29 September to 3 October 1997
Pohnpei, Federated States of Micronesia

6th South Pacific Conference

on

NATURE CONSERVATION

&

PROTECTED AREAS

VOLUME 3
CONFERENCE PAPERS

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Volume 3
Conference Papers

Compiled and Technically Edited by Sue Miller and Joanna Sim, SPREP

Foreword

The Sixth South Pacific Conference on Nature Conservation and Protected Areas held in Palikir, Federated States of Micronesia, on 29 September – 3 October 1997, continued the series of nature conservation conferences held in New Zealand (1975), Australia (1979), Western Samoa (1985), Vanuatu (1989) and Tonga (1993).

Government, non government agencies, local communities and SPREP working in the Pacific islands region had made significant progress for nature conservation in the four years since the Fifth South Pacific Conference on Nature Conservation and Protected Areas in Tonga, particularly in community-based conservation initiatives. The Pohnpei Conference recognised that it was timely that lessons learnt of *what has worked and what has not* were drawn out to benefit the conservation and sustainable use of the region's biodiversity.

Four key nature conservation TOOLs were focused on during the Pohnpei Conference with the overall objective of producing a "TOOLBOX" of practical, solution-orientated guidelines for use. TOOLs focused on were:

- Protected Areas - marine protected areas and community-based conservation areas
- Enterprise Development as a Conservation Incentive
- Conservation Trust Funds
- World Heritage Convention

This was the first time the conference series had been held in Micronesia and this provided a special opportunity to celebrate and focus on conservation initiatives in the Federated States of Micronesia, Guam, Kiribati, Nauru, Northern Mariana Islands, Marshall Islands and Palau during the Micronesian Celebration.

In addition the Pohnpei Conference provided the opportunity to review the Action Strategy for Nature Conservation in the Pacific Islands Region and set priorities for the coming four years. The Pohnpei Conference has called upon the international conservation community to "*share responsibility for implementing, monitoring and evaluating the regional and international actions of the Action Strategy*". SPREP will convene a roundtable meeting of these organizations with the hope to foster greater coordination, closer partnerships and more effective action for conservation in the region.

There was a tremendous feeling of goodwill and cooperation amongst all present and an amazing energy that pervaded the entire conference week. In the weeks following the conference SPREP received feedback that reinforced my own belief that the Pohnpei Conference is an achievement that will reap success for Nature Conservation actions for the Pacific in the new millennium.

The Pohnpei Conference innovative design began as Sue Miller and Barry Hoggs' dream of doing a conference in a more 'Pacific style' that maximised participation from within the region. The key to success was the - faces of the conference - the Pacific Team of Facilitators. I acknowledge with gratitude this team's hard work and dedication.

The Conference reports comprises three volumes:

- Volume 1 Conference Proceedings
- Volume 2 Conference TOOLBOX
- Volume 3 Conference Papers

The Conference Proceedings includes the Opening and Closing Plenary, Resolutions, Recommendations and summarises all work done during the meetings. Volume 2, the Conference TOOLBOX, summarises

work done before and during the conference on the focus TOOLS for Conservation: protected areas (marine protected areas and community-based conservation areas), enterprise development, conservation trust funds and the World Heritage Convention). Volume 3 comprises the Conference Papers presented to the Sixth Conference.

On behalf of all conference delegates I wish to express our sincere appreciation to the partner agencies and sponsors of the Pohnpei Conference, and especially to the Government and peoples of the Federated States of Micronesia for hosting the conference.

To all conference participants - your dedication and sheer hard work made the Conference both a productive and very enjoyable event. I congratulate you on setting a new standard for meetings in the region.

The more than 170 participants to the Sixth Conference, by far the largest yet, indicates that the importance of, and interest in, nature conservation issues has grown in the region in recent years. Unfortunately this increase in activity is also an indicator of the increased need for nature conservation work due to unsustainable resource use, habitat degradation and biodiversity loss becoming all too common across the region.

From Tonga to Pohnpei the Sixth Conference built on the previous conference through revision of the Action Strategy for Nature Conservation and Protected Areas and kept faith with the strong emphasis of community involvement and partnerships in conservation initiatives. In the four year journey from Pohnpei to the Cook Islands, the venue of the Seventh Conference, I urge you to keep that faith and renew your energy and commitment for the work ahead.

Tamari'i Tutangata
Director
South Pacific Regional Environment Programme

Acknowledgements

SPREP gratefully acknowledges its Partner Agency for the Pohnpei Conference – NZODA – New Zealand Official Development Assistance.

SPREP also gratefully acknowledges its key sponsors for the Pohnpei Conference; the UNDP/GEF/-AusAID South Pacific Biodiversity Conservation Programme, the World Heritage Fund, the Government of Australia and The World Conservation Union (IUCN).

SPREP sincerely thanks the Government and peoples of the Federated States of Micronesia and particularly the State of Pohnpei for their gracious hosting of the Pohnpei Conference. SPREP also thanks the traditional leaders of the State of Pohnpei, particularly the Iso Nahnken, for their tremendous support for the conference. SPREP notes with deep appreciation the untiring hard work of the FSM Organising Committee, particularly FSM's Department of Resources and Development, Department of External Affairs, Pohnpei Visitors Bureau, and the Pohnpei office of The Nature Conservancy. Furthermore SPREP thanks FSM Committee members Francis Itimai, Okean Ehmes and Bill Raynor for their personal commitment to ensuring the success of the Pohnpei Conference. SPREP also gratefully acknowledges the participation and sponsorship of the private sector in Pohnpei, via the Pohnpei Tourism Association.

Approximately 70 percent of participants were funded by their own agency or secured their own funds to attend the Pohnpei Conference. These agencies and funding sources are too numerous to mention here, however, SPREP gratefully acknowledges this tremendous network of support.

SPREP acknowledges with deep appreciation the Conservation TOOL Facilitator Team and their respective agencies whose commitment ensured the success of the new 'Pacific-style' Conference; Russell Nari (Environment Unit, Government of Vanuatu), Noah Idechong (Palau Conservation Society), Francis Tarihao (Solomon Islands Development Trust), Emensio Eperiam (Pohnpei Historic Preservation Office, State Government of Pohnpei, FSM), Wep Kanawi (TNC), Isoa Korovulavula (SPACHEE), and SPREP officials Joe Reti, Lucille Apis-Overhoff, Michael McGrath, Sam Sesega, Tiare Holm, Sue Miller, and consultant Barry Hogg.

SPREP thanks Sebastian Anafel (FSM) and Seva Tabua (Fiji) for their expert leadership as Chair and Vice Chair respectively of the Pohnpei Conference. SPREP notes with appreciation the work of Audrey Newman (TNC) and Sam Sesega (SPREP) as co-Chairs of the Action Strategy Review Committee. SPREP also thanks Seva Tabua, Chair of the Resolution Committee. SPREP thanks the coordinators of the Sixth Conference Special Sessions; Jeremy Harrison (WCMC) and Tom Moritz (IUCN) who organised the South Pacific Conservation Areas Resource Centre Technical Session and Mick Clout (IUCN), Jean Yves Meyer (French Polynesia) and Lu Eldredge (Bishop Museum) for the Invasive Species Technical Session and Dianne Russell (BCN) for the NGO Partnership Session. SPREP thanks the Chairs of the Pohnpei Conference Paper Sessions; Bill Raynor (TNC), Dianne Russell (BCN), Seva Tabua (Native Land Trust Board, Fiji) Trevor Sankey (UNESCO), Bing Lucas (IUCN), Kathy Fry (FSP) and Chris Bleakely (GBRMPA). SPREP thanks Wren Green and David Sheppard from IUCN for convening the Pacific Regional meeting of the World Commission on Protected Areas (WCPA) during the conference. SPREP also thanks the Pohnpei Watershed Project and particularly Bill Raynor for organising the preconference field trip to this community-based conservation area.

SPREP thanks the delegates from Nauru, Marshall Islands, Kiribati, Guam, Palau, Northern Marianas, Yap, Kosrae, Chuuk and Pohnpei and the cultural groups from Kiribati, Yap and Pohnpei who provided an unique insight into the conservation issues and culture of Micronesia through special presentations,

music, song and dance. SPREP also thanks Okean Ehmes (FSM) for organising the Micronesian Celebration.

SPREP thanks Patrick Delhaye, Francoise Martineau and Emy Watt from Language Professionals Ltd for translation and interpretation services.

SPREP especially thanks conference delegates; Nina Eejima (FSM), Dion Ale (Samoa), Toni Tipama'a (Samoa), Chris Bleakely (GBRMPA) and Kathy Walls (NZ) for volunteering and helping the Conference Coordination Team with all the last minute preparations that kept the conference running smoothly.

Finally, SPREP wishes to express its sincere appreciation to Sixth Conference Consultant Dr. Barry Hogg. Dr. Hogg was a key part of the innovative and successful participatory design of the Sixth Conference's format and trained the Sixth Conference Facilitator Team, even while recovering from treatment for cancer. Unfortunately Dr. Hogg could not come to FSM to see the success of the work he helped to create due to his illness.

Obituary

During preparation of these Conference reports Dr Barry Hogg passed away October 1998. Our deepest condolences extend to Barry's family and friends – he will be sorely missed.

Also, the Pacific lost a great friend and supporter when Mr Bing Lucas died suddenly in December 2000. Bing was a tireless worker for conservation and protected areas throughout the world, yet the Pacific always held a special place in his heart. As mentor, adviser and friend, Bing was always ready to serve.

Our deepest condolences to the families of Barry and Bing and to their many friends.

SPREP Conference Team

The SPREP Conference Team was led by SPREP's Director Mr Tamari'i Tutangata and consisted of Mr Joe Reti, Ms Ruta Couper, Ms Sarona Stanley, Ms Saunoa Matau, Ms Tiare Holm, Ms Lucille Apis-Overhoff, Mr Micheal McGrath, Mr Sam Sesega and Ms Sue Miller (Conference Coordinator).

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Protected ***Areas***

Community-based Conservation Areas in Vanuatu

Russell Nari and Charles Vatu
Vanuatu Environment Unit

Background

Conservation is a long standing practice of ni-Vanuatu people. There are a range of general approaches to conservation that have widespread use in the country. While it is beyond the purpose of this paper to investigate traditional practices in detail, the use and continuing importance of customary resource management systems in Vanuatu is acknowledged and respected.

In recent decades additional approaches have been introduced and adopted. These conservation ideas and practices differ in some respects from those of traditional ni-Vanuatu. Furthermore the influx of conservation concepts from different agents has created a range of community-based conservation areas with different management regimes.

Influences on the range of conservation practices adopted have included:

- The introduction of laws and controls that follow international practices: e.g. provision under the Forestry Act (1982) for the Minister to set aside areas in the national interest.
- Observation of the practices of the expatriates or visitors to Vanuatu e.g. management of the "Melemaat Cascades" just outside Port Vila for tourism, or the protection given to the area immediately surrounding the Lope Lope Resort on the island of Espiritu Santo.
- Recommendations of expatriates or ni-Vanuatu professionals eg. proposals for a National Park to protect the stands of kauri *(Agathis macrophylla)*, or the biological research which has underpinned efforts to manage coconut crabs *(Birgo latro)*.
- Awareness or resource management programmes conducted by national or international organisations eg. Year of the Sea Turtle campaign, Wan Smol Bag's turtle play, or the South Pacific Regional Biodiversity Conservation Programme.
- The perceptions, experiences and education gained by ni-Vanuatu travelling overseas eg. the influence and experience of family members participating in the Narong Marine Reserve on the island of Malekula.
- International commitments, or international influences on Vanuatu, to adopt "recognized" environmental standards and practices e.g. international support for the concept of "National Parks".
- Activities of many government and non-government organisations and individuals that have actively promoted the concepts of conservation areas, protected areas or managed resource areas e.g. tree replanting initiatives on Emae.

Very little is known about the relative impacts of the different conservation approaches. However, two factors that have had particular influence on the form and process of conservation in Vanuatu should be noted. Firstly the land tenure system gives traditional landowners inalienable rights to land. Secondly, Vanuatu customs gives landowners, or their chiefs, the right to make key decisions abut the allocation and use of most resources that occur within their lands. As a consequence, conservation activities in Vanuatu can only proceed with the agreement and commitment of landowners and community leaders. Consequently participatory approaches to conservation predominates. This situation differs from where nature protection becomes an administrative function of the government, with considerable investment in conservation directed to government owned land and with little direct participation from the general population.

An overview of conservation as a management tool in the last four (4) years in Vanuatu is summarised below.

The outcomes of conservation could be numerous and having both positive and negative impacts on the communities involved. Firstly we would like to highlight some of the positive outcomes experienced with Vatthe Conservation Area in the last four years. These include to:

1. Promote peace and unity in the two communities of Sara and Matantas.
2. Educate communities and reiterate the importance of conservation and resource management.
3. Places respect and power to the communities involved.
4. Create partnership and linking the two communities with the outside world on conservation.
5. Contribute to communities infrastructure development and help meet basic needs and services.
6. Provide sustainable alternative income generating activities and job opportunities.
7. Promote community co-operation in management and decision making.
8. Promote equitable sharing of resources and benefits.

Secondly I would like to highlight some of the issues that are affecting conservation which cause a lot of headaches to the conservation practitioners during the decision making, implementation and management stages, as experienced in Vatthe Conservation Area. These include:

- lack of concept understanding at all levels;
- low level of literacy;
- land disputes;
- strong influence from capitalism and individualism;
- lack of knowledge and respect for traditional culture;
- breakdown of community institutional structures;
- lack of community co-operation;
- lack of community understanding and knowledge of the development of alternative income generating activities;
- lack of appropriate legal framework at all levels of governments;
- expectation for quick results;
- inadequate project timeframe;
- jealousy, and
- personal interest.

Conclusion

The current deterioration of resources and their habitats in areas under the responsibility of the landowners is now perhaps the major challenge to Vanuatu leaders. In nearly all cases, the contradictory demands for the immediate need for cash versus the sustainable use of resources occurs. Traditional practices and harvesting techniques have been altered while the adoption of the new practices have changed the ways in which resources are perceived and managed.

Given this situation, it is inevitable that whatever resource management approach is adopted, it must comprise the blending of both the traditional and contemporary systems. Any management programme must be acceptable to most landowners and accommodate the socio-cultural features of the communities. Total reliance on any one system is doomed to fail.

Traditional resource management can enhance national development if properly regulated. Local management practices must adapt to the changing social and economic system in Vanuatu. However,

some modern resource extracting techniques are depleting many resources. These practices must change now, and perhaps our traditional methods have a place in this.

Broad questions raised:

1. Can traditional and contemporary conservation approaches be merged to be effectively implemented and managed by our people of this region?
2. Is there enough conservation, education and awareness raising in our various localities in the region?
3. Can we identify the potential alternative income generating enterprises that are feasible and viable to be implemented within our conservation areas?

Community-based Conservation and Challenges of Urban Population in Funafuti, Tuvalu

Teleke Peleti Lauti
Conservation Area Support Officer
Funafuti Marine Conservation Area
Tuvalu

Introduction

Why should there be conservation / protected areas and who benefits by their existence? This question was raised at a maneapa meeting (a Traditional Meeting House gathering comprised only of elders) who, like most other ordinary Tuvalu people are suspicious of the conservation ideology. To them, conservation appears to focus mainly on economic development. This, coupled with uncertainty over the question of who benefits from the existence of conservation areas and a lack of awareness of the aims and objectives of such an idea, has resulted in serious doubts about the new methodologies that are being used for what is often called "sustainable use of the resources" and "environmental protection". The indigenous people who have asked such questions have been masters of their own land and seas, seeing nature with their traditional eyes and translating within their own cultural and traditional frameworks. However, the traditionalists with their own conservative thinking are now challenged by the reality of modern changes in urban areas, and it cannot be denied that urban developments are constantly changing Tuvalu's community setting.

Due to the growing population on Funafuti, and the absence of any form of environmental control and management, already scarce marine and land resources have become scarcer through over-exploitation in the face of increasing population pressures and commercial interests. Destructive forms of fishing activities carried out in the lagoon and on the surrounding reef for commercial interest and subsistence living are responsible for quickly depleting the marine resources. The absence of a legal framework for the control of our resources has made it impossible for the Funafuti Town Council, for example, to enforce a prohibition order for access to the newly formed conservation area. This state of affairs has frustrated the Town Council's efforts to control and better manage the dwindling marine and land resources. There are still many important questions relating to the conservation ideology that need to be addressed carefully if it is to be accepted, let alone implemented. The main concerns are:

- What will be the direct and indirect consequences if the harvesting of scarce resources continues for the purpose of money earning and family consumption without proper control?
- Who is responsible for the controlling and management of the urban environment and its resources? and
- Who will benefit under conditions of proper management?

These and other important questions need to be addressed within the Tuvalu context using the information available from other countries facing similar environmental problems and a rapid depletion of their natural resources as a result of over population.

The population of Tuvalu in 1973 was only 5,887 but in a matter of six years (1979 census) it rose by about 25 percent to 7,349 people. Most alarming is the population boom on Funafuti. In 1973, Funafuti had 14.8 percent of the total population of Tuvalu while in 1979 the percentage share almost doubled to 28.8 percent. The percentage has risen steadily over the years to 42.5 percent of the total population of

9,043 in 1991. The population density has almost doubled in the period 1979-1991 from 893 to 1,376 people per km^2. Funafuti has a total land area of only 2.79 km^2. Table 1 shows the total population and distribution by island of people and land area in Tuvalu.

Table 1: Total population, sex distribution, density island and area for Tuvalu (G&T Central Statistics Division, 1992).

Island	Occupied households	Males	Females	Total	% of total population	Land area (Km^2)	Number of persons per km^2
Nanumea	155	381	443	824	9.1	3.87	213
Nanumaga	157	283	361	644	7.1	2.78	232
Niutao	139	351	398	749	8.3	2.53	296
Nui	116	286	320	606	6.7	2.83	214
Vaitupu	197	560	642	1,202	13.3	5.60	215
Nukufetau	145	359	392	751	8.3	2.99	251
Funafuti	499	1,975	1,864	3,839	42.5	2.79	1,376
Nukulaelae	60	147	206	353	3.9	1.82	194
Niulakita	15	34	41	75	0.8	0.42	179
Tuvalu	1483	4376	4667	9043	100	25.63	353

The Funafuti Marine Conservation Area (the CA) is located in the western part of Funafuti atoll at approximately $8^o30'S$ and $176^o05'E$. The CA runs approximately north-south and covers an area of approximately 33 km^2. Six small islets or motu are included in the CA, covering a total of eight hectares of land. The largest part of the conservation area is in marine habitats including lagoon, reef, backreef and channel habitats. It is within the framework of the effective establishment and day-to-day management of this conservation area that this paper is presented. This paper will discuss the significant role that may be played in conservation management and the development process by the community at large. The central questions concern how we might for the purposes of conservation:

1. encourage and strengthen grass-roots participation in all modes of conservation practices; and
2. urge all local institutions and other stakeholders, such as the Funafuti Town Council, the Government, Parliamentarians, the Maneapa, the private sector and NGOs to establish a working relationship and effective lines of communication among them.

Communication and participation among these groups is urgently needed to fully establish and enhance the functions of conservation areas and their role in the future, long term, sustainable use of our natural resources.

Development of individuals, families and the community

Tuvalu comprises eight islands and island communities. The name Tuvalu means 'a cluster of eight islands' or 'eight islands grouped together'. A community in the Tuvalu context is a pattern of life in which people and their natural environment are chained together and the capability of individuals and families to determine their livelihood is guided by cultural norms and practices. Community people in the islands are socially active in communal activities with a strong sense of sharing. Individual development is synonymous with community development because of their mutual relationship as recognised by culture and tradition.

The rural communities in Tuvalu are the key stewards of their environment and its natural resources. They are very unique in their ability of mastering their land and seas and are skilful in planting crops,

fishing, handicrafts and hunting. In other words, they have an intimate knowledge of their natural wealth, its traditional management, and have a legal right over it. The urban community does not mean a people living in "a land flowing with milk and honey" but a reality in which most people are challenged by many acute problems. Funafuti is under increasing pressure to change. Modern influences and their impacts on the peoples' lives are having large impacts on the natural environment.

Although, the individual communities rely mostly on the land and sea resources, they maintain the belief that the material arts of their ancestors are the basis of their future. The use of local materials as a means of survival has an intimate link with their natural surrounding. For example, the ***lama***, torches made from three dry coconut fronds bound together are used at night when fishing for flying fish to provide light and ashes that will be eaten by the small fishes.

The values of the community are recognised as important tools for strengthening conservation areas. Without legislation in Tuvalu to legally protect the conservation area, the community at large, working through the maneapa system still has the right and power to declare and to manipulate it. Of course, the conservation area project was designed from inception with very specific work components that will certainly satisfy its purpose. It is important to remember that legislation will also be required to legally declare the conservation area as protected area, and to regulate resource exploitation and development activities within.

The social and community structure of Tuvalu described above could be of advantage for implementation of a marine conservation area. Successful marine reserves in other parts of the world have relied at least in part on the co-operation of the communities that live around them. By involving the local people in decision-making and the planning process, we hope to engender a sense of ownership of the protected area and an understanding of its value. In this way, we expect that participation will include self enforcement and become part of the community duties carried out by Tuvaluans.

Community participation may be encouraged using a combination of formal and informal techniques. These include:

- teaching the value of conservation areas in school,
- maneapa meetings, including the encouragement of representation from women's and youth groups at such meetings so that their views can be incorporated into any actions,
- public seminars, video screenings, radio and newspaper reports,
- interpretive centre and library with relevant holdings, and
- clean up campaigns.

All of these activities either directly or indirectly act to increase the public's awareness of the functioning of natural communities, the values of conservation and consequences of over exploitation.

Changes in lifestyles and the behaviour of communities

Thirty years ago Funafuti was just like other rural atoll communities possessing an abundance of land and sea resources. The closeness of the people to their natural environment was remarkable in day-to-day life. Young children playing on the beaches, fed the great frigatebirds and played with turtles. Old men planted coconut trees and *Pandanus* and tended their **pulaka** pits (swamp taro) and women wove every day. The rural people may still have some of this life, coping under the pressure to accept practices of intensive exploitation of their natural resources, persuaded by the short term financial and development incentives. Funafuti is the worst hit. The urban centre with its modern influences and accessibility to technology creates traumatic changes to peoples behaviour.

This contrast between the old and new ways could provide additional ways of increasing stakeholder participation. The loss of a connection between the users of a resource and its condition is understood by many Tuvaluans who lament the passing of old ways. Encouraging a balance between old customs and modern life could be done through the maneapa, community and family system, particularly in regard to conservation of resources.

People's rights and incentives for conservation

What is the most important thing in the world ? A little boy answered: "It is life" and an old man answered "It is the ***Fenua*** (the land/sea of a people) and a young elite answered: "Yes, both answers are correct". Life cannot exist without the Fenua and the Fenua cannot exist without life. Therefore, in the Tuvaluan context, the most important thing in the world is people who have life on the fenua. Without people on planet earth there is no meaning to the whole of creation. And for the purpose of creation the institution of men on earth was made possible with the establishment of a remarkable framework for opportunities and rights. That meant that the world was made with an abundance of diversity of things. Human-beings are given to a certain degree the right of stewardship to cultivate and nurture the land and sea resources for their own survival. Consequently, we were given the opportunity to have the rights over the land and seas for some very particular purposes.

The Funafuti Community did have the rights of ownership like other islands in the group. With centralisation, the appearance on Funafuti of other communities from outer islands has meant that others have needed the opportunity to enjoy the resources at the expense of people's ownership. Fishing for subsistence living is no problem to the rights of the people of the land since that is the way of Tuvaluans. It doesn't matter whose waters or island, all people may share in the fish resources to be used for subsistence living only.

Because of our traditional and cultural ties were strengthened by Christianity, the people of Funafuti cannot forsake members of other local communities who are desperately in need of the resources. Likewise, government and other local institutions leasing lands on Funafuti for infrastructure and development purposes must also have some form of legal contract with the traditional landowners.

Although, there is a right of ownership to lands on Funafuti as clearly expressed under the lands code, the Funafuti community in particular are in doubt of their rights to inland waters, lagoons and other surrounding waters of the island. This has arisen as a result of the dominant laws of Tuvalu, particularly the Government prescriptive rights under the Prohibited Areas Act. In practice, however, if there are any issues concerning the harvesting activities of the island sea resources, the community will decide on the appropriateness of the issue and cooperatively consult with Government. In most cases, the office of the Attorney General is asked to formalise a set of rules or a legislation that can be put in place and which can be enforced by the Town Council. For example, an approved by-law can be enforced by the Town Council imposing restrictions on the designated conservation area.

Living memories of abundant resources and clean lagoon waters reminds people that degradation is real and constant. Since the inception of the Marine Conservation Project in July 1996, the people of Funafuti, particularly the land owners on the small islets, have freely surrendered their lands to be included in the conservation area. For the first time, it has been agreed that these lands be legally protected under a written legislation. This is an indication that of the fear of poverty that has been faced by the local communities on Funafuti. By accepting conservation incentives, the community believes that the old picture of a life of plenty will be returned.

Conclusions and recommendations

The impact of the growing population and its concentration within Funafuti has started to show negative effects on our natural environment such as the rapid depletion of resources. This has affected the people and is now being considered in government planning strategies and priorities.

The future success of conservation areas as management tools depends on increasing the awareness and participation of local people at all levels of organisation from individuals, families, communities and institutions. This is best achieved by increasing their knowledge of the consequences of failure to manage resources, benefits of correct management, and techniques needed for achieving sustainable management. Education is required in schools and within the community so that a need to conserve resources is understood by all. Actions need to be taken at all levels including:

- use formal and informal techniques for raising community awareness of the need for conservation areas,
- the development of a community ethic of respecting a conservation areas,
- the introduction of legislation and a planning process which guarantees that other developments do not conflict with the goals of a reserve, and
- encouragement of communication and cooperation between the public, user groups, the government, private sector and other stakeholders in all aspects of planning and management.

One of the most important and fundamental changes which has been suggested in Tuvalu (during the Niutao Forum, July 1997) is to:

- shift the power for management of the environment, resources and community affairs from the government to the chief and elders in a new form of the maneapa to be called **te Falekaupule**.

The future outlook of our wealth depends entirely on our immediate actions. It is about time now to build an ark that can contain the real meanings of feelings. We live not just to eat, but we eat to live. Therefore, looking onward to the future we people of today need to plant and allow the freedom of the diversity of all the living things to reproduce at their natural rate without being disturbed.

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Community-based conservation areas – what role for regulation?

Mark Christensen
Russell,McVeagh, McKenzie and Co.
New Zealand

Abstract

This paper considered the benefits of providing legislative support to community based conservation areas as well as the problems with this type of regulation. It discussed examples where such regulation has been used and particularly considered innovative approaches to legislation. It was important that regulation or legislation is tailored to the social and legal context and has the support of the community involved. Ways in which this could be achieved and some general guidelines on things to address and consider when developing this sort of regulation was discussed

Overview of Existing Protected Areas Systems in Papua New Guinea

Dr Navu Kwapena
Nature and Biodiversity Conservation Division
Department of Environment & Conservation

Traditional Conservation System

The customary land tenure system and associated subsistence economy traditionally contains many forms of resource management and conservation in Papua New Guinea. The shifting cultivation system, for example, with its long periods (10-35 years) of fallow helps to maintain soil fertility. Customary rules may also prevent the felling of trees along river banks. There are also prohibitions against cutting down trees near villages, while other trees of special economic value or of particular importance for certain types of wildlife may be protected from indiscriminate felling. In addition to controls consciously imposed by village societies, there are a great many associated traditional beliefs and practices that have often prove extremely effective in protecting certain habitats and species. In many Papua New Guinea societies there are prohibitions or tambu against entering certain areas for hunting or felling trees within them. These may be sites of old settlements, burial grounds or physical features, such as mountain tops, caves, ponds and forests. Some areas may be protected permanently, in others the restriction may be for a limited period as may happen after a death in the group (Eaton, 1985).

While traditional beliefs and customs have helped to protect the environment in the past and are often still operative, the integrity of the environment is under increasing threat from pressures associated with population growth, increased mobility and growth of the cash economy. The establishment of a protected areas system has proved to be extremely difficult on account of the traditional land tenure system. New legislation and novel approaches to environmental management have proved necessary.

National Government Conservation Policy and Legislation on Protected Areas

An Environment and Conservation Policy was adopted by the National Parliament in 1977, in recognition that development must be ecologically, socially and culturally suitable for Papua New Guinea. The Policy was drawn up in response to the Fourth Goal of the National Constitution.

> ***4. Natural Resources and Environment –***
> ***"We declare our fourth goal to be for Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of us all, and be replenished for the benefit of future generations."***

The Fourth Goal provides for:

- wise use of natural resources,
- conservation and replenishment of the environment and
- protection of flora and fauna for the benefit of present and future generations (SPREP, 1985a).

Papua New Guinea has not as yet developed a national conservation strategy.

In order to implement the constitutionally-based policies, various legislation has been introduced. Of particular relevance to the establishment of protected areas are the Fauna (Protection and Control) Act, National Parks Act and Conservation Areas Act (Venkatesh et al., 1983). These are discussed separately below.

Types of National Government Legislation that Enforce Protected Areas

Fauna (Protection and Control) Act 1966 and its Amendments thereof

Since 1966, the Fauna (Protection & Control) Act has provided formal mechanisms for regulating the taking, possession or trade of native fauna, from areas declared by the responsible Minister over land of any tenure. The three protected areas declared under the Fauna (Protection and Control) Act are Wildlife Management Areas, Wildlife Sanctuaries and Protected Areas. The major group of existing protected areas is that of Wildlife Management Areas, which attempt to provide a basis for resource conservation relevant to customary tenure. The 27 existing WMAs cover a total of more than 10,529 sq.km (2.3 percent of the country), although it should be noted that just two large WMAs (Tonda and Maza make up most of this area (7,742 sq.km.)

National Parks Act 1982

The National Parks Act, 1982 replaced the amended 1971 Act, which in turn superseded the original National Parks and Gardens Act, 1966. It provides for "the preservation of the environment and of the national cultural inheritance by –

(1) the conservation of sites and areas having particular biological, topographical, geological historical, scientific or social importance"

and thereby upholds the Fourth National Goal and Directive Principle of the Constitution.

The Act contains provisions for reserving government land and for leasing and accepting gifts of land. Powers to make regulations to control hunting, fishing, sports, vehicles and domestic animals, and law enforcement provisions are also contained in the Act. Although comprehensive in its coverage of different types of protected area, the Act does not define or even list the various categories nor is there any statutory requirement for the provision of park management plans (Eaton, 1985; SPREP, 1985b). The procedure for establishment of protected areas under this Act involves three stages: proposal, approval and declaration (Kwapena, 1984).

Conservation Areas Act 1978

The Conservation Areas Act, 1978 has similar objectives to the National Parks Act but is more comprehensive and, to some extent, remedies deficiencies in the other legislation. For example, provision include the establishment of a National Conservation Council to advise on the identification and management of protected areas, and the formation of management committees for each area to be responsible for inter alia the production of management plans. Conservation areas may be established on land under public, private or customary ownership. The Act awaits implementation due to some legal loopholes in the Act (pers. comm. Kibikibi).

Different Categories of Protected Areas

The different categories of protected areas used in PNG, and as defined in SPC (1985), are as follows:

1. National Parks are extensive areas of outstanding scenic and scientific interest which are of national significance. They should be of at least 1,000ha and preferably in excess of 2,000ha. Ideally, the whole range of land-forms and environments found in Papua New Guinea should be represented.

National parks have two main functions; firstly for public use and education and secondly, for the conservation of nature through protection of undisturbed habitat.

2. Provincial Parks are less extensive natural areas than national parks; frequently less than 2,000ha and often less than 1,000ha. Not necessarily of national significance, they are of scenic and recreational importance at provincial level. Their main role is to provide for outdoor recreation in a natural setting close to urban centres.

3. Historical Sites are areas of historic significance, covering prehistory and recent history. They may be of any size and, in many cases, adjacent areas will be developed for recreational purposes. They should provide for the preservation of areas of historic and prehistoric significance and their interpretation to the public.

4. Nature Reserves can be areas of any size in which samples of ecosystems and habitats are preserved, either for their intrinsic value or for the protection of wildlife. Scientific research is permitted, but access by members of the public is very limited.

5. National Walking Tracks are physically challenging and scenic primitive routes through natural landscape that provide for walking in natural surroundings over long distance. Wherever possible, there should be a minimum easement of 10m of natural vegetation on either side of track. Advantage may be taken of existing national parks or other large areas of reserved natural landscape.

6. Sanctuaries are areas set aside primarily for breeding and research on indigenous wildlife and its display to the public for education and recreation purposes. They can be of any size but should contain some natural habitat in additional to the display area.

7. Wildlife Management Areas are areas reserved at the requested of the land-owners for the conservation and controlled utilisation of the wildlife and its habitat. Declaration of a wildlife management area does not in any way affect ownership of the land, only the way in which resources are used. Thus, Wildlife Management Areas represent an attempt to develop conservation on a customary basis, using traditional methods of resource management (Eaton, 1986).

Other environmental legislation is reviewed by Eaton (1985). Some of this legislation is relevant to protected areas. The Forestry Act (Amalgamated) 1992 is the main new legislation responsible for the conservation and management of forest resources. Under this Act the Government purchases timber rights from customary landowners for a certain period and then grants a licence to commercial companies to extract the timber. Royalties are paid to the government and a proportion of these is passed on to the provincial government and landowners. Environment safeguards are provided for in the agreements between the government and logging companies. For example, logging is not within 20m of permanent watercourse, or 50m in the case of major rivers, nor on gradients above 25-30 deg. The interests of customary land-owners are also protected. They retain rights of access for gardening, hunting and collection of wood for fuel and construction purposes. Reforestation is not provided for in the forestry legislation but depends on arrangements between the landowners and permit-holders. An important statute is the Environment Planning Act, 1978 which calls for an assessment of the impact of a development project on the environment. Both the Environmental Planning Act and permits issued under the Forestry Act may also require logging companies to leave certain areas undisturbed as reserves for wildlife (Ventakesh et al., 1983). The export of logs of ten species has been banned since June 1989 and no new log export licences were issued after 1991. The bans are aimed at protecting high quality timber stands from rapid depletion, and at encouraging local timber processing (Anon., 1989).

Characteristics of Existing Protected Areas

The 27 areas under the Fauna Act can be called as Fauna Protected Areas (FPAs) and these include 19 Wildlife Management Areas, 3 Wildlife Sanctuaries, and 3 Protected Areas. A total of another 200 Fauna Protected Areas has been proposed. The existing areas under the National Parks Act include four National Parks, one sanctuary, one wildlife sanctuary, two historical reserve, three provincial parks, three nature reserves, one scenic reserve, and one reserve. About another 21 areas have been proposed for National Parks. The sizes and purposes of existing Fauna Protected Areas and National Parks are summarised separately below.

Size of Existing Protected Areas

The sizes of National Parks and Fauna Protected Areas are compared as below.

Size Range (hectares)	National Park Areas	Fauna Protected Areas
<50	7	1
50-100	3	1
100-1000	3	2
1,000-10,000	3	10
10,000-50,000	0	6
50,000-100,000	0	1
100,000-200,000	0	1
200,000-500,000	0	0
<500,000	0	1

Purposes of Existing Fauna Protected Areas

Protection of subsistence resources form clearly, the main purpose:	*14 of 27 areas of over-harvesting by both customary landowners and outsiders place specific restrictions on landowners and/or non-landowners resource used by all; Maza WMA is unique in its lack of distinction between customary landowners and others in the application of its rules.*
Protection of biodiversity	*second major purposes; perceived by DEC and scientist; less by landowners; some PAs protect habitat as well as wildlife; eg. at Pokili vegetation protected with 1km of scrubfowl nests; some prohibit all taking of native fauna; e.g. Mt. Kaindi, or Sawataetae where only pigs and dogs can be taken.*
Gaining formal recognition of tenure and resource ownership	*a major purpose for many PA landowners is to harvest resources only within their own customary areas.*
Providing opportunity for income generation	*for a number of areas there remain an unrealised expectation; schemes include fees for collecting; commercial hunting; sale of fauna; visitors fees.*

Protection of cultural values by reinforcing authority of customary owners	
Protection of significant sites or historical locations	
Developing scientific values, and providing education opportunities	*applies at Mt. Kaindi, reflecting Wau Ecology Institute's keys association with this WMA*

Purposes of National Parks

Protection of fauna and flora	*contribution of individual sites to this goal poorly documented; many may too small and vulnerable to provide adequate long term protection.*
Provision of nature recreation	*picnic areas, open areas, walking tracks and some information are provided at some sites; infrastructure in disrepair in others; level of use and quality of experience not assessed; rascals and vandalism are problems.*
Provision of urban recreation	*small areas close to urban centres used by tourists and urban population.*
Protection of scenic values	*protect scenic values recreation and tourism.*
Protection of historic and cultural values	*a number of sites are World War sites and meorials; combines with recreation and tourism.*
Provision of education resources	*educational function is not yet developed in most National Parks (exceptions are Moitaka Sanctuary, Baiyer River Sanctuary and Mt. Gahavisuka Provincial Park).*
Protection of scientific values	*generally understated purpose: use of protected areas by scientists has "added value"; Variarata, Mt. Wilhelm, Mt. Gahavisuka and Baiyer River have all been studied in some detail; provide valuable "benchmarks" to understanding biology and ecology of PNG's natural resources.*
Multiple purposes	*most sites combine a number of the above purposes.*

International Conventions, Treaties and Legislation

Recently, Papua New Guinea has ratified two most important Conventions namely, the Ramsar Convention in 1992 and the Biodiversity Convention for protection of fauna and flora and their diverse ecosystems. Previously, PNG also ratified the Apia Convention on Conservation of Nature in the South Pacific in 1976. However, I am not sure about the current status of Apia Convention at this moment. PNG is also a Party to the South Pacific Regional Environment Programme (SPREP) and has ratified the Convention for the Protection of the Natural Resources and Environment of the South Pacific Region, 1986 (SPREP). The main objectives of the Convention are to combat pollution, although one article

covers protected areas and protection of wild fauna and flora. The most recent Convention which PNG ratified this year is the World Heritage Convention.

In-situ and Ex-situ Conservation

Of all the total Fauna Protected Areas and National Parks declared almost 80 percent of the areas provides in-situ conservation whilst the other 20 percent provide ex-situ conservation. Most of the in-situ conservation or protected areas are found in the high biodiversity conservation areas (CAN Report 1992). Only Baiyer River Sanctuary and Moitaka Wildlife Sanctuary provides ex-situ conservation to protected fauna of PNG.

Natural History Stories or Robust Science? Meaningful assistance from scientists to community-based conservation, with particular reference to pigeon management.

Roger James[1],
Conservation International
Melanesia Programme

John Waihuru[2]
Hauta Village, Makira
Solomon Islands

Kevin Prime[3]
Te Runanga O Ngati Hine
New Zealand

Abstract

This paper discusses the lessons learnt from two quite different community-based conservation areas in the Solomon Islands and New Zealand which have invited outside scientists to study fruit pigeons as a result of local concerns over declining populations, and have encountered similar cross-cultural issues in the process.

The recommendation of this paper is that the scientist working on customary-owned land needs to appreciate what information is relevant to his/her hosts as well as what is necessary for "good science". It is ultimately the former which will be more likely to get results in community-based conservation areas, as it is the landowner who will initiate management, not the scientist.

Introduction

Science vs Natural History

To the non-scientist working with conservation, "science" may be viewed as any *information* that is gathered on species or ecosystems, especially if fancy technology is used to gather the information. To the scientist, however, there are two different levels of information. There is scientific data, which is collected according to a rigorously determined sampling procedure, and subjected to statistical tests to lend support or otherwise to clearly stated hypotheses. Then there is natural history, which is usually based on a smaller sample of observations taken from less strictly comparable times or places.

