		1995			Community managed protected area set up under customary tenure arrangements. Uripiv Island community.		Conserve reef and marine life – 3 year term.	Current status unknown	Source: Naviti & Aston (2000)
Nevnal	Malakula Island		1995			Community managed protected area set up under customary tenure arrangements. Leviamp Village community		Marine and forest conservation. 10 year term.	Current status unknown	Source: Naviti & Aston (2000)
Ring Te Suh	Malakula Island		1991			Community managed protected area set up under customary tenure arrangements. Pelongk Village community (Enrel family), FSPI, Vanuatu govt. Environment Unit.		Conserve marine resources – 5 year term. Fisheries Dept. provides technical advice, monitoring and clam restocking.	Current status unknown	Sources: Naviti & Aston (2000) Whyte *et al.*, (1998)
Lekavik	Pentecost Island		1998 *	Reef flat, rocky shoreline and coastal land.	Shellfish & land crab gathering, line and spear fishing on outer reef slope.	Community managed protected area set up under customary tenure arrangements. Lebwibwi Village	Customary *tabu* established by Chief Ignatus in consultation with neighbouring chiefs. People who	According to Whyte et al (1998) the *tak-tabu* was initiated for 3 years beginning 1993 and reopened during Christmas/New Year 1997.		Source: * Naviti & Aston (2000) Whyte et al (1998)

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							did not recognise the Chiefs authority (e.g. people disputing ownership and access rights to the tabu area) did not respect the tabu or pay fines imposed on them by Chief Ignatus for breaking the tabu (Whyte et al, 1998).	Naviti & Aston (2000), however, report a 15 year term *Tak-tabu* on the marine area indicating that the original Tak tabu has been extended.		
Loru conservation area also known as the Loru Protected Area (LPA)	Santo Island	220 ha (terrestrial)	1995	Fringing reef and coastal lands belonging to Ser family.		Community managed protected area set up under customary tenure arrangements. Ser family co-ordinate conservation activities and management with advice from VPAI (Vanuatu Protected Areas Initiative). The initiative is supported by the Khole community.	Chief Ser and male family members.	Marine and forestconser-vation. Chief Ser originally established a 10 year tabu on harvesting coconut crabs. In 1992 talks with VAPI led to the idea of completely protecting the Loru area. In 1995 the LPA was formalised.	Current status unknown	Source: Naviti & Aston (2000) Whyte et al (1998)

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Untangling	Nun Island	1000 ha	1995		Turtle & turtle egg harvesting. Shellfish gathering.	The area was established by the Chief but the decision to restrict turtle harvesting was reached by village consensus.	Village Chief	Tabu placed on fringing reef effective for 3 years 1996-1999. Fish and shellfish gathering and collection of land crabs was banned during this period. In 1997 trochus were restocked within the tabu area. The Chief also placed a tabu on turtle hunting and egg gathering until 2005.		Source: Whyte *et al.* (1998)
Lope Resort	Santo Island	5 ha *	1991	Fringing reef, outer reef, mangroves, fish breeding pools.	Fishing, picnicking, fire wood gathering, food harvesting.	Managed and administered by Chief and members of his family.	Village Chief	The Chief was concerned about over fishing and over harvesting in marine areas and recognised the potential for tourism if the natural assets of the area were protected. The Chief closed marine areas but these were still exploited by groups who did	In 1998 the Chief was planning to re-close a smaller area for a longer period as a nursery that could continually restock surrounding reefs. Whether or not this occurred and the current status is unknown.	* This probably only refers to the terrestrial component but may include the marine area. Source: Whyte et al, (1998)

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								not respect his authority and others who disputed access rights to the area. Eventually the Chief lifted the tabu when it became apparent that people were ignoring it.		
President Coolidge and Million Dollar Point reserve	Santo Island	100 ha	1983					De facto management by local dive operator.		The site contains a sunken WWII ship and is a popular dive site. Source: Round Table (1998)
Vatthe marine conservation area Source: Round Table (1998)	Southern end of Big Bay on Espirito Santo Is.		1994							Round Table (1998) lists the "Vatthe Marine Conservation Area" . Other references (e.g. SPBCP, 2001c) refer to the Vatthe Conservation Area but make no mention of marine habitats being included in the CA. The SPBCP Transition Strategy for this CA, (SPBCP, 2001c), deals with forest and freshwater wetland areas. Although SPBCP (2001c) notes that at least one village is interested in

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										developing small village fisheries as part of an alternative IGA development strategy, protected areas appear to be exclusively terrestrial.

Category	Classification and Management Objective
I	Strict Nature Reserve/Wilderness Area: managed mainly for science of wilderness protection
Ia	Strict Nature Reserve: managed mainly for science
Ib	Wilderness Area: managed mainly for wilderness protection
II	National Park: managed mainly for ecosystem protection and recreation
III	Natural Monument: managed mainly for conservation of specific natural features
IV	Habitat/Species Management Area: managed mainly for conservation through management intervention
V	Protected Landscape/Seascape: managed mainly for landscape/seascape conservation and recreation
VI	Managed Resource Protected Area: managed mainly for the sustainable use of natural ecosystems

Dimension	Central Management	Local Management
Socio-economic	Low resource dependency; diverse and stable alternative income options High population size	Existing or increasing resource dependency Low to moderate human population size and density
Cultural	No customary tenure No traditional management	Existing, strong traditional decision-making structure Customary tenure and resource ownership Traditional management and customary use
Legal	Full state ownership of waters and resources Open, public access	Legally recognised customary tenure (limited/private access) State influence over existing tenure and ownership rights
Institutional	Centralised, bureaucratic decision-making structure Strong human, technical, and financial capacity Balance preservation and restricted use Complex, multiple levels of regulatory control	Decentralised decision-making structure; Low to moderate human and financial capacity Multiple use resource management and biodiversity needs Clear, local authority and decision making
Biological	Large, complex systems Not a principal determinant	Discrete, critical habitat or area of species home range Reproductive events (larval source, spawning aggregation, recruitment site)

Indicator	Country	References
Fishers report improved catches	Cook Is.	MacKay, unpubl.
	Fiji	Tawake *et al.*, in press; MacKay, unpubl.
	FSM (Pohnpei)	FSM, 2001
	Samoa	MacKay, unpubl.
More communities establish MPAs	Cook Is.	Evans, in prep.; MacKay, unpubl.
	Fiji	Tawake *et al.*, in press; MacKay, unpubl.
	Palau	Smith, 2001
	Samoa	King and Fa'asili 1999b
	PNG	Lokani and Seeto, in prep.
	Vanuatu	Johannes, 1998a
New or more restrictive rules	Fiji	Tawake *et al.*, in press
	PNG	Lokani and Seeto, in prep.
	Samoa	King and Fa'asili 1999b
	Vanuatu	Johannes, 1998a; Whyte *et al.*, 1998
Length of closed period extended	Cook Is.	Evans in prep.
	Vanuatu	Johannes, 1998a; MRAG, 1999; Naviti and Aston, 2000; Whyte *et al.* 1998