In the world of conservation, where threatened species are rare or difficult to observe, or where surveys have to be "quick-and-dirty" to save time and resources, it is natural history information that is collected rather than truly scientific data. Because this natural history information is generally simple and anecdotal, it is more readily understood by non-scientists. It can also be relayed in less formal language as a "story" in a way that anybody, regardless of their educational background or lack thereof, can understand.

[1] Conservation International, Melanesia Programme / Postal Counter, Opua, Northland, New Zealand
[2] Hauta Village, C/- Kirakira Post Office, Makira, Solomon Islands
[3] Te Runanga o Ngati Hine, P.O. Box 36, Kawakawa, Northland, New Zealand

Scientific data, however, is analysed statistically and interpreted according to the levels of significance that these analyses produce. This interpretation involves the use of language and concepts that are difficult for the non-scientist to understand.

Pigeon Conservation

The pigeon family *(Columbidae)* is represented on most Pacific Islands, from small atolls to large mountainous islands, usually by small fruit-doves (genus *Ptilinopus*) and large fruit-pigeons (genus *Ducula*). As their English names suggest, they are fruit-eating birds, and because they do not digest the seeds of the fruits they eat, they are important seed-dispersal agents in Pacific Island forests.

Pigeon meat tastes very good, and on most islands they are hunted for food. (It must also be noted that pigeons are eaten in Northern Hemisphere countries, and not just Pacific Islands!). This hunting became much easier with the introduction of firearms to the Pacific.

There is a problem, however, in that most pigeon populations in the Pacific are declining. This decline may be due to natural disasters (cyclones), deforestation by people, predation by introduced vertebrates, by unsustainable hunting, or by a combination of these factors.

Although it is a regional issue, the conservation of pigeons has to be supported by locally-gathered information, so that conservation action properly addresses the local threats. The question is, what sort of information is needed? Science or natural history?

Case Study: Makira Conservation Area

The Makira Conservation Area in the south-eastern Solomon Islands is managed by the customary landowners. During a participatory resource management workshop in 1993, the pigeon population decline was raised as an issue which needed to be addressed. The NGOs involved with the conservation area sought out a scientist who would live in the community for a year, and supply information which the community could use to base pigeon conservation action on.

Because the partnership between the overseas researcher and the community was seen to be crucial, the next step was for the two parties to meet and discuss what would be involved in the year-long study, from both sides. Most importantly, a formal invitation to study the pigeons was made by the community-leader at a community meeting.

There are four large pigeon species subject to hunting on Makira, namely kuvwau (*Ducula rubricera*), gao (*Ducula brenchleyi*), manu papahu (*Columba vitiensis*), and manu baumahui (*Columba pallidiceps*).

The study involved two main components: monitoring and radio-tracking. The objective and methods were presented at a general community meeting at the start of the study, to see if there were any suggestions and to let everyone know what was being done.

Research Objective

To evaluate the sustainability of pigeon-hunting and devise sustainable hunting methods based on information gathered about the birds' reproductive capacity, home range area, and local hunting practises.

Monitoring

The pigeon populations were monitored using ridge transects along existing walking tracks. Transect counts were used instead of point counts, because of the lack of wristwatches at Hauta to time point counts. Three transects of similar forest, altitude and aspect were monitored. Two were chosen because

of their use as "hunting roads", the other more distant one was selected as a non-hunted control. Three local people were trained in the technique and reasoning behind monitoring, and four more came along out of interest. The concept of an "index" as opposed to an absolute count had to be explained.

Radio-tracking

Pigeons were captured alive in mist-nets set in the forest canopy adjacent to fruiting trees. They were fitted with radio-transmitters which would enable them to be followed using hand-held radio-tracking equipment. The nature of the radios emitting a pulsed signal had to be explained, because the only radios people had knowledge of were transistor radios and they expected to be able to hear the pigeons voices.

Reporting back results

The monitoring data was presented as simply as possible. That meant omitting the 3-factor nested ANOVA which showed significant differences in site and year, and instead presenting the averages for each of the three sites for 1995 and 1996, and seeing how the numbers declined. Assuming that written numbers would have little meaning given the low literacy levels in the community, about 70 paper kuvwau were drawn, coloured-in and cut-out and used as props. Two men pinned the number of kuvwau for each site for 1995 onto three different seats in the church. Then with everyone huddled around, we removed the appropriate number from each seat to give the 1996 numbers. It was visually very effective, as the numbers were almost halved for the two hunted transects, but stayed more or less the same for the unhunted one.

The radio-tracking had not produced bulky data, so the stories of each individual bird caught were told (whether they had disappeared, died or been tracked to different places).

Then a story was presented incorporating numbers shot, breeding season, the single-egg clutch, nest predators and other aspects of the kuvwau's life. Information was used from traditional knowledge, and studies from other Pacific countries. Part of this involved using the paper kuvwau for a second activity. On the back of each was written the name of a member of the community. As fruit pigeons appear to be monogamous ("bird for married" rather than "bird for all-about"), an appropriate number (based on proportions from New Zealand and New Caledonian studies) were assigned to married couples (20) and to singles (40). This gave a population of 60, which would be about right for the number of kuvwau using the area hunted around Hauta, based on monitoring indices and radio-tracking results. We shuffled the paper cut-outs then asked a hunter to take 20 as his bag total for the year. We then looked at the names on the back of each, and saw how many single birds had been shot, and how many married ones. The main point to be illustrated was that once the "husband" or "wife" was killed, the other partner effectively became a single bird. This then lowered the number of eggs that could be layed that year. The exercise highlighted quite nicely how "marriages" are disturbed by hunting, and how this lowers the number of young birds produced each year. It also provided a bit of entertainment as the deceased birds' names were read out.

Suggested management options

The concept of extinction was illustrated by the story of the passenger pigeon. This was followed up by suggesting some possible options for managing the pigeons so that they do not become extinct on Makira.

1. "Tambu" areas, where pigeon-hunting is forbidden
2. "Tambu" times, such as the June-December peak breeding time, or maybe alternate years, when pigeon-hunting is forbidden
3. "Compensation" from hunters selling pigeons commercially, as they are a communally-owned resource and commercial hunting is more likely to deplete the pigeon populations than is subsistence hunting.

4. Bag limit of 10 pigeons per hunter per year.
5. Shoot only kuvwau, as the other species are much less common.
6. Continue monitoring once or twice a year, to know what is happening to the pigeon populations.
7. Keep chickens better, so that there is an alternative to pigeon meat. Village chickens are mostly semi-wild, and vulnerable to predation by snakes, goshawks and hungry dogs.

It was emphasised that the only way that any decision made by the community would work, was if the hunters controlled their impulse to shoot beyond the prescribed limits when they are out in the forest with their rifle in their hands.

Feedback

Four months later, it was reported that one hunter had limited the area within which he would hunt. People were still expressing intrigue at the fact that birds could "marry", because they thought all birds were polygamous like chickens. Also, there were requests from villages outside the Conservation Area to hear the story about the "life blong kuvwau".

It was apparent that although no truly scientific data had been presented or used, the natural history stories had been remembered, relayed and acted upon.

Case Study: Motatau Forest

The Motatau Forest in the far north Taitokerau region of New Zealand is owned by the Government's Department of Conservation (DOC), but managed by the traditional landowners, Te Runanga o Ngatihine. The return of ownership or management rights to conservation land means that community-based conservation is starting to appear in a country which is more used to government-controlled conservation.

An issue identified by Ngatihine is the decline of their pigeon, the kuku (*Hemiphaga novaeseelandiae*). While hunting is a threat to kuku in some parts of New Zealand, the Ngatihine kuku are protected by a rahui, which is a traditional law (also used in the Cook Islands and French Polynesia) which is declared over a resource and prohibits harvesting until it is lifted. The trees within Motatau Forest are protected from cutting, so the main problem seemed to be the introduced mammals, especially the Australian brushtail possum (*Trichosurus vulpecula*) and the ship rat (*Rattus rattus*), which are common in the forest.

In one of the first projects of its kind in New Zealand, the research organisation Manaaki Whenua (Landcare Research New Zealand) began a cooperative project with Ngatihine to investigate what the impacts of the mammals are on the kuku.

Research methods

The abundance of possums and rats is being measured using trap-lines and foot-print tracking tunnels respectively. The fruit availability on kuku food-plants is being measured, in case the mammals are having an effect on food supply. Finally, kuku nests are being monitored for their success (or otherwise) in producing young, and this is being assisted by the use of 24-hour night-vision video monitoring which can film predators at nests.

Results from Ngatihine perspective

The numbers gathered to date on the above topics simply confirm what was already suspected, and the data require some translation and interpretation. However by having the scientists working with the community has given Ngatihine much greater credibility and status as managers of the forest than before, and this has opened doors to obtaining funding and assistance for a mammal-poisoning programme that may never have happened otherwise.
The information that has most raised the awareness of the threats to kuku in the community has not been the scientifically collected data, but rather the video-footage of nest predation. The number of nests filmed to date is still too small to be considered suitable for scientific analysis, yet it has yielded revealing natural history insights into what happens to nests during the night. When people see with their own eyes the possum pushing the kuku off the nest then eating her egg, or the rat coming and eating the egg while the kuku is away, they become more determined to see something done about preventing it. At schools where the video has been shown, the interest and questions generated are overwhelming.

So while the scientifically robust data is interesting to the funders, the natural history "drama" of the video is what is interesting for the people of the community.

Lessons

When a need for information is identified for a community-based conservation area, the first question to be answered is, "**Who is the client?**" Given that the community are the managers of the area, the information must be in an easily understood form and this means natural history stories rather than robust science. This is because local or traditional knowledge is essentially natural history, and telling stories is the medium for communicating information, so there is already a conceptual and communicative framework in place that is best served by natural history stories. Therefore the second point is that **simple natural history-style information is important**. And thirdly, **good pictures and good stories change minds** more than do lists of scientific names or statistical analyses.

This is not to say that science is redundant – far from it. There is most certainly a place in community-based conservation for robust scientific data. For example, funding agencies require information that is culturally appropriate to them, and this generally means information that can stand the scrutiny of university-educated scientists and managers. Also, good science can reveal processes or patterns that are not visible to the naked eye. But the point is that when gathering and presenting such information for the community, science must be the servant to good natural history stories.

Science is, after all, simply a TOOL for community-based conservation, and not the master.

Takitumu Conservation Area Project: Community-based or landowner-based?

Anna Tiraa-Passfield and Robert Ben
Takitumu Conservation Area
Cook Islands

Abstract

Takitumu Te-ika-a-Tangiia (the fish Tangiia caught) is the old name for Takitumu-te-vaka-ta'unga now commonly referred to as Takitumu. It is one of the three districts on Rarotonga. Takitumu is comprised of three villages which represent the body of the fish that Tangiia caught. Rangi-Atea now known as Matavera symbolises the head; Ngati-Tangiia now known as Ngatangiia symbolises the stomach; Teimurimotia now known as Titikaveka symbolises the tail. Takitumu is also the name of the vaka (canoe) that brought the great chief Tangiia-Nui and his Ta'unga (priests) to Tumutevarovaro (Rarotonga) many many years ago. The people of Takitumu are descended from those that were on board this vaka.

Introduction

The Takitumu Conservation Area (TCA) is located on the largest island of the Cook Islands - Rarotonga. It is situated in one of the three districts on Rarotonga called Takitumu. The 155ha forested area is situated on the south side of inland Rarotonga. It is the core breeding area of the critically endangered and unique Rarotonga Flycatcher *(Pomarea dimidiata)*, locally called Kakerori. The area also contains other native and unique plants and animals.

The three valleys that make up the TCA were declared a Conservation Area in early 1996 by the three landowning clans (Kainuku, Karika and Manavaroa). This move was facilitated by the Cook Islands Environment Service supported by the South Pacific Biodiversity Conservation Programme (SPBCP).

The clans are represented on the Conservation Area Coordinating Committee (CACC) (the management committee) by their members. The committee comprises of six landowners - two from each of the clans. Almost all major decisions concerning the TCA are made by the landowners representing the CACC.

Nobody lives within the TCA as most people on Rarotonga live on the coastal plains. There is minimal harvesting of the resources within the area. These include *i'i* (chestnuts), *moakirikiri* (flying fox), *rupe* (Pacific fruit dove) and *koura vai* (freshwater prawns).

Land ownership

Before the advent of the land court on Rarotonga in 1901, the chief on behalf of the tribe had the final say on land matters. However, with the advent of the land court, determination of ownership of and succession to land is awarded to all children of a previous owner, thus creating excessive fragmentation of ownership (Crocombe, 1987). Today, land decision issues follow more of an individualist approach rather than tribal.

When the project was established it was intended that the CACC members report back to their families about the activities in the TCA. In one of the valleys there are hundreds of landowners, some landowners are living outside of Takitumu and one landowning clan is from another district.

However, it is apparent that the CACC members are informing the traditional leaders of their clans on matters relating to the TCA, suggesting that perhaps that not all our customary principles are lost in today's society. In an indirect way, the chief is very much involved in the decision making process of the TCA through the CACC. Because of the fragmentation of our land tenure system, it is virtually impossible to inform every landowner about the activities of the TCA.

Often when we give public talks on the TCA it is not uncommon to hear 'I'm a landowner in that area, and I've never heard of what's going on there'. At first this was frustrating to hear. It was obvious that there was a lack of communication within some families. To help counteract this the media is utilised periodically, and a newsletter is now produced quarterly and is given to the CACC for distribution to their family members. The newsletter is also deposited in public places such as the library, USP centre and other various locations, and mailed to interested individuals and organizations.

Under the SPBCP guidelines, one of the main features of a CA is that it must be owned and/or used by the nearby community. In other words it must be community-based. In the case of the TCA, it is our opinion that community-based should be replaced by the words landowners-based.

Advantages of the TCA project

1. Landowners are fully involved in the planning, management, decision-making aspects of the project.

2. Different landowning groups are working together to achieve a common goal - conservation of biodiversity.

3. Traditional leaders are recognised, as was in the past, on matters relating to lands.

4. Potential long-term financial benefits from income-generating activities.

5. Appreciation by the landowners and general public of the resources and conservation values.

One of the landowners recently told me that *"for so long we landowners have been left out in major developments concerning our lands. It is the normal procedure for Government to tell us that they would like to develop our land. Because we are told it is in our best interest we agree. They then go ahead and develop the land without our input. This project has come 40 years too late"*.

This project is a reflection that what has come 40 years too late for those landowners has given the CACC the determination and will to make the TCA succeed. It is their project.

Reference

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Acknowledgments

I would like to thank the Takitumu Conservation Area Coordinating Committee for their support and their determination to make the TCA a success. Thanks also to my father, Tuakana Mata'iapo for telling me the story of Takitumu.

Meitaki maata e kia manuia.

The Fagatele Bay National Marine Sanctuary Experience
Maximizing Resources for Marine Management

Nancy Daschbach
Fagatele Bay National Marine Sanctuary Coordinator
American Samoa

Introduction

Implementing a Vision on a Shoestring OR Bruddah Can You Spare a Dime?

The National Marine Sanctuary Program (NMSP) enjoyed its 25th anniversary this year. This US federal program of the National Oceanic and Atmospheric Administration (NOAA) enjoins 12 Sanctuaries along the continental US, in Hawaii, and in American Samoa. The program's mission is to protect marine natural and cultural resources through a blend of education, science, regulation and enforcement.

In the early 80s, local government officials in American Samoa proposed to the NMSP several coral reefs of exceptional quality. It was their hope that the national program would choose at least one of the sites to be designated as a marine sanctuary. One of the proposed sites was Fagatele Bay. However, the reasons for choosing this particular area were not immediately obvious: the bay's coral reef was in poor condition. In the late 70s, a crown of thorns starfish *(Acanthaster planci)* outbreak devastated reefs on Tutuila, the main American Samoan island. Fagatele Bay, previously renowned among the local divers and fishermen as a reef of exceptional beauty, was virtually destroyed; over 90 percent of the coral were killed. The argument in favor of Fagatele Bay proposed that the protection afforded by the Sanctuary designation would help guarantee the full recovery of the bay's resources. And the federal dollars generated would help the local economy.

In 1986, Fagatele Bay was designated as the seventh National Marine Sanctuary. Regulations were promulgated that effectively protected the marine resources, yet allowed many subsistence activities to continue. In fact, zoning allows commercial fishermen to take advantage of the relatively protected waters of the bay during bad weather; hook and line commercial fishing is permitted in the outer part of the bay. One distinction between this smallest of all the sanctuaries and its sisters: Fagetele Bay National Marine Sanctuary (FBNMS) is administered by the American Samoa Government through a cooperative agreement with NOAA.

The question most of you might be asking is "how can this US-funded program offer itself as a model to countries that struggle to obtain meager resources in order to implement their own environmental programs?" In fact, the promise of the Sanctuary becoming an economic "cash cow" to American Samoa has never been realized. The political realities of the Reagan-Bush administrations and subsequent "anti-green/anti-government spending" Congresses have contributed to the slow growth of the national program, which has left all the sites underfunded, and continues to this day. So FBNMS has had to operate with a relatively tiny budget, the majority of which goes to overhead costs.
Because of our funding constraints, our site has never been able to enforce its regulations in an effective manner. We do very little science. Our office has remained small, with two paid staff and two volunteers. We have no boat, although we have an aging truck which can get us most of the way to the site. Sound familiar? What we do best, and relatively cheaply, is education and public awareness. And we have been very successful in collaborating with other agencies in order to maximize the programs we run.

It was apparent early on that we could get the best return on money spent by focusing our attention and energies on education activities. We believe that an informed public is a concerned public. And so the logic goes: if people know what the Sanctuary is, and understand why we are protecting the resources there, they will respect the regulations. We have little direct evidence that this logic is judicious, however. And we also know, that it only takes a few people using dynamite to fish, or selectively spearfishing the larger species, to do significant damage to the habitat and populations. So I must confess that our assumptions remain untested. (That hasn't stopped us from continuing to develop our programs, but at some point we must begin to evaluate the effectiveness of the programs.)

Environmental Education: Let the Youngsters Lead the Way

We have many education and outreach vehicles, but let me focus on two education programs we sponsor, both for school children, and each at opposite ends of the funding spectrum.

Marine Science Summer Camp

One of the first programs we implemented was the Marine Science Summer Camp (MSSC) for children just entering high school (13-14 years old). In cooperation with the Department of Education, we have funded this program for eight years now, at a cost of about $US15,000 per year. Students are selected through an application process, so we are getting the best students of those who apply. The camp is actually held during our winter, June and July, when the students are on "summer" break. The number of 25 students per session. Focus is on field study with plenty of lecture and laboratory time. This year, the camp offered two three-week sessions, and the scope was broadened to include coastal environments such as mangroves and streams. The "camp" is held five days a week from 8 am until 2 pm and includes swimming lessons in the afternoon, since many of our island's children cannot swim. It is the only high level extra-curricular course of its type in Samoa, and students would have to go to Hawaii or beyond to find anything comparable. Over 80 percent of the cost of the program goes for salaries (two biology teachers and one swim instructor per session), with the remainder buying supplies and bus transportation to field sites.

EnviroDiscoveries Camp

EnviroDiscoveries is an ever-evolving "summer" program designed for 9-11 year old children. The camp is held at various locations around the island during the school break in June and July. Originally a one-week day camp when founded six years ago, it is now a three-day, two-night session where the kids stay in the camp day and night. This program has varied in cost to the Sanctuary, but generally runs to about $US4,000. We average about 200 students per summer. Children spend the days learning about their coastal and marine environment through field trips, discussion, and learning activities that include arts and crafts, singing, drama, etc. The camp is fun. The kids love it, and even parents will come and participate. Our costs this year covered food, venue costs, salary for one teacher and an intern, bus transport, and supplies. There were additional costs, of approximately $US2,000, covered by other participating agencies.

Why the big difference between these two programs?

EnviroDiscoveries is done largely in-house, and MSSC is contracted out. EnviroDiscoveries is a collaborative program with several other agencies, allowing us to get a lot more program for less cost to each participating agency. For example, we must contract for the teachers in the MSSC. However, most of the staff for EnviroDisco are our own people, and volunteers from Americorps. (Americorps is a US program where young, largely untrained, adults work for a year or two as volunteers to cooperating social or environmental agencies. There is no cost to the agencies and the program is funded through a federal grant. In American Samoa, Americorps volunteers are placed in environmental agencies, and the program is run through the Environmental Protection Agency). We did hire a science teacher last year, and an

additional intern, which the Sanctuary paid, and which accounted for over 50 percent of our costs. Additional costs were shared among the other participating agencies and those costs ran between $US2-3,000 for items such as t-shirts, tent and portable potty rentals.

MSSC is a more specialized program requiring experienced marine science teachers. There is just no way to offer an in-depth program like this one without highly qualified teachers (all three biology teachers began with the course in 1989; one travels from California every year to participate). We justify the high cost MSSC because it is a unique program. However, we are committed to look elsewhere for at least some of the funding in 1999, and will target corporate sponsorship, perhaps from the local fish canneries.

Are they worth it?

This is the tough question to answer, especially if you are looking for corners to cut. We have answered "yes" to that, but have little data to back up our decisions. We do some evaluation of the students before and after the courses, but have not really analyzed the data in detail. The short answer is that the kids are having fun, they are learning something, and we may have set them on the path to become wise stewards—and voters— of their environment when they are adults.

Science, Our Poor Relative

As many of you may know, the National Oceanic and Atmospheric Administration, NOAA, the parent agency of the Sanctuary Program, was founded 25-odd years ago by scientists who grew up to be policy makers. So it might come as some surprise that science in our program is the poor relative that always makes the first funding cut. There is one glaring reason for that: science is expensive, the returns are years away, and conclusions are often just not useful to resource managers. Over the years, it has become increasingly obvious that "science" and "management" have different ideas about how to interpret the natural world. Management would like to have all the answers neatly packaged and accessible so they can USE the information. Scientists know that there are no neat answers, and that getting accurate glimpses into the workings of the natural world can take decades. So what do we managers do?

We monitor. Scientists recognize the value of monitoring, but to them it's not science. It's stamp collecting. Which, of course, it is. But we managers work make decisions based on the premise of baseline data and the changes in those data over time. Monitoring of the habitats we manage, collection and analysis of the data, are the only way we can make management decisions based on reality. And we can do that without paying a scientist.

For example, at FBNMS, we monitor water temperature at various depths. The monitoring equipment is relatively inexpensive (less than US$1,000 for a setup and several recording devices) and we can do it ourselves. Data can be downloaded in the field or back at the office and the loggers last for years. There are any number of parameters that can be monitored this way. And if you do it yourself, it's pretty cheap. We also try to take advantage of any programs that the local Marine and Wildlife Department or the Environmental Protection Agency are running. We have been a part of larger projects and it's cost us nothing, or only the cost of analysis.

In the past few years, there have been several low-tech survey techniques for monitoring coral reefs. These techniques offer rapid survey over large areas performed by local technicians. There is disagreement among the scientific community about the overall validity and usefulness of these techniques, but for many low capacity islands, it may be the only option. Care must be taken in interpretation of the data, but used properly these techniques may be very useful for taking a regular scientific snapshot of reef conditions, and be a valuable technique for the manager's toolkit.

Enforcement, Everyone's Bugbear

No matter how you do enforcement, there are costs involved. FBNMS has a mixed bag of enforcement tricks. We have limited community participation in our enforcement, but it is important. Since FB is surrounded by communal lands, the families are very protective of the resources in the bay. They cooperate by not allowing poachers to enter (one of the main entry points has a locked gate across the road) and by chasing fishermen away when they see them illegally fishing. It doesn't cost much, but we do have to invest time, and some equipment (signage, gifts, etc.). We consider this expenses well-spent. We appreciate the assistance our neighbors afford us, but we also recognize that the responsibility of enforcement still lies with us. Over the years, we have cooperated with other law enforcement agencies in an effort to boost our presence at our remote site. These efforts have largely failed for a number of reasons, but primarily because our program is not a priority for them. We now have a contract with the Department of Public Safety's Marine Patrol to visit the site regularly. They get paid only for patrols completed. So far they have had no encounters with visitors at the site (after over 30 patrols), which demonstrates the low volume of visitation we have. Finally, we rely on our outreach programs to educate our users about the regulations. In the end, education may be the best enforcement tool.

Conclusion

Collaboration: Maximize Talents, Minimize Costs

The lesson we have learned in our years of managing the Sanctuary distill down to one word: collaboration. We learned very early on that we could merge our goals—and their objectives—with other environmental agencies' goals and objectives. In American Samoa, there are currently eight agencies that deal with environmental issues, two federal and seven territorial. In addition, agencies that are not traditionally viewed as environmental—such as the power and water utilities—have also shared in projects.

Le Tausagi a vision for the future:

Two years ago, all the environmental education coordinators banded to together to form a cooperative group that they called Le Tausagi (Samoan for the morning call of the birds). Together they have coordinated their outreach programs, shared in all their projects and have agreed on a consolidated environmental message that covers each programs' mandates.

It's working. Le Tausagi now runs our EnviroDiscoveries program; in turn our staff cooperate with other agencies' projects, for example, EPA's Earth Day efforts. The group has done some fertile brainstorming of each project, and they have initiated new ones. As a group, they have taken and offered training to school teachers on environmental education. They have been tasked by the Department of Education to spearhead the development of an environmental curriculum for the schools.

Le Tausagi has an over-full plate. But they have managed to avoid the pitfalls of "turf protection" so common in government agencies. In short, their vision is breaking down institutional barriers to serve the collective goal of fostering environmental stewardship. They are inspired and inspiring. Wish them luck.

In almost every example so far, we could not have accomplished what we did without our government and community partners. In every case where we have collaborated with other agencies, we have gotten a better program. We have had more people—thereby broadening our knowledge base—involved in planning and implementation, we have been able to do more activities with cost-sharing, and we have ultimately been able to achieve a higher effectiveness than we could have if we did it alone.

Collaboration has its down-sides. Each program has to share the limelight, and although that sounds trivial, it is significant to some people who value their mandates' primacy—or occasionally more crassly their own petty empire-building—above all others. With cooperation comes responsibility—and a redistribution of time allotments. If you are not the one in charge, you must make the case to your supervisor (and they in turn to theirs) that collaboration is a two-way street. Collaterally, expenses will be redistributed and although you may be saving costs on your project, you may be asked to contribute to a partner's project later. And of course, the other consideration when people collaborate is personalities. Again, this may sound trivial, but relationships among the players are important, and if people do not get along, it won't work.

Even with all those caveats, I still feel that collaboration is a win-win proposition for all players. None of us will ever be in the enviable situation where we have too much money and not enough projects to spend it on. Collaboration will maximize resources and allow programs to produce the best with the least.

Traditional marine tenure and adaptive management: a look at the role of marine protected areas in community based conservation initiatives.

John Parks
Director, Ecotrack Consulting
Hawaii

Abstract

Community-based conservation applications in natural resource management strategies offer many advantages over that of more traditional "top-down" approaches. In particular, adaptive management strategies have recently begun to be recognised as having a very useful and practical role in marine resource management through monitoring and evaluation activities. This paper examines the dynamics of adaptive management within a community-based marine conservation context, and evaluates the ability of resource managers in Melanesia to utilise customary marine tenure practices within monitoring protocols during the last several years. An emphasis on the role of marine protected areas in community monitoring through such customary marine tenure practices is provided by case study analysis.

Marine Protected Areas: Pacific Island partnerships for conservation

Chris Bleakley and Graeme Kelleher
Great Barrier Reef Marine Park Authority
Australia

Abstract

Pacific island countries have a unique opportunity to develop and apply Marine Protected Areas (MPAs) as a conservation tool. By providing opportunities for sustainable development such as through fisheries and tourism, MPAs can provide the basis for partnerships between local people, interest groups and government. Such partnerships are the key to achieving protection and wise use of marine diversity and resources in the Pacific islands.

Value-adding for wetland protected areas through Ramsar listing

Roger Jaensch, Wetlands International - Oceania
Australia

Introduction to wetlands and Ramsar

The relevance of wetlands

Wetlands include mangroves, lagoons, coral reefs and seagrass beds as well as lakes swamps and rivers and the Pacific islands region is rich in several of these ecosystems. This richness can be measured in terms of area (notably Melanesia), biodiversity (given high levels of species endemism in the region generally) and quality of condition.

The economic and cultural needs of Pacific Islands people continue to be closely linked to the natural environment, including wetlands. Mangroves, for example, contribute food, construction materials and traditional medicines in many countries. Rivers are vital for water supply.

Wetlands therefore are an important component to consider in planning and implementing conservation programs in the Pacific islands region. This is underlined by the increasing threats to wetlands, notably catchment degradation, conversion, pollution and over-harvest of resources as economies change from a subsistence basis.

Many protected areas in the Pacific region include wetlands. In Papua New Guinea, gazetted Wildlife Management Areas (WMAs) such as Lake Kutubu (inland), Tonda (coastal-inland) and Maza (marine) include wetlands. Other examples are the Arnarvon Islands Conservation Area (Solomon Islands) and Uri Marine Park (Vanuatu).

The Ramsar Convention

The Convention on Wetlands, also known as the Ramsar Convention (it was signed in Ramsar, Iran, in 1971), seeks to mobilise international cooperation and to support local initiatives for conservation of wetlands. It currently has 103 member countries and is served by a secretariat in Switzerland (the Ramsar Bureau).

The process for a country to join Ramsar is relatively simple (see Annex 1).

A minimum requirement, however, is that the country nominates at least one wetland to the List of Wetlands of International Importance (= List of “Ramsar sites”), which currently comprises more than 800 wetlands world-wide ranging in size from a few hectares to thousands of square kilometres. There are 13 criteria, only one of which must be met, for “Ramsar-listing” and these include, for example, criteria based on importance for endemic wetland species or for fish stocks (see Annex 2). In the Pacific context, a potential Ramsar site could, for example, be a mangrove or reef site which supports a particularly high number of fish species.

Most Pacific island countries have wetlands that qualify as Ramsar sites, as shown in *A Directory of Wetlands in Oceania* (Scott 1993).

An important feature of the Ramsar Convention is the "Wise Use Concept", which is basically the same as ecologically sustainable development (Guidelines on wise use are available). In other words, human activity within Ramsar sites which is deemed to be wise use is quite acceptable. Consequently, it may not be necessary for any change in human occupation or resource use to occur at a Ramsar site. Furthermore the gazetted status (or lack of it) of the site is not specified by Ramsar.

The Convention's work program is guided by the *Ramsar Strategic Plan 1997-2002*, which has eight General Objectives (see Annex 3). The important point to note here is that, whereas some of the Objectives relate to Ramsar member countries and to Ramsar sites, others are universal, e.g. General Objective 3: "to raise awareness of wetland values and functions throughout the world and at all levels".

Ramsar in the Pacific - present situation and initiatives

The Ramsar Convention was involved in the first regional initiative on wetlands in the Pacific, compilation of *A Directory of Wetlands in Oceania*, through a funding partnership with SPREP and several others.

Papua New Guinea is the first and so far only Pacific island country to have joined the Ramsar Convention (1993). As a member it has attempted to promote the concerns and interests of Pacific island countries generally and is Regional Representative for Oceania, which includes Australia and New Zealand and the whole of the Pacific islands region, for the 1997-1999 triennium.

PNG secured funds from Ramsar to host a regional workshop, co-organised by Wetlands International and SPREP, in Port Moresby in 1994 at which a preliminary *Action Plan for Wetland Conservation in the South Pacific* (Jaensch 1994) was drafted by the national delegates. This led to the *Regional Wetlands Action Plan* (Idechong *et al.* 1995) that is now being promoted by SPREP and its Wetlands and Mangrove Officer.

In 1995, PNG secured funds from Ramsar's Small Grants Fund to assist five Pacific island countries - Palau, Federated States of Micronesia, Kiribati, Solomon Islands and Vanuatu - prepare for accession to the Ramsar Convention. Work on several of these projects has recently been completed and the products (site datasheets) potentially form the materials needed in response to any political decision to join Ramsar.

Most recently, Ramsar demonstrated its continuing interest in embracing the Pacific island countries by holding its 1996 Conference of Parties in Brisbane, Australia, and by the host country arranging sponsorship for 20 delegates from 10 Pacific countries to participate. Special sessions were dedicated to Oceania and Recommendation 6.18 on "Conservation and wise use of wetlands in the Pacific Islands region" was adopted.

In order to provide within-region support in regard to Ramsar and wetland conservation generally, Wetlands International and the Australian Government have since 1995 maintained a partnership that provides a part-time "Ramsar liaison officer" (the author) for the Pacific islands region, based in Australia. The emphasis of his workplan is implementation of appropriate parts of the Ramsar Strategic Plan, as directed by the requests and circumstances of the various countries.

Benefits of Ramsar-listing in the Pacific Island context

The main purpose of this paper is to demonstrate that considerable value can be added to a marine protected area or community-based conservation area (that includes wetlands) through Ramsar-listing. This pre-supposes that the country has joined the Ramsar Convention.

Firstly, a Ramsar site has international recognition and thereby normally a much higher profile than it would enjoy within just the country or region. This situation has the potential for:

- greater priority assigned to the area in planning by national and local governments and greater resources dedicated to it, e.g. improving access to the area;
- increased prospects for assistance for integrated conservation and development initiatives at the area, from international development assistance agencies; and
- higher interest of visitors (international, regional, local) wanting to experience the internationally recognised area, e.g. enhanced support for eco-tourism at the area.

Also, the Ramsar member country has the opportunity to apply for technical assistance from the Convention, notably:

- funds from the Ramsar Small Grants Fund for projects on, e.g. area management planning, capacity building, awareness;
- specialist advice from the Convention or its associates in regard to problems that may threaten the ecological character of the area (known as the Management Guidance Procedure).

Compared to World Heritage sites, which are accepted only after a lengthy vetting process with much stricter criteria, Ramsar sites are simply proposed by the national government. (In the Pacific context, landowners normally would initiate, and in any case must of course support, the proposal).

Finally, given the growing cooperation between the Ramsar Convention and the Convention on Biological Diversity, the World Heritage Convention and the Convention on Migratory Species, having a wetland protected area listed as a Ramsar site would enhance the prospects of recognition and/or specific assistance from these other treaties. There is great potential for the conventions to complement each other in regard to protected areas.

Examples of value-adding through Ramsar-listing

1. The only Ramsar site in the Pacific islands so far is Tonda WMA in PNG. As a consequence of its Ramsar status, a "Tri-Parks Project" has been initiated as a partnership between WWF, national governments and other organisations, involving Tonda and nearby Ramsar sites in Indonesia and Australia. This initiative will promote trans-border cooperation, as well as capacity building and community development for landowners. Tonda WMA was included in a recent project feasibility study on coastal zone management by AusAID, which seems likely to lead to specific projects at Tonda.

2. PNG has also applied to the Ramsar Small Grants Fund in 1997 for funding for capacity building for its conservation agency in regard to wetland projects: the project has been recommended for approval. This initiative will include site visits and data collection for management planning at the Tonda site as well as three potential new Ramsar sites.

3. Largely as a consequence of its Ramsar site status, substantial funding over several years has been obtained by Wetlands International from DANCED to undertake an integrated conservation and development project at Tasik Bera, a lake and swamp forest system in Malaysia which has no gazetted protection status and is that country's first Ramsar site. The project includes components for enhanced education opportunities for the indigenous Semelai landowners and development of appropriate wetland-based livelihoods.

4. The Berbak Game Reserve in Sumatra, Indonesia, is the home of the indigenous Kubu people. It has attracted considerable international attention and practical support including, since Ramsar-listing, an allocation from the Ramsar Small Grants Fund in 1992 towards training and technical assistance for improved management and conservation of the site (Jones 1993).

5. Red River Delta was Vietnam's first Ramsar site and a subsequent Ramsar Small Grants Fund allocation in 1991 led to the development of an integrated management plan for the nature reserve (in which mangroves have been replanted) and the vast surrounding wetland area (Jones 1993).

6. The Global Environment Facility (GEF) gives greater weight to requests for funding if a wetland is Ramsar-listed. A example of this is the five coastal lagoons in Ghana, which had not been gazetted as a protected area under national legislation when an application for funding was made by the national authorities, but the grant was approved when GEF was advised that the lagoons were a Ramsar site (M. Smart, Ramsar Bureau, pers. com.).

7. The Nariva Swamps, in the Caribbean island nation of Trinidad and Tobago, was the first Ramsar site for that country. Due to conflicts between small-scale traditional farmers and larger agro-business interests, the authorities requested help from Ramsar under the Management Guidance Procedure. This resulted in a negotiated solution and also a Ramsar Small Grants Fund project for the area.

Summary of lessons learned

In regard to **new nominations** for Ramsar sites in Pacific island countries, including countries preparing to join the Convention, several lessons have been learnt:

- an adequate process of consultation must be undertaken to explain the benefits and implications of Ramsar listing to governments, community organisations and landowners, because the Ramsar Convention is a relatively new concept in the region and misconceptions regarding land alienation and permissible on-site activities must be allayed;
- it is also wise to ensure there are no false expectations of the scale and type of economic development that Ramsar listing might bring; e.g. donors are unlikely to fund poultry projects at a Ramsar site whereas wetland-based projects, such as production of local-language booklets or videos on wetland benefits or brochures on the flora and fauna of an appropriate eco-tourism venture, are more likely to be supported;
- where an adequate process of consultation has been undertaken, landowners have shown enthusiasm for Ramsar-listing proposals: for example, landowners at Lake Kutubu in PNG see Ramsar listing as a means of exerting international influence to ensure environmental best practice in regard to planned petroleum extraction by a multinational venture in the lake catchment;
- where initiatives for establishment of a protected area have occurred at the wetland in the recent past or are ongoing, it is important to integrate the awareness raising activities to explain how the various initiatives are complementary, or it may be wise to delay progression of one or other initiative to avoid confusion among the landowners;
- in some instances, there may be full support for Ramsar-listing of a wetland by the landowners and also the senior officers of the national conservation agency, but indecision or reluctance at the political level to commit the country to Ramsar membership; in such cases considerable effort must be given to explaining to politicians the benefits of accession, including the complementary roles played by the various international environmental treaties.

Despite some recent effort to explain that mangroves, coral reefs and related coastal ecosystems are embraced under the Ramsar Convention, some misunderstanding remains. Ramsar certainly is not limited to inland wetlands and thus is entirely relevant to the Pacific islands region.

Difficulties have been experienced with the implementation of Ramsar and other conventions in regard to inadequate national administrative capacity (human and financial resources) and lack of supporting policies. These potentially can be resolved through partnerships and external support.

Next steps

Countries that lack adequate understanding of Ramsar are welcome at no cost to contact Wetlands International - Oceania, the Oceania Regional Representative for Ramsar (PNG: The Secretary, Dept of Environment and Conservation) or the Ramsar Bureau itself for technical advice on the benefits, obligations and process of accession to the Convention.

Where a non-member country is well versed on Ramsar and has already identified a potential Ramsar site with full agreement of landowners, any of the above-listed organisations should gladly assist in checking that the site meets at least one criterion for nomination, or in compilation of the Information Sheet that needs to be prepared for the formal Ramsar site nomination. Where compilation requires additional site visits it may be necessary to raise funds for that purpose, for which Wetlands International - Oceania is willing to assist.

Communities or individual landowners wishing to propose their wetland as a potential Ramsar site or simply to find out what Ramsar is all about will need to engage in a series of on-site consultations. For this purpose, and depending on accessibility of the site, funds may need to be raised to enable an officer of the national conservation agency and possibly also an external advisor to undertake those consultations. The Ramsar Bureau recently funded such a mission in PNG.

Once formalities for Ramsar-listing have been completed, it will be wise to determine through consultation a program of follow-up support by local, national and international organisations.

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Annex 1: How a country may join Ramsar

There are two basic components to joining the Convention on Wetlands (Ramsar Convention): the formal notification; and the nomination of at least one Ramsar site (see below). A country must join the Convention in order to establish a recognised Ramsar site and a site nomination must be submitted at the time of joining.

It is recommended that as a first step, adequate explanation of the nature and implications of Ramsar membership and information on how to access technical and financial assistance, be given to relevant agencies, organizations and communities.

Formal notification process. A member State of the United Nations may become a Party to the Convention either by:

- signature without reservation as to ratification;
- signature subject to ratification followed by ratification; or
- accession.

In order to accede to the Convention, signatures and the deposit of instruments of ratification or accession - along with details of the first wetland(s) to be designated for the List (see below) - are to be made with the Director General of the United Nations Educational, Scientific and Cultural Organisation (UNESCO), 7 Place de Fontenoy, 75700 Paris, France.

Wording of the instrument of accession. In order to ensure compliance with established international practice, the instrument of ratification or accession must be signed by the Head of State or Government, or by the Minister of Foreign Affairs. It should indicate clearly:

- the full title of the Convention ("The Convention on Wetlands of International Importance especially as Waterfowl Habitat"); and
- the expression of the State's willingness to be bound by the Convention, to comply with its provisions, and to implement them (see example in Davis 1994).

> Note that the words "especially as Waterfowl Habitat" tend to be dropped in common usage of the name today, which reflects the Convention's broader scope than when it was established in 1971.

Designating the first wetland for the list. In the Pacific Islands context of traditional land/water and resource ownership, it is recommended that the owners:

- are given adequate explanation and are clearly aware of the benefits, obligations (e.g. "wise use"), other implications (especially regarding the persistence of present ownership and control), and process of Ramsar listing;
- independently conclude through an adequate consultation process among all owners, that a Ramsar site nomination be submitted for an area under their ownership;
- have a process in place to appropriately manage the site and/or know how to seek external help for site management if needed;
- have realistic expectations of the benefits, including potential economic development, arising from Ramsar-listing; and
- are fully included in the process of preparing the site nomination document and defining the site boundary.

Where the site is in State ownership, all agencies with an interest in the area should be consulted.

A precise description and map of the boundaries of the wetland or wetlands designated for the List of Wetlands of International Importance should accompany the application to join the Convention. The written description should follow the format of the **Information Sheet** on Ramsar Wetlands which is available from the Ramsar Bureau or supporting organisations.

It is possible to designate all wetlands within the boundaries of a particular specified area (e.g. a protected area or a catchment), in order to simplify description of the Ramsar site boundary.

Additional sites may be nominated by the country at any stage. In this case, the submission may be sent directly to the Ramsar Bureau. It is also possible to extend the boundaries of an existing Ramsar site.

(For further details see pages 111-116 of *The Ramsar Convention Manual* (Davis 1994).

Annex 2: Criteria for Ramsar sites

A Ramsar site may be any type of wetland, or comprise several wetland types, as defined by the Convention. In the Pacific Island context, the most common wetland types are mangroves, coral reefs and lakes but rivers and other freshwater wetland types also are widespread.

A wetland should be considered internationally important, that is, it would qualify as a Ramsar site (Wetland of International Importance), if it meets *at least one* of the following criteria:

1. Criteria for representative or unique wetlands

- it is a particularly good representative example of a natural or near-natural wetland, characteristic of the appropriate biogeographical region;
  Example: an atoll and lagoon representative of an island bioregion.

- it is a particularly good representative example of a natural or near-natural wetland, common to more than one biogeographical region;
  Example: a crater lake representative of all Melanesian high islands.

- it is a particularly good representative example of wetland which plays a substantial hydrological, biological or ecological role in the natural functioning of a major river basin or coastal system, especially where it is located in a trans-border position;
  Example: a mangrove swamp that protects a coastal area from storm damage.

- it is an example of a specific type of wetland, rare or unusual in the appropriate biogeographical region.
  Example: a freshwater lake or marsh in a bio-region of coral atolls.

2. General criteria based on plants and animals

- it supports an appreciable assemblage of rare, vulnerable or endangered species or subspecies of plant or animal, or an appreciable number of individuals of any one or more of these species;
  Example: a lagoon and beach system that supports endangered turtle species..

- it is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna;
  Example: a swamp forest rich in plant species, and the largest in the region.

- it is of special value as the habitat of plants or animals at a critical stage of their biological cycle;
  Example: a mangrove swamp that is vital as a nursery for lagoon fishes.

- it is of special value for one or more endemic plant or animal species or communities.
  Example: a lake that has fishes found only in that lake.

3. Specific criteria based on waterfowl

- it regularly supports 20,000 waterfowl;
  Example: large floodplain swamps, seasonally inundated (mainly PNG).

- it regularly supports substantial numbers of individuals from particular groups of waterfowl, indicative of wetland values, productivity or diversity;
  Example: a tidal/reef flat that supports large numbers of feeding shorebirds.

- where data on populations are available, it regularly supports 1 percent of the individuals in a population of one species or subspecies of waterfowl.
  Example: a reef used by 1 percent of the population of Bristle-thighed Curlew.

4. Specific criteria based on fish

Note: "fish" includes certain shellfish and other aquatic invertebrates such as shrimps, clams and hard corals.

- it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biodiversity;
  Example: a reef supporting a particularly large number of fish species.

- it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.
  Example: a mangrove swamp that is important for crabs that are harvested.

Detailed guidelines for applying the criteria are available from the Ramsar Bureau.

Annex 3: General Objectives of the Ramsar Strategic Plan

The **mission** of the Convention on Wetlands (Ramsar Convention) is the conservation and wise use of wetlands by national action and international cooperation as a means of achieving development throughout the world.

> *In the Pacific Island context, the Convention thus provides an opportunity for local wetland issues to be brought to international attention, for lessons learnt locally to be shared worldwide, and for external assistance to be harnessed. The Convention also clearly recognises the inter-relationship of people and wetlands.*

Within the overall mission the **General Objectives** of the Ramsar Strategic Plan are:

1. To progress towards universal membership of the Convention.
   Example of Pacific relevance: provide awareness and explanation of the Convention.

2. To achieve wise use of wetlands by implementing and further developing the Ramsar Wise Use Guidelines.
   Example of Pacific relevance: recognise and apply traditional management practice.

3. To raise awareness of wetland values and functions throughout the world and at all levels.
   Example of Pacific relevance: encourage partnerships with NGOs.

4. To reinforce the capacity of institutions in each Contracting Party to achieve conservation and wise use of wetlands.
   Example of Pacific relevance: provide opportunities for site manager training.

5. To ensure the conservation of all sites included in the List of Wetlands of International Importance (Ramsar List).
   Example of Pacific relevance: provide technical advice to resolve problems at sites.

6. To designate for the Ramsar List those wetlands which meet the Convention's criteria, especially wetland types still under-represented in the List and transfrontier wetlands.
   Example of Pacific relevance: designate coral reefs, mangroves and seagrass beds.

7. To mobilise international cooperation and financial assistance for wetland conservation and wise use in collaboration with other conventions and agencies, both governmental and non-governmental.
   Example of Pacific relevance: encourage cooperation between conventions.

8. To provide the Convention with the required institutional mechanisms and resources.
   Example of Pacific relevance: more funds for grants and technical support.

Further details of individual actions under each Objective can be found in Ramsar's *Strategic Plan 1997-2002: Objectives and Actions*.

Protected Areas – the Papua New Guinea way

Vagi R. Genorupa and Mick N. Raga
Department of Environment and Conservation
Papua New Guinea

Abstract

The concept of 'collaborative management' of community-based conservation areas and/or protected areas in Papua New Guinea is assumed to be another form of sustainable development. It is accorded with regulatory tools or mechanisms and this is widely accepted in relation to the management of natural resources in the 'so-called' wildlife management areas. The collaborative management is referred to as a partnership by which various stakeholders agree on sharing among themselves, the management functions, rights and responsibilities of natural resources under conservation status. In terms of conservation actions, part of the collaborative management and sustainable management has been to link the conservation of a particular resource with the perceived development needs and requirements of the traditional landowners which is (at least partly) dependant on that resource for their livelihood support.

The stakeholders, primarily includes the agency in charge and various associations of local landowners and resource users, but can involve the provincial governments, non-governmental organisations, district and local level administrations, traditional authorities, research institutions, businesses and others.

This paper addressed conservation professionals - in particular governmental agency staff - interested in pursuing collaborative management option. it offers a broad definition of the approach and provides a number of examples of how it has been specifically tailored to suit different contexts.

General assumptions, consequences, benefits, costs, and potential draw-backs of collaborative management are reviewed. A process by which an agency in charge of an area can pursue the approach was illustrated. The paper ended by posing a number of questions on the future of collaborative management as a viable effective option in protected areas.

Processes for Effecting Community Participation in Conservation Drives: A Case Study of the Crater Mountain Wildlife Management Area

Arlyne Johnson
Crater Mountain Integrated Conservation and Development Project
Research and Conservation Foundation of Papua New Guinea

Introduction

Community-based conservation which engages the participation of rural resource owners in sustainable management of their natural resources is presently seen as one of the most promising methods for protected area establishment although little systematic analysis of the methods and effectiveness of this approach has been conducted (Brandon and Wells 1992, Western and Wright 1994). This paper presents an analytical framework to assess the aspects of community participation which have been used in the effort to establish the Crater Mountain Wildlife Management Area of Papua New Guinea. The results of the Crater Mountain case are compared to other community-based conservation initiatives. Lessons for conservation practitioners about the realistic use and constraints of community participation for establishing protected areas, as experienced in Papua New Guinea, are drawn.

Definitions of participation and community-based conservation

Brown and Wyckoff-Baird (1992) describe the possible participation by communities in protected area management as a continuum which can range from "limited input in decision-making and control, to extensive input into decision-making and ultimately stewardship of the resources." Over the last two decades, the realisation that community participation was a significant variable in determining success of rural development projects (Midgley 1986 and Oakley 1991) has also influenced the field of natural resource management in developing nations. Across the world, prior to 1970, protected areas were managed by national governments who denied access to traditional resource users yet did not have the capacity to effectively manage the natural resources or more importantly, enforce rules to conserve the resource base (Wells and Brandon 1992). Today, most efforts to manage protected areas by developing nations give mention to the importance of community participation in protected area management (Wells and Brandon 1993) but the form and intensity of participation in each case varies significantly (Oakley 1991, Midgley 1986, Wells and Brandon 1992 and Paul 1987).

One widely-used definition which is used to describe "community participation" in rural development projects (Paul 1987) states that it is "an active process by which beneficiary/client groups influence the direction and execution of a development project with a view to enhancing their well being in terms of income, personal growth, self reliance or other values they cherish." Cernea (1985 in Wells and Brandon 1992), describes local participation in protected area management "as empowering people to mobilize their own capacities, be social actors rather than passive subjects, manage the resources, make decisions, and control the activities that affect their lives".

The "instruments" used to promote this participation fall into two categories, agents of change and institution building (Wells and Brandon 1992). Agents of change are those individuals associated with external agencies or within the communities whose presence catalyzes local involvement in the development process (Paul 1987). The strengthening of existing community institutions or the

development of community organisation is seen as a means which will provide for continuity of the process that has been established (Midgley 1986, Murphy 1994)

The world-wide trend from traditional state control to increased involvement of communities in the management of conservation areas which border or are included in their lands has lead to the term, "community-based conservation". Western and Wright (1994) described this is an approach that, "reverses top-down, center-driven conservation by focusing on the people who bear the costs of conservation...community-based conservation includes natural resources or biodiversity protection by, for and with the local community." Little (1994) adds that community-based conservation has **two outcomes.** They are , "the maintenance of habitats, the preservation of species, or the conservation of certain critical resources **and** ... improvements of social and economic welfare." It is the additional development outcome which distinguishes this approach from traditional protected area management. Projects which are designed to **link** biodiversity conservation in protected areas with socioeconomic development in adjacent communities are termed, "integrated conservation and development" (ICDP or ICAD) projects (Brandon and Wells 1992 and Brown and Wyckoff-Baird 1992).

While attractive in theory, the actual mechanics of linking biodiversity conservation with rural development **in addition to** encouraging community participation in the process has proven to be elusive, extremely challenging and yet to be realised in most cases which are characterised as community-based conservation projects (Western and Wright 1994, Wells and Brandon 1992 and Brown and Wyckoff-Baird 1992).

- It is not simply a matter of relying on traditional conservation beliefs of indigenous residents within and near protected areas. Traditional practices alone are often not sufficient to sustain viable populations of flora and fauna under the present day scenario of increased human population and pressure on the natural resource base (Western and Wright 1994 and Brandon and Wells 1992).
- Community participation alone cannot be idealised as a given solution to conservation challenges. Midgley (1986) in a historical review of community participation reminds us that communities are not homogenous and that they, "suffer from conflicts, rivalries, and factionalism. He states that, "a clearer understanding of these problems would allow a more realistic assessment of possibilities and prepare workers more adequately for the problems they will face."
- For many reasons, local participation is known to be time consuming and, in many cases, the threats to conservation of biodiversity are often imminent and urgent (Little 1994, Brandon and Wells 1992). The challenge of providing tangible community benefits which are derived from the conservation of biodiversity often takes time. In the interim, community participation may be limited.

Given these considerations, it cannot be assumed that most communities will sustainably manage resources on their own (Little 1994) nor that natural resources can be managed by the state through, "proclamation alone." (Bromley 1994). The art of crafting the mechanisms which will provide for biodiversity conservation **and** rural development **through** community participation is the challenge facing today's conservation practitioners. Bromley divided the challenge into three parts:

1. to create the means, "mechanisms" for discussing, reviewing and assessing the values of biodiversity conservation
2. to permit those values to be expressed in policies which incorporate incentives for conservation
3. to implement enforcement procedures to provide assurance that conservation actually results

"A community-based conservation program with any hope of success will contain **all three elements**"

The recognition of customary land tenure in Papua New Guinea provides an extremely unique policy environment where some degree of participation by rural communities is obligatory in the establishment and management of a protected area. In a survey of 99 parks in 38 countries around the

world, only 21 percent were categorised with local people having legal title to all or part of the reserve (Zube and Busch 1990). As in all of PNG, traditional landowners retain guaranteed ownership of their land and maintain an unprecedented level of control of the resources on their land. Successful conservation in PNG, more than anywhere, will rely on landowner management.

The Crater Mountain Wildlife Management Area

Biological Significance

The Crater Mountain Wildlife Management Area encompasses approximately 2,700 square kilometers of which 98 percent is covered by primary forest ranging from lowland rain forest of the Purari River (50 meters) on the Great Papuan Plain to montane cloud forest on the slopes of Crater Mountain (3100 meters) (Figures 1a). A diverse collection of flora and fauna indicate that the Crater biota is very species rich and as such constitutes a natural resource of national and global importance (DEC 1993).

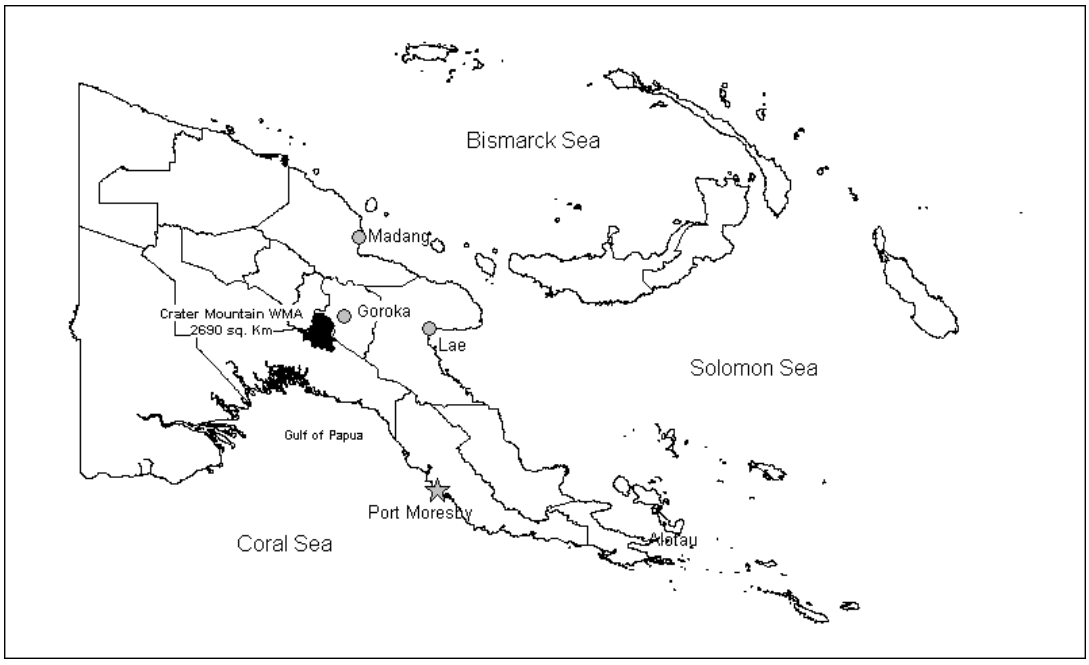

Figure 1a. Crater Mountain Wildlife Management Area in Eastern Highlands, Gulf and Simbu Provinces, Papua New Guinea

National Legislation

Crater Mountain was gazetted as a national Wildlife Management Area on October 14, 1994. The Fauna (Protection and Control) Act of 1976 provides for the establishment of Wildlife Management Areas (WMAs) to be declared by the Department of Environment and Conservation (DEC) upon request by the customary owners of the land. The landowners submit to the national government a 1) legal description of the boundaries of the area to be gazetted as the WMA 2) list of the clan leaders who will sit on the local Wildlife Management Committees and 3) the rules which the Management Committee establishes for use of natural resources in the WMA. The boundaries, committees and laws are reviewed by the DEC, and if not conflicting with any other national laws, are gazetted by the parliament and recognized as the governing body and laws of the conservation area.

Despite the name, Wildlife Management Areas can be more accurately described as multiple-use areas whose objectives are to encourage sustainable use of subsistence resources by customary landholders, protect biodiversity, gain formal recognition of tenure and resource ownership, provide sustainable

opportunities for income generation, protect cultural value, and provide for scientific research and educational opportunities (Hedemark and Sekhran 1995)

Given these objectives, PNG legislation does provide a fertile foundation for attaining the three elements for successful community-based conservation as identified by Bromley (1994). Communities can actually establish a protected area if they feel that the biodiversity they own has some value to them if conserved. Through the management committees, communities can create the policies which provide incentives to practice sustainable resource use and they can prosecute individuals who violate the rules. Yet, given the heterogeneous nature of communities and the traditional lack of collaboration among clans over a large geographic area in Papua New Guinea, how feasible is it that communities, without further technical assistance, will be able to progress beyond establishment of small isolated protected tracts? Will WMAs remain as "paper parks", where gazettal takes place but no mechanisms are put in place to realise the conservation goal? Despite the existence of favorable legislation, it has been found throughout the world that most communities can likely not be left alone with the expectation that they will be able to "defend and conserve their resources in a sustainable fashion"(Little 1994).

Community Profile

Crater Mountain Wildlife Management Area covers two language groups, Gimi and Pawaian. The boundaries of the WMA overlap three political districts including Chimbu, Gulf and Eastern Highlands Provinces. Approximately 3,000 Gimi occupy the northern half of the Wildlife Management Area and are concentrated in an arc that runs through the villages of Herowana, Ubaigubi and Maimafu. The only road access is to Ubaigubi on the northern boundary of the WMA with access to the remainder of the communities by grass airstrips. The southern half of the WMA is inhabited by approximately 600 Pawaiians who have settled around and airstrip to create the village of Haia.

The Gimi villages of Crater are traditional Highland 'Bigman' societies. Each clan has one or more 'Bigmen' (chiefs) who maintain their position through their skill as politicians or fight leaders. The Gimi are subsistence farmers who follow shifting agriculture or swidden farming patterns. The Pawaiians are semi-nomadic people whose primary subsistence is obtained through hunting and gathering with limited short term cropping. Pawaian society is built around the immediate family. They are true forest dwelling people, travelling around their land in small bands which usually number less than 20. Crater landowners are responsible for their own land which may be days away from the airstrip where they are settled. Use of the forest is restricted to the principal landowner and his immediate family. Others require permission before they are allowed to cut, hunt or trespass. As with any village violations, cases are reviewed by a Village Court composed of community representatives who hear public testimony on the case, pass judgement and verify the fine.

Approximately 80 percent of the men and 50 percent of the women in the WMA speak tok pisin (pidgin English). Only 30 percent of the WMA residents are literate in tok pisin and less than 1 percent speak English (DEC 1996). Government-sponsored community schools have been present in Maimafu, Herowana and Haia for only the last two to six years and may range from grades one to as high as grade six if teachers and funding are available. There is a rudimentary health post in each village and at least one trade store which sells basic supplies such as salt, rice, candles and canned fish. Outside of the research, ecotourism and handicrafts enterprises, cash income is earned through sale of coffee or market hunting.

Threats to the Biodiversity of the Crater Mountain Wildlife Management Area

Land use impacts on biodiversity include sago and sweet potato garden plots and cutting for fuel wood or local timber use. Subsistence and market hunting has already extirpated some game species in some

regions of the WMA. Cuscus and tree kangaroo populations are seriously depleted. Cassowary populations are still strong, but the high rate of removal of cassowary chicks suggests a significant population crash might occur in a few years with the death of the existing adult populations (Mack pers. comm. 1995) An increasing human population in the region will continue to increase its impact throughout the area. The delivery of community services (education and health) to rural areas in Papua New Guinea is hampered by their remoteness and the corresponding lack of infrastructure required for socioeconomic development. One of the few options seen for satisfying community cash needs and infrastructure development in these areas is thought to be the selling of natural resources, minerals or forests, to satisfy cash needs. Alternative forms of cash-generating activities will be needed to meet cash needs.

Papua New Guinea national government policies and rules regarding resource extraction in national protected areas could have significant impact on biodiversity in the area. Despite gazettal as a national Wildlife Management Area, the southern lowlands of the Wildlife Management Area on the north side of the Purari River boundary are included in the National Forest Authority designation of Turama Extension Timber Permit TP2-12A, Forest Management Area (FMA) Block 3. Logging in this timber permit area is scheduled to begin within the near future (National Forest Authority 1996). The Department of Mines and Petroleum controls and grants exploration licenses through out the country. In the Northwest quarter of the WMA, exploration lease 1115, is currently held by MacMin Mining who is presently conducting exploration for potentially significant gold deposits in the area (Post Courier 1996).

Crater Mountain Integrated Conservation and Development Project

The Crater Mountain Integrated Conservation and Development (ICAD) initiative informally began in 1982 with the first attempts to establish a national protected area while addressing the socioeconomic aspirations of the local landowners through the development of environmentally-sensitive enterprises. Since its initiation, the primary goal of the project has been the long-term conservation of biodiversity in the Crater Mountain area and has been the process of attempting to integrate conservation and development components to achieve the product of a functional national Wildlife Management Area as described under the national legislation. The Wildlife Conservation Society (WCS), an international non-governmental conservation organisation within the New York Zoological Society was the first conservation agency to sponsor researchers and field workers in the project area as early as 1975. WCS was also instrumental in the establishment of the national non-governmental organization, The Research and Conservation Foundation of Papua New Guinea (RCF) in 1986, who today serves as the lead agency in the Crater Mountain project. Over the years, numerous national and international governmental and non-governmental agencies have provided financial and technical assistance to RCF and WCS in the implementation of the project.

The effort to establish a national Wildlife Management Area had very informal beginnings which developed from contact between expatriate scientists and the landowners in the area. It is important to note that for over a decade, it was through these personal relationships that steps for gazettal of the WMA and establishment of fledgling eco-enterprises of research and eco-tourism developed. It was not until 1993, with the achievement of formal gazettal of the Gimi and Pawaiian lands as a national Wildlife Management Area that the ongoing activities took on the official title of a “project” and the following documented objectives (RCF and WCS 1995):

- To increase the average annual per capita income of clans (land-owning groups) from the establishment of locally-owned research and ecotourism enterprises in the WMA
- To increase the level and range of understanding and skills of community residents who work in the research and ecotourism enterprises in the WMA

- To increase the number of decisions and actions which integrate the results of enterprise, biological and socio-economic monitoring programs in a WMA management plan
- To increase national involvement and human resource exchange within the WMA as teachers, trainers and consultants working towards conserving natural resources in the WMA

The first two objectives had been informally in place since the first discussions with the Gimi tribe in the 1970s. The last two objectives evolved in the 1990s with of the realisation that the establishment of environmentally-sound and sustainable businesses was not possible without a process for assessment and for increased national involvement at all levels. Today, the emphasis of conservation efforts in the Crater Mountain area is on building the capacity of local communities and their organisations to assume the principle role of managing the operations in the Wildlife Management Area. As such, the project is an ambitious effort to engage an extremely high level of community participation in management of the conservation and development components of the Wildlife Management Area.

Agents of Change and Community Institutions In the Crater Mountain WMA

Field researchers

Expatriate scientists were among some of the first outsiders to spend extended periods of time with WMA communities. Their concern for the unique biodiversity and cultures of the area was the impetus for their ongoing informal dialogue with Crater communities about mechanisms of establishing and operating the Wildlife Management Area and the associated eco-enterprises. Length of stay and impact of field researchers has varied over the last two decades; some have stayed only months while others developed long-term friendships with members of Crater communities, some returning for intermittent periods of up to twenty years. Characteristics that have been common to most field researchers has been a respect for the cultures of the WMA and an obvious admiration and enthusiasm for the WMA's unique natural resources. Most have been diligent workers who have enthusiastically lived and labored in their field work alongside residents of the WMA who were their assistants, guides and companions.

A significant example of these relationships is Australian photographer, David Gillison who has worked with the Gimi tribes since 1973. In the early years of his work, he returned for consecutive seasons to his field site near Ubaigubi village where his original interest in the recording of ritual theater of the Gimi lead him to the forest with Gimi men to document the displays of the birds of paradise from which the they said that the cultural theater had evolved (Gillison 1983). These interactions solidified a strong mutual respect and commitment between David and community members which gave rise to the first informal discussions with Gimi villages about the status of these unique birds and the mutual concern for their decline as well as associated Gimi traditions.

A similar relationship between community and scientist evolved in the south half of the WMA where biologists Andy Mack and Deb Wright came to work on Pawaiian land near Haia in 1987. In the process of building a research station and conducting five years of field work, they would inevitably engage in ongoing dialogue with Pawaiian community members about the uniqueness of Crater's natural resources and the options of land use which the Pawaiians were considering. Along with Gillison, Mack and Wright came numerous field assistants over the years who later came back to do further studies of their own. In this way, a unique "family" of scientists has evolved to live and work with the Gimi and Pawaiian on various studies of natural resources in their forests.

Field workers

Beginning in 1984, the project began to place resident and intermittent field workers as trainers in the WMA. They were both expatriate and national, from a variety of disciplines including biologists, teachers, small business and rural community development backgrounds. The focus of their work has been on providing technical assistance to village counterparts in business, community development

and WMA management. Initially, expatriates played a central role in field implementation. As of 1995, all are in volunteer and advisory positions only, with national staff or community counterparts directly responsible for field implementation. As with the scientists, most resident field workers who have stayed for periods of two years or more have formed close friendships with Crater communities.

Business trainers in the position of tourism lodge managers were first present in Ubaigubi from1983-1986. In 1990, the project began to utilise United States Peace Corps (USPC) Rural Community Development volunteers as field trainers. The USPC program requires that the village provide bush material housing for the volunteer in return for the technical assistance which they receive. The volunteer is initiated with the development philosophy that his/her role is to train and support village counterparts and not to lead and do work for the community that it does not want to do for itself. Since 1990, seven USPC couples have served in WMA communities and volunteers are still working with the project in three of the five WMA villages.

In 1993, the WCS placed the first resident field coordinators and scientists on the project staff in the WMA. While the USPC volunteers continued to work with small business and community service committees, the field coordinators where assigned to strengthen and assist the clan leaders who sat on the newly-formed WMA management committees. The coordinators also live in village housing and spend much time in community meetings as well as on the trails of the WMA. As the first field coordinator, Jamie James became known and admired by the communities for his capacity to briskly patrol the rugged country between all five WMA villages. James was followed by two national biologists, John Ericho and Robert Bino who have been equally well received and respected as mentors to Crater communities.

Community Committees / Institutions and Village Coordinators

Community committees are composed of clan representatives whose selection and responsibilities vary depending on the function of the committee. The institution which governs the operation of the WMA is the Management Committee in each community. It is responsible for composing the laws of the WMA, enforcing the rules and assessing land use practices. The institution which governs operation of the Handicrafts Businesses in Herowana and Ubaigubi is called the Handicrafts Business Committee. The institution which governs operation of the Research and/or Ecotourism Business in each community is also the Management Committee, the same institution who oversees general WMA operations. In some cases, community workers, called Village Coordinators or Station Managers, have been selected from or by the committees to carry out specified duties of the committee. These individuals are often community leaders who have originally volunteered for a leadership role or have previously worked field researchers at the site.

Methods for Assessing Processes and Outcomes of Community Participation in the Crater Mountain Wildlife Management Area

The intent of this paper is to briefly describe the processes that have been used for engaging community participation and the resulting extent of participation which has been achieved in the Crater Mountain ICAD project from its informal inception in 1982 until the present. To assist in this assessment, an analytical framework was developed (Table 1). It is modelled after Shripton (1989 in Oakley 1991) who used the method to assess the community participation aspects of health care and nutrition projects. The framework identifies seven indicators (Table 2) which represent aspects of community participation which must be present to some degree in order to establish a functional protected area which is actually managed by the landowner communities. With the exception of training, which is an indicator of external input, it is felt that all indicators of community participation must approach level five if operation of the WMA is to be sustained over the long-term without continued external inputs.

The framework is used to specifically assess and rank the presence and extent of community participation over time in two aspects of the operation of the Wildlife Management Area over the history of the Crater Mountain project. These two aspects are community involvement in

- WMA Development: management of the Wildlife Management Area (the processes of establishing the WMA and its operating policies and procedures as related to natural resource use) and
- Eco-enterprise Development: management of the eco-enterprises, including handicrafts, research and ecotourism, in the Wildlife Management Area (the processes for starting and maintaining economic enterprises)

These two areas were selected for analysis as they represent the change over time of community participation in the "C" (conservation) and the "D" (development) components of the ICAD formula for establishing a functional Wildlife Management Area. A discrete analysis for WMA and eco-enterprise operations was conducted for each of the four principle communities in the WMA which includes Ubaigubi, Herowana, Maimafu and Haia. Each has a unique community profile and history of involvement in the development and management of the WMA. Due to the informal beginnings of the Crater Mountain project, indicators of participation were not predetermined and have not been formally monitored over the entire length of the project as recommended (Oakley 1991). Descriptions and assessments of participation processes have been derived from the historical trail of written records, reports, minutes and personal communication from community members and project staff.

Table 1. An analytical framework for judging community participation aspects of Integrated Conservation and Development projects

CC=A community committee or an institution identified to manage an activity in the community (e.g., protected area management, business

CW/s=community worker/s; one or more community leaders who take action on a project activity independent of or in collaboration with a community committee or

Ranking: Indicator:	**1. nothing/narrow**	**2. Restricted/small**	**3. Mean/fair**	**4. Open/good**	**5. Wide/excellent**
Needs assessment/ action choice	None	Done by outsiders with no community involvement	Assessment by outsiders and discussed with community representatives	Community does assessment and outsider helps in analysis and action choice	Community does assessment/analyses/ action choice
Training	Limited technical and management training for CC or CW/s	Technical and management training at remote institutions with little on-site training	Intermittent on-site technical and management training by visiting trainers	On-going on-site technical and management training by resident trainers	Short local trainings plus regular on-site training by resident trainers
Organisation/ Institutions	No organisation structure present on site to support activity	New organisational structure introduced but limited community organisation links	New organisational structure introduced, but became very active	Active co-operation with existing community organisation	Existing community organisations involved in controlling activities
Leadership (taking initiative)	One-sided organisational support dominated by project staff	CW working independent of social interest groups or community support structure	Organisational support functioning under the leadership of independent CW/s	A CC active and taking initiative together with CW/s	CC fully represents variety of interests in community and controls CW/s
Management (assigning and coordinating)	CW/s supervised by outsider or project staff	Committee present. Community worker, if present, is independent of CC. All dependent on project staff	CC self-managed but does not supervise CW/s	CC self-managed and involved in supervision of CW/s	CW/s responsible to and actively supervised by CC
Resource Mobilisation (funds or in-kind)	No resource contribution by community. Any CW/s externally funded	Fees collected, fund-raising or in-kind contribution. CCs have no control over money collected. CW/s externally paid.	Fees collected,fund-raising conducted, or in-kind contribution. CCs have control of expenditure. CW/s externally paid.	Fees collected,fund-raising conducted, or in-kind contribution CC have control of expenditure. CW/s voluntary or partially paid by CC.	CC raises funds, or collects fees and controls allocation of money pays CW/s
Monitoring/ evaluation	No formal information system in place for evaluation of conservation and/or development processes	Information collected by or sent to outsiders who are aware of conservation and/or development processes but not fed back to a CC	Information collected by CW/s who are monitoring conservation and /or development processes	CC receives information necessary for decision-making from CW/s. CC aware of conservation and/or development progress, problems and benefits	CC disseminates information so that community is aware of problems, programme progress/benefits

1. Needs assessment / action choice
Indicates the extent of community involvement in determining the need for and the choice of an action in some aspect of the operation of the Wildlife Management Area

2. Training /Agents of Change
Indicates the extent of technical and management training which the community is receiving to build capacity to perform the operation of some aspect of the Wildlife Management Area. Agents of change may include any external field workers from an agency associated with the project area or community members from within the Wildlife Management Area which have been used to influence the level of the community participation in the Crater Mountain WMA.
The conceptual framework ranks resident trainers as the most desirable (level 5). While this is seen as desirable as a "means" to community participation, it should not be viewed as the "end". As the community reaches high levels of participation in the other indicator areas (action choice, organisation, leadership, etc.), it is expected that community participation will provide for sustainable operation of the WMA with the need for training reciprocally declining.

3. Organizational structure / Institution presence
Indicates the extent of development of community organization and institutions involved in some aspect the operation of the Wildlife Management Area. Also reflects how well the organisation incorporates and represents the existing power structure of the community.

4. Leadership
Indicates the extent of community leadership (ranging from none to a few individuals to full community representation) which is active in the operation of some aspect of the Wildlife Management Area

5. Management
Indicates the extent of management actions (assigning duties or coordinating the work of others) being conducted by community leaders and / or institutions in the operation of some aspect of the Wildlife Management Area

6. Resource Mobilization
Indicates the extent of funds or in-kind services which are being contributed by the community, its leaders and / or institutions to the operation of some aspect of the Wildlife Management Area

7. Monitoring / Evaluation
Indicates the extent of community involvement in the collection, utilization and dissemination of information to evaluate the operation of some aspect of the Wildlife Management Area

Table 2. Indicators of Community Participation

Results: The Crater Mountain Story

Community Participation in Development of the WMA

In this section, the processes for engaging community participation in the development of the Wildlife Management Area are described. The extent of community participation achieved in each WMA community by utilising these processes was ranked according to the framework (Table 1) and shown in Figures 3a-d. Results are shown separately for each WMA village. Years of assessment for each community begin from the time of arrival of the first field workers/researchers which is depicted in the lightest color gray with recent years in black.

Training / agents of change in WMA development

From 1982-1992, intermittent field workers and researchers met with communities to introduce the WMA concept and assist in establishment of WMA committees. David Gillison worked closely with

the Gimi communities in the north while researchers Andy Mack and Deb Wright dialogued with the Pawaiians to the south. The first resident field worker, Jamie James, arrived in 1992 to conduct on-going on-site technical and management training in WMA development. In 1995 and 1996, the first national resident field workers, John Ericho and Robert Bino, were placed in the WMA communities of Maimafu, Herowana and Haia. Intermittent assistance from field researchers is still ongoing.

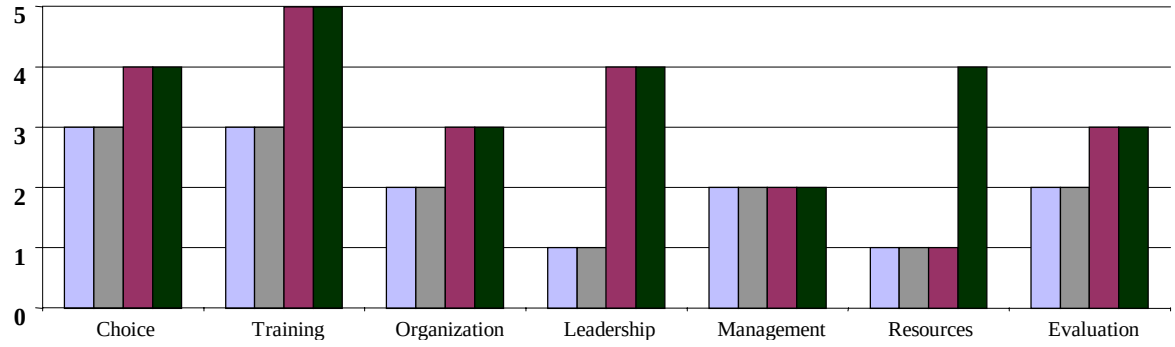

Figure 3a. Maimafu participation in WMA development from 1993 (gray) to 1996 (black)

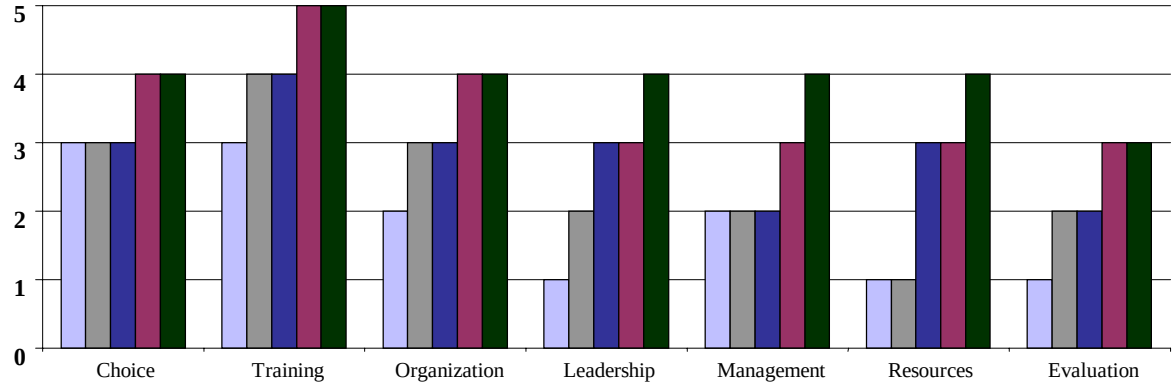

Figure 3b. Herowana participation in WMA development from 1992 (gray) to 1996 (black)

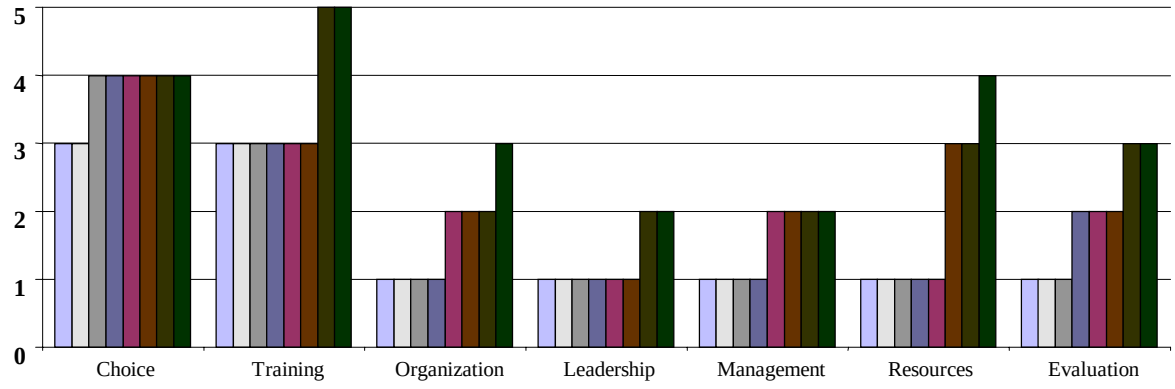

Figure 3c. Haia participation in WMA development from 1990 (gray) to 1996 (black)

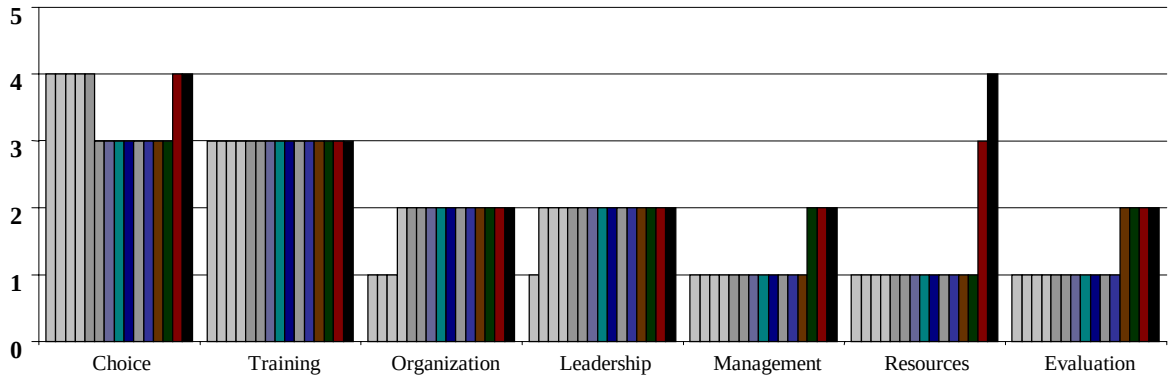

Figure 3d. Ubaigubi participation in WMA development from 1982 (gray) to 1996 (black)

Needs assessment / action choice

From 1982-1992, the process leading up to gazettal of the lands of Crater Mountain as a national Wildlife Management Area consisted of numerous meetings and conversations between the researchers and the landowners. For the most part, the need to protect the unique biodiversity of the area was an external-driven assessment which was discussed with communities. The possible exception to this was in Ubaigubi village where clan leaders volunteered the assessment that culturally important birds of paradise were declining due to overhunting by the young men. The leaders voiced this concern to Gillison who became instrumental in initiating talks with DEC and other international donors which led to the introduction of the Wildlife Management Area concept to the clan leaders.

To engage communities in the planning process for the WMA, Gillison made numerous patrols to hold informal meetings in the men's houses and with individual families as well as formal meetings with Big Men from several Gimi clans. During these forums, the idea of creating a WMA was introduced and discussed. The neighboring Pawaiians heard of the meetings between Gillison and the Gimi, and discussed their interest in possible involvement in the WMA in conversations with researchers Mack and Wright. Based on the Pawaiian interest, representatives of RCF and DEC made a brief helicopter visit to Haia to request names of clan leaders interested in serving on a WMA committee. When gazettal of the WMA was achieved, a resident field worker, James, was placed in the WMA to hold regular meetings with the newly-formed management committees to develop the laws and enforcement procedures.

The result of this process has been that community participation in the choice to establish the Crater Mountain Wildlife Management Area has ranged from Fair (3) to Good (4) (Figures 3a-d). What began as an external assessment of the need to establish the WMA later evolved to a community action choice to proceed although the reasons for electing the action of establishing the WMA where very different for the communities than for RCF and WCS. The reaction of most communities to the discussions of establishment of the WMA was that they hoped it would quickly bring development in the form of cash income, employment and improved human services (health, education and transportation infrastructure) which the government had yet failed to deliver to these remote areas. Gimi landowners, worried about encroaching neighboring clans, also saw WMA gazettal as a means to gain formal recognition of their land ownership. The Pawaiians occurring at a much lower population density and isolated from the rest of the country, came to field workers and researchers seeking advise about how to deal with the rumors of "development" of all forms.

During the numerous meetings between field workers and the clan leaders in all parts of the WMA, the rhetoric from RCF and WCS was that they wanted to achieve conservation of natural resources but

recognized the development needs and desires of the communities. For that reason, they proposed the adoption of the WMA multiple-use strategy in which they hoped to be able assist the communities to implement development activities that were also compatible with conservation of biodiversity. In general, there was and continues to be confusion and misunderstanding on the part of the communities about how and what the WMA will actually deliver in the form of cash income, employment and community development.

Organizational structure / institution presence

The process of establishing WMA Management Committees began after clans indicated an interest in including their lands in the proposed WMA. Based on national legislation, a representative of each land-owning clan must sit on the Management Committee. In community meetings with field workers, clans were asked to nominate a representative of their respective group. No formal social mapping was conducted by RCF or WCS. Identification of clans was volunteered during the meetings and through the acquaintance of field researchers with clans based on their years of affiliation with the WMA communities. The first Management Committee representing seven Gimi clans was organized with the assistance of Gillison in 1986. Committees had been volunteered from a total of 21 clans in all four WMA communities in order for official gazettal to take place although there was still considerable confusion on the part of the landowners about what a WMA was and what the role and responsibilities of the committee members were. It was recognized by RCF and WCS that a resident field worker was needed to assist the committees in their development. James worked with all the committees in the WMA by constantly patrolling between the communities over the next two years. The rugged terrain and lack of radio communication between sites meant that James could only organise meetings with committee members at each site once every three months. A significant portion of his work was done by informally talking with people while walking and living with them on patrol. With the lag time between meetings, James found that committees did not function well, often at a stalemate on any action or decision before his return visit. Based on this assessment, RCF and WCS placed three resident field staff in the WMA, one in each of the major villages. John Ericho and Robert Bino, have brought considerable cultural insight into methods for developing the capacity of interclan committees and worked with Chris Filardi, an expatriate conservation biologist who provided on-site technical support in protected area planning and management.

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At present, the 21 clans are represented by 64 members in four communities. For the Gimi, this representative is a Big Man of the clan. Within clans, there are sub-groups, who have had to consulted by the clan leader before land decisions can be made. Originally, these individuals also sat on the committee until committees attained an unruly size for decision making. As an alternative, each Big Man selects a younger man from his clan to also be present. The younger man will likely speak tok pisin as well as tok ples and may have a wider range of experience in activities outside of the traditional life of the WMA. The Pawaiians do not have traditional clan leaders but elect two representatives of each land-owning clan as voting members of the Management Committee. Since the Pawaiians are semi-nomadic, it is often the case that representatives will both not be in attendance at the same time.

The result of this process has been that community participation in Management Committees in Crater Mountain has moved from minimal to restricted (2) or even good (4) in some villages (Figures 3a-d). Only the Herowana committee could be categorized as becoming active when it hosted the first Annual WMA Meeting in 1993 and began to meet regularly with James. With continued technical assistance, the Herowana committee has assumed a more powerful role in the community and can now be considered approaching level 4. It has incorporated two female leaders of community women's' groups onto the Management Committee and are considering inclusion of a representatives from community government, school and health center to strengthen their connections to other community institutions.

Other communities remain at levels 2 and 3 in organisation development, and continue to be quite dependent on field staff for assistance. All committees are holding intermittent meetings and are involved in designing WMA rules and enforcement procedures and are involved in discussions over procedures for dealing with land use issues such as WMA entry fees and mining exploration leases. Some have taken action to enforce WMA laws over illegal wildlife harvest, access for research activity and unauthorised mineral exploration.

Leadership

The process of fostering leadership in the development of the WMA was done by field staff working with individuals who initially came forward with an expressed interest in WMA establishment. From 1982-1992, these were community members who had either worked for Gillison at his research site or became friends with him during his patrols to other Gimi villages. In Haia, they were individuals who had assumed leadership roles in field work with Wright and Mack. Later, one or two from each village were jointly selected by field staff and community to officially serve as Village Coordinators to work with James on committee organisation and development after WMA gazettal. Initially, the Village Coordinator received a stipend from RCF for this work but often they had difficulty gaining cooperation from the community support structure under this arrangement. Although the individual was elected by and representing the committee, considerable jealousy over the power and financial remuneration served as a constraint to full community support. Stipends for Coordinators were discontinued and some individuals ceased involvement. For those remained, traditional clan loyalty hampers their capacity to effectively represent and work with the many clans present in each community. Even for individuals who have sincerely attempted to work with all clans, considerable suspicion by others in the community remains an obstacle. In Pawaiian culture, the additional customary absence of leadership and formal organisation puts considerable stress on individuals who stand out from the rest of the community.

The result is that community participation in leadership in WMA development relied on the intermittent external field worker in early years of the project (level 1) (Figures 3a-d). Two communities, Herowana and Maimafu, seem to be approaching a level 4 by having a Management Committee and a designated Village Coordinator who are beginning to work together in WMA operations. Due to cultural and historical differences, Haia and Ubaigubi still lack this unified leadership and primarily individuals play a prominent role (level 2).

Management

The process of building the management capacity of the Management Committees had its beginnings in 1986 when Gillison worked with the first Committee of Gimi clans to define their seven operating rules of the proposed WMA. Discussion and implementation of the rules did not proceed further until the placement of James and the covening of the first WMA annual meeting of all 21 clans in Herowana. In the quarterly committee meetings that followed in each community, James would assist members with discussion about what actions needed to be taken by the Committee on WMA laws or enforcement and with assigning the Coordinator to take action on behalf of the Committee. These procedures are revisited at each all-clan annual meeting whose venue rotates among WMA villages. With the placement of Ericho, Bino and Filardi, most committees now meet on a monthly business. With assistance, minutes are kept and the procedures of committees are practiced and slowly understood by the members. Preliminary designation of land use zones for protection of biodiversity through restricted use and for subsistence activities have been described by landowners (James 1995) but remain to be mapped and discussed, with the assistance of field staff, in regards to biodiversity conservation implications.

The result is that community participation in management is yet minimal at most sites (Figures 3a-d). With the exception of Herowana, all Management Committees are still reliant on resident field

workers to advise them (level 2) when they conduct meetings. The Herowana Management Committee, who has benefited from more experience and training, is now capable of holding independent meetings and direct the actions of the Coordinator at times (level 4). Previously the Coordinator was working independently of the Committee as the members were not clear of their roles nor the means to direct action. The Herowana Management Committee has collected fines on violations related to 5 of the 17 WMA laws (Table 3) since October 1995. In Haia, they have collected fines on one violation and taken action on two others. WMA laws remain in the early stages of development. The existing await review by the Department of Environment and Conservation and some require modification where they violate existing national policies.

Resource Mobilization

The process of encouraging resource mobilization by the community for development of the WMA has been especially challenging. Costs of WMA operation have evolved to presently include stipends for individuals who sit on the Management Committee and for the Coordinator, travel for members to conduct Committee business, and hosting of WMA annual meetings. Village Coordinators in most WMA communities were originally externally funded by RCF and WCS were paid a wage for work with researchers which indirectly compensated for their involvement in development of the WMA.

To reduce this dependence on outside support, efforts where made by RCF and WCS to assist communities to generate funds internally. Since 1994, field staff have worked with Management Committees to develop mechanisms to collect fees to finance WMA operations. Funds are now collected through a 10 percent surcharge on all expenditures made by clients of WMA eco-enterprises (researchers and tourists who pay for accommodation, guides, carriers and research assistants) , WMA entry fees for researchers and tourists, and fines collected for violation of WMA laws by WMA residents or visitors. In addition, in-kind community contributions of land, labor or bush materials are requested before any external input is considered by RCF for WMA infrastructure development.

As a result of these mechanisms, Management Committees now have the potential to be somewhat self-supporting. The focus of training is now on guiding the Committees in principles of financial planning and reinvestment so that all funds are not dispersed simply in stipends but are utilised for Committee operation, maintenance of infrastructure and socioeconomic development in the community. This is being done by field staff in the regular meetings with Committees as they discuss the implications and possibilities of each action and expenditure with the Committee members.

The result of this process has been that community participation in resource mobilisation in the form of funds or in-kind services which are being contributed by the community to the operation of the Wildlife Management Area has increased in all communities (Figures 3a-d). This began in 1994 when the Committees began to control expenditures but Village Coordinators were still paid by external agencies (level 3). In 1996, the Coordinators can be partially paid by the Management Committee or work voluntarily but are not subsidized through external funds (level 4). None are currently paid by their Committee although some coordinators are also involved in management of WMA eco-enterprises from which they continue to receive some wage through the business which offsets their current voluntary work with the Management Committee.

The following 17 laws were passed by Management (Landowner) Committees from the villages of Haia, Herowana, Maimafu and Ubaigubi in the Crater Mt Wildlife Management Area at a meeting held in Maimafu on 4 - 6 October 1995. The following laws apply to the entire area enclosed in the boundaries of the Crater Mt Wildlife Management Area (CMWMA) unless otherwise stated.

1. No hunting of Birds of Paradise. Few Birds of Paradise can be killed for special occasions only. Before birds are hunted permission must be granted by the appropriate Landowner Committee (MC). *Fine for infringement: K40 or 2 months imprisonment.*
2. The following species are unconditionally protected from all hunting and killing: (i) New Guinea Harpy Eagle, (ii) *Fine for infringement: K40 or 2 months imprisonment. Fine is paid as follows:K10 to whoever reports the infringement and K30 to MC.*
3. No-one may enter an area set aside for conservation for the purposes of hunting, food collecting, cutting, or gardening. No-one may remove plants or animals from these areas (except for the purposes of research and with the permission of the appropriate MC). *No fine.*
4. No-one may enter another person's land for the purposes of hunting, food collecting, cutting, or gardening. People who pass through the land of others cannot leave trails. *Fine for infringement: K50 or 2 months imprisonment. Fine is paid as follows: K10 to informer; K10 to MC; K30 to landowner. Infringements are reported to the MC in the area it occurs. This MC writes to that of the infringer. It is the responsibility of the MC of the infringer to pursue the matter in court.*
5. All approaches to researchers and tourists concerning pay, conditions, fees, labour or any disputes must go through the appropriate coordinator. *Fine for infringement: K5; Fine is paid as follows: K5 to MC.*
6. All sales of crafts must go through the Artefacts Committee. *No fine.*
7. No-one can steal from a researcher or tourist. Anyone caught stealing must return the stolen goods and pay a fine. *Fine for infringement: K50 or 2 months imprisonment.*
8. No-one can lie to or mislead a researcher. Fine for infringement: K50 or 2 months imprisonment. *Fine is paid as follows: K10 to informer, K10 to MC, K30 to researcher/tourist.*
9. People who are not traditional landowners in the CMWMA cannot do the following:
(i) Buy land
10. All forms of mineral, oil and timber prospecting or exploration are banned in the CMWMA (except for land of the Kuasa Hauslain [near Herowana]).
11. No-one may hunt with slingshots, bows and arrows or shotguns near villages in the CMWMA. *Fine for infringement: Landowners K10 Outsiders K20 Fine is paid as follows:K5 to informer, K5 (K10) to MC, K5 to landowner (in the case of outsiders).*
12. No-one can hunt with a home-made or unregistered shotgun. *Fine for infringement: K100 or 6 months imprisonment Fine is paid as follows:K30 to informer; K70 to MC.*
13. No-one can buy or sell shotgun cartridges. *Fine for infringement: K20 per cartridge Fine is paid as follows:K10 to informer, K10 to MC.*
14. No researcher, tourist or company may remove any forest/river/land resource, use any idea, technique or information from the CMWMA without the permission of the MC. Any profit made from any products derived from the above must be shared with the people of CMWMA. All researchers and/or companies entering the CMWMA must sign a legally binding document to this effect. [*Editors note: This does not refer to crafts and produce sold for re-sale]*
15. No-one may consume, transport or grow illicit drugs in the CMWMA. No landowner may consume, sell or transport alcohol. Tourists and researchers may not supply alcohol to landowners and must consume alcohol in privacy. *Fine for infringement: Alcohol K20,Drugs K30. Fine is paid as follows: K10 (K15) to informer, K10 (K15) to MC.*
16. No playing cards for money or other gambling is allowed. *Fine for infringement: K10 per person playing. Fine is paid as follows:*
17. No wild animal products (except bits of pig) are allowed to be used in the manufacture of crafts for sale.

Table 3. A list of laws passed by WMA Management Committees at the 3rd Annual Meeting, October 4 - 6, 1995.

Monitoring / Evaluation

The process of engaging the community in the collection, utilisation and dissemination of information to evaluate the operation the Wildlife Management Area and the status of conservation of biodiversity is yet in an informal stage. Field workers assist Management Committees to record minutes of each meeting. Decisions about WMA operations are documented and reviewed at each consecutive meeting. WMA laws have been translated to tok pisin and posted by each Management Committee to encourage review and comment. To involve communities in evaluation of biodiversity, resident field workers and researchers in Haia worked with the community Coordinator and community members to implement the beginning of the Trained local Observer (TLO) program. Landowners in the WMA can now receive certification in and work as Trained Research Assistants (TRAs) or Trained local Observers (TLOs). The former is qualified to work on a research project under the supervision of a guest scientist or student in the WMA. A TLO has been trained to a level where he or she can independently conduct simple repetitive monitoring of a selected taxa group. 15 TLOs have received preliminary training in the monitoring of selected mammals, birds, plants and amphibians. Three are now monitoring amphibian populations in the south end of the WMA as an indication of ecosystem health. Three others are involved in an orchid inventory project with the Forest Research Institute of Papua New Guinea. In all cases, they are not yet formally feeding this information back to the Management Committees although this is expected to evolve.

The result of this process has been that community participation in evaluation of the operation of the Wildlife Management Area has grown from nothing to fair (Figures 3a-d). In 1992, resident field workers and researchers began to consistently document the conservation status and operations of the WMA although there was yet no mechanism to involve community workers in the documentation (level 2). Beginning in 1995, community members became more involved in the collection and discussion of information related to the operation of the WMA and the status of its natural resources through the processes described (level 3).

Community Participation in Enterprise Development

In this section, the processes for engaging community participation in the development of eco-enterprises in the Wildlife Management Area are described. The extent of community participation achieved in each WMA community by utilising these processes was ranked according to the framework (Table 1) and shown in Figures 4a-c and Figures 5a and 5b. Results are show separately for each WMA village and each business. Similar to the previous section, years of assessment for each community begin from the time of arrival of the first trainers pictured in the lightest color gray with the latter years in black.

Handicraft businesses have been established in the communities of Ubaigubi and Herowana, beginning in 1990 and 1992, respectively. They specialise in the production of traditional New Guinea highlands products including fighting shields, spears, bows, stone axes, mumu bowls, bilum string bags and more. They are marketed domestically and internationally through village stores and mail order. Research and/or ecotourism businesses have been established and tested in three WMA communities. They have included the Ubaigubi Ecotourism Lodge (1984-1986), the Ubaigubi Rutanabi Guesthouse (1995-present), the Crater Mountain Biological Research Station (CMBRS) at Wara Sera near Haia (1989-present), the Crater Mountain Biological Research Station (CMBRS) at Herowana (1992-present). All facilities feature permanent structures with cooking and accommodation for three to ten visitors. Research clients include scientists in the natural and social sciences, both expatriate and national, from student to professor. Tourism clients are typically bushwalkers or natural history enthusiasts, including birdwatchers, orchid specialists as well as generalists. Marketing is still informal and primarily conducted by word of mouth from previous visitors.

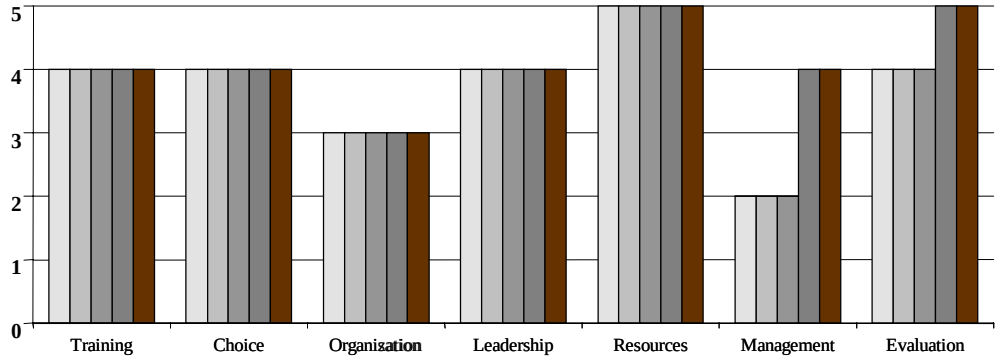

Figure 4a. Herowana participation in handicraft enterprise development from 1992 (gray) to 1996 (black)

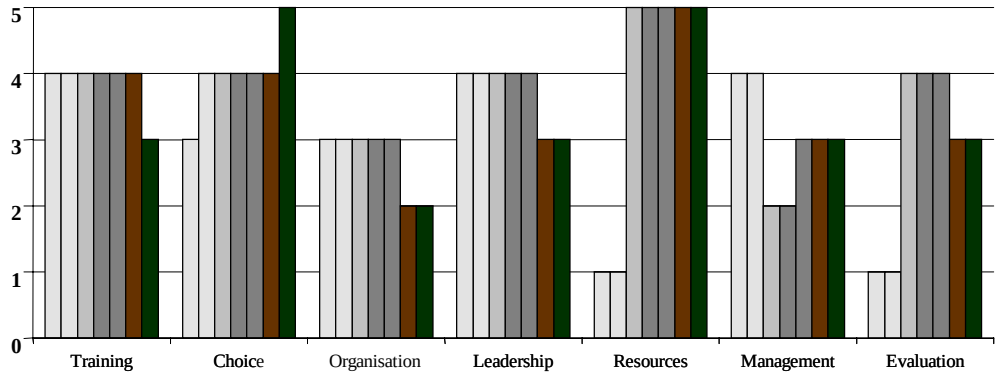

Figure 4b. Ubaigubi participation in handicraft enterprise development from 1990 (gray) to 1996 (black)

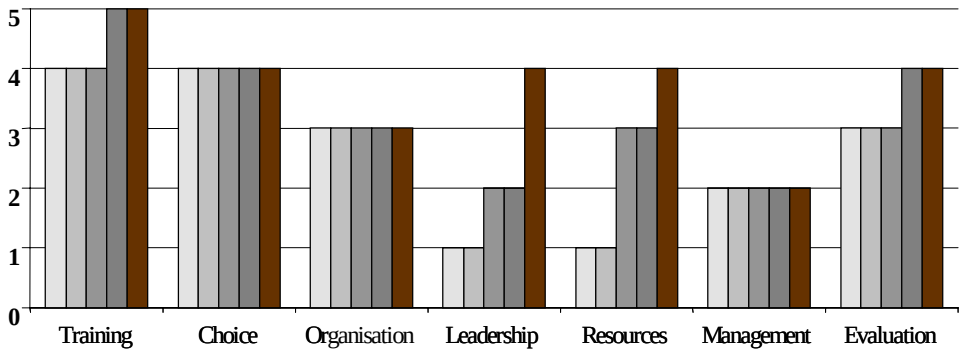

Figure 5a. Herowana participation in tourism and research enterprise development from 1992 (gray) to 1996 (black)

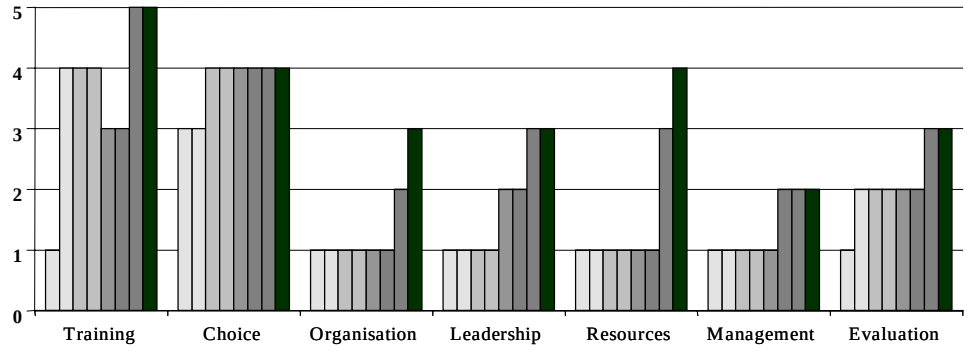

Figure 5b. Haia participation in tourism and research enterprise development from 1989 (gray) to 1996 (black)

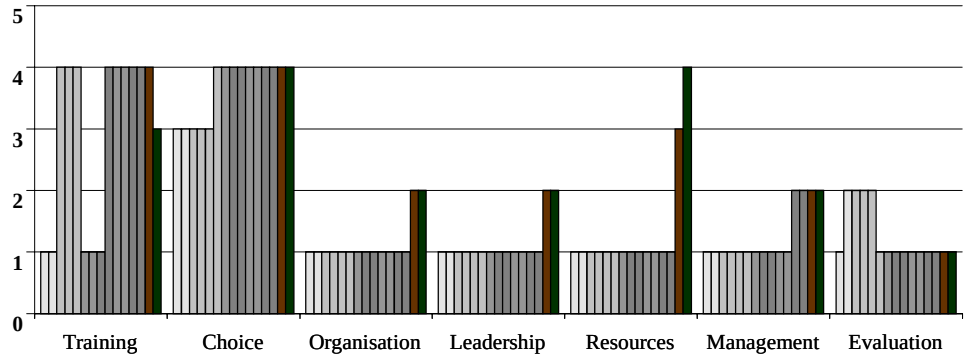

Figure 5c. Ubaigubi participation in tourism and research enterprise development from 1982 (gray) to 1996 (black)

Training / Agents of Change

Rural Community Development (RCD) volunteers from the United States Peace Corps (USPC) were engaged to conduct on-site resident training in Ubaigubi from 1990-1995 . The USPC model for small business training was transferred to Herowana in 1992 to establish the Herowana Handicrafts business. Additional training workshops have been organised with the assistance of handicraft buyers in Port Moresby and Goroka.

Methods of training in eco-tourism and research has been highly variable. In Ubaigubi, resident expatriate lodge managers initially provided community guide, cook and manager training . Training ceased from 1986-1989 until USPC RCD volunteers arrived to provide training for the handicrafts enterprise, some of which was applicable to the potential ecotourism business. In Herowana, some training was provided by the USPC RCD volunteers but most was dependent on field workers assigned to other tasks such as biological research or work with WMA Management Committees. These staff provided on-site and short local trainings for selected community members as eco-tourism guides and research assistants, and in eco-tourism product development. At the CMBRS at Haia, field researchers served as the resident trainers by providing Pawaiians with experience as research assistants. Additional training workshops in the WMA have used Awareness Community Theater for role playing tourism and research scenarios. Outside of the WMA, selected community members have attended workshops in ecotourism product planning and study tours to guesthouses, research stations, national parks, museums and herbariums.

Needs assessment / action choice

Handicrafts

The process resulting in establishment of the Ubaigubi Handicrafts was initiated by Gillison who was seeking alternative forms of income generation for WMA communities after the collapse of the ecotourism lodge in Ubaigubi in 1986. The idea was introduced by USPC volunteers, Steve and Kristi Booth, and was embraced by a community committee who worked with the Booths and later volunteers to develop the business. Other WMA communities assessed the successful business activity in Ubaigubi and approached RCF with a request for assistance to establish a similar. RCF responded with the placement of USPC volunteers in Herowana in 1992 and in Haia and Maimafu in 1996. The result of this process has been that community participation in the choice to establish the handicrafts enterprises in the Crater Mountain Wildlife Management Area has been quite high (Figures 4a and b).

Research / Ecotourism

The process of initiating the first Eco-tourism Lodge venture in the WMA in the early 1980s was also based on an assessment by Gillison, along with representatives from WCS and private entrepreneurs in Goroka who met with community representatives to discuss plans for the business. In Haia, the CMBRS was established by Deb Wright and Andrew Mack in 1989 with the permission of the Pawaiian landowners through external financial support and assessment of need for such a station. The Pawaiians were pleased with the employment and requested external assistance to further develop the enterprise when Wright and Mack completed their studies. As with the handicrafts, the surrounding communities heard of the business activity and approached RCF and WCS with similar requests for more activity. In response, the CMBRS in Herowana was initiated in 1992 and some accommodations are in the planning stages at Maimafu. The result of this process has been that community participation in the choice to establish (and discontinue) these businesses has been quite high (Figures 5a-c). In Ubaigubi, the Lodge proved to be financially non-viable after three years of operation as it was dependent on external marketing and management, and costly transportation. Community capacity was not sufficient to maintain or to even down size operations when the external institutions withdrew subsidies for the operation in 1986. The community elected to disassemble the Lodge and discontinue the business despite outside advise that they reconsider aspects of the operation.

Organizational structure / Institution presence

Handicrafts

The process of establishing the Handicraft Business Committees was done by field staff asking each clan to nominate a representative to serve on the committee. The committee then underwent a five year period training period where they met once each week with USPC volunteers to practice and design systems for how to receive and price products from artisans in the community, and to conduct bookkeeping, banking and communications with clients. Volunteers were largely responsible for locating the initial markets for the products. As the capacity of the committee to carry out these tasks has increased, field staff gradually reduce their involvement in the operations each year. The result has been that community participation in the Committees has ranged from restricted (2) to fair (3) (Figures 4a and b). In Ubaigubi, the committee disbanded in 1995 after internal conflict over misappropriation of funds by a committee member. The Herowana committee continues to be very active (3). Both businesses market handicrafts from most households in their respective communities. Over 190 artisans from all seven clans participate.

Research / Ecotourism

The process of establishing the institutions for managing ecotourism and research businesses in the WMA began only after the enterprises were operating for some time. All were operated by field workers or researchers until 1994 when an effort was made by RCF to begin to transfer management of these businesses to the WMA Management Committee present in each community. The result of this process has been that community participation in an institution responsible for operating the Research and Ecotourism enterprises is still very limited (Figures 5a-c) and remains heavily dependent on external assistance.

Leadership

Handicrafts

The process of fostering leadership in the Handicrafts Businesses was done by field staff working with the community-selected committee to develop their collaborative capacity to operate the business. Every committee member was trained in all tasks that the committee must perform so that all tasks could be performed equally well by all members of the group. When a misappropriation of funds occurred in the Ubaigubi business by a dominant clan leader on the committee, a system of checks and balances was built into the Herowna financial accounting such that three or more members must be involved at some point in each transaction. When procedures of the Herowana committee have been questioned by the community, field staff have assisted the committee in determining and practicing appropriate responses.

The result of this process has been that community participation has been good (level 4) in Herowana where the committee members exhibit confidence in their capacity to understand and operate their business systems (Figure 4a and b). In Ubaigubi, the committee has dissolved but the single manager exhibits competency to operate the business (level 3).

Research / Ecotourism

The process of developing community leadership in these businesses is just beginning as management transfers from project field workers and researchers to community members. Field staff are now holding meetings with the Management Committees and their Coordinators in each community to define and develop appropriate systems for operating the business. The result is that community participation remains restricted (2) (Figures 5a-c). Businesses that were once externally run are now run collaboratively with individual community leaders on the Management Committees and only recently expanded to involve others on the Management Committee in Herowana in 1996 (level 4).

Management

Handicrafts

The process of building the management capacity here required that Volunteers be present on site to provide weekly lessons in basic English and tok pisin so that orders can be read and responded to, in basic math required for accurate accounting, and elementary lessons in banking, letter-writing, phone-calling, pricing, and product development. Additional workshops in pricing and quality control have been provided by artifacts dealers from Port Moresby and Goroka. The result has been that management in Herowana has progressed from its original dependency on project field workers (level 2) to primarily self-management with intermittent assistance (level 4) (Figures 4a and b). All external technical assistance for the Ubaigubi business was withdrawn in 1995 and the business continues to function under community-level management.

Research / Ecotourism

The process of building the management capacity of community leaders / institutions in the operation of the WMA research and ecotourism enterprises has involved a variety of training methods. Random community members have been elected to attend workshops in and outside of the WMA in ecotourism product planning and have participated in project-sponsored study tours to guesthouses, research stations, national parks, museums and herbariums. Selected individuals have also completed elementary courses for research assistants and tourism guides offered by staff and researchers in the WMA. The Management Committee in each community governs the work of researchers in the WMA through letters of request from each scientist who wants to work in the WMA. The committee reviews the research protocol and grants permission for the selected procedures and time of visitation. A concerted effort is now underway to identify and strengthen the core group of clan representatives who are establishing the procedures to better manage the finances and logistics of this business. The result has been that community participation in management remains restricted (Figures 5a-c). Although workers have received training, the management of the business is theoretically conducted by committees but is actually reliant on a single community worker who maintains the structure and coordinates ecotourism guides, research assistants and other visitor services in the village. The community worker is often not working closely with the committee and is dependent on project staff for assistance (level 2).

Resource Mobilization

Handicrafts

Encouraging resource mobilization by the community was done without start up funds from RCF or WCS. The Committees initially worked on a voluntary basis and proceeds from the first sales were sufficient to cover their subsequent costs of operation. Proceeds from sales are managed by the committee with the help of the Volunteers and used to pay artisans, committee stipends, business expenses and contribute to a community fund. Sales in Herowana have increased substantially with proceeds in the last year equal that of the total of the first three years of operation. The Ubaigubi Handicrafts is also self-sufficient financially. Community participation has been excellent (Figures 4a and b) since funds were immediately available to compensate committee members and artisans for their work.

Research / Ecotourism

In these businesses, the process of resource mobilisation has been more difficult since start up and maintenance costs are much greater. Fees for use of research stations and guest houses were first collected by the Management Committees at rates determined by each respective community. Community workers who coordinated the businesses and maintained the stations were paid a wage by RCF and WCS. In 1995, uniform pay rates and laws for ecotourism and research activities for the entire WMA were ratified and documented at the WMA Annual Meeting by representatives of each Management Committee. The formalized protocol for fees and laws now provides the instruments which each Committee uses to collaboratively govern the ecotourism and research enterprises of the WMA. The subsidy for community workers by RCF and WCS is being withdrawn over a two year period and station and guesthouse managers will become voluntary or paid by the Management Committee. Community participation in resource mobilisation has increased as they have had funds from the business to do so (Figures 5a-c).

Monitoring / Evaluation

Handicrafts

Involving community participation in evaluation has been dependent on the capacity of the business committees members to be engaged in the maintenance and analysis of the business records and feedback from buyers. Originally, recordkeeping was primarily done by the Volunteers but the responsibility has gradually been assumed by the committee members or the sole manager of the business, as is the case in Ubaigubi. In Herowana, the records have been used in the last two years to respond to community criticism about concerns over equal distribution of benefits or destination of proceeds and handicraft buyers have been brought in to meet with artisans and managers. The result of this process has been that community participation in evaluation has risen from restricted (level 2) to fair (level 3) or excellent (level 5) (Figures 4a and b).

Research / Ecotourism

Community participation in evaluation of this business is done through financial records and feedback through visitor evaluations. The involvement and capacity of community members to assist with maintenance of accurate records for this business has been limited due to lack of technical assistance from field staff which is now only beginning. Each tourist or scientist who visits the WMA is asked to write an informal evaluation of WMA facilities and services. These are returned to the field worker at each site who reads them for discussion at the Management Committee meeting. The result has been that community participation, originally dominated by external review (level 2) is recently expanding to involve individuals and committees within the last two years (level 3) (Figures 5a-c).

Discussion

Action choice

Customary land tenure in Papua New Guinea precludes the rating of the action choice indicator to be anything less than fair (3). Some community involvement will be obligatory before any actions related to land use can be implemented. As shown at Crater, community discussion alone in the action choice seems to have little bearing on whether an initiative will flourish (e.g. Ubaigubi Lodge and WMA establishment in the 1980s) We have found that the constraints of community conditions in Crater (low to non-existent formal education, lack of experience in the modern cash economy outside of the WMA boundaries, resulting in “cargo cult” tendencies and unrealistic expectations) will require that considerable community education take place before community assessment of actions, especially as related to business development, can really be practiced. As in other remote sites in Papua New Guinea where few government services and infrastructure are present, residents will likely be very eager to elect for an action which they feel will result in socioeconomic development despite the fact that they likely have little understanding about the implications or requirements of the action (Sekhran 1996).

Congruent with the recommendations of Midgley (1986), rushing to construct facilities for an eco-enterprise or a physical base of WMA operations does not guarantee further community involvement. Even though community representatives participated in the original discussion of the action choice, they have not had the technical capacity to continue the involvement in the subsequent steps of implementation without assistance. Not surprisingly, in other community-based conservation initiatives, if technology utilised or the maintenance demands of the initiative was beyond the capacity of the landowners, their participation dropped off (Little 1994). The Ubaigubi Lodge is an illustrative example of this. Local capacity was not sufficient to maintain the activity at the stage when external

support was withdrawn. Misunderstanding reduced confidence, resentment and skepticism on the part of the community resulted.

Results at Crater do suggest that an affirmative action choice on the part of the community initially, followed by demonstration and years of discussion, may be necessary to result in community understanding of the action choice and a possible commitment to it. Even if the demonstration was unsuccessful, as in the case of the Ubaigbui Lodge, follow-up discussion of its story and the lessons learned by the action choice have been instructive to all communities in Crater who contemplate similar enterprises. Another demonstration site, The Crater Mountain Biological Research Station at Haia, although managed entirely by external field researchers, was a model for demonstrating what a Research Station was and how it operated. The extremely positive reaction of the Haia community lead to their request for more research business. It is likely that this affirmative action choice did not mean that Pawaiians thought at that at that time that they could / or wanted to manage the operation, but rather that this type of employment be continued to be offered in the area. It will likely take much more time with field worker presence to build the confidence and capacity to result in significant community participation in operation of the Station. This is not inconsistent with conservation initiatives in Africa where a lengthy first phase of external management was necessary in more complex operations of game reserves (Kiss 1990).

While the complexity of the action will dictate the length and intensity of external involvement, Uphoff (1985) suggests that for working with communities who may not be organized and accustomed to involvement in development programs, as in Crater, it will be necessary to not only discuss with people whether a project activity will be undertaken or not, but also engage in an ongoing dialogue about the specifics of **how** the community envisions itself participating in the proposed activity. Because actions in Crater, by this project and others, have involved external initiation and management, and local people yet lack significant experience, we find that people are often "waiting for action" and still have considerable difficulty conceptualizing their role in "taking action".

A possible model from El Salvador involved communities in a dialogue which discussed the "rights and obligations" of participants to prepare them for what to expect in the future of the project (Paul 1987). The discussions covered physical, financial, social and organizational aspects of the proposed project. Although this is likely still too conceptual for direct use in projects like Crater, it provides a useful framework for the ongoing dialogues which discuss the roles of external agencies and the WMA communities. To increase community capacity for understanding the complexity of action choices, we have found study tours for landowners to travel outside of the WMA to be very influential. In Crater where few people have travelled beyond their home village, a trip to talk with landowners in another part of Papua New Guinea about land use or eco-enterprise development has changed misconceptions that field staff say may have "otherwise taken ages to achieve at the normal rate for Crater". This and other hands-on experiences through internships and workshops in technical and management skills have been found to be invaluable in most rural development projects (Midgley 1986).

Training

Given the isolation and education of Crater communities, we feel that the investment we have made in training has been necessary to engage community participation as an "end" to ongoing sustainable operation of the WMA as reflected in the project objectives.

At this stage in WMA development, intermittent field workers have not proven to been sufficient to assist in the development of the embryonic institutions in the WMA. In the lengthy absence of a field worker from a site in the WMA, confusion or conflict has arisen. The committees have lacked confidence and the experience to take action or to govern on topics related to operation of the WMA or the eco-enterprise. This is complicated by the fact that collaborative management of the WMA and its

enterprises requires cooperation between clans that may have been traditional enemies for centuries. A resident field worker must still be present to "walk" most the committees through the motions of conducting a meeting, delegating responsibility, identifying action, making a law, writing letters or resolving conflict.

The potential impact of a resident trainer is reflected in the greater extent of community participation in the Handicrafts enterprises versus the WMA Ecotourism and Research enterprises (Figures 4 and 5). This can be attributed somewhat to the greater complexity of the service industry (e.g. research and tourism) versus product sales as in trade stores or handicrafts but it is also likely a reflection of the history of community training for each respective business. The USPC Rural Community Development model for community capacity building was used to establish the Handicrafts businesses. A committee was elected specifically by the clans to run the business and work as counterparts to the USPC volunteers. They meet regularly with the volunteers who have assisted them in developing a specific methodology for operating the business. Until recently, there was no designated resident small business or development trainer assigned to the ecotourism and research businesses. These businesses have been run on a rather ad hoc basis by the Management Committee who is not specifically trained as a business committee but functions more as governing body for policy and law in the WMA. The systems for record keeping, marketing and managing the enterprise have been random and uncoordinated. These results indicate that an appropriate field worker must be assigned to any new community institution to steward the members in the development of their capacity to operate the institution. This is consistent with the findings of Paul (1987), in a survey of World Bank projects, who noted that the selection of appropriate field workers suited for specific training tasks was instrumental in successful community participation initiatives. When comparing the overall development of community participation in WMA operations, Herowana and Maimafu have progressed the farthest (Figures 3a-d), even though Haia and Ubaigubi have been "involved" in WMA activities for longer. The constant presence of resident trainers in Herowana and Maimafu in the past 2-4 years who have been assigned to working with specifically with the Management Committees on WMA operations may have had this impact.

Although it is understood that field workers are present only to demonstrate and to work alongside the committees, workers must constantly guard against the possibility of community dependence on them. As confirmed in most rural development work (Uphoff 1995, Wells and Brandon1992, Oakley 1991) this has required field staff with considerable patience, sensitivity, neutrality, the capacity to listen, and to teach a task instead of doing it for people. As anywhere, the cooperation, trust and respect of rural landowners in Crater has had to be earned (Wright and Mack 1993) through demonstrated commitment and long-term presence. This has been one of the strengths of the Crater Mountain project to date where a committed group of associated individuals maintains contact with each other and the communities during and long after their presence in the WMA. Despite internal successes and failures, and the comings and goings of individuals, an institutional presence of an RCF and/or WCS field representative has been consistent for fourteen years. This has provided the environment for staff to work with communities to continue the dialogue about the successes and failures, and to learn from the mistakes.

Organization

The Management and Business Committees are new institutions in Gimi and Pawaian cultures. Although most are based on representation by traditional clan leaders or representatives, the necessary collaboration of a large number of traditional clan enemies as in the Crater Mountain WMA committees is a relatively new and unprecedented phenomena. It is only with the development of WMA airstrips in the last 10-20 years that clan groups have been clustered in such close proximity as to constitute villages. Suspicion and fear of personal harm from another clan is not uncommon. Pearl (1994) in a review of the conservation-based conservation efforts at Crater aptly described the

situation as, "unruly, contentious, rumor-filled, open-ended, and slow but broadly consultative, inclusive, and potentially, uniquely effective."

In addition to the challenges of new levels of organisation in Crater, as has been documented in other developing societies (Kiss 1990, Bromley 1994), field staff report the breakdown of the traditional authority structures. The elder clan leaders are not always seen as competent in the modern society while younger people struggle for and are restless for change. In some communities, this has further weakened the power of the Management Committees which, by tradition, have been comprised of elder clan leaders. With the Pawaiians, the traditional lack of high levels of organisation due to semi-nomadic behavior and low population densities in large expanses of forest are inherent. Given these constraints, it is not surprising that institutional development throughout the WMA has been slow and uncertain.

Although committees for community management of protected areas has been used in many parts of the world few have yet demonstrated the capacity to act independent of external assistance (Well and Brandon 1992). While this is not particularly encouraging for projects like Crater where we are in the very early phases of institution-building, it suggests that we will likely need to make a long-term commitment to resident assistance for the near future followed by intermittent field visits to follow for much longer.

Leadership

We have seen that as the tangible results of time invested in an institution and its activity materialise, the extent of community participation in the form of leadership does increase. Oakley (1991), in a review of rural development projects, found that participation often evolves in this manner. Businesses and/or activities which take a long time to reach fruition, and are very hard to get started and maintain, will require some degree of external leadership. This can be seen in the Handicrafts business which has had the capacity to earn money almost immediately and where levels of participation grew quickly. In the tourism and/or research business, growth is slow and requires considerable up front investment. The latter has required more outside intervention to establish before the community has been able to or had a desire to take an active leadership role. Equally elusive is the concept of benefits derived through the long-term investment in biodiversity conservation.

The indicators of leadership show that in many activities in Crater there have been independent leaders, rather than active groups or committees of people who have taken leading roles in WMA establishment of some sort. Most of the independent leaders work without the support of the entire community which is not surprising as it is difficult to gain given clan rivalries. There appears to have been many reasons for the individual leaders. For some, the ulterior motive was to financially or politically benefit the leader personally or his clan. For others, it appeared to be out of sincere interest in the activity. In either case, the resulting community jealousy leading to lack of involvement from other community factions or the dependency on just one individual to carry out any activity has led to problems. In Ubaigubi, a charismatic individual was instrumental in dissolving the Handicrafts committee resulting in current management by single individual. While the business still functions, the reliance on a single individual places it in some jeopardy as projects with single charismatic leaders are known to have a higher association with failure (Midgley 1986). In Haia, the traditional lack of leadership in the culture has led to dependence on a single young man for most WMA operations.

To encourage involvement from a wider spectrum of the community in WMA operations, field staff have attempted to more widely disseminate training and information opportunities. Because communities are not homogenous and traditional New Guinea authority structures can hoard information as power, dissemination can be challenging (DEC 1996). In Herowana, the longer and more extensive presence of resident staff have countered this constraint by encouraging the

involvement of both young and old clan representatives on committees, by disseminating information through women's groups and female representatives on community committees, and by offering repeated training sessions in different areas of the village to provide opportunities for more clans to attend. This is consistent with the suggestions by Orsak (1996) who recommends "flooding" communities with information to reduce the tendency to restrict information flow. Amidst this complexity, the challenge remains to cultivate leadership, while encouraging community participation, without provoking jealously.

Management

Although most community institutions are still dependent on project staff for assistance in carrying out their management duties, there are now a sufficient number of visitors (approximately 250 in the last year) coming to the WMA, that issues which the committees must act on are increasing. Each transaction or event provides another opportunity for the committee or the designated coordinator to practice management skills. This involves collection and distribution of revenues, record-keeping, work assignments, enforcement of rules and collection of fines.

This activity has engaged people in the practice of the WMA procedures such that some are becoming familiar with the implications of the rules they have made for operation and are beginning to question some practices. The annual WMA meeting has proven to be an invaluable forum where representatives of each community can vote on changes in the standardized procedures of WMA operations and enterprises. The indication that people are questioning is an indication that the procedures are being used and thought about. They are not only symbolic.

As value of biodiversity is realised, the reasons and incentives for enforcement of management rules are becoming clearer for WMA residents. An example of this occurred in 1995 around a rule which was made at the WMA annual meeting that no biological materials could be taken out of the WMA by a non-resident without permission from the Management Committee. Later that year, a new species of orchid was discovered by one of the landowners involved in a parabiologist orchid inventory project with the Forest Research Institute in Lae. The orchid was named after the landowner who was obviously impressed that something previously undescribed by science was found in the Crater forests and may have value to attract clients of the research and tourism enterprises. Later, a trekker was apprehended leaving the WMA with orchid samples which were confiscated by the WMA Management Committee. Previously, it is likely that the lack of landowner perception of value, as well as threat, would not have resulted in disciplinary action.

Management in the form of equal distribution of benefits in the form of training and revenue-earning possibilities are a constraint in all WMA procedures. Community institutions struggle to fairly distribute these benefits despite traditional clan nepotism which gives work and training opportunities to fellow clan members. This is still an area that requires careful external refereeing by the resident field staff. It may prove to be one of the biggest hurdles for the committees in terms of management, yet one that will be critical to providing appropriate incentives to sustain community participation if a sufficient quantity of land is to be involved in the establishment of a viable conservation area.

Community dilemmas over distribution of benefits is not an issue unique to Crater. The revenues from community wildlife farms and lodges in Africa have been distributed in a number of ways depending on community and enterprise profile (Kiss 1990 and Metcalfe 1994). Although the emphasis is often on equal distribution, one of the Campfire models in Zimbabwe distributed wildlife income in accordance with land area enrolled in wildlife protection. This may have application to Crater. Business income is now distributed to the workers with a surcharge for committee managers and overhead costs. In the future, shares may be held by WMA residents in a community company portfolio of Crater eco-enterprises. If eco-enterprises are dependent on the presence of biodiversity,

should shares in the Crater companies be reflective of land area assigned to conservation, rather than to some other land use such as hunting, gardening or coffee production? Because some residents own larger blocks of land, especially the Pawaiians, it will bias revenues to these individuals who can hold more shares. Yet, it is likely true that viable populations of flora and fauna, especially seasonal movement of vertebrates, will depend on large contiguous blocks of undisturbed forest.

Resource Mobilization

All community institutions associated with WMA operations or enterprises are now collecting revenues of some sort to finance their activities. The more complex businesses like the Research Stations still receive subsidies from external agencies for manager stipends although this will be discontinued as income of the enterprise increases. Resource mobilisation has proven to be another big challenge for the Crater Mountain project. The communities in the WMA are only a recent phenomena and all individuals identify with their clan lineage instead of the village as a whole. As such, there is no tradition of pooling resources collectively as a village to invest in a community venture. Compensation for labor, materials or expertise is requested from any individual outside of the immediate family. Any favors granted are catalogued in an mental record of debts as favors owing.

In this cultural environment, it has been difficult for field staff to initiate community contribution towards a collective action without some sort of compensation going to the involved individuals. For the project to directly employ village members or provide monetary compensation for some action associated with WMA operations or enterprises without any matching contribution from the community or the individual goes against all mainstream development theory which has shown that these actions are not sustainable, lead to dependency and are counter-productive to encouraging local ownership in the activity (Little 1994 and McNeely 1988). For example, in Nepal at the successful Annapurna project, they have required a minimal 50 percent community contribution on any project activity and have refrained from any cash compensation (Wells and Brandon 1992).

The earliest research activities in the villages of Ubaigubi and Haia where conducted prior to the organization of an ICAD project initiative. WMA residents were employed in essentially externally managed operations. The effort to encourage community participation in protected area establishment by moving their involvement from the level of laborer to that of business manager in the WMA enterprises has been difficult. With the lack of experience in business and the cash economy, Committees are not eager to part with a portion of their earnings on maintenance or overhead costs of business or WMA operations. On the other hand, there are participation benefits to their frugal nature. As external agency subsidies for community Research Station Managers have decreased, Management Committees have had to consider their capacity and need to assume some of these costs. As a result, their level of participation in management has increased significantly as they scrutinize the work of the Manager for the merit of his pay which must be provided from their potential earnings.

In this way, the project has made shaky progress in evolving from a once beneficiary system to a participatory one. The most successful activities are those which are now actively generating revenues which can be readily used to pay for labor and costs associated with operations. Constraints still exist in enterprises such as ecotourism where a guesthouse must be built before revenues can be collected. Individuals are very reluctant to participate in construction without being paid for labor. Yet, there are insufficient funds to offset these initial costs. Contributions of labor are not readily offered as direct benefits back to the individual cannot be readily seen or assured. In addition, Crater residents are still dependent on a demanding schedule of subsistence existence. A day spent on a business enterprise is a day spent away from gardening. In an effort to avoid direct cash payment, yet consider the cultural constraints, the project must provide indirect incentives to break these stalemates. Providing rice for lunch on work days for community structures is one technique.

Monitoring and evaluation

The participation of Crater committees in monitoring of their enterprises is fairly good as all records are maintained by committee members. The Handicrafts enterprises have progressed to actually managing that data and utilizing it to report to the larger community. Since jealousy and suspicion of neighboring clans is a common problem, records of evidence of income and distribution of benefits is important to combat misunderstanding and misinformation. Records also provide an important log of increasing community benefits as the provision of material benefits can be meaningless without community realization of the growth (Midgley 1986)

The presence of the research enterprise in Crater for many years has provided a unique potential for selected community members to be actively involved in the collection of data on the presence of, or change in, biodiversity in the WMA. The interactions of communities with scientists has been important in community realisation of the uniqueness of their resources. Over the last two years, scientists and visitors to the WMA have been asked to submit comments on their findings and experience to the Management Committees in an attempt to encourage feedback to the WMA governing body.

The Trained Local Observer (TLO) program (Sinclair 1995 and RCF 1996) is the beginning of an ambitious effort to build local capacity to conduct biological and socioeconomic monitoring as required to guide the Management Committees in WMA operation. While individuals still retain significant information about their natural resources, the limited level of literacy restricts the number of individuals who qualify to participate in the program.

Conclusion

The Crater Project is a combination of "top-down" **and** "bottom-up" initiatives (Hough and Sherpa 1986). The early existence of external intervention was tempered with the obligatory involvement of resource owners from which the initial demonstration sites have sprung. These sites and the lessons learned provide the tangible evidence and incentive that fuels the fledgling participation of communities in all aspects of the Wildlife Management Area operations. In Papua New Guinea, it is a delicate balancing act where all clans must lead and benefit in the negotiations to move all towards a common goal. The process of engaging participation will be inherently slow.

The presence of neighboring communities of 21 clans within the WMA, although a challenge, at this point has also been a benefit. We see that communities, and clans within communities, learn from one another and they compete for the self-esteem to do it better. Yet, through the annual meetings and collaborative training ventures, they are increasingly aware of their dependence on one another to have a viable product. If cultural constraints do develop in one community, as they did in Ubaigubi, the project has not needed to withdraw its presence from the area, it can continue to provide technical assistance in a nearby community or clan and wait for the invitation to return.

Crater is remote and expansive site with high training needs. Paul (1987) identifies levels of complexity of the three components (intensity, agents, objectives) of community participation. Based on his three-dimensional framework, the level of commitment required to achieve the complex combination of empowering communities to eventually initiate action, as sought after in the Crater Mountain WMA, will require an extremely high level and lengthy commitment on the part of the external agencies involved. Such projects require high investment in human and financial resources to address the logistics to initially establish the project in order to offer the technical assistance that is needed to provide for community participation to occur (Sekhran 1996, and Wells and Brandon 1992). Once going, the process requires commitment. ICADs which exist for less than five years with a lack of secure funding but who are utilising taxing innovative and experiment procedures have been shown to be ineffective in achieving their objectives (Wells and Brandon 1992). Funding constraints increase

the difficulty of an already difficult task. While the government of Papua New Guinea provides such unique legislation for empowerment of local resource owners to establish national protected areas, it does not currently provide the technical assistance to landowners on how to actually implement this ambitious agenda. In the most recent draft of the Strategic Plan of the Department of Environment, this task is assigned to non-governmental organisations operating in the country (DEC 1996). If NGOs are assigned by the DEC to the challenging task of providing technical assistance to develop a system of protected areas in PNG, and have demonstrated their capacity to do so, they should be considered for financial or logistical support from the government to carry out the mandate.

Communities in the Crater Mountain WMA are balancing subsistence living with entry into the cash economy. Time available to participate in training, business and WMA management is limited by the demands of traditional subsistence and cultural obligations. The structure of businesses and governing institutions must take this into account.

Community participation as the "means" to establish a protected area and the "end" to sustain it, is only one facet of the challenge to achieving biodiversity conservation. Most protected areas, if established through community-based management, will only persist in a conducive national policy environment that does not undermine community efforts by providing incentives which decrease biodiversity value and encourage production versus conservation (Wells and Brandon 1992, and Little 1994). The fledgling laws and systems which currently govern the Crater Mountain WMA are only beginning to address the internal threats from non-sustainable subsistence practices within the WMA. They are certainly not at a point where they can withstand the fragmentation that would result from external threats of competitive land uses such as large-scale extraction of mineral and timber resources. It will be imperative that national policy align with the current community-based conservation initiative in the Crater Mountain WMA if it is to persist as a national protected area.

This document comments only on the level of community participation in the operation of a national protected area. It does not attempt to comment on whether community participation will actually achieve the project goal of biodiversity conservation. It is yet a theoretical process and, to date, there is no proof that participation will enhance conservation objectives. Yet in Papua New Guinea, as in many other areas of the world, integration of conservation and development through community participation is accepted as the current means to protected area establishment (Little 1994, Brandon and Wells 92). A monitoring and evaluation plan to collect quantitative data on the project goal and each objective of the Crater Mountain ICAD project was designed in 1995 and is currently being implemented. (Ericho, et.al in press, and RCF and WCS 1995). When in place, the indicators will provide a more systematic assessment to answer this question.

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Community-based Marine Protected Areas

Ueta Faasili and Michael King
Fisheries Division, MAFFM
Apia, Western Samoa.

Abstract

In Western Samoa, the Fisheries Division has developed a community-based fisheries extension process which encourages coastal communities to produce their own Village Fisheries Management Plans. These community-owned plans are in the form of agreements between villages and the government in that they set out the resource management and conservation undertakings of the community, and the servicing and technical support required from the Fisheries Division. Communities have decided on many different undertakings, ranging from enforcing laws banning destructive fishing methods to protecting critical habitats such as mangrove areas. An unexpectedly large number of villages have chosen to establish Fish Reserves (or Marine Protected Areas, in which all fishing is banned) in part of their traditional fishing areas. Within the first sixteen months of full operation (up to August 1997), the extension process had been commenced in 54 villages. Of these, 37 have progressed to the stage of producing Village Fisheries Management Plans, and 30 have established Village Fish Reserves, the first such community-owned Marine Protected Areas (MPAs) in Western Samoa. Features, requirements, and potential problems associated with the establishment of community-based MPAs are discussed.

Introduction

As in many other Pacific Islands, catches of fish and shellfish have been declining in the lagoons and inshore reefs of Western Samoa for many years (Horsman & Mulipola, 1995). Reasons for this decline include overexploitation, the use of destructive fishing methods (including the use of traditional poisons, bleaching agents and dynamite), and environmental disturbances. The decline in fish stocks is of particular concern in coastal communities where subsistence catches of seafood provide a traditional and valuable source of protein. In Western Samoa, the subsistence catch has been estimated at about 4600 tonnes per year (King, 1989), nearly twice as much as the present commercial catch of approximately 2600 tonnes (A.Mulipola, pers.com.1997).

In most countries, government responses to falling subsistence fish catches involve setting up public awareness programs and enacting national laws to protect fish stocks. However, due to many factors, including under-resourced enforcement, and particularly lack of community ownership, these actions are rarely successful. In some cases, attempts are made to involve communities in working with government authorities on a cooperative basis (co-management). Often, community consultation is used merely to seek approval for courses of action predetermined by Fisheries Authorities.

However, fishing communities are often repositories of valuable traditional knowledge concerning fish stocks, and have a high level of awareness of the marine environment (Johannes, 1982). In addition, many subsistence fishers in tropical regions live in discrete communities which have some degree of control, either legal or traditionally assumed, of adjacent waters. Together, these factors provide an ideal basis on which communities can be encouraged and motivated to manage their own marine resources.

In the community-based fisheries extension program in Western Samoa, each village accepting the extension program was encouraged to analyse its fishing practices and develop a community-owned plan with undertakings to introduce appropriate village laws and pursue other conservation measures.

Reciprocally, the Fisheries Division gave undertakings to support the community by providing technical advice, and by assisting with the development of alternative sources of seafood. Village communities decided on many different undertakings, ranging from enforcing laws banning destructive fishing methods to protecting critical habitats such as mangrove areas. An unexpectedly large number of villages have chosen to establish Fish Reserves (in which all fishing is banned) in part of their traditional fishing areas. This paper reports the authors' experience with the establishment of these community-owned Marine Protected Areas (MPAs).

The fisheries extension program

The fisheries extension strategy was based on the belief that, regardless of legislation or enforcement, the responsible management of marine resources will only be achieved when fishing communities themselves see it as their responsibility. Accordingly, the strategy focused on mobilising each community through direct contact with key village groups. A culturally acceptable extension process involved recognising the village council (fono) as the prime instigator of change, while still allowing ample opportunities for other community groups (including women and untitled men) to participate. The developed extension process from initial contact with the village to the production of a community-owned Village Fisheries Management Plan is summarised in Figure 1, and described in detail in King and Faasili (1997).

Following an indication of interest, a village meeting was arranged to provide the community with information to allow them to either accept or refuse the extension program. If the village council (fono) decided to accept the process, it was then asked to arrange for meetings of several village groups, including women and untitled men. These groups held separate meetings to analyse the condition of their marine environment and fish stocks. Each group decided on key problems, determined causes, proposed solutions, and planned remedial actions. These were written (as a problem/solution tree) on a portable white board by a trained facilitator. Finally a Village Fisheries Management Advisory Committee (FMAC) was formed with three people nominated from each group. The FMAC members (assisted by Extension Officers) prepared a draft Village Fisheries Management Plan for discussion and approval by the village fono.

The Village Fisheries Management Plan was in the form of an agreement between the village and the government in that it listed the resource management and conservation undertakings of the community, and the servicing and technical support undertakings required from the Fisheries Division. If the plan was accepted, the fono then appointed a Fisheries Management Committee to oversee the working of the plan.

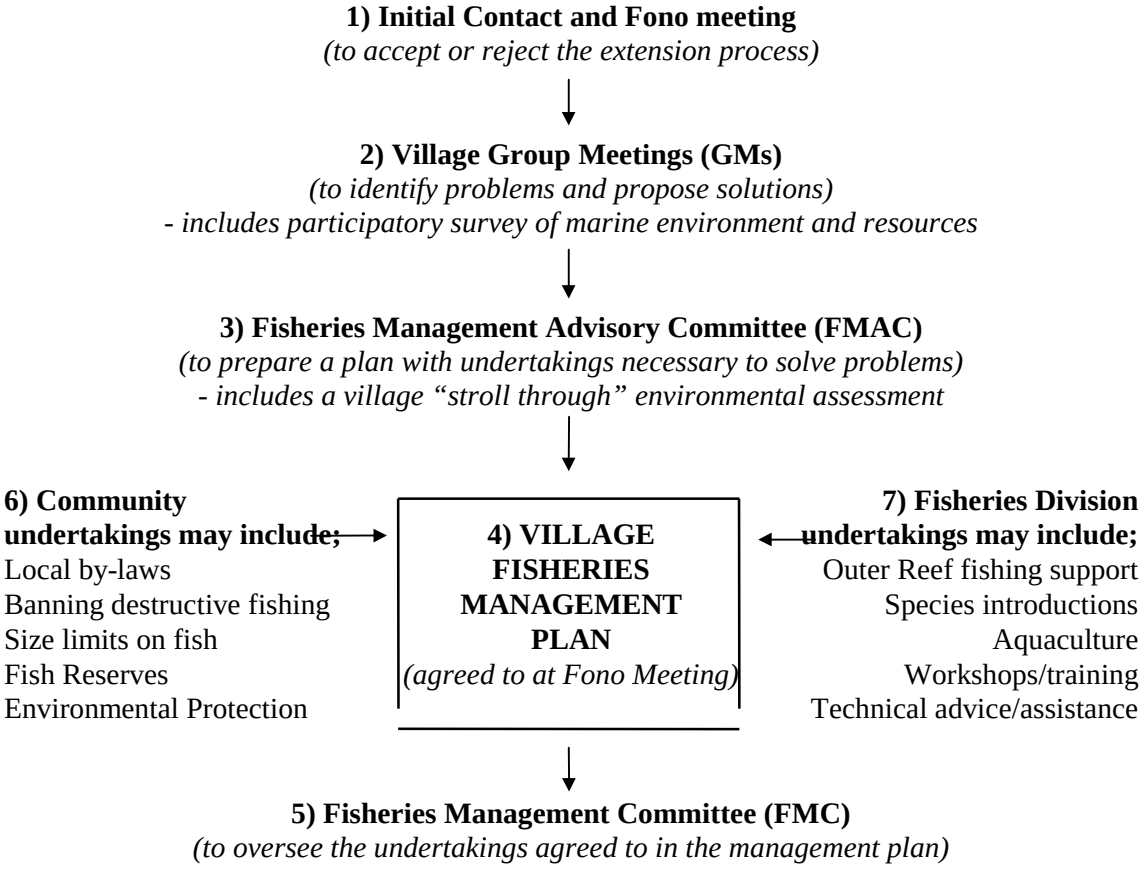

Figure 1: *The Fisheries Extension Process in Western Samoan villages.*

Discussion

In their Village Fisheries Management Plans, communities have included undertakings to support and enforce Government laws banning the use of chemicals, dynamite and plant-derived poisons (ava niukini) to kill fish. Many villages have banned traditional destructive fishing methods such as the smashing of coral to catch sheltering fish (*fa'amo'a* and *tuiga*). Most villages have made their own rules to enforce National laws banning the capture of fish less than a minimum size, and some have set their own (larger) minimum size limits. In addition, some villages have placed controls on over efficient methods of fishing, such as the use of nets and the use of underwater torches for spearfishing at night. Community conservation measures have included collecting crown-of-thorns starfish as well as banning the removal of beach sand and dumping of rubbish in lagoon waters. An unexpectedly large number of villages have chosen to establish Fish Reserves (MPAs in which all fishing is banned) in part of their traditional fishing areas.

Within the first sixteen months of full operation (after the trialing period, and up to August 1997), the fisheries extension process had been commenced in 54 villages, and, so far, 37 of these have progressed to the stage of producing their own Village Fisheries Management Plans. Of the villages with management plans, 30 have established their own MPAs. Although there are existing national MPAs at Palolo Deep and Saanapu in Western Samoa, these are the first community-owned MPAs in this country, and possibly the South Pacific.

Features, requirements, and potential problems associated with the establishment of community-based MPAs are related to village control over fishing areas, the size and nature of MPAs, the loss of traditional fishing areas, the long-term nature of potential benefits, access to alternative sources of seafood, the enforcement of regulations, and scientific support.

Village control over fishing areas

For a village community to set conservation regulations including the establishment of MPAs, it must have either traditional, defacto or legal control over its adjacent waters. In countries where this is not the case, it may be necessary to grant such rights (Territorial Use Rights in Fisheries, or TURFs) as proposed in the Philippines (Agbayani and Siar, 1994). In Western Samoa, villages have defacto control of adjacent fishing areas, and also have the ability to devise fisheries by-laws which, after government approval, become enforceable under national law (Fa'asili, 1997).

The location and size of MPAs

Location and size play an important role in the effectiveness or otherwise of MPAs. In cases where a village had proposed an MPA in an area consisting of bare sand or coral rubble, additional scientific information was provided to encourage the community to select a more appropriate site. Ideally, an MPA should be located in a position, and be of sufficient size, to encourage a significant increase in the numbers of sedentary species (including coral) and fish stocks. However, the biological requirement for a large MPA has to be balanced against the sociological disadvantages of banning fishing in a large part of a village's fishing area (see point c). In some cases neighbouring villages chose to establish a combined MPA, in order to increase its size.

In spite of the small size of many MPAs in Western Samoa, their popularity, the resulting large number, and the small distances between them, provide the possibility of establishing a network of fish refuges around the entire country. Although hard evidence on the benefits of marine reserves in increasing inshore fish production is lacking (Roberts and Polunin, 1991), intuitively, they provide the means by which adjacent fishing areas may eventually be replenished by breeding and larval transport (King, 1995, 1996). Studies in South Africa suggest that excess stocks of fish in reserves move to adjacent exploited areas (tagging experiments; Attwood & Bennett, 1994), and that even small reserves are beneficial for non-migratory species (Buxton, 1996).

The loss of traditional fishing areas to sectors of the community

The declaration of an MPA in village waters will usually deny members of the community access to part of their traditional fishing areas. When the area of the MPA is small, relative to the total fishing area, this is unlikely to be a problem. However, some villages in Western Samoa wanted to ban fishing in their entire lagoon area. In such cases, although young men would still be able to fish beyond the reef, women and the elderly would be denied access to shallow-water areas in which to fish. In particular, women who traditionally collect sea-cucumbers and molluscs in subtidal areas would be disadvantaged. Extension staff were often obliged to curb over-enthusiasm for large MPAs, and ask community leaders to reconsider the effect of having large MPAs on women and the elderly. The possibility also exists that having a large MPA would force members of that village to fish in the waters of neighbouring villages, thereby increasing the potential for conflict.

The long-term nature of potential benefits

It was found that some communities had optimistic views on the time required for fish stocks to rebuild their numbers in depleted areas. To avoid unrealistic expectations, all communities choosing to establish MPAs were informed that it may be several years before fish numbers increased in such areas, and, even then, there would be no certainty that this would result in improved fish catches in areas adjacent to the MPA.

Access to alternative sources of seafood.

Many conservation measures, including preventing destructive fishing methods and imposing fish size limits, as well as establishing MPAs, will cause a short-term decrease in catches. However, as many subsistence fishers require seafood for their families on a daily basis, it is unreasonable to expect communities to adopt conservation measures, which will, at least initially, reduce present catches of seafood even further without offering alternatives.

Accordingly, the extension program in Western Samoa included the development of alternative sources of seafood to those resulting from the present heavy and destructive exploitation of near-shore reefs and lagoons. The alternative seafood sources identified were **1)** the diversion of fishing pressure to areas immediately beyond the reefs through the introduction of medium-sized, low-cost boats, **2)** the promotion of village-level aquaculture, and, **3)** the judicious introduction of new (exotic) or depleted species.

The enforcement of MPA regulations

The prime indicator of success in the fisheries extension program was the number of villages which not only continued with the undertakings and activities agreed to in their Fisheries Management Plans, but enforced their own regulations. In most villages with plans, village councils have actively enforced their owns rules, and have applied severe penalties for infringements. People fishing in MPAs have had traditional fines of pigs or canned goods imposed on them by the village council. In addition, some villages have made their village rules into Fisheries By-laws (Faasili, 1977), in order that these can be applied to people from other villages.

Scientific support

Scientific support is required to advise communities on the placement of MPAs, monitor biological changes within MPAs, and collect data on fish catches in areas adjacent to MPAs. In Western Samoa, scientific input was also required to encourage the development of alternative sources of seafood including diverting fishing pressure away from heavily exploited inshore areas to areas immediately beyond the reefs (see point e). It is doubtful that community-based fisheries management would continue on a sustainable basis without such ongoing support.

A side benefit of working closely with fishing communities is that the collection of scientific data on subsistence fisheries is greatly facilitated. A trial run in Western Samoa involved senior high-school students keeping a "weekly fishing log" of all fishing activities (fishing methods, effort and catches) in their own household or extended family (King, 1995). Such a survey could be repeated at intervals over the year in order to detect seasonal variations in catches. A surprising amount of information, and even estimates of sustainable yield by area, may be gained from such extensive surveys on subsistence fisheries. Where data are collected from different areas with similar ecological characteristics it may be possible to apply a surplus yield model (over area rather than time) to estimate not only the sustainable catch, but also indicate villages where resources are presently under pressure.

In summary, 30 community-based MPAs have been established in Western Samoa. As the MPAs are being managed by communities which have a direct interest in their well-being, compliance with bans on fishing is high. In spite of the long-term nature of potential benefits, enthusiasm and continuing commitment to community-based MPAs also appears to be high (a formal assessment of this will be completed before the end of 1997). Although many of these MPAs are smaller than the biologically optimal size, their large number, with small separating distances, provides the possibility of establishing a network of fish refuges around the entire country. Such a network may provide the means by which adjacent fishing areas are eventually replenished with marine species through reproduction and larval transport.

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Community-based MPAs

Features, requirements and potential problems

Village control over fishing areas
Village must have either traditional, defacto or legal control over its waters.

The location and size of MPAs
Suitable location (eg. not just coral rubble or bare sand)
Suitable size (may be social disadvantages in large MPAs)

The loss of traditional fishing areas
Locking up large parts of a village's lagoon may disadvantage

- the elderly who cannot fish beyond the reef.
- women who collect invertebrates in subtidal areas.

The long-term nature of potential benefits
Unrealistic expectations, on the time required for fish stocks to rebuild, must be avoided.

Alternative sources of seafood.
Conservation measures will, INITIALLY, reduce present catches. Therefore, need alternative sources of seafood.

- the diversion of fishing pressure to areas immediately beyond the reefs through the introduction of medium-sized, low-cost boats,
- the promotion of village-level aquaculture, and,
- the judicious introduction of new or depleted species.

The enforcement of MPA regulations
Experience suggests that villages actively enforce their owns rules, and apply severe penalties for infringements.

Scientific support
Scientific support is required to advise communities on

- the placement of MPAs,
- monitor biological changes within MPAs, and
- collect data on fish catches in areas adjacent to MPAs.

Tool 2

Enterprise Development as a Conservation Incentive

Conservation of a rare palm species through enterprise developments

Kathy Fry, Suliana Siwatibau and Cathy Clarkin
Foundation of the Peoples of the South Pacific International
Regional Office, Vanuatu

Introduction

The term "conservation enterprise" usually refers to a business activity that is established with the primary objective of promoting the conservation of a particular resource or eco-system, and a secondary objective of making at least a modest profit to sustain the conservation incentive and contribute to the economic well-being of the resource owners. Conservation may result either from activities that relieve pressure on the target resource or from carefully managed use of the target resource itself. This case study is based on the latter example of a conservation enterprise but with the added challenge of establishing an enterprise structure that will not only promote conservation through its activities, but also utilise the enterprise profits to finance additional, non-profit conservation activities. This paper attempts to highlight the particular difficulties, requirements, and feasibility of interlacing enterprise and conservation so closely by presenting a case study of Island Palm Products (IPP). IPP is an FSP initiated conservation enterprise that exports seeds of Vanuatu palms and in doing so raises money for the conservation of an endangered endemic palm tree.

Background to the enterprise

The Foundation of the Peoples of the South Pacific International (FSPI), is a regional Pacific NGO whose members are independent national Pacific affiliates and have been implementing extension activities in integrated rural and community development throughout the Pacific for more than thirty years. Small enterprise development and sustainable resource management are two important sectors in the FSPI programme portfolio, so the marriage of the two as a conservation tool is a natural progression in the FSPI development evolution.

From 1992-95, FSPI managed a USAID funded "Profitable Environmental Protection" (PEP) project which was intended to establish and trial models of enterprises that would directly promote the conservation of threatened resources in certain Pacific countries. The project was never implemented in full because of the withdrawal of USAID funding from the Pacific region. Nevertheless, there were some interesting models initiated, one of which is the subject of this case study.

The conservation target: *Carpoxylon macrospermum*

Listed as a highly endangered palm by the International Union for the Conservation of Nature (IUCN), the beautiful Carpoxylon palm is of a monotypic genus endemic to Vanuatu (ANNEX I). In terms of evolution, it is interesting in that it has no close relatives in the palm family. It was first described by botanists in 1875 from a specimen collected on the southern island of Aneityum in 1859. Later attempts to find it on Aneityum failed and it was therefore thought to have been extinct until its "rediscovery" on the island of Santo in 1987 by Australian botanist John Dowe. The latter reported its occurrence only in cultivation. Another botanist reported its occurrence in Tanna also in cultivation. It was thought that there were no more natural stands left.

A nationwide survey mounted by FSP and led by Dowe found a total of 26 mature fruiting trees in natural stands in three southern islands and some 113 mature fruiting trees in cultivation or escaped from cultivation in a total of nine islands. Since then a few more trees have been reported in cultivation in another three islands.

The population and social survey found that the palm was cultivated mostly by men for a range of uses including the following: the ripe fruit for tobacco pipe; the dead leaf top for a broom; the leaf sheath for a bowl, shovel, mat or baby bath; the young fruit and the seedling for popular and nutritious snacks; and the bark for medicine and contraceptives. The fruit of the palm also serves as a source of food for land crabs and flying foxes, which in turn are eaten by villagers.

Preserving the Carpoxylon palm in-situ will have a broad conservation impact by promoting the protection of its natural habitat - the rainforest. *Carpoxylon macrospermum* prefers well-drained, moist, rich soils on valley slopes, in riverine areas and coastal forests. It grows best in sheltered partially shady locations. Healthy stands have also been found in abandoned settlements in the high, cooler interland of Malekula. The seedlings tend to grow close to the mother trees in amongst the forest undergrowth, on ground well furnished with leaf litter and humus.

The FSP survey identified the palm's broad ecology and gross morphology, and made observations on flowering and fruiting habits, using these to attempt to identify variability. It found a marked difference in tree height between the Tanna population and the rest of the country. There was, however, very little if any other easily observed variability. It also found that the natural stands seemed to be regenerating moderately successfully with a ratio of 2:4:13 of adults:juveniles:seedlings. However the stands were so scattered and the sizes so small that the long term viability of the population was not assured.

Because there were so few mature trees left, it was important to establish the genetic variability of the species in order to ensure that what still existed was entirely protected. The survey conclusion was that the palm was highly vulnerable and approaching extinction. FSP contracted the Australian Institute of Marine Sciences (AIMS) to complete a DNA analysis on samples collected. This confirmed the existence of only three genetic varieties of the palm. All three occurred in only one island, Tanna, while only one of them occurred in all the other islands. One variety was identified as originating from only one cultivated tree in a village in Tanna.

There are several issues that would raise serious concerns about the future of the *Carpoxylon* palm in Vanuatu:

- the population survey found that the natural population totalling 26 adult fruiting trees, existed in very small and widely scattered stands of adult trees. This restricts cross fertilisation and maintenance of a healthy population with a good stock of genetic variability;

- little is yet known of the flowering, pollination and reproductive system of Carpoxylon, ie extent of cross fertilisation, what size cross breeding population is needed for viability in the long term, etc.;

- while the rate of regeneration observed during the survey showed it to be moderately successful, this does not guarantee long term viability if the total size of the population is insufficient anyway;

- since the individual populations do not appear from the DNA analysis to contain much variability, the species is vulnerable to drastic changes in environmental conditions.

- the forest areas in which the three DNA varieties exist in Tanna are being cleared for agriculture purposes. The natural stand in Futuna consists of only five adult fruiting trees in a forest area that is

dwindling in size due to agriculture clearing. Only in Aneityum is the forest less threatened by clearing. However the population there seems to be of only one DNA variety and therefore still vulnerable to extinction with drastic environmental changes.

Clearly the population studies both in the field and through the DNA analysis showed the urgent need for action to save the palm and to conserve what little variability is left. Traditionally, the approach would have been to find some international funding agency to finance the necessary activities for its protection. However, the PEP project had a clear mandate to develop profitable enterprise as a tool for conservation.

Development of the conservation enterprise

The first strategy in designing a viable conservation enterprise is to determine what and where the economic value of the resource lies through market research. If there is no market, then there is no potential conservation enterprise, but merely a conservation project to be funded by grant assistance. If there is an economic value significant enough to provide an incentive for preserving the resource through sustainable usage and management, then there exists the possibility that one can establish an enterprise whose profits will not only provide conservation incentives to the resource owners, but also finance all or part of supplemental conservation activities.

As the domestic uses identified for *Carpoxylon macrospermum* were mainly for subsistence purposes, FSP had to look further afield for economic markets for products directly linked to the palm. Initial market research identified a potential model on Lord Howe Island (Australia) where the marketing of seedlings of the endemic Kentia Palm has been developed into a multi-million dollar export business. The success of this business, however is based on the particular quality of this palm to be a hardy and attractive horticulture specimen suitable for decorations in indoor offices and shopping centers. The adaptability of the Carpoxylon palm to such extreme ex-situ habitats would have to be trialed before this market could be approached.

Market research also revealed that there was enough of an interest from overseas palm collectors willing to pay a considerable price to obtain the seeds of the Carpoxylon palm from the endemic source in Vanuatu to make this the base economic strategy for a conservation enterprise with the target being *Carpoxylon macrospermum* and its habitat. Therefore, the two-fold objective of the conservation enterprise was established : **through the sale of *Carpoxylon macrospermum* seeds, to create local economic incentives and awareness that will promote the conservation and replanting of the Carpoxylon palms, and to earn profits that could subsidise in-situ conservation activities for the palm.**

A palm specialist was engaged to advise on suitability of seed collection and local nursery establishment. He recommended collection only from cultivated trees in order not to jeopardise chances of regeneration of the natural stands. In order to effectively control this restriction, it was determined to collect seeds only from the islands of Malekula and Pa'ama where no natural stands were known to exist.

A nurseryman dealing also in palms was engaged to advise on seed collection, storage, packaging and export. He also advised on seed germination, pricing of the seeds and suitable overseas agents to contact. It was important that reliable retailers be identified who would not undercut the market.

A trial run was made of seed collection, appointment of a local supply agent to purchase from villagers, packing, and exporting. The seeds were exported to retailers in Queensland, Hawaii and California. Feedback from these retailers was very useful in guiding the project on improving services such as the selection of fresh seeds, husking of seeds, packaging for shipment, and methods of shipment.

Germination trials were run to be able to predict viability of seeds related to shelf life. Germination rates were found to be variable for the different sources. The rate from the main source for export seeds, however, were found to be high at 80 percent and more. This gave a measure of confidence in the reliability of the export seeds.

Seedlings and plants were also distributed to interested persons to grow in a wide range of conditions in order to test the performance of the palm under cultivation. Some seedlings and plants were also sold locally to gauge the local market potential.

Based on the preliminary enterprise and scientific research, FSP felt there was enough evidence that both economic and conservation mandates could be successfully combined for a start-up enterprise, and a registered company, Island Palm Products (IPP), was established under an FSP trading arm known as Island Conservation Initiatives.

IPP was capitalised with a total of about US$50,000 from a USAID grant in October 1995. A business manager was hired from overseas in April 1996, but because of the restricted growing season of the Carpoxylon palm, full business activities did not initiate until about August 1996, when the first product shipments went overseas. Thus, Island Palm Products has only been effectively trading for about 13 months.

To date, the enterprise has experienced a total loss of about US$21,000 due to the initial start up costs for marketing, trials and product purchases before any product could be sold. Because of the seasonality of the Carpoxylon seeds, product lines were added to include the marketing of other palm and horticulture products, as well as novelty items such as T-shirts. Thus the 'conservation' component is marketed as well as the resource itself. Table I below illustrates clearly both the seasonality problem as well as the increased sales with the introduction of new product lines. Decreased sales are also an indication of the small client base and saturation of the market after the introduction of a new product line, thus indicating a need to look at expanding both the client base and repeat sales.

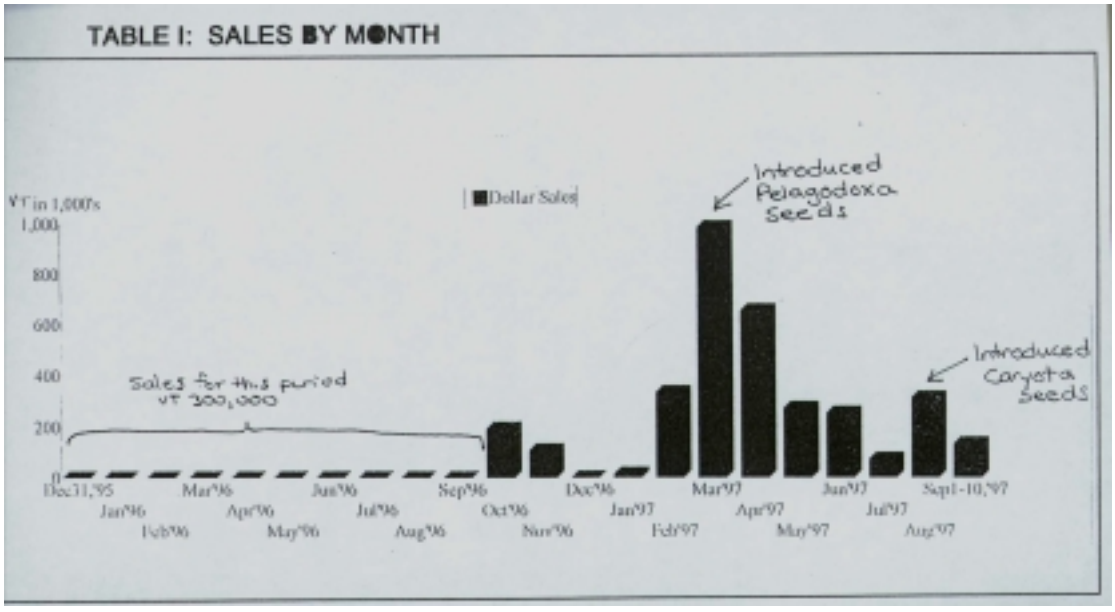
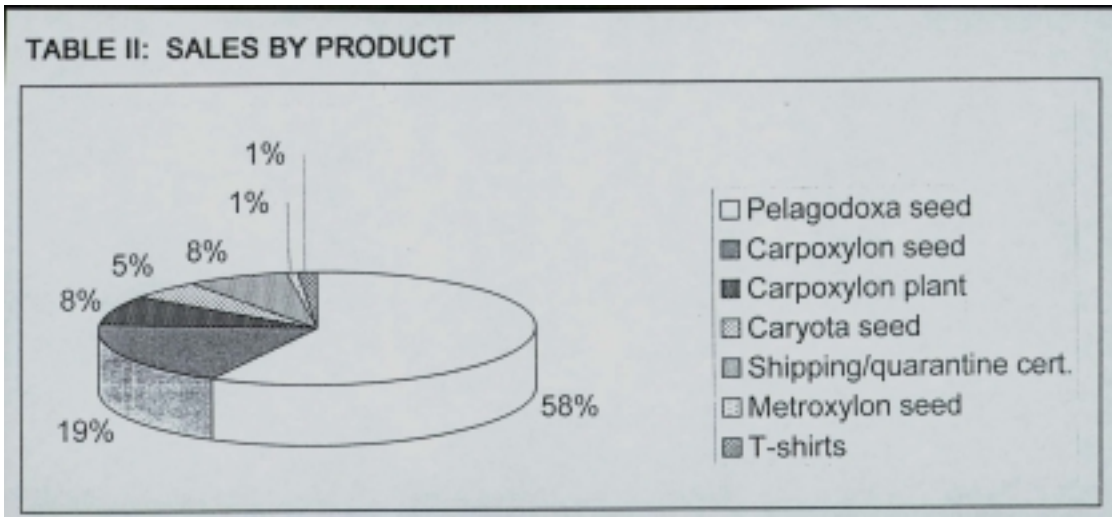


Table II shows that diversification to other products has expanded the income potential for the enterprise.



There is potential to investigate and test markets for more value added products as well, such as the sale of seedlings and young plants, particularly as horticulture specimens. However, to expand into some of these markets will require an investment in long term plant endurance trials and marketing promotion. The diversification into the export of other collectable palms and plants driven by market demand is a good indication that a niche market has been identified that could support an expanding regional enterprise with national subsidiaries.

Conservation impact of the enterprise

Even though the enterprise has not to date produced profits to finance conservation activities, there has been considerable impact on the conservation of *Carpoxylon macrospermum* through the nature of business development alone:

- Local sales promotions, such as participation in National Environment Week, articles in the local paper and talks with local organisations such as women's clubs, Kiwani's, etc. have increased the awareness of the rarity of the palm and the importance of saving it in Vanuatu. Plantings by individuals in both rural and urban areas has been encouraging. The Vila Town Council has purchased over 200 juveniles and planted them along roadsides and in front of the nation's parliament house. Other local entrepreneurs have started nurseries to market the palm locally as a houseplant and garden plant. There is a definite notice of national pride in conserving and promoting a rare palm unique to Vanuatu.

- Overseas collectors have become aware of the existence of *Carpoxylon macrospermum* and have requested seeds for their collections. Carpoxylon palms are now being grown in the USA, Thailand, New Caledonia, Australia, Germany, Venezuela, South Africa and Fiji. With the quantity of seeds and seedlings sold and planted to date, the world population of this palm has already increased multi-fold to expand the chances for species survival.

- The Government of Vanuatu has included information about the palm in the education materials produced by the Environment Unit and the Education Department, and have become actively involved in its cultivation through germination trials at the Agriculture Department's experimental station. They are active members of the Conservation Committee established by FSP/Vanuatu and will be partners in the design and implementation of the conservation strategy.

- Interest and skills in seed collection and preservation and nursery development has developed in Vanuatu among resource owners and other entrepreneurs, not only for palms, but for other plants that may have an economic horticulture value as well.

- Interest in seed export of rare native trees in a sustainable manner is beginning to spread to other Pacific countries with requests for advice and assistance.

- Experience in pricing of plant seeds and seedlings, as well as other aspects of dealing with sophisticated international markets is being developed.

- Germination trials required to determine the shelf-life of seed exports have resulted in more than 1,000 plants being raised that are to be used for in-situ conservation activities, eventually to be funded from the enterprise profits.

Lessons learned

Capital

- Because the enterprise was established with grant capital rather than loan or entrepreneurial capital, there was the tendency to forego stringent requirements for business feasibility studies up front. While we feel the use of grant funding for conservation enterprise capital is justifiable, particularly where the enterprise is very experimental in trying to prove a model for future replication, having had better feasibility studies would have given us greater guidance in terms of expectations and projections for the business.

- It is important that NGOs promoting conservation businesses seriously consider investment capital in strict business terms as an investment of their own assets and expect a profitable return on their capital that can be re-invested in other development or enterprise ventures, whether the enterprise is owned by themselves or by communities. If capital invested is considered as an expendable grant rather than investment capital, then the business is not replicable unless each subsequent business has the same access to grant funding. However, if the enterprise can exhibit a return on venture or loan capital invested, then it will prove a viable model for subsequent enterprises to be replicated with loan or venture capital from a variety of sources.

Extraordinary Costs and Requirements

Conservation enterprises will always have extraordinary burdens taxing the viability of the enterprise by nature of trying to fulfil the two objectives of conservation and profit. Although any responsible enterprise should carry out many of the same activities for the long term sustainability of their resource base, most would consider these activities expendable or not cost effective. Where the burden is extraordinary for conservation purposes only, then consideration should be made to account for these separately and to fund with grant support.

Conservation Research: The IPP enterprise required research and investigation into the genetic variability of *Carpoxlyon macrospermum* in order that the enterprise not only did NOT threaten the survival of any genetic variations, but actually promoted the conservation of all genetic varieties as well. As it was discovered that there were three distinct genetic varieties occurring on only one island and only one variety in all other islands, the enterprise strategy was restricted to collect and market seeds from only the variety with the broader scope in cultivated stands. The studies to determine genetic variation were expensive, amounting to more than US$40,000 for population, DNA and morphology research and analysis. However, there should be a further obligation of the enterprise to promote the cultivation of the

two other genetic varieties and eventually the interbreeding between the three varieties to strengthen the genetic constitution of *Carpoxylon macrospermum* as a species. This would not only contribute to the conservation of the palm, but also provide an advantage to the enterprise by protecting its source product from disease and also giving it another two varieties to market to palm enthusiast clientele.

Conservation Awareness and Education: It is important that IPP invest in the conservation education and awareness activities for their suppliers so that the eventual success of the enterprise is less likely to place additional stress on the resource to be conserved. For example, the conservation strategy included collecting seeds from only cultivated stands so as not to interfere with natural regeneration. This was controlled somewhat by initiating marketing activities on two islands where there were only cultivated stands. However, this created an imbalance between those communities who owned natural stands and could not benefit from the income from seed collecting. Conservation education played an important role in explaining this strategy, but the enterprise is still looking at ways to make this a more equitable situation through the financing of a long term conservation strategy in which more resource owners can participate. IPP also spends considerable time and money contributing to community and public education to raise awareness about the conservation of the Carpoxylon palm. Activities might include involvement in Environment week, printing posters, talking to schools and service clubs and working with the Conservation Committee.

Enterprise Expertise

Because most conservation and development agencies are non-profit, they will have little in-house private sector business management expertise guide them in the development and management of an enterprise. Most professional enterprise expertise that could be contracted will have a natural tendency towards the maximisation of profits with little compassion for the conservation objectives of the enterprise; thus, it may be difficult for the non-profit agency to supervise or regulate the enterprise component effectively. FSP is dealing with this by establishing business arms, such as IPP, that will cultivate in-house private sector expertise that can understand and support conservation and development objectives as well as promoting good business practices. Another way to bring on professional private sector expertise is to establish a Board for the conservation enterprise that includes business savvy people as well as development and conservation expertise. A good source for this is to look to local social services clubs such as Kiwani's, Lions, or Rotary whose members are usually business people interested in development.

Marketing

The golden rule of any business is 'Know your market, sell your market". The most critical activity for IPP's survival centers around marketing: identifying and expanding sources for sales, promoting the product, servicing the market for repeat sales. This takes into account reliability of product in terms of orders fulfilled promptly, correct packaging for protection of the seeds and seedlings during shipment, and providing services to clientele for facility of payment. In addition, IPP has invested considerable time and expense in marketing materials such as professional glossy brochures, newsletters and a Website to promote their product and services. IPP has also used the conservation aspects of the enterprise as a marketing appeal, assuming that some additional sales will be generated through the conservation appeal to clientele. Likewise, the high cost of the products is justified in part by the conservation objective of the enterprise.

Diversification of product

IPP found that, although it intended to market only the *Carpoxylon macrospermum* products, the infrastructure of the enterprise put it in a position to be able to easily respond to market demand for other palms and horticulture products. IPP's response to this market opportunity has given it a more stable and secure financial base. In expanding to these new markets, IPP has to be careful to obtain conservation

advice on the impact on any new product just as it did with the Carpoxylon palm. Even though a marketing strategy may seem harmless at first, such as marketing seeds from a single cultivated specimen of a rare palm that is not endemic, an unexpected market "hit" may cause other competing enterprises to procure seeds from sources that should be protected in other countries. Potential downstream and domino conservation impacts have to be considered carefully before any marketing strategy is adopted. This may include discussing regulatory requirements with national governments.

Rural Enterprises

As with any enterprise which is trying to inject income generating opportunities in rural areas, there are the usual problems to overcome in dealing with remote and scattered villages without access to roads or phone communications. In order to facilitate training and communications, IPP established local middleman agents on six different islands which are paid on a commission of product delivered. These agents facilitate liaison between IPP and the local suppliers because they have better access to communications and shipping, and can easily and quickly travel to the remote locations of the resource owners. They are trained by IPP to provide training to the resource owners in conservation awareness as well as how to collect and process seeds.

Middleman Function

In an enterprise structure where the resource base is in a rural area, as will be the case with most conservation enterprises, FSP found that it was critical to establish itself as the middleman element because it was the initiator who could understand and protect the dual objectives of the conservation enterprise. In particular, the importance of links with and understanding the demands of sophisticated international markets was beyond the capacity of a rural based enterprise. Thus, we did not try to establish a community owned or cooperative enterprise from the beginning as the managers would not have had the overall perspective for management, marketing and conservation. IPP, as the middleman, will eventually train local staff from within. As the business proves its viability, IPP will hand over the enterprise to local ownership under a profit sharing scheme. This will ensure that the business continues as a sustainable function, as this opportunity for additional income for the resource owners will rely on this middleman function to maintain the markets for their product.

Profits

There is diverse opinion about non-profit agencies owning profit making enterprises. However, one can point to traditional models that have been accepted since the history of development assistance. Women's organisations have run handicraft enterprises and governments have owned airlines and utilities companies, to name a few. What is most important is not profit-making, but how profits are used. For government owned businesses, there is usually a dual objective to provide a service not taken up by the private sector and to earn revenues to subsidise government expenditures. Similarly, women's handicraft shops are established to provide a middleman outlet for rural producers and suppliers, with modest profits helping to finance the salaries of development workers or the cost of a headquarters' office.

We feel that it is important for NGOs to consider taking up the ownership roles in conservation enterprises as it will provide a responsible middleman function to promote and regulate both conservation and development objectives. Additionally, it will promote a new model for NGOs to become more independent in their core funding by utilising profits to help subsidise not only their conservation objectives, but their development objectives as well.

Financing Conservation Activities From Profits

The objective in the establishment of IPP was to set up a structure whereby 50 percent of the profits would be invested in pure conservation activities that had no profit potential. A conservation committee was established consisting of FSP/Vanuatu, the Environment Unit, the Departments of Agriculture and

Forestry to plan and direct the conservation activities and handling of funding. Expectations were raised that profits from IPP would be realised much sooner than actually happened. However, a certain percentage of profits need to be invested back into the enterprise in the early years to ensure its sustainability and growth. It is now realised that there will be a substantial gap between enterprise establishment and the availability of profits to fund significant conservation activities. The latter will have to be supplemented by grant funding if they are to be implemented in a timely manner.

About the Authors:

Cathy Clarkin has been the General Manager of Island Palm Products for the past seven months. Prior to joining IPP, Cathy was a senior associate with Environ, an environmental and health science consulting firm in Washington, DC, USA. She holds a Master of Science degree in environmental science from the University of North Carolina (1991) and a Bachelor of Science degree in chemistry from the University of Illinois (1989).

Kathy Fry is the Regional Manager for FSPI based in Vanuatu. She has managed various FSP country and regional offices and projects in the Solomon Islands, Kiribati, PNG and Vanuatu since 1979. She holds a Master's degree in International Administration from the School for International Training, USA (1980).

Suliana Siwatibau is an international consultant associated with FSPI . She was the FSP project manager for the USAID funded Profitable Environmental Protection (PEP) project until 1995, and is now involved in a range of environmental management and community development activities in the region. She has both a Bachelor and Master of Science degree in Botany from Auckland University (1962, 1964).

Cost-effective management of marine conservation areas in Palau, Micronesia

Tom Graham and Noah Idechong
Palau Conservation Society

Adalbert Eledui
Koror State Conservation and Law Enforcement

Charles Cook
The Nature Conservancy

Abstract

Palau has a substantial and growing system of locally managed marine conservation areas. The challenge now is to devise cost-effective means of managing these areas. In those areas where marine-based tourism is a substantial use, management costs can be covered by fees collected from tourists, with revenue left over as resource rent for local communities. But in Palau's more remote areas, opportunities for revenue generation from conservation areas are fewer, making it more difficult to justify both the costs of management and the protected status of the areas. Tourist-based sportfishing is one opportunity being explored in some of the more remote areas.

Introduction: Conservation Area Development in Palau

Listed in Table 1 and shown on the map on the following page are the areas of the Republic of Palau receiving some degree of environmental protection. These areas fall under any of three jurisdictions: the Palau national Government, the local state Governments, of which there are sixteen, and traditional authorities.[4] The areas range from what could be called "preserves," in which harvest and human disturbance are severely restricted, to areas in which only certain activities are restricted, some during only certain months of the year.

Table 1 includes all the areas of Palau that have legal status as conservation or protected areas, but there are other areas that have no special status and that are not subject to formal management plans, but that are, in fact, specially managed with conservation objectives in mind. Examples are the Rock Islands near the urban center of Koror and the extensive reef areas in the far north of the archipelago. Throughout this paper, the term "conservation area" is used to describe both the formally-established areas listed in Table 1 and the *de facto* conservation areas such as the two described above. Palau's successes and challenges in managing both these types of areas are the focus of this paper.

Kelleher and Kenchington (1992:1) note that until recently, most marine protected areas throughout the world aimed to protect particularly valuable areas, and were generally small. The establishment of "large, multiple use protected area[s] with an integrated management system providing levels of protection varying throughout the area," is only a recent development. The vast Great Barrier Reef Marine Park is one example of the latter type. Palau is a small country. Its inshore waters are divided among its 16 states, with rights to "own" the resources of those waters accorded by the Constitution to the states. Managing large, multiple-use areas in Palau would necessitate managing the inshore and coastal resources of entire states and groups of states. But because inter-state management is politically difficult, the largest practical area of management is limited to a great degree by the sizes of the states. This

[4] Traditional leaders are often represented in the state Governments, so traditional authority is often expressed through state laws.

applies to the land, as well, making effective management of whole watersheds a considerable challenge. Some of the advantages and disadvantages of such decentralized management are discussed below.

Local initiatives

The establishment of conservation areas in the Republic of Palau has gained momentum during the last four years. Since 1994 five new areas—four marine and one mangrove—have received some level of protection. Both of the conservation areas established prior to 1994 are regulated at the national level. In contrast, all five recently-established conservation areas were created through local-level initiatives. Four were established by state governments and one by village-level traditional leaders.

Table 1. Conservation Areas of Palau

Area and Location	Primary Authority	Law	Effective Date	Approx. size (km^2)	Main Restrictions
Ngerukewid Islands Wildlife Preserve Koror	Republic of Palau	PDC 201 (24 PNCA 30)	1956	12	No fishing, hunting, or disturbance
Ngerumekaol Spawning Area (reef channel) Koror	Republic of Palau	PL 6-2-4 (24 PNCA 31)	1976	0.3	No fishing April 1 - July 31
Nationwide (trochus sanctuaries) areas in each of 16 states	Individual states	various state laws			No harvesting of trochus
Ngaraard Conservation Area (mangroves) Ngaraard	Ngaraard State	NSPL 4-4	1994	1.8	Only traditional, subsistence, and educational uses allowed
northern reef channels Ngarchelong and Kayangel	Ngarchelong, Kayangel traditional leaders	Traditionl bul	1994	90	No fishing in 8 channels April 1 - July 31
Ngemelis (marine area) Koror	Koror State	K4-68-95	1995	30	No fishing
Ngaruangel Reserve (atoll) Kayangel	Kayangel State	KYPL 7-02-96	1996	35	No entry, no fishing (3 years)
Ngemai Conservation Area (reef) Ngiwal	Ngiwal State	NSPL 7-004	1997	1	No entry, no fishing (5 years)

To illustrate the scale of these local initiatives, Palau's population of about 17,000 is divided among 16 states. More than 10,000 reside in the state of Koror, leaving an average of about 500 people in each of the other states. The states are really village-level political units, and except for the urbanized state of Koror, each state is typically made up of one to five coastal villages. Each state has its own government, including executive and legislative branches that incorporate both elected and titled leaders. Traditional leaders also exercise authority outside of the state government, but it can be assumed that initiatives of the state governments reflect the will of the states' traditional leaders to a high degree.

National roles

Although the only conservation areas established in the last four years are local-level ones, the national government's role in and degree of support for those initiatives has not been trivial. The Ngaraard mangrove conservation area was established pursuant to an agreement between the state, the national government, and the U.S. government to provide mitigation for a U.S.-funded road project. The national government has also undertaken resource assessments that have been used to prioritize the nation's resources in terms of biodiversity, productivity, and conservation value. The assessments have also provided important information to the states, giving them justification and direction for protecting their natural resources. In 1991, the Natural Heritage Reserves System Act was enacted with the intent of building a system of nationally-managed conservation areas. No areas have yet been designated under the system. The aspirations of the national government are also reflected in the recently-completed National Master Development Plan, which calls for an ambitious system of marine and terrestrial conservation areas. Currently, the national government, with support from the South Pacific Regional Environment Programme, is pursuing establishment of a community-based conservation area in the vicinity of Ngeremeduu Bay on the island of Babeldaob, an area recognized for its biological richness and productivity.

Non-governmental organization roles

Additional assistance in the establishment of local-level conservation areas has come from non-governmental organizations. The international organization, The Nature Conservancy, the University of Guam, and regional organizations such as the South Pacific Regional Environment Programme and the South Pacific Commission have provided the support and technical expertise to conduct resource assessments and advise the government in management issues. Those efforts contributed to the environmental aspects of the National Master Development Plan completed in 1996 (SAGRIC, 1996) and the recommendations of Palau's National Environmental Management Strategy (Maiava and ROP, 1994). In 1994, the non-profit Palau Conservation Society (PCS) was formed. It has taken on a variety of tasks, including educational campaigns, applied research, and assistance to the states in managing their natural resources. That work contributed to the three state-level conservation areas established since 1995.

Conclusions

What appears to be emerging in Palau in terms of marine resource management is a system whereby the states are exerting primary control with regards to access to the resources (including permit and fee systems, closed areas and seasons, and restrictions on fishing methods), while the national government is focusing on enforcement of restrictions on exports of marine products and controls over destructive fishing practices, especially since the passage of the Marine Protection Act of 1994.[5]

The collection of conservation areas emerging in Palau cannot be considered a "national system" of conservation or protected areas, as the establishment and management of these areas is not being guided by any national policy, plan, or law. Although there exists a law with the purpose of creating a national system of "natural heritage reserves," no areas have been designated under the system and the law provides few incentives for landowners (e.g., the states) to make such designations. Thus, despite all the effort devoted by the international conservation community towards "the creation of a global,

[5] The Marine Protection Act also provides for restrictions on minimum capture sizes of coconut crab, mangrove crab, lobsters, humphead parrotfish, and napoleon wrasse, seasonal fishing closures for five species of groupers and two species of rabbitfish, and restrictions on the use of certain types of nets. Enforcement of these provisions has strengthened substantially in the last couple of years.

representative system of marine protected areas" (Kelleher and Kenchington, 1992), the recent progress in Palau has been largely accomplished at the local level, responding to local concerns. To be sure, many of the local initiatives were aided by organizations with objectives at the national, regional, and global levels. But such assistance has been mostly limited to technical and financial support for local initiatives. It was not spent convincing the communities of the need to protect their natural resources.

The recent progress in establishing locally-managed conservation areas in Palau is encouraging in that:

1. The limits to productivity of natural resources appears to be well-recognized (i.e. the "conservation ethic" appears to be alive and well in Palauan communities).

2. The local Governments, including both elected and titled leaders, appear to have ample motivation, public support, and legal standing to take action with regard to conservation of their natural resources.

However, the lack of national coordination in the establishment of conservation areas has several disadvantages:

1. It may result in a "non-system" of conservation areas that does not take into account the ecology of the archipelago as well as it might. For example, working on such small scales, it is difficult to take into account water currents, such as with regard to pollution and sources and sinks of pelagic larvae. Similarly, many major watersheds are shared by two or more states, making it difficult for downstream states to control upstream effects on their resources.

2. The body of restrictions associated with such a "non-system" of conservation areas may be complex and seemingly inconsistent. And without a coordinating body, informing the public of the various restrictions will be difficult. This may not be an overwhelming burden for local users, who are largely restricted to their own and neighboring states, but it could be a substantial burden for tourists and the tourism industry. Visiting scuba divers and sportfishers, for example, may have to obtain access permission from several different states.

3. Economies of scale will make cost-effective management of small, local-level conservation areas a considerable challenge. In the worst case, each state (representing only a few hundred people) will have to support its own institutions, personnel, and operating costs for monitoring, enforcement, and other management needs.

This last challenge—finding cost-effective means of managing Palau's conservation areas—is the focus of the remainder of this paper. It includes both the design of efficient management systems and the development and control of uses that bring the best returns.

The challenges of cost-effective management

Palau has several advantages in terms of being able to afford to conserve marine areas. [6]

[6] Without going into detailed discussion on fisheries management strategies or the rationales for marine protected areas, some explanation of these terms is necessary: Our term "to conserve marine areas" really includes three strategies being implemented simultaneously. The first is putting some areas off-limits to fishing. Even where the sole use of a resource is extractive fishing, the rationale for managing such areas is discussed by, among others, Roberts and Polunin (1991) and Plan Development Team (1990). The second is limiting the overall harvest of inshore resources, through restrictions on both harvest and exports. The justification for doing this in any fishery should be apparent. The third is restricting fishing in order to accommodate activities that provide better returns, such as diving and (catch-and-release) sportfishing. Because all three strategies presumably *improve* the returns from the resource, to implement them is not costly, but beneficial, and use of the phrase "to be able to afford to conserve" is misleading.

First, Palau is fairly lightly populated. Palau's resident population of 17,000 shares about 500 km^2 of land and 2,500 km^2 of reef and lagoon. Currently, as much as one third or one half of Palau's inshore fisheries harvest is exported, mostly to Guam and Saipan. In short, Palau has not yet found itself overfishing to such a degree that decisions to limit fishing are politically impossible.

A second advantage is Palau's appeal to tourists and its proximity to the important tourism markets of East Asia. Visitation to Palau is growing at more than 10 percent per year. Virtually all visitors come primarily for marine-based activities—mostly scuba diving and snorkeling. Sportfishing is a minor but growing activity. Most visitors are from Japan (mostly scuba divers) and Taiwan (mostly non-scuba divers). Assuming that Palau can control the negative impacts associated with these largely non-extractive activities, they should provide a greater return than fishing for export.[7]

Another category of uses of marine resources that has substantial economic potential in Palau includes ecological research, bio-prospecting (e.g., for development of pharmaceuticals), and contributing to global conservation. Palau contributes enough to the world's pool of biodiversity that the international research, bio-prospecting, and conservation communities have considerable incentive to invest in Palau.

In spite of these prospects, there are considerable challenges to putting in place cost-effective management systems for Palau's marine resources, and its conservation areas in particular. The first problem is that the advantages noted above are not evenly distributed throughout the country. Virtually all tourism-related businesses are based in Koror, Palau's only urban center, and few tourists venture beyond the boundaries of Koror and Peleliu States. Thus, most revenues (as well as the associated social and environmental costs) from tourism flow into Koror and only trickle indirectly to the other states.[8]

The second problem is that, as discussed above, local-level conservation initiatives suffer from poor economies of scale. Unless a reasonable degree of inter-state cooperation and national support can be achieved, each and every state will have to support the whole of the institutions, personnel, and operations necessary to manage their natural resources.

The variety of challenges faced by Palau in managing its marine conservation areas is illustrated in the very different situations in three areas of Palau:

1) the Rock Islands and southern lagoon area shared by Koror and Peleliu states, with their rich marine resources that draw tourists and their proximity to Palau's urban center;

2) the states in the far north of the archipelago, with large reef areas, small resident populations, narrow economic bases, and substantial fishing pressure from outside; and

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However, in the short term, the costs of conservation often outweigh the benefits, which is the main reason these types of initiatives are so difficult to implement—transitions are difficult because while society as a whole will benefit, certain groups, such as commercial fishermen, may lose, at least in the short term. In Bermuda, for example, which was in a similar position to Palau about 10 years ago, the Government recognized that tourism offered a much greater return than extractive fishing, and found it necessary to buy out its commercial inshore pot fishermen, at US$10,000 to $75,000 per permit (Butler, 1993).

[7] In 1985, 13,300 visitors to Palau spent a total of about $6 million, generated about $3 million in wages, salaries, and profits, and generated about $2 million in Government revenues (SAGRIC, 1996). Visitation has since increased to about 50,000 per year. The gross wholesale value of Palau's reef fish exports probably does not exceed $500,000 per year.

[8] All the state governments, except perhaps Koror, are supported primarily by grants from the national government, which generates much of its income from the tourism industry.

3) the remote Southwest Islands, with their tiny populations, subsistence economies, and critical habitats for regional populations of sea turtles and birds.

Booming dive-based tourism in the Rock Islands

The Rock Islands, a group of limestone islands and patch reefs rising from a shallow lagoon within a barrier reef, are world renowned by diving enthusiasts, natural science researchers, and the international conservation community. For Palauans, the Rock Islands are a center for recreation, a source of subsistence and commercial fisheries, and the foundation for economic development—marine-based tourism.

The Rock Islands have been proposed as a conservation area in several reports and planning documents, but to date the area has not received any special status. The state of Koror, however, which, along with Peleliu State, owns the Rock Islands and surrounding waters,[9] implements a range of rules and policies within the area that serve to protect the natural resources, encourage sustainable use, reduce conflicts among user groups, and extract resource rent. Within the Rock Islands, there are three formal conservation areas: the nationally-managed Ngerukewid Islands Wildlife Preserve and the Ngerumekaol Spawning Area, and the state-managed Ngemelis no-fishing zone (or "pro-diving zone").

Management of the Rock Islands is being done in the face of rapidly increasing use by increasing numbers of user groups. These groups include:[10]

- Palau and foreign residents visiting for:
  - recreation, including camping, picnicking, boating, fishing, and hunting
  - subsistence and commercial fishing and hunting (sometimes with foreign employees)

- Tourists visiting for:
  - scuba diving
  - snorkeling, picnicking, and boating
  - sportfishing

- Foreign tuna fishing fleet:
  - commercial fishing for tuna and other pelagic species[11]
- Palau and foreign students visiting for:
  - educational experiences

- Visiting and resident researchers conducting:
  - basic ecological research
  - management driven research
  - bioprospecting

[9] The Constitution of Palau grants the states "ownership" of the living and non-living resources of the waters out to 12 miles from the outer reef.

[10] One group not of concern is inhabitants; the Rock Islands have been uninhabited for at least 100 years.

[11] Foreign fishing is restricted from fishing within 12 miles of the reef, but the fleet, with its pollution and aesthetic impacts, is based in Koror, adjacent to the Rock Islands. Such offshore fishing could also conceivably remove some fishes—particularly sharks—that are an attraction to divers, especially to the extent that the fleet poaches within the 12 mile limit.

Another but less direct user group is the international, regional, national, and local communities that benefit from the maintenance of the biodiversity and associated values of the Rock Islands.

The annual number of tourists visiting Palau is about 55,000 and increasing about 10 percent per year. Virtually all tourists' marine-based activities take place in the Rock Islands, an area of about 750 km^2, and centered at about 20 dive, snorkel, and beach sites.

Three central challenges of management of the Rock Islands are:

1. ensuring that the activities listed above do not cause excessive damage or depletion to the resources (i.e., maintaining sustainable levels of use),
2. minimizing conflicts among users, and
3. ensuring that an adequate portion of the benefits from resource use accrue to the resource owners.

Except for the two national conservation areas, the national size restrictions and closed seasons on certain species, and the national enforcement program, all three objectives are being addressed by a Koror State conservation program that includes the following elements:

- A permit system in which visiting scuba divers (US$15) and fishers (US$10), and any commercial fishers must pay a fee for access to the waters of Koror State
- Enforcement of the Ngemelis no-fishing zone around the area's most popular dive sites
- Installation and maintenance of mooring buoys for dive boats
- Improvement and maintenance of beaches and picnic facilities
- An enforcement program that includes 15 officers

Issues that are still of concern include:

- Much of the money spent by tourists is going to foreign-operated businesses
- Palau residents seeking recreation are being crowded out of the Rock Islands by tourists
- Increasing numbers of inexperienced visiting snorkelers are causing damage to reefs
- Increasing numbers of visiting scuba divers are being crowded into a limited number dive sites, with attendant congestion, impacts to corals, and decrease in diver satisfaction
- Exclusion of local fishers from dive sites is causing friction
- Increasing beach use, including building of summer houses by residents, may be causing negative environmental impacts, including disturbance of sea turtle nesting activity

The issue of who benefits from tourism is a complicated and contentious one. The national government enforces business ownership and participation laws that aim to ensure that Palauans benefit from foreign investment and to maximize employment opportunities for Palauans. But ownership of businesses, especially in the tourism sector, is often only nominally Palauan, with operations and employment dominated by foreigners. The user permit fees collected by Koror State provide one way to guarantee that at least some portion of tourist investment stays in Palau, and in this case, that it accrues to the resource owner, the state. Much of the permit fee income, however, is directed (both by law and by necessity) to the conservation program administered by the state. At current levels of fees and of visitation, it appears that about 75 per cent of the fee income is funneled back into management of the Rock Islands, leaving the rest available as resource rent for the state of Koror. The other owner of the Rock Islands, Peleliu State, does not yet administer any permit system and collects no direct fees from tourism, fisheries, or research use. Peleliu is, however, developing a conservation strategy that will affect management of the Rock Islands.

Some of the management issues listed above may be addressed by a pending Koror State law that would extend the permit fee requirement to all non-Palau users of the Rock Islands, not just scuba divers and fishers. It would also reserve some areas of the Rock Islands for use by Palauans only.

Assessing sportfishing potential in the far north

The waters and reefs of the far north of Palau are shared by the states of Ngarchelong and Kayangel. There are two conservation areas: the Ngaruangel Reserve (an atoll) and the northern reef channels. The second is not a well-defined area, but comprises the eight main channels within a large reef complex decreed by the traditional leaders to be off-limits to fishers during the months that groupers are known to spawn there. In addition, there is an agreement between the two states that establishes common fishing grounds that may be shared by fishers of the two states.[12] Kayangel regulates through a permit and fee system most marine-based activities, including commercial fishing and virtually all tourist activities, including sportfishing, diving, swimming, and sightseeing.

Currently, there is very little visitation to these areas by tourists, primarily because of the distance from the urban center of Koror. Inshore fishing for subsistence and commercial purposes is an economic mainstay of both states. Because of its relatively productive fishing grounds, these waters are also subject to substantial fishing pressure from people residing outside these states.[13]

Both states are looking for economic development opportunities. For the last three years, the Palau national government, Palau Conservation Society, and The Nature Conservancy, with support from the U.S. Government, have been collaborating to develop tourist-based sportfishing in these northern waters (Division of Marine Resources, 1996). In addition to the business aspects of such development (e.g., setting up local businesses and promoting the industry abroad), an important requisite of successful development is that the local governments have management systems in place that can: 1) ensure that a fair share of the benefits from the industry accrue to the states and local residents, 2) provide for the safety and other aspects of the satisfaction of the visiting anglers, and 3) ensure that the inshore fish resources remain abundant.

The challenge of ensuring an adequate flow of benefits from the industry to local residents is being addressed with two strategies. First, the state-level permit systems (already in place for Kayangel, pending in Ngarchelong) would funnel some tourist dollars directly to the states. Second, legislation is being considered at the national level that would, among related things, provide that only Palauans can act as sportfishing guides (although business ownership might be the more important factor controlling the flow of benefits, restricting employment to Palauans is much less problematic than restricting business ownership).

Safety and related issues—basically, providing for a reputable local sportfishing industry—is being addressed through pending national legislation that would establish safety standards and require certain certifications for guides and boat operators.

The last requisite - abundant fish resources - is being addressed with several strategies. First, a fundamental objective of developing sportfishing in the area is to encourage local commercial fishers,

[12] There are fairly discrete and well-recognized marine boundaries between each of Palau's 16 states. At the most simplest level of fishing rights, fishermen are restricted to the waters of their own states. However, a variety of cultural and practical factors result in considerable crossing of state boundaries—some invited or tolerated and some not.

[13] These "outsiders" include both people with no connection to those states and people who consider themselves to be from those states, most temporarily residing in Koror for employment opportunities and claiming fishing rights in their home states.

whose catches are sold in Koror and exported to Guam and Saipan, to do less extractive fishing and to instead participate in the tourism industry as sportfishing guides. Second, Kayangel's closure of Ngaruangel atoll was done to provide for the recovery and maintenance of depleted fish resources. Finally, both states are considering the establishment of zones in which only catch-and-release fishing would be allowed.

In implementing these local-level conservation initiatives, the states are coming up against problems related to their small size. States with populations of only a couple hundred people simply cannot support the vessels, personnel, and operational costs to patrol vast marine areas. One option is to have local fishers patrol their own waters while fishing—something that can be effective only if the fishers feel a certain degree of ownership in the management system. This is done to a certain extent in the northern waters, but its effectiveness is limited by the small size and speed of the fishers' boats. Coordination among the states would also improve the economies of scale. Finally, support from the national government is an important option for improving the management capacity of the states. The office of the Attorney General does not generally prosecute violations of state laws, leaving the small state governments—most without a lawyer on staff—to bear the entire burden of enforcing and prosecuting their laws. And the deterrent that can be leveraged by the states is limited by a law that puts a monetary limit of $100 on penalties for state laws. Relaxing this limit, assisting the states with prosecution, and extending its on-water enforcement resources to the states are some of the actions the national government could take to support local-level conservation initiatives.

Another tool the states have at their disposal is their traditional systems of resource management. In most states, there is a high degree of overlap between the traditional leadership and the elected leadership, with some government positions reserved for titled leaders. Traditional leaders are not constrained by the US$100 limit on penalties (US$1000 is the limit on traditional fines). The authority of traditional leaders is certainly not as strong as it used to be,[14] but conflicts, especially within a given state, can often be quickly resolved through traditional means.

Searching for options in the remote Southwest Islands

Palau's Southwest Islands are 300 to 500 kilometers from the main archipelago and are culturally distinct. The six islands are divided into two states, Hatohobei and Sonsorol. The total resident population in the islands is less than 100 people. The economies are mostly subsistence, with outside family links and the nationally-funded state governments providing economic inputs. A priority of both states is to identify economic opportunities in the islands that will lure people back to the islands from the urban center of Koror, to which most have migrated. The natural and cultural resources of the Southwest Islands have been found to be exceptionally valuable (Maragos *et al*., 1994). The islands' contributions to the region's green sea turtle and seabird populations are especially important. Current threats include over-harvesting of sea turtles, seabirds, and the eggs of both by local residents (the turtles are often shipped to Koror). Being so remote, the islands are also subject to substantial poaching from the nearby countries of Southeast Asia (often with the consent of local residents, who trade with these visitors). Reef fish, giant clams, and sea cucumbers are the main targets. Helen Atoll, which has a substantial reef system but only a few residents, has been fished (legally) off and on by foreign boats supplying Asia's booming market for live reef fish—primarily groupers and napoleon wrasse.

Numerous recommendations have been made to provide some degree of protection to the natural resources of the Southwest Islands, especially for Helen Atoll, which has little land available for human

[14] That the force of traditional authority is tenuous is reflected by the fact that although it was the chiefs of Kayangel that first put Ngaruangel atoll off-limits to fishing, in order to ensure compliance, the chiefs requested the state Government to enact a law that mirrored their edict.

habitation (Maragos *et al*., 1994; IUCN, 1991). Maragos *et al*. (1994) recommended that the atoll be managed as a pristine ecological research site. Opening the area to international researchers would be not only a purpose of protection, but part of the means for doing so. The presence of the researchers would help deter poachers, and the research dollars spent at the site would trickle into the local economy and provide some local employment.

There are other initiatives in Palau that take advantage of international interest in the conservation and biodiversity values of Palau. There is an agreement between Japan, the U.S. and Palau to build a coral reef research center in Palau that would serve the region. The center should attract both "research" and "conservation" funds from international sources. The center could provide the catalyst for establishment of research facilities in the Southwest Islands.

Bio-prospecting has been active in Palau for at least the last decade, but Palau has seen few benefits. The Japanese have commissioned regular expeditions to Palau to "investigate" its marine resources, but the activities do not seem to be controlled by the Palauan government and little information is available on the purpose or results of the research. Similar but more transparent investigations, sponsored by the U.S. Government, have been made during the last six years. A locally-based organization, The Coral Reef Research Foundation, under contract with the U.S. National Cancer Institute, collects marine organisms in Palau and elsewhere for screening for potential activity against cancer and the AIDS virus. Palau, however, has no agreements in place with either the collectors, the U.S. government, or third party recipients that dictate how the benefits from any successful developments will be shared.[15]

Conclusions

The recent progress in the establishment of locally-managed conservation areas in Palau is an indication that local communities have the motivation and means to establish such areas and to pro-actively manage their natural resources. A foundation of both their motivation and means is the constitutional provision that provides for state (i.e., village) ownership of the nation's inshore marine resources—first, by affording some degree of enclosure to the resources, and second, by empowering the local governments with the authority to control access to those resources.

Palau is in the fortunate position of being able to choose among a wide range of alternative uses of its marine resources. Fishing for subsistence and for sale—both locally and for export, is the current dominant inshore use in most of Palau's states, and both the national government and some state governments still have policies and plans in place to further develop this sector. Only the two states that share the Rock Islands are currently benefiting to any significant degree from Palau's vast tourism potential. Efforts are underway, however, to develop tourism opportunities in other states, including the northern reefs with their potential for a significant sportfishing industry. Palau is also in a position to take advantage of the appeal of its natural resources to ecologists, bio-prospectors, and the conservation community.

While tourism and research-related uses of Palau's marine resources are relatively non-extractive compared to fishing for export and they may bring substantial economic benefits, they also present a host of new challenges to resource managers. These include the need to keep a fair share of benefits within

[15] Notwithstanding this lack of agreement, the U.S. National Cancer Institute, which conducts the screening, does, in fact, exercise a policy of sharing any benefits derived from the collections with source countries. But since samples and information derived from samples are often passed to third parties such as academic research institutions and pharmaceutical companies, ensuring that Palau benefits from profitable developments is virtually impossible under present circumstances.

Palau and directed to the resource owners, minimizing conflicts among user groups, and controlling the negative environmental impacts stemming from these activities.

Some of Palau's states have made substantial progress in improving their management capabilities and taking on these issues, but their small sizes necessitate innovative enforcement techniques, better coordination among the states, and legal, technical, and financial support from the national government.

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Avian Community-Based Ecotourism
ACE PROGRAM - Pilot Program for Fiji

Australian Foundation for the Peoples of Asia and the Pacific

Introduction

Increasingly in the Pacific Region, NG0s, Communities and Governments are seeking ways to protect the environment while generating good, sustainable business income. This paper seeks to present a community-based, avian ecotourism pilot plan and strategy designed to achieve both aims.

Ecotourism has increasingly formed a major part of the economies of many developing nations in the last decade. Many smaller nations whose economies rely very strongly on tourism such as Costa Rica, Botswana, Nepal and Belize count ecotourism as their most lucrative sub-sector within the greater tourism sector. Much of the ecotourism dollar goes back into environmental management, and provides local providers, communities and Governments with a strong incentive for quality, environmental protection.

Within the ecotourism sector, avian ecotourism is increasingly becoming one of the most lucrative niche markets. In Costa Rica alone, avian ecotourism alone accounts for 35 per cent of the total ecotourism budget. Increasingly bird watching and related activities have become very big business in developed nations over the last two decades. In Europe, North America, Japan, Australia and New Zealand, the funds spent on birding activities is now estimated at approximately 750 million dollars/ year and growing. A wide variety of avian ecotourism ventures are now widely available through tourism companies in these developed countries. Besides providing bird watching tours in their respective nations, some tourism companies occasionally take tourists to developing nations on various avian ecotourism packages.

While many of the tourism companies which offer major avian ecotourism packages are based in the developed nations, an increasing number of local avian ecotourism ventures and opportunities are arising locally in developing nations. Many countries in Latin America and several nations in Africa have widely regarded avian ecotourism ventures which attract many tourists from Europe, North America, Japan, Australia and New Zealand.

Although there are some avian ecotourism programs of note in the Asia-Pacific Region, many factors have served to slow avian ecotourism growth. These include the scarcity of birds in general areas outside of national parks and preserves due largely to hunting and habitat destruction, lack of easy to use guide books for remoter areas, lack of local guides who know birds, and transport and time constraints.

In the Western and Central Tropical Pacific, only PNG and the USA State of Hawaii have formalised avian ecotourism tours which attract a high number of foreign tourists. These formalised birding tours to PNG are for the most part run from Australia and the United States. The nations of Fiji, Vanuatu, New Caledonia, Northern Marianas, Western Samoa and Tonga and possibly some territories have localised programs which foreigners may readily access, but their quality overall is modest.

AFAP and FSPI are seeking to lay the foundation for the establishment of a community-based, avian ecotourism program throughout the Pacific. AFAP, FSPI and FSP Fiji are now designing a model, pilot

program. This program, which will serve as a prototype model for the South Pacific, will initially be based in Fiji during the pilot phase. Fiji is a logical choice of a South Pacific country in which to inaugurate such a venture due to the excellent development of the tourism sector combined with fairly easy access to its substantial endemic terrestrial and local marine birdlife distributed across several key islands. Furthermore, the management of most species would be reasonably easy. While birdlife of Fiji is under constant threat, most species exist in large enough populations which, if properly managed, would thrive locally.

Through this avian ecotourism project, FSP seeks to find a means to protect island endemic birdlife while providing a simple, low impact and lucrative tourism market for local economies. Unlike many ecotourism ventures in developing nations which give little return to local communities, this venture will be designed to be managed by the communities themselves in conjunction with the local FSP offices and FSPI, yielding maximum local return.

General Background on Birdlife in the Pacific

Pacific Wide

In the island habitats of the tropical Pacific endemic birds have been locked in a constant struggle for survival in the last century. In over three dozen cases this struggle has ended in extinction. The rate of extinction has been worst in the Hawaiian Islands (20 extinct, >30 endangered), followed by Guam/Northern Marianas (five extinct, ten endangered), Tahiti/Societies, Tuamotus and Marquesas (four extinct, eight endangered) and the Federated States of Micronesia (three extinct, six endangered). Other critical problem areas are Wake Island, Western Samoa, New Caledonia and Palau.

On most small islands in the Tropical Pacific and even on the larger island groups of Fiji, Vanuatu, the Solomons and in Papua New Guinea itself, birds face a constant threat from habitat destruction due to slash and burn agriculture, logging, and beach front development; unregulated local hunting for food, pets and overseas trade; introduced species, pollution and vandalism.

Except for New Guinea Island, which has one of the Earth's most diverse and spectacular avifauna cultures with over 250 endemics, attention to the avifauna of other island states has been sporadic and often limited. The USA state of Hawaii, as well as Guam and other former or current American territories have inherited the legal framework of USA environmental law including the Endangered Species Act. This has allowed for strong conservation programs in some areas. The successful recovery and reintroduction program for the Guam Rail *(Rallus owstoni)* is a good example. Hawaii has undertaken a wide variety of species specific conservation initiatives, both successful and unsuccessful.

Vanuatu, Fiji, Tahiti, and New Caledonia have a history of notable immigrants usually Europeans taking an interest in birds, and writing guides and working with the Governments for protection.

The Solomon Islands and the Bismarcks are one of the least studied areas, with even new bird species discovered in Bougainville and New Ireland in the 1980's, and more rumoured to exist on the bigger islands.

Tonga, Kiribati, Tuvalu and many of Polynesia's and Micronesia's smaller islands do not have that many species, and only little attention has been paid with only Tonga having a very small indigenous guide of modest quality.

The birdlife situation in Fiji

Despite the clearing of forests for agriculture and the ravages of the mongoose *(Herpestes auropunctatus)* on the larger islands, Fiji has retained a rich and diversified birdlife. Fiji has 24 endemic species and a wide variety of pelagics, shorebirds and other nonendemic terrestrial avifauna. The endemic species are spread out over several islands including Kadavu, Ogealevu, Rotuma, Taveuni, Vanua Levu and Viti Levu.

The birdlife in Fiji has been extensively studied and documented. In the field it is generally accessible with most species easily located in suitable habitat. Also a very suitable local guide for terrestrial avifauna is widely available. It has good, concise descriptions, moderately good graphics and is very easy to take into the field (unlike Vanuatu's hefty tome).

The main islands of Viti Levu and Vanua Levu are home to most of the nation's endemics. The main problem for birdlife on these bigger islands is the introduced mongoose which has decimated ground bird populations. Most native rails have been wiped out on these islands even including the hardy and ubiquitous Purple Swamphen *(Porphyrio porphyrio)* and the Banded Rail (Rallus philippensis). However landbird populations on the other larger islands of Taveuni and Vanua Levu.

The following endemics and other key species are readily found on both Vanua Levu and Viti Levu:

Accipiter rufitorques--Fiji Goshawk
Ducula latrans--Barking Pigeon
Phigys solitarius--Collared ~Lory
Prosopeia tabuensis--Red Shining Parrot (possibly endemic; Tongan introduction ?)
Charmosyna amabilis--Red Throated Lorikeet
Vitia ruficapilla--Fiji Warbler
Clytorhynchus vitiensis--Lesser Shrikebill
Mayomis lessoni--Slaty Flycatcher
Myiagra azureocapilla--Blue-crested Broadbill
Myiagra vanikorensis--Vanikoro Broadbill (not endemic)
Rhipidura spilodera--Spotted Fantail (not endemic)
Petroica multicolor--Scarlet Robin (not endemic)
Pachycephala pectoralis--Golden Whistler (endemic subspecies)
Zosterops explorator--Fiji White Eye
Zosterops lateralis--Common White Eye (endemic subspecies)
Foulehaio carunculata--Wattled Honeyeater (not endemic)
Gymnomyza viridis--Giant Forest Honeyeater
Myzomelajugularis--Orange-breasted Honeyeater
Erythrura cyanovirens--Red-headed Parrot Finch (not endemic)
Artamus mentalis--Fiji Wood Swallow

The following endemics are readily found on Viti Levu only and/or surrounding small islands.

Ptilinopus luteovirens--Golden Dove
Prosopeia personata--Sulphur-Breasted Musk Parrot
Erythrura kleinscmidti--Pink-Billed Parrot Finch

On Taveuni and Vanua Levu, there are two endemics of note: the very beautiful and popular Silktail *(Lamprolia victoriae)* can be easily located as well as the equally magnificent Orange Dove *(Ptilinopus victor).*

On Kadavu and its outlayers there are three local endemics; the Whistling Dove *(Ptilinopus layardi),* the Kadavu Fantail *(Rhipidura personata)* and the Kadavu Honeyeater *(Xanthotis provocator).*

Isolated Rotuma is home to one island endemic; the Rotuma Honeyeater *(Myzomela chermisina).* Equally isolated Ogealevu is home to one local endemic, the Ogea Flycatcher *(Mayromis versicolor).*

One more endemic warbler, the Long-Legged Warbler *(Trichocichla rufa)* has only been scantily recorded on Viti Levu and Vanua Levu historically, and its status is unclear. In any case it is most unlikely to be seen.

These above of course all in addition to the many and varied pelagic, wader and shore bird species which can be seen throughout Fiji. Excellent rookeries for many terns, reef herons, frigate birds, boobies and tropic birds are scattered throughout the nation. During the boreal winters, Fiji is host to many northern waders who migrate south, and during austral winters to a few species which migrate north.

Avian Ecotourism in Fiji

Fiji's rich birdlife forms the basis for a major avian ecotourism project which could generate a lucrative income for some of many of the nation's isolated island communities. Fiji's tourism sector is already one of the most developed in the Pacific Region, and this coupled with the varied and accessible birdlife makes it an ideal candidate with which to launch this Pacific-wide pilot project.

The two big islands of Viti Levu and Vanua Levu offer a wide range of prospects for avian ecotourism development with substantial areas of intact habitat throughout both islands. The two big islands along with the two smaller islands Kadavu and Taveuni are all well positioned to combine bird watching for endemics with a variety of other ecotourism pastimes such as hiking, scuba, caving and relaxing in natural settings. Small islands like Ogealevu and Rotuma which are very isolated and have a very limited resource base, have the potential for a very lucrative industry on the basis that they are the only place on the planet which harbour their particular species, and people will pay to come and see these.

A typical tourist with a focussed avian itinerary has the potential to easily see 20 endemics and an additional 20-30 species in a typical week long visit. While not impressive by large tropical island (PNG) or continental areas, this number is still very attractive to the international birder especially due to the fact that the endemics simply can not be located anywhere else.

With the coordination of FSP Fiji and training provided by avian ecotourism specialists from New Zealand and Australia, various tourism packages can be easily developed. These tourism packages, once in place, will be marketed through the various avian tourism networks and ornithology groups around the world. Equipment such as spotting scopes and binoculars will can likewise be donated by groups in Australia, Japan and the USA.

The local communities on these islands would be the central focus this scheme, and tourism packages would be designed to meet communities needs and understandings. The communities would provide bird watching activities and bird watching guides, as well as have additional programs like bush-walking, snorkelling, and cultural events. Special focus will be paid on finding those activities which can target the skills women and children.

The tourists would pay a set package fee, a major portion of which would return to the community. The packages can be as simple as day trips, or with proper planning can last up to one month covering many key island locations, because avian ecotourism is such a niche market.

'ACE' Pilot Program Activity Description and Analysis

The Avian Community-Based Ecotourism (ACE) Program is detailed in the following Sections.

Objectives

Primary Objective

To design and promote a model program for avian ecotourism in Fiji which will provide a viable micro-enterprise to several rural communities on these islands while simultaneously promoting avian and forest conservation.

Specific Objectives

1. Identify the villages on Viti Levu, Vanua Levu, Kadavu, Taveuni, Rotuma, Ogealevu and other key islands where an avian ecotourism program is feasible. These islands have previously been determined by ornithologists to possess key bird species of interest to avian tourists;
2. Hold introductory workshops in those communities to introduced the concepts of avian ecotourism and conservation, and to learn about the importance of key bird species to local culture and tradition;
3. Establish village project action teams to develop the avian ecotourism project, and to help promote parallel avian conservation and awareness initiatives;
4. Take one participant from each village team and two government participants to New Zealand to train with the Department of Conservation and the Royal Forest and Bird Society in their model ecotourism and avian conservation projects;
5. Develop avian ecotourism design model for Fiji in cooperation with the village action groups, local tourism companies, local ornithologists, business leaders and other interested parties. A principal focus of this design will be on investment and marketing strategy. Another part of this design will focus on avian conservation initiatives;
6. Using the avian ecotourism design model, seek the necessary investment to establish community-based, avian ecotourism programs for Fiji.

Main Inputs

1. Training in avian conservation and ecotourism for two government officials, for six community trainers and for villagers in six isolated rural communities (in Fiji and in New Zealand);
2. Provision of Specialist Avian Conservation and Ecotourism Expertise;
3. Equipment for Avian Ecotourism and related Ecotourism Projects;
4. Workshop Materials;
5. Environmental Awareness and Educational Materials; and
7. Financial and Support Linkages with Major Avian Conservation and Tourism Groups in the Asia-Pacific Region

Main Outputs

1. Design and promotion of a model, community-based, avian ecotourism program for Fiji. This will lay the foundation for a major ecotourism initiative for Fiji and a model for the Pacific Islands. This will also be the first such initiative for the Pacific outside of Australia and New Zealand;
2. Training for at least four Village Workers and two Government Officers focussed on avian ecotourism and conservation;
3. Establishment of Village Action Teams in select villages on all the key islands, which will be able to carry out avian ecotourism and conservation initiatives;

4. A detailed Design Document and Marketing Plan for Avian Ecotourism in Fiji which details how a model operation will be conducted and managed, the sources of investment and the major national and international linkages to be established.

5. A detailed program of action to seek investment to establish the Avian Ecotourism Programs in Fiji.

6. A detailed, community-based conservation strategy for avifauna for Fiji.

Description of the Proposed Activity

Year 1

1. The first step will be to identify those villages on all key islands where a major avian ecotourism program is feasible. These islands have previously been determined by ornithologists to possess the key bird species of interest to avian tourists. The criteria for identifying the communities include the proximity to good birding locations, ease of access to the community, and the willingness of the community to undertake the requisite initiatives;

2. After these communities were identified, FSP Fiji will hold introductory workshops in those communities to introduce the concepts of avian ecotourism and conservation, and to learn about the importance of key bird species to local culture and tradition. This will be a two way exchange of information. The local knowledge and traditions about the birds are critical to the project's success;

3. Once the communities have been introduced to the concepts and wish to accept the project, a village project action team will be established in each selected village. These teams will develop and implement the avian ecotourism project, and will also help promote parallel avian conservation and awareness initiatives;

4. Once the teams have been formed, one participant from each village team along with two Government participants will go for a two week training course to New Zealand with the Department of Conservation and the Royal Forest and Bird Society. They will tour model ecotourism and avian conservation projects, and receive training in carrying out the necessary activities. Equipment such as spotting scopes and binoculars will be donated by the groups like the Japanese Ornithological Society or the Royal Bird Protection Society;

Year 2

5. Together with specialist expertise from New Zealand and Australia, local Fiji tourism groups, the Fiji Government, FSP Fiji, community leaders and the village action teams, a major design document will be drawn up for the establishment of avian ecotourism ventures in Fiji. Along with detailed information on the logistics of such ventures, the design would include a marketing and investment plan, a detailed conservation strategy and plans for possible expansion of the initiatives to other key nations in the Pacific. Special focus will be paid on finding those activities which can target the skills women and children;

6. Simultaneously with the above activity, FSP Fiji will form linkages in international avian ecotourism and conservation networks as well as general ecotourism and adventure travel networks.

Year 3

7. Carry out the recommendations called for in the Investment and Marketing Plans in order to establish the financial base for establishing the projects.

8. Initiate community-based, Avian Awareness and Conservation Projects called for in the Design Document.

Activity Implementation

Implementing Agencies and Arrangements

The implementation of this project will be carried out by FSPI and FSP Fiji in association with AFAP. AFAP, in October 1995, graduated to AusAID APSS (full accreditation) standing within the ANCP. By graduating to Program Funding status, AFAP and its affiliates in the FSPI network have shown our processes and procedures to be of very high and capable standards.

FSP Fiji, who was reviewed by the AusAID team, during our ORA-ORO review is likewise a very respected and capable institution. FSP Fiji has been involved in a wide variety of community projects in Fiji for over twenty years. These project activities have had a specific emphasis on enabling communities to plan and manage their own development activities.

Activities have included assisting communities to improve health and nutrition standards, to promote alternative education, to develop micro-enterprise schemes and to conserve the environment. All projects involve intense training of the community leaders, committees and interested parties to be able to conduct ongoing training in nutrition, agriculture, small business development, conflict resolution and associated subjects. Community motivation to understand the project and to 'own' the project is an essential component of FSP Fiji's activities.

Monitoring

Both experienced Government personnel and environment officers from FSP Fiji, FSPI and AFKP will be present at all critical stages of the project. Comprehensive training programs will also be incorporated before any specialised activities take place. FSP Fiji will submit six-month reports to AFAP and FSPI, and they in turn will submit annual reports to donors. An FSPI environmental officer will also make annual monitoring visits to keys sites.

Crater Mountain Wildlife Management Area (WMA) an Integrated Conservation and Development (ICAD) Project : Testing the Linkages Between Development and Biodiversity Conservation.

John Ericho and Paul Hukahu
Research and Conservation Foundation
Papua New Guinea

Introduction

The Integrated Conservation and Development (ICAD) hypothesis -testing of an idea or concept, when introduced in the 1970s, was an attempt to shy away from the exclusive zone concepts of running wildlife protected areas. The concept is to include the human component rather than exclude them from the conserved areas. The idea is that human beings must be the major actors in conservation from the inside rather than from the outside in the protected areas. The stake-holders must be trained to manage their resources sustainably over time. Several ICAD projects have been established and implemented in Papua New Guinea (PNG) for some time now. Crater Mountain WMA is one of the ICAD projects.

The Crater Mountain Wildlife Management Area (CMWMA) is a gazetted area which includes three provincial boundaries (Simbu, Gulf and Eastern Highland provinces). It has an area of 2700 km^2 and recognized as an area that has a high diversity of plant and animal life and the forest is unaffected by outside corporate influence except by the local people who use forest products for their sustenance. The gazettal allows the people to continue to practice their traditional way of utilizing forest products with minimal influence from the outside.

Goal

The Conservation of Biodiversity.

Objectives

Objective #1. “Increase the average annual per capita income of clans (land owing groups) over the next three years from the establishment of locally-owned research and ecotourism enterprises in the WMA.”

Objective #2. “Over the next three years, increase the level and range of understanding and skills of community residents who work in the research and ecotourism enterprises in the WMA.”

Objective #3. “Over the next three years, increase the number of decisions and actions which integrate the results of enterprise, biological and socio-economic monitoring programs into the working management plan.”

Objective #4 “Over the next three years, increase national involvement and human resource exchange within the WMA as teachers, trainers, and consultants work toward conserving natural resources in the WMA.”

It will be obvious that the ultimate goal is conservation of biodiversity while the objectives are development oriented. In this paper we will concentrate on the enterprise development and see how it relates to conservation.

The people have exercised their right and privilege to organize themselves into Management Committees in five main communities. These are Wabo in Gulf, Haia in Simbu, Herowana, Maimafu and Ubaigubi in Eastern Highlands. These committees have technical assistance from Research and Conservation Foundation (RCF) a national non-government organization (NGO) in collaboration with the Department of Environment and Conservation (DEC). With this technical assistance the people are developing the Crater Mountain as an Integrated and Development (ICAD) project as a business venture to enhance their livelihood.

Business Enterprise Development

The business ventures are threefold:

1. Tourism
2. Artifacts
3. Research as business

Tourism includes development of lodges and trails for adventure and nature seekers, while artifacts is geared for all types of visitors and research includes the development of research stations and protection of the undisturbed environment and plant and animal life. All of these are developing slowly due to limited funds and the peoples resistance to new ideas. Business development will be discussed later in detail.

Community Development Activities

Besides the enterprise development, there are other community development activities that field staff engage in. In Crater, we have volunteers placed in three of the communities to work with the people on community projects like airstrips, water supply, family planning, nutrition, general hygiene, adult literacy, number skills, assist at the local schools, assist at the health clinics. They also do community awareness on any of the issues that is deemed to be necessary, they conduct workshops like, 'What is a visitor?', 'What is service?', 'What is government?' 'What is business?' They also organize educational trips out of the community to bring them to the outside world so that they can appreciate what is happening from outside their closed community.

Management Capacity building

We have biologists as natural resource managers who are working with the Management Committees. These Committees meet monthly in each site to make decisions and debate issues, make laws and also police the laws. They are in essence constructing a management plan as they meet month by month and also convene at an annual meeting to decide on issues that affect the whole WMA. The biologists are working with the people building their capacity to enable them to manage the WMA in a sustainable way.

Monitoring and Evaluation

Monitoring and Evaluation is an integral part of the whole scheme of things. The monitoring scheme involves two segments. These are enterprise development and natural resource management. We have established a repertoire of data sheets for selected indicator species of animals and business activities. The data is entered into a database and statistics are derived to determine over time whether or not the immediate objectives (development oriented objectives) are being realized. That is to say we like to ascertain whether the enterprise activities are earning money for the communities. It is assumed if this level of economic enterprise can be sustained and expanded it would meet the peoples cash needs .

Natural resource data collected are also fed into the database. This portion of the data provides statistics on population levels, trends, migration routes, resource extraction figures, land use practices etc. The data could potentially also be fed to the Management Committees to incorporate into their management strategies to sustainably manage the WMA.

Enterprise Development

This section is about Enterprise Development or sustainable income generating activities in a Wildlife Management Area (WMA). Firstly, I will introduce you to the types of enterprises that are operating in the Crater Mountains and the forms of benefits they are bringing into the community. Secondly, I will briefly discuss the monitoring of socio-economic activities. Thirdly, I will outline some successes and constraints of setting up ecological-friendly enterprises in a WMA.

In the Crater Mountain Wildlife Management Area the people, with technical assistance from RCF and with community development assistance by US Peace Corps volunteers, have set up three types of business enterprises. They are Tourism, Artifacts and Research as mentioned above.

These businesses, though in their initial stages are doing well. Handicraft sales, being one of the major source of income in the Crater Mountain, earned K35,000 for Herowana village in four years ending last year (1996), whilst Haia and Maimafu Villages sold K800 and K1400 in the first six months of this year respectively. There is opportunity to maintain and expand to ensure that the artists get a continuous income from handicrafts.

For the Research Business Haia Village got more than K6,000 for the first six months of this year. The Management Committee gets 10 per cent of the fees while the rest goes to individual workers. The workers include carriers, guides and maintenance workers. Money for the Committee is used to pay for their allowances, stationary and reinvestment in their businesses.

The tourism business though not as polished as yet has received very good comments from a handful of tourists who have gone into the Crater mountains.

In addition, the people have started and are interested to venture into other businesses. Some of these businesses include, coffee, peanuts, livestock, and spices. Although coffee is growing well in the area, especially Herowana and Maimafu, and there is fertile land available to raise other cash crops there are still some constraints to successful business development in the Crater Mountains. The problems include; lack of transportation, lack of capital, lack of technical expertise, and lack of markets.

RCF is now assisting the people ease those problems by providing capital for infrastructural development, find markets for their products and provide technical advice for efficient management of their businesses.

On the whole the people's income have been raised to a reasonable level resulting in some spin off businesses. For example, in the case of a landowner clan business group of Haia, they have reinvested money from the guest house sleep fees to start other businesses. They have started a trade store and have put some money aside to start a fish project. They started the store business with K330.00 in February of this year (1997) and at the end of April 1997 they made a net profit of K281.70 bringing their total current assets to K611.70. They have decided to use the profits from the trade store and the guest house to expand their current businesses and diversify into other related businesses.

Another indication of the increase in the people's level of income is the increase in the rate of bride price payments. In Haia, before the people pay K200.00 to K500.00 for a bride. Today they are paying K1000.00 to K1500.00 for the same.

Whilst money is flowing into the community from these enterprises as well as other sources it is quite difficult to monitor/evaluate the effect of the rise in income and training on the people's lifestyle and therefore their activities on the environment. As such we have come up with a monitoring system.

Socio-economic Monitoring

We are training the locals to monitor the socio-economic activities so that when we leave they will be able to continue monitoring for their own benefit. However, one problem in regards to this is that the locals' level of literacy is very low and it will take them a lot of training before they are able to monitor the activities and use the information for themselves. Thus we are trying to train them through Adult literacy classes (USPC), leadership and TLO workshops, and other informal training.

Transparency

Some indication of successes:
1. The businesses are increasing income level of the community.
2. The people are trained by volunteers and project staff to successfully run those businesses. Training include basic bookkeeping, sales and marketing.

Constraints

1. Creating high expectations - people believe that the businesses will make fast money overnight. As it is taking time for benefits to accrue , especially the elders are impatient for financial benefits they had hoped to reap when they had declared their land to be included in the management area.
2. Ownership issues - people prefer clan-based businesses rather than community-based because of their traditional organizations. While they want to go into clan based enterprises they are not prepared to own and operate the three enterprises that the project is espousing. That is perhaps where the mistake is. The businesses may be the correct ones but if it's clan or family-based it might work. The community's resistance to communally own the three businesses. This may reflect the community politics and rivalry and traditional feudalism that exists within the communities. We need to be more sensitive to these undercurrent issues.
3. The people's literacy level is very low hindering business progress. Even though the will is there to do business the know-how is amiss and therefore the enterprises are slow in getting established. The business enterprises being established by the RCF need trained local people to run and our business development officers are working at it in various ways like, book keeping and numeracy courses and how to run small businesses. This means that for the enterprises to be sustainable our officers have to be there for a long time.
4. Threats from mining and logging agreements. There are definite threats from the logging and mining sector in the WMA. The government on the one hand agrees to gazette the area as a WMA and on the other hand gives licenses to logging and mining companies to operate in the WMA. The people are baffled and could not comprehend this. The people have only few choices, they either agree to allow the companies come (which is very likely as companies have more money than NGOs) or tenaciously disagree with the government and thus bring the wrath of the government on it as in Bougainville. Or they could seek help and influence government policy.
5. Leadership issues. The leadership structure in these communities is very fluid and are not static from generation to generation. A leader is "recognized" rather than "elected". This means that a would-be leader must earn that leadership. He must be an orator, fighter, and man with substance (wealth). The

men who accumulate or develop these attributes are recognized to be the leaders. There are some individuals who fulfill these criteria but the modern attributes that give that individual power is education and money. In line with their culture and community structure some individuals are accumulating wealth but the other dimension (education) is missing. We do really have leadership constraints and we need to scrutinize it more carefully and see how things can be best achieved for the time being.

Linkages and Summary

To summarize, the Crater Mountain Wildlife Management Area have three business enterprises operating, Research, Tourism and Artifacts which are boosting the local communities' income level. By monitoring income and expenditure of the community we aim to evaluate the benefits/losses of setting up the enterprises. Although at this stage we have realized some successes we still have some constraints hindering successful business operations. At this stage it is quite difficult to give a clear cut conclusion of the effects of introducing the enterprises to the local communities in the Crater Mountain Wildlife Management Area.

With the business enterprise development and other community development that is taking place in the communities, it is envisioned that the people will lead a relatively comfortable life and sit down and take stock of the importance of their natural resources. With the training received from the biologist natural resource managers they will themselves come up with sustainable management strategies so that the end result would be maintenance of conservation of biodiversity in the WMA.

BCN grants to develop enterprises highly linked to biodiversity

Hank Cauley and Diane Russell
Biodiversity Conservation Network (South Pacific)

Abstract

BCN is a US$20 million six year program funded by the US Agency for International Development, through the US-Asia Environmental Partnership. BCN is part of the Biodiversity Support Program, a consortium of the World Wildlife Fund, The Nature Conservancy and the World Resources Institute. Twenty sizeable grants have been given to organizations in seven countries to set up or maintain enterprises that are highly linked to biodiversity (see BCN 1994 and 1995 Annual Reports for more detail on the grant-making process). The bulk of the projects (50 per cent) involve harvesting or processing non-timber forest products (NTFPs). Another substantial portion (33 per cent) is eco-tourism projects. Two projects are setting up community-based sustainable timber businesses; one has set up a bio-prospecting agreement between a community in Fiji and a drug development institute, and another is setting up deep-water fishing enterprises with communities living around a community managed marine sanctuary. The 1996 BCN annual report provides more detail on these projects and on the program (BCN 1997).

The projects are as diverse as their landscapes. Butterflies are being "ranched" and sold by the Hatam and other Irianese peoples living in the vicinity of the Arfak Mountains Nature Reserve of Irian Jaya. Bees produce honey that is sold by the Batak and Tagbanua of Palawan, Philippines, and the Soligas around the Biligirirangan Temple forest in the Western Ghats region of Karnataka State, India. We also have some rhinos, silkworms that feed on old oak forests, 36 species of rhododendron, and an aromatic rhizome called jatamansi that grows in the highest villages of Nepal's Humla region.

Some learning gleaned to date from the program includes:

1. The need to work within the context of a long-term vision regardless of the funding period of the project. Where will the community be in the next generation? What are the short and long-term threats and opportunities?
2. Keeping a holistic vision: the enterprise(s) developed should fit within livelihood patterns, fill a niche in the local economy, and not be too risky. Careful planning on how returns and profits will be reinvested needs to occur at a very early stage. Attention to how groups and individuals use surplus and profits is essential. Conflict management strategies are needed to deal with disputes over participation, benefits and investment strategies.
3. The importance of adaptive management strategies: sustainability of supply, production capacity, and market links change over time. Community managed monitoring and adaptability are essential.
4. Understanding partnerships. External donors need to work with committed local partners: they have a stake and credibility. Partnership issues need to be carefully worked out at each level.
5. Work directly with traders and merchants where possible: One project in India has a contract with an ayurvedic medicine house. Another is working in partnership with an association of travel agents. In the Philippines, a prominent manufacturer of rattan furniture was tapped for advice on rattan value addition, while in Indonesia a project is working with a well-known designer of handbags and a retailer in Jakarta.
6. Educational and political links are critical: local people become aware of the value of intact forest; threats may be kept at bay for a period. For example, BCN staff and partners have worked closely with Department of Environment and Natural Resources (DENR) officials in the Philippines to push

ahead ancestral domain policies. Environmental education and respect for local environmental knowledge and practices is part of many projects.

7. Cross-site visits and discussions among local partners can be a good tool for building skills and confidence. Producing materials in local languages is also important.

BCN staff and partners discussed these and other findings during their presentation.

Bioprospecting as an Enterprise Tool for Conservation

William Aalbersberg (Chemistry Department)
The University of the South Pacific

Abstract

The Convention on Biological Diversity in granting national sovereignty to biological resources has also linked providing access to biological resources with reciprocal technology transfer. One natural method for achieving this is bioprospecting ventures which links communities and professional bodies in developed countries. Beyond a linkage that can promote technology transfer bioprospecting can also provide short, medium and long-term financial returns to communities and organisations that can be used in biodiversity conservation.

The University of the South Pacific through support of the Biodiversity Conservation Network has developed a bioprospecting project between Verata Tikina and Strathclyde Institute of Drug Research. This experience can provide lessons on how bioprospecting can be best be used to promote biodiversity conservation in the Pacific islands region.

Case Study on Substitution Income Generation through Community Fisheries Development: Arnavon Islands, Solomon Islands

Peter Thomas
The Nature Conservancy
South Pacific Office

Abstract

The Nature Conservancy and its partners in the Arnavon Islands Community Marine Conservation Area, Solomon Islands, have established two community managed co-operative fisheries centres in an attempt to develop a biologically and economically sustainable income source for two communities affected by the marine invertebrate harvesting restrictions imposed in the conservation area. The case study describes the background and rationale of the project, the model used and identifies fundamental issues which must be addressed by organizations contemplating such developments in the Melanesian context. It emphasizes the need for thorough community involvement in all phases of the project, careful evaluation of development options, objectives and costs, and realistic assessment of prospects of commercial viability as essential ingredients for success.

Paper on Enterprise Development as a Conservation Incentive

The enterprises described in this paper are initiated by the Solomon Islands Development Trust (SIDT) Conservation in Development Programme (CID) in central Bauro on Makira Island. CID programme is currently operating in partnership with funding for the programme has come primarily from the US based Mac Arthur foundation. Further funding and technical support has come from Biodiversity Conservation Network (BCN) in USA.

Solomon Islands Development Trust, (SIDT)
Conservation In Development Department (CID)

Abstract

The community-based enterprises that are described in this paper were initiated by SIDT/CID programme. Five enterprises were developed as conservation incentives in the Solomon Islands. Ngali Nut Enterprise, Eco Tourism and Bee keeping are located in Central Bauro Conservation Area on Makira Island. Eco Forestry, Paper Making and Butterfly Farming are in Malaita and Guadalcanal.

The reason why this tool is developed and used as a conservation incentive, is to show the rural communities an alternative means of using their resources wisely in a sustainable manner. By preserving the rest of the resources for the future generation and providing an opportunity that changes people's natural wealth to cash to meet family basic needs and other social services that improve and strengthens the quality of life at the village level.

In order to maintain the biodiversity, in the area, the country, or at the regional level, enterprises must be a community-based, owned, controlled and managed by the local people and design in such a way that equal distribution of benefits are shared among all stake holders. They need to viable for a long benefit and all partners who have been involved and supported the enterprises one way or another should be fully committed.

Background

Central Bauro Conservation Area in Makira Province have three ongoing enterprises which are currently operating and controlled by the indigenous people who lived in the area. The enterprises are located at three different sites in Central Bauro Conservation Area. The enterprises are Ngali Nut enterprise located at East Bauro a long the Warihito River, Eco Tourism is at Hauta area (highlands), and the bee keeping is at Arohane and Togori in the north coast area. The paper making enterprise is at Balai Village in Malaita Province and Paregho in the Western Province. Eco Timber production and Butterfly ranching are also found in various communities in the Solomon Islands.

The followings are some of the enterprises used to promote conservation in Makira and other parts of the Solomon Islands.

1. Ngali nut enterprise
2. Eco tourism
3. Honey production
4. Butterfly ranching
5. Eco timber production
6. Fibre paper making

Successes

Creates income generating opportunity for local communities in the area
Create employment opportunities for local people
Unites communities
Monitoring that ensure the enterprise will survive for a long term benefit
Community owns, controls, and manages the enterprise
Maintains long term biodiversity
Use of renewable resources
Alternative to logging
Revive traditional values
Change health standard in the community
Change peoples wealth to cash to improve well being of communities
Additional income generating source
Provide support to conservation community
Link communities to other sector of government and industry
Marketing secured

Warihito Ngali Nut Enterprise

Since October 1992, Conservation In Development programme have been working with a group of communities in Central Bauro on Makira Island and have established a conservation area. The following 1993 feasibility study was conducted and identified a viable enterprise, using a local forest species of nut called *Canarium Indicum* and the market outlet in the United States was been located. In October 1994, the programme installed a cold pressed oil extraction at Warohinou village as an conservation incentive. The technical input was done with the help of the staff from Conservation International (CI) and Biodiversity Conservation Network (BCN) two of Conservation in Development (CID) programme partners. A training was contacted and the skills required to control and managed the tool were acquired by the local people.

In 1994, 200 litres of ngali nut oil were exported, 800 litres in 1995 and 500 litres in 1996. This year, the project have target for 1000 litres, 220 litres were already in stock.

Ecotourism Enterprise, Marika Bush village

The inland village of the Makira Conservation Area have always been disadvantaged in their economic opportunities because of their isolation. The enterprise “tool” had to fit the situation of these people. There is no point of taking electrical tools to a carpenter who lives where there is no electricity. Similarly, it would not be suitable to start an enterprise which relied on transport of materials to and from the villages for these isolated communities. Therefore, ecotourism arose as a suitable enterprise “tool”. It required no transport of materials, and was closely linked to the goal of forest conservation.

The ecotour involves trained tour guides from the local villages, who meet the tourist at the coast and guide them along the forest trails to their villages in the hills. The whole community is involved in entertaining, housing and feeding the tourist.

The demands of the tours on the villages means that the local have set a limit of three tours per year, because they still live mostly by subsistence gardening and cannot meet the demand on their time of continuous or unexpected tourists.

The tourism has brought the outside world to a group of people who had previously had very little experience of it. With this contact has come positive reinforcement of the community's commitment to conservation, as the type of people who are coming on tours are those who believe strongly in conservation.

Also, the fact that an enterprise has been developed in the villages means that men do not have to go down to the coastal land away from their families to seek paid employment. The ecotourism enterprise has developed as a tool which is very appropriate for the "bush" villages.

Recommendation

Enterprises should not create a high hope of earning money amongst the village communities. Marketing outlets should be secured and for long term partners, to ensure continued engagement of the village communities, in order to maintain the cash flow in the communities. If there are other potentials available, then other enterprises should be also developed as an supplement.

This tool required a close consultation and cooperation also with the Area Council, Provincial Government, and other relevant statutory bodies, both at the national and international levels.

To conserve the biodiversity through establishing conservation area in the Solomon Islands, where most of the land is customary land, whether in the ocean or on the land, the primary decisions as to yes or no, must come from the village people who own the land and sea, and use the resources for their survival. The approach to alienated land is different. People needs to know of what, why, when and how. Although the area may be highly recommended for biodiversity protection, ground work is crucial for long term survival of the conservation area.

The enterprise should provide an income generating opportunity in the area so that direct benefit should flow to the community (no middle man) which will balance the interest of the stake holders. The enterprise should be appropriate for the village communities to manage without depending much on outside expertise and it should be a profit making conservation enterprise.

Summary of Village Based Bee Keeping Enterprise in Makira Conservation Area

Prepared by: Victor Kohaia (CEDO)
Conservation and Enterprise Development Officer, Makira

Abstract

The conservation in Development (CID) Programme of SIDT have helped to established two Bee Keeping project on the North Coast of the Makira Conservation Area. The two bee keeping projects are located at the coastal villages of Arohane and Togori (see Makira map * Togori not on map see Pawa)

Despite funds being made available as early as 1994, the bee keeping project did not start until mid 1995. Merely it is because bee keeping was just introduced in the Solomon Islands and most rural people have not had slightest idea of what are likely the impacts of the new industry. It took about half a year to run series of bee keeping workshops to assist the two communities before the actual installations of the hives were being put in place in two locations in November 1995. The training series were organised through collaborations between the CID team and Government Ministry of Agriculture through its Honey Unit.

Whilst the Ministry of Agriculture took care of the technical aspects of the training series the CID team helped to develop the management system to help the communities to manage the project using the already existing village leadership structure.

Aim

The aim of Bee keeping projects to assist the village communities in the Makira Conservation Area to have access of cash in come from a natural resource that is believed to have no negative impact of the biodiversity of the Makira Conservation Area to promote the utilisation of non-timber resources (eco-tourism) on a sustainable basis and to generate income for the communities to support community services (village schools, church contributions etc…).

Principles

- Sustainable economic development
- Environmentally sound approach
- Tool to support village based development services
- Promoting conservation, educational awareness, resources planning and management

Objectives

- To link enterprise with conservation of biodiversity and development of bee keeping in the selected conservation area on Makira

- To diversity options for rural development (bee keeping) based upon renewable resources and sustainable development

- To support conservation education among the communities within the Makira Conservation Area.

Current stage of the project

The project has gone through some minor scratches at the beginning, and today the project looks very promising, for example Togori community are already getting good money for the sale of honey in the provincial capital Kira kira.

Trade

The honey production in the Solomon Islands has steadily increased in the past five years since it was first introduced in 1992 The latest figures from MAL show a 221 per cent increase in number of bee keepers, and 238 per cent increase in hive over the past years. However, the actual increase in hive numbers is probably much higher than this. Exact statistics are difficult to obtain. Mean while in Makira Conservation Area numbers of bee hives have steadily increased, again the statistics are difficult to obtain from MAL.

Community participation and benefits

From past experiences many community project have failed, due to lack of proper management, dispute over distribution of the cash benefit derived from the projects and lack of technical skills that require a proper management of the projects. How ever the CID programme has taken every careful measures to assist the participating communities in the Central Makira to be able to solve their own problems in a more amicable manner that suits the local situation.

What is bee keeping?

Much of the information introduced was adopted from New Zealand for simple reason, the MAL bee keepers are trained in New Zealand.

Example. Some day when you feel as though you are over-worked and cannot find time to do all the things you think you have to do, just give a thought to the life of your worker bees. The life of a worker bee usually lasts about 63 days, and can be divided neatly into three distinct periods.
21 days as brood (before hatching)
21 days as a hive bee (stays at home) 21 days field bee (goes and flies)
a total of 63 days

The work programme of a hive bee is arranged as follows:

- Clean cells, and hang around…3 days Feed older larvae 3…days feed young larvae and queen….7days

- Produce wax, build comb, ripen nectar store nectar and store pollen ……..5 days Clean the hive, guide the hive and fan the entrance……3 days total of 21 days

The work programme of the field bee is arranged as follows:

Collect water, collect pollen, collect nectar collect propolis….21 days or until their wings are worn out.
NOT EVEN ANY TIME TO CELEBRATE CHRISTMAS OR QUEEN'S BIRTHDAY!!!!!!

Success and Constraints

There is no doubt the communities will benefit from the enterprise initiates provided under the CID programme funding, the question of how long this will last depend mainly on the community participation and CID's capability of continuing funding of the programme. The limited supply of materials has also hindered the project.

Conclusion

Generally speaking, the CID conservation programme in Makira is doing its best and for the past three years much has been successful. On the other hand there are also obstacles that we need to closely monitor, and these include the continuous clear cutting of virgin forests, along the north coast, and possible chain saw milling as well.

CID – Women in Development Programme Report

Abstract

Women in Development has also a very important role in the Conservation in Development Programme, which tries to help the communities within the Conservation Areas with some small enterprise projects, such as in Makira province Conservation Area.

In fact Solomon Island Development Trust – Conservation in Development Programme thought that it is not only enough to provide Enterprise projects alone, but also to include other mechanical projects such as schools, clinics, water supply and sanitation, to promote/change the village quality of life in the communities.

Aims and Objectives

The aim of the Sanitation Project is to raise awareness about the importance of general health in the village and to build proper toilets for the community's use and protecting the streams, beeches and bushes as part of preserving the environment.

The Project

Arohane Village, which is one of the community in North Coast of Bauro Conservation Area in Makira, has been prioritised to have been involved in our first Sanitation Project. This Sanitation Project is to provide/build 48 toilet slabs for village use.

The Sanitation Project was first thought of and planned by the Women's Group from Arohane Community where they thought that it might solve some of their problems, such as diarrhoea, malaria and other related issues on dirty environment within the village/community.

And as the project was planned by the Women's Group, the women have the leading role with the community chiefs and elders in anything that needs to be done with the project for example in planning and in decision making.

Success

The project is very successful because three quarters (3/4) of the proper toilets have been completed with construction, and that there are no more roaming around of domestic animals such as pigs within the village. The Community Health Committee is very strong with the Provincial Bye-laws. In addition, everywhere around the village and especially beside every house you can see are vegetable gardens which aim to improve daily diets and reduce Vitamin A deficiency and other related sicknesses and problems.

Recommendation

The community has recommended that there is a big need for a leadership training, so that each individual would know what are the roles and responsibilities in the community. Therefore, Conservation in Development have to take note of this as a priority, just the same as the Conservation in Development Programme thought to prioritised Arohane to have the Sanitation Pilot project.

Balai community paper making enterprise

Prepared by Silverio Wale
SIDT/CID Enterprise Co-ordinator

Abstract

The Conservation in Development (CID) Programme of SIDT has helped to establish a paper making project for the community of Balai. This follows a survey done by the CID programme indicating that the area should be preserved for conservation. The project is located in Central Kwara'ae of Malaita.

Aims and objectives

- To provide women and youth with the opportunity to learn the art of making hand made paper from waste leaves and natural fibres, and also how to make paper from recycled paper fibres.
- To provide an opportunity for employment and revenue for women and youth.
- To encourage village youth to remain in their villages rather than drift to the urban centres in search of employment
- To allow women and youth to develop their own innovative marketing opportunities for paper, such as high quality art and craft paper
- To promote conservation values and increase environmental awareness

Background

In 1994, a unique project was started in an isolated bush community in Malaita. For six years this small community had resisted advances from logging companies. They wanted to preserve their rain forest environment for themselves and the generations to follow. However, the need for a cash economy to pay for medical, educational and additional food requirements mean they needed to find an alternative income.

With the financial help from the New Zealand Government and in conjunction with the SIDT/Conservation In Development Programme, a pilot programme was started (first in the Pacific) and the village people enthusiastically embarked on what was to become the Balai Paper Project.

The results were rewarding. Under the strong leadership of its community chief George Tome and project manager Luke Suifasia, the project began to show a healthy profit. The profits from the sale of paper and woodblock prints are divided. One third to the workers, one third to the community and one third back into the business. So far the community account has paid for:

- a whole new village water supply
- iron roofing for the community centre
- a generator; and
- vocational school fees for some of the youth
- A new leaf roof for the community kitchen (flattened by the cyclone last year) and other community assets

In 1997, the community received a award from the Blama society.

Skills transfer

The designing of the wood block prints has meant the youth have had to learn about their custom designs and images. In doing so they have gained the respect of the elders. The project has given the women and girls of Balai their own income. Some of the villagers have been to the Marovo Lagoon in the Western Province to pass on their skills to a new project there. This tiny community is helping to educate local people as well as tourists from outside world about sustainable development, conservation, custom art and other valuable lessons. At the same time they are earning a good income which is culturally and environmentally sustainable.

Community participation

A series of three training workshops was arranged for the Balai community to get to know how to produce natural paper from their resources. With the skills of Chris Deleny, and with the assistance from SIDT/CID programme, those have organised and conducted training workshop for selected participants from the community.

During the operation of the project, the community have come across some problems, including bad weather during the time of production. Producing the paper needs sun and dry weather.

However, the management had studied the weather and drew out a weather time table, with high time for producing 100 pieces or more during the dry season. The committee also had a working time table for each community to come and participate in the project. So this means that each community has to work for one week on the project, and whatever they produce they get to benefit from. This is a way of balancing income for each community for Balai Paper making project

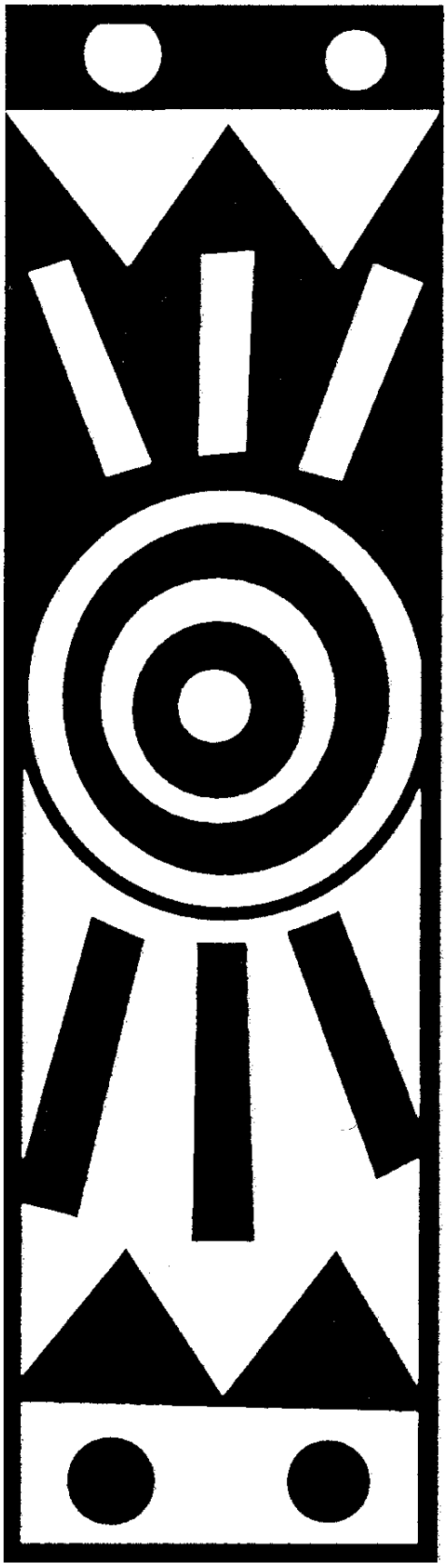
Current stage of the project

The Balai community is currently selling their natural fibric paper throughout the Solomon Islands and outside world. Their average sale of fibric paper for one month is 1000 pieces, and it sells fast every month.

For the first years, the project has gone through some minor problems, but now they have manage to organise themselves. The project is now successfully earning lots of money from their sales of paper through out the Solomon Islands.

Tool 3

Conservation Trust Funds



Lessons from the Vanuatu Biodiversity Conservation Trust Fund

Luca Tacconi
Department of Forestry
Australia

Abstract

The paper considered some lessons learnt from the development of the Vanuatu Biodiversity Trust Fund. The significant features of the trust deed were outlined before considering some general issues. The following issues are addressed:

i. the viability of biodiversity conservation in the pacific;
ii. stakeholders participation in conservation and trust fund development;
iii. the objectives of trust funds; and
iv. trust funds as 'financial burdens'.

(Note this is the Rosenberg report given in full)

Concept Paper

proposing the framework for

a South Pacific Regional Trust Fund

for

Conservation and the Environment

(first draft)

prepared for: South Pacific Regional Environment Programme
Apia, Western Samoa

prepared by: Elliot Rosenberg, September 1997

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Abbreviations

ADB	Asian Development Bank
ESCAP	Economic and Social Council of Asia and the Pacific
GEF	Global Environmental Facility
NGO	Non-Governmental Organization
RET	Regional Expert Team
RTF	Regional Trust Fund
SPBCP	South Pacific Biodiversity Conservation Programme
SPREP	South Pacific Regional Environment Programme
TMAG	Technical and Management Advisory Group of the SPBCP
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme

Introduction

In July 1997 I was asked by SPREP in coordination with UN/ESCAP Pacific Operations Centre to develop a concept paper for consideration by SPREP and the participants at the Sixth Conference on Nature Conservation and Protected Areas to be held in Pohnpei at the end of September 1997. The terms of reference stated that the concept paper was to,

"Set out the case for the establishment of a South Pacific Biodiversity Conservation Fund" and to "Propose a suitable structure and mode of operation for the Fund."

In addressing these issues in the Concept Paper which follows, I took into consideration further discussions I had with SPREP and the many informal discussions I had within the Region. While these informal discussions were not as geographically wide-ranging as expected primarily due to the short time frame available, a number of elements of the Paper became evident. For example, the necessity for broadening the scope of the proposed trust fund from only covering biodiversity conservation to more broadly addressing conservation and the environment. In doing so the proposed fund is still able to realize that inherent in many conservation and environmental programs remains the ability to address biodiversity issues. And at the same time this broader scope also allows for better consideration of the need to balance cultural, social and economic objectives in a sustainable manner throughout the region.

Another revision made to the terms of reference is that subsequent to the Pohnpei Conference, the Concept Paper will now be revised taking into consideration comments received at the Conference. The Paper will then be presented at the year-end TMAG meeting where it will be discussed and voted on for further action. Should the TMAG vote be in favor of establishing a trust fund, this will set in motion the necessary means to achieve this goal within a very tight time frame.

I would like to express my thanks to the many people who gave their time in discussing the many issues with me and for assisting in preparing this paper.

ER

Executive Summary

The purpose of this Concept Paper is twofold. First, to set out the case for the establishment of a South Pacific Regional Trust Fund for Conservation and the Environment ("RTF", "the Trust" or "the Fund"), and second, to propose a suitable structure and mode of operation for this fund.

While this Paper sets out a number of recommendations for the establishment of an RTF, as of this writing the Paper will also be used to provide the stimulus for further discussion and comments at the 6th South Pacific Conference on Nature Conservation and Protected Areas. A final draft will then be completed for consideration at the SPBCP multi-partite meeting at the end of 1997. If at this meeting there is a three-quarter majority of the independent island nations for proceeding with the proposed Fund, then a Regional Expert Team will be assembled to facilitate the establishment of such a Fund. Concurrently with or even prior to assembling this team preliminary discussions should commence with the World Bank/GEF on this matter.

Within the South Pacific region there has been discussion about the establishment of a regional trust fund for biodiversity conservation for more than two and a quarter years. Early discussions about a fund took place at the Third Meeting of the Technical and Management Advisory Group (TMAG) of the South Pacific Biodiversity Conservation Programme (SPBCP) in May 1995. This was followed by the Lucas Report[i] in February 1996 and the Stanley Report[ii] in December 1996.

There exist a number of excellent reasons that support the establishment of an RTF, namely that this Fund would:

- succeed the SPBCP and assure continuity of its programs;
- provide *reliable*, *regular* and *long-term* funding for conservation and environmental projects;
- provide region wide funding for conservation and environmental projects that might otherwise not be funded;
- assist in developing innovative, public and private participatory, long-term approaches to conservation;
- accelerate the creation of local solutions; and
- help strengthen human resource and institutional capacity building at both the national and regional levels.

Also, in the establishment of the Fund it is recommended (if within GEF guidelines) that the Fund broaden its scope from biodiversity conservation to address conservation and environmental issues.

Some recommended basic features of the Fund are that:

- its minimum annual grants total in the range of US$400,000 to US$500,000 per year. This would mean that the Fund's principal or corpus be in the range of about US$12 million to US$15 million, in real terms, depending on the annual return and minus overhead expenses;
- the balance of funds remaining at the expiration of the SPBCP be transferred to the Fund;
- donations to the Fund would be open to any source;
- member nations make a one-time contribution to the fund of US$10,000;
- funding for any one project during a given year would not exceed ten percent (10) of the total annual amount available that year for grants;
- there be a seven (voting) member Board consisting of:

three members - each representing the head of a member nation environmental agency;
two members - representing major donor organizations;
one member - representing the business community;
one member - representing an NGO; and
two ex-officio, non-voting members -the Director of SPREP, and the Fund Director.

The primary reason for the number and representation of the Board is to keep it as small as is reasonably possible while at the same time providing the Board with the broadest regional representation. In addition, the smaller the Board the less the expenditure for Board related expenses. Another way to reduce Board related costs is to minimize the number of meetings where Board members have to be physically present. For example, while it is recommended that the Board meet once every quarter, its annual meeting can require Board members to be there in person while the other three quarterly meetings could be conducted by telephone conference call.

It is recommended that the Fund create a management/administrative body consisting only of a Director, a secretary and a Programme Officer. Other supporting functions could be provided by SPREP (by mutual agreement) since SPREP already has the infrastructure in place to support many of the ongoing requirements of the Fund. Likewise, it is recommended that the Fund office be co-located with SPREP in Apia. By keeping the Fund management, administration and office facilities to a minimum and utilizing SPREP in this manner, this too would help to minimize annual expenses related to the Fund's operations.

Within guidelines set out in the Trust by-laws, the Board and the Fund Director will establish the process and requirements by which proposals are to be selected annually for Fund grants. The nature of the process will be to provide positive support in the submission and review of proposals. Requirements for the submission of proposals will be widely disseminated within each member nation well in advance of the final submission date; will be open to any private or public entity; and will adhere to a strict time frame. The Board and the Director will assure that the proposal process and requirements have been adequately followed and that all proposals have been professionally reviewed.

It is recommended that there be two co-trustees; one co-trustee representing the donors and a second co-trustee who is a managing director or governor of a member nation's reserve or central bank.

The nation where the Trust will be registered will be determined by the Regional Expert Team. While location of the Trust in Western Samoa should be given first consideration, the ultimate location is primarily dependent upon the prevailing laws of the member countries; this may require that the Trust be established outside the member nation area.

Why Establish a South Pacific Regional Trust Fund for Conservation and the Environment?

Perhaps the foremost reason for establishing this Fund is that it will provide *reliable*, *regular* and *long-term funding* for conservation and environmental efforts within the region. In effect, by establishing the Fund the member nations have made a commitment to a long-term regional strategy that can co-exist with their national strategies. There should also be the realization that in order to provide for an annual funding level on the order of US$400,000 or more, a substantial amount of capital must be tied-up for the duration of the Fund.

There are additional and strong reasons for the establishment of this Fund:

- By having created the SPBCP the member nations have already provided the basis for the proposed Fund. The establishment of the Fund will allow for the logical succession of the SPBCP and demonstrates to prospective donors that the member nations, individually and collectively, are committed to this effort.
- Besides the SPBCP, the Pacific Island Nations have a long and positive history for addressing common regional issues. Some examples include: the South Pacific Commission, The Forum Secretariat, The Forum Fisheries Agency, the South Pacific Regional Environment Programme, the South Pacific Applied Geosciences Commission, the University of the South Pacific, the Pacific Islands Development Program, and The Pacific Tourism Council.
- With respect to projects specifically related to conservation and the environment, perhaps only a few of the member nations would be able to individually access the amount of money equal to the Fund's corpus, i.e. US$12 million - US$15 million, whereas collectively all member nations could benefit from the annual proceeds of the corpus.
- With respect to conservation and environmental activities, the RTF would make it easier for some donors to contribute to a regional effort whereas the same donors might contribute a smaller amount or no amount to individual nations.
- The Fund can assist in providing specific, ongoing expertise on a regional basis that may not be available within every member nation.
- The Fund can provide grants that would otherwise not be available to some member nations.
- The Fund would help to facilitate within the region better coordination of funding, communication, and strengthening of institutional capabilities, i.e. capacity building, in the conservation and environmental areas.
- The Fund can adapt more easily to the ability of a recipient to manage its project(s), i.e. a recipient's absorptive capacity.

While some of the above reasons have been articulated by the World Bank[iii] as general concepts, a number of additional reasons specific to the South Pacific region have been articulated in the Stanley Report as other advantages of trust fund options, namely:

- Providing seed money to start up community efforts.
- Stabilizing recurrent cost financing.
- Moderating fluctuations in operating income streams.
- Flexibility in the use of funds.
- Encouraging fuller donor and recipient participation.
- Provides an innovative funding opportunity for donors
- and recipients.
- Expanding sectoral support.
- Leveraging other sources of funds.
- Leaving a (sustainable) development legacy.
- Developing civil society.

The Stanley Report has already articulated in greater detail than allowed for here the natural science reasons for establishing this Fund.[iv] In the context of this Paper two sections are repeated here for emphasis:

"Nature conservation is of fundamental importance to the sustainable development of the Pacific Island countries. This is because the interlinkages between social, cultural and economic well-being of people and biological diversity are most pronounced and intimate on inhabited small islands and their associated ecosystems. Consequently the conservation of biological diversity is, anthropocentric as it may seem, an inherent aspect of sustaining people's livelihood and culture. It must therefore be pursued with the highest priority and urgency, using new approaches that are more effective and appropriate in the context of the South Pacific" (Dr. Fuavao, former Director of SPREP and David McDowell, IUCN)

"Island biological diversity, with its high degree of endemism, is among the most critically threatened in the world. It is estimated that about 75 per cent of the mammals and birds that have become extinct in recent history were island-dwelling species, with more extinctions likely in the future." (Action Strategy for Nature Conservation in the South Pacific Region 1994-1998, SPREP 1994)

The Regional Expert Team ("RET")

If at the year-end (1997) SPBCP multi-partite meeting there is a three-quarter (3/4) majority vote by the (14 or 15) independent island nations for proceeding with establishing an RTF, then an RET will be assembled immediately thereafter for this purpose. Prior to this meeting, the SPBCP working with SPREP and other participating entities, will have identified the composition of this team and prospective team members and should have commenced preliminary discussions with the World Bank/GEF.

At a minimum, the RET would most likely consist of two lawyers with expertise in trust and conservation/environmental issues, at least one financial expert knowledgeable in the formulation, operation and management of trust funds, and two conservation/environmental experts (one marine, one terrestrial) with expertise in Pacific island related issues.

It would be the responsibility of this RET, presumably working in concert with a similar World Bank/GEF team, to actually formulate and implement the trust instrument. Since it can take at least twelve to eighteen months for this process and taking into consideration that the SPBCP expires around the end of 1998, hence the requirement that the RET's efforts begin immediately after approval from the multi-partite meeting at the end of 1997.

The RET will use as its framework the recommendations contained in the final Concept Paper resulting from the multi-partite meeting. To commence the discussion the following framework is initially being proposed.

Trust Membership

While at the end of this year the vote for going ahead with the establishment of the Fund will be taken by the multi-partite meeting consisting of the 14 independent island nations of the SPBCP, it is recommended that the Fund be open to all of the members of SPREP. This will allow for a more inclusive membership while also indicating that if the Fund is to work closely with SPREP to further common goals it would better facilitate the efforts of the Fund.

Trust Goals

"As its principle goal, the Trust will provide funding within the South Pacific region for the conservation of its habitat and the environmental protection of its citizens. "

There are two issues that remain to be clarified by the conclusion of the multi-partite meeting. First, how broad or narrow should the Fund's principle goal be? That is, as defined here the principle goal is broadly defined. One factor that may not allow this is based on GEF criteria. However, because of the broad-based beneficiary group and the myriad conservation related problems throughout the region, keeping the goal within the present context is recommended.

The second issue regards how inclusive or exclusive should be the Trust's beneficiary geographic region. Should it contain only those nations who have acceded to the Trust, or be more inclusive to include say all political entities within the region? This is open to discussion.

There most likely will be secondary goals that may be included in the Trust instrument. For example, the issue of sustainability and sustainable development often arises. Should there be an emphasis on one or more aspects of funding, i.e. community-based proposals, strengthening capacity building, etc..

The Trust Instrument

Basic aspects of the Trust Instrument are that:

- it exist in perpetuity;
- it be irrevocable; and
- it is permitted tax-free status.

Additional aspects of the Trust, such as safeguarding Trust assets, may be specified by the laws of the country where the Trust is registered and where necessary, further detailed by the RET.

Since it is recommended that the Fund operate out of Apia, the RET will examine the possibility of registering the Trust in Western Samoa. However, where the Trust is ultimately registered will depend on that country's laws with respect to establishing this type of trust.

Invasion of the Fund

Should the multi-partite meeting decide that the Fund can be "invaded" for certain emergency reasons, the RET will specify within the by-laws the procedures for this action. For example:

- there can be no invasion of the Fund until it reaches its ultimate principal amount;
- no one grant exceed US$500,000; and that
- the corpus should never go below ninety per cent (90%) of the Fund's final corpus amount. For example, if the ultimate final goal of the corpus is US$15 million, then the principal can never go below US$13.5 million.
- invasion of the Trust could only take place with a *unanimous* vote of both the Board of Directors and the co-trustees.

It should be emphasized in and by the Fund that it is not nor should it be considered a primary donor for emergency funds.

However, if the multi-partite meeting decides that invasion of the Fund not be allowed under any circumstances, then that should be so specified in the Trust by-laws.

Annual Audit

The Trust's assets and expenditures will be annually audited by a certified accounting firm according to generally accepted auditing principles followed within the region. Selection of the auditor shall be by the co-trustees from a list of qualified auditors from within the region.

The Trust Principal or Corpus

It is proposed that an annual target amount of from US$400,000 to US$500,000 be available for distribution as grants by the Fund. Based on prevailing and estimated rates of return and taking into account Fund overhead expenses, the Fund corpus is estimated to be in the range of from US$12 million to US$15 million. The specific annual target (say US$400,000) would be determined by the RET based on a decision of the multi-partite meeting.

The reason for the annual target amount specified above is that with 14 or more nations involved with the Fund, there needs to be in fact and appearance annual amounts available for projects that justify each country's support for the Fund while at the same time maintaining a large principal amount in perpetuity. A case may be made for a lesser amount, for example, based on what is believed to be the total contributions that would be made to the Fund. The same holds true for a larger amount.

The by-laws will prescribe conditions for investing the principal, i.e. to maximize return, and investment safeguards.

Contributions to the Fund

Contributions to the Fund would be open to all donors. Examples of possible donors are:

- SPBCP (remaining balance on expiration)
- GEF
- UNDP
- UNEP
- ADB
- bi-lateral aid
- member nations
- NGOs
- private donors
- foundations
- non-traditional donors

With the expiration of the SPBCP about the end of 1998 and based on its current level of project funding, it appears there could be in the range of from US$1m dollars to US$3m dollars remaining in its budget at its expiration after taking into account continued funding for ongoing projects. It would make practical sense, with the appropriate approvals, to transfer this balance in to the newly created Fund with the following implications:

- It would demonstrate that both the current SPBCP donors and members are committed to continuing the efforts of the SPBCP; and

- There would immediately be a significant initial contribution which would act as "seed money" to attract additional contributions.

For the Fund to realize its ultimate goals, it is expected that the World Bank/GEF would have to play a significant role in its creation and contributing towards the principal. This means that preliminary discussion with the World Bank/GEF would have to commence as earlier as possible so as not to delay or jeopardize the Fund's creation.

In addition and if agreed on by the member states, their individual US$10,000 contribution in total would add another US$140,000 or so to the Fund. This contribution by the member nations would also demonstrate their financial as well as political and moral commitment to the concept of the Fund.

Trustees

It is recommended that there be two (2) co-trustees, comprised as follows:

one trustee - governor of a reserve/central bank amongst the member nations; and
one trustee - representative of a major donor.

The reserve/central bank governor or managing director shall be elected at large by the member nations. The donor representative trustee shall be elected by the donor organizations.

The co-trustee's duties and responsibilities will be specified by the laws where the Trust is registered and may be further specified in the Trust's by-laws. The co-trustee's duties also include the establishing the requirements for (which may written into the by-laws) and selection of an Asset Manager.

Board of Directors

In determining the composition and size of the Board, there are several goals that need to be achieved simultaneously. One goal is to limit the size of the Board so as to make its operation viable and at the same time keeping its costs to a minimum. Another goal is to attempt to achieve a broad representation that both represents stakeholders and prevents domination by one group.

To form the basis for discussion a proposed Board would consist of seven (7) voting members and two (2) non-voting members, as follows:

voting members

three members	-	each member representing the head of a member nations' environmental agency;
two members	-	representing major donors;
one member	-	representing NGOs regionally; and
one member	-	representing the business community.

non-voting ex-officio members

one Director	-	Trust Fund
one Director	-	SPREP

Board Size and Composition

With respect to the voting members, there could be variations as to the Board's size and composition, which should be discussed and agreed upon at the multi-partite meeting. However, in proposing the above suggested Board the primary concerns of a manageable size, adequate representation of interests throughout the region, and minimizing the Board's expenses have been taken into consideration for this Paper. The same factors should also be considered by the multi-partite meeting.

Board Selection

Except for the Donor members and NGO member, all other Board members would be selected at-large by the member nations. The donors would select their two members, and recognized NGOs from throughout the region would select one member.

Board Member Terms

Of the *initial* seven members, two will serve only a one year term and two only a two year term. The other three members and all succeeding members would serve a full three year term. In this manner there will always be over-lapping terms for Board members. Exact details would be worked out by the RET and specified in the Trust administration manual.

Board Meetings

It is recommended that the Board meets quarterly. Of the four meetings each year the annual meeting would require the personal attendance of all Board members, without substitution. The other three meetings should be conducted by telephone conference calls.

The RET will specify in the Trust by-laws the Board's duties and responsibilities.

Board Accountability

Two primary means by which the Board can be held accountable are:

1. by a regular (e.g. every two years) outside review of the Fund's activities. For example, this review could be performed by the donor agencies and address issues such as: how the Board functions; how proposals are reviewed; how funds are dispersed; how funds are invested and the annual audit; etc.; and
2. written into the by-laws of the Trust instrument it could stipulate that if certain (adverse) actions occur, then funds will be withheld for disbursement by or to the Board until those actions are corrected.

The RET will address in the Trust by-laws issues such as: the Board's duties and responsibilities; Board accountability; Board member removal and/or succession should a member not fulfill her/his responsibilities; selection, term and responsibilities of a chairperson; etc.

The Director

For the day-to-day operations of the Fund, it will be necessary for the Fund to have a director. By having its own Director, the Fund is able to maintain complete independence of and from other organizations, and where the Director will be immediately responsible to the Board.

Some activities the Director should have immediate responsibility for are:

- overseeing the day-to-day operation of the Fund;
- preparing the Fund's annual report;
- developing working relations with each member nation's conservation and/ or environmental agency, NGO's and other organizations;
- co-ordinate, according to a mutual agreement, the Fund's activities with SPREP;
- and other duties that are further defined through discussion and by the RET.

The actual duties and responsibilities of the Director will be developed by the RET and included in the by-laws.

Proposals

In accordance with the Trust by-laws the Board and the Director shall establish procedures for the submission, review, selection, funding and oversight of proposals submitted to the Fund. The detail to which this responsibility is specifically articulated within the trust by-laws or delegated to the Board and the Director is open to discussion.

Dates

Each year the Board and the Director shall establish dates for the submission of proposals and the announcement of which proposals have been selected to receive Fund grants, and the amount provided. These dates will be strictly adhered to. In determining the dates, the Board and the Director will take into consideration factors such as :

- providing sufficient time for the dissemination of the announcement for submission of proposals prior to the final submission date; and
- - providing sufficient time between the final submission date and the announcement date of finalists for the thorough and professional review of the proposals.

Who Can Submit a Proposal?

Submission of proposals is open to all, public and private, from within member nations and other nations in the region. In this way the Fund will receive the widest possible submission of ideas from within the region which have a common goal.

A Positive Approach

The Board and the Director shall assure that a positive approach is taken in securing and reviewing proposals. For example, the Director should develop relationships within each member country of perhaps one or two organizations (public, NGO or private) that could assist a community or organization in the adequate preparation of a proposal. Also, after a proposal is submitted and if it is found that while the underlying idea is good the actual proposal requires strengthening, these same in-country organizations could assist with this effort.

The Fund may have to assist with providing for technical assistance and/or funding to strengthen this effort at the local level, but should not be a major source of funding for any of these organizations. For example, a local government or an NGO may provide this service as part of its own extension effort with or without supplemental funding from the Fund, or the Fund may contract for this service at a fixed though not exorbitant rate.

Proposal Selection

Immediately after the submission date, proposals would be initially reviewed to see if each meets the Funds objectives and other basic requirements for the submission of a proposal, such as: Is there adequate management of the project?; Have proposal costs been clearly defined?; If follow-up funding is required, has it been addressed?; etc..

Once a proposal has passed the initial review, it will then be reviewed by experts in their respective fields. The responsibility of the expert reviewer is to see if the proposal makes sense as good science; that the proposal makes sense with respect to its overall approach, continuity for additional funding, training, management, etc..; to see if the funding level requested makes sense for the level and duration of effort being addressed by the proposal; and finally, together with the other experts rank the proposals. In line with its positive approach, at any time during the review process the expert review team should encourage the applicant, when and where appropriate, to further explain or clarify issues that arise.

After all proposals are ranked, the Director will submit them to the entire Board for approval and the announcement made per the schedule previously set out. It is expected that the Board will rely on the expertise of the review team. The Director and experts, as required, could be in attendance to answer questions from the Board.

Proposal Funding

There are a number of issues relating to proposal funding that are strongly suggested:

- the Board need not expend all of the funds available during any year for a number of specified reasons, i.e. there were not sufficient proposals that met the minimum requirements; there were funds left over after funding all acceptable proposals; etc.;
- the Board can decide, based on a proposal's funding requirements, to fund a proposal over a number of years;
- the Board does not have to fund the entire amount requested in an accepted proposal, i.e. the amount requested is believed to be excessive or co-funding may be available;
- the Board will use its "good office" to assist acceptable proposals in obtaining funding from other sources in addition to or in lieu of Trust funding.

In addition, the Fund, primarily through its Director must develop and maintain very good lines of communications with *all* organizations with which it does business. For example, it must work closely with each nation's designated agency to assure that both the Fund and the agency fully understand the proposal(s) put forward from within that nation; that there is no overlapping work between the Fund and other agencies; and that the funded proposal is assured the best opportunity for succeeding. The same holds true for the Fund and other funding organizations. In effect, the Fund (and/or SPREP) can become, either informally or formally, a clearinghouse for proposals related to conservation and the environment.

Absorptive Capacity

The issues may arise where there is a question of whether the Fund would be able handle and distribute large amounts of capital and grants and/or whether within the region if there is the capacity for projects to effectively take in such large amounts of funding.

With respect to the first issue, the Fund would presumably not be taking in say US$15 million all at one time. Contributions would most likely occur over a period of perhaps five to six years. This would mean that there is a gradual build-up of the Fund's principal which would allow for all the elements of the

Fund (i.e. Trustees, Asset Manager, Board, Director and staff, etc.) to develop over this time; that all available funds for grants to not have to be disbursed during this year; and there may be a greater emphasis by the Fund during this period for capacity building.

Regarding the second issue, the provision for providing a grant for any one proposal would limit its size to say no more than US$50,000 during any one year. This means that each proposal is in effect a "micro-project" and not a large, development type project. Also, since there will be more than twelve Fund members at a minimum and many more if all SPREP members accede to the Trust, then the number of small size projects should be sufficient to allow for their funding without undue concern that these projects cannot absorb such "large" amounts of funding.

Grant Follow-up

The Board and the Director (in accordance with the by-laws) will establish requirements for the monitoring, evaluation and action required for all grants made. There could be different requirements based on the type of grant, i.e. direct project, supplemental funding, technical assistance, etc.. The Director will provide the Board, prior to its quarterly meetings, with an in-depth summary of all actions taken during the prior quarter and leading up to the quarterly Board meeting.

Tool 4

World Heritage Convention

UNESCO Office for the Pacific States - Chair's remarks

Trevor Sankey
Science Adviser
UNESCO, Apia

Introduction

Good morning, everyone. Welcome to the paper session on Tool 4 "World Heritage Convention". Before Bing Lucas guides us through the nuts and bolts of the World Heritage Convention and the mechanisms associated with it, I want to say a few words on the essence of the World Heritage system and the advantages of using it.

The essence of World Heritage

The concept of World Heritage is to provide an international system of protection for sites of outstanding universal value. The Convention covers both cultural and natural heritage, and increasingly the two together. Emensio Eperiam talked on the opening day about world famous sites like the Pyramids, the Great Barrier Reef and the Great Wall of China that are included on the World Heritage List. But less well known sites are equally important. I vividly recall the thrill that I experienced through seeing on television some of the superb sites that tell the story of flourishing past civilizations in West Africa. Few people worldwide know about them, yet they are an important part of world history. In the same way, the Pacific countries should not be afraid to put their own heritage forward.

The advantages of World Heritage

Local communities get many messages from the outside world. Material wealth equals happiness is one. Some are about plundering their natural resources without any concern for sustainability. Other messages promote ways of living that can be sustained economically, environmentally, culturally and socially. The community conservation initiatives discussed in detail at the current conference are an example. The particular message of World Heritage is that the global community of nations and people want to preserve heritage of exceptional value and are ready to help.

In the working groups tomorrow, discussions will rightly centre on the practical aspects of applying the World Heritage Convention and particularly on things that are difficult in the Pacific context. What are the advantages that define the role of the World Heritage Convention in the spectrum of conservation tools?

(a) The World Heritage list is for exceptional sites only. Most countries will have other sites of national or regional importance, and will use other measures like CBCAs to protect them. Being on the list singles out outstanding sites for extra protection. It does not exclude other conservation measures like CBCAs or Biosphere reserves.

(b) The World Heritage convention is an inter-governmental agreement that is binding in international law. It extends international legal protection to specific sites. Local owners may see this as additional protection against future government actions in their own country.

(c) Through the World Heritage Fund and UNESCO's own regular programme budget, the international community provides technical, financial and moral assistance for the identification, protection, conservation and presentation of the world's irreplaceable heritage. Over the next two years UNESCO is proposing to allocate about US$4.5m dollars to the World Heritage Centre

while anticipated contributions to the World Heritage Fund are estimated at US$8m dollars for the same period.

(d) The Pacific and its peoples have much heritage to be proud of. Inclusion of sites on the World Heritage list would increase international awareness of our Pacific treasures. For example World Heritage material is used in UNESCO Associated Schools in many countries. In the Pacific UNESCO is working to raise youth awareness of heritage and to develop a system of heritage volunteers. While this programme would cover a broader range of heritage, World Heritage sites could be highlighted.

At present World Heritage is making a special effort to include under-represented regions. The Pacific islands are very under-represented and can thus expect to receive special attention.

Thank you to you all for coming. I will now move on to introduce our papers for this lunch-time.

Conserving the World's Heritage: the Challenge in Pacific Island Countries

P H C (Bing) Lucas, Vice chair, World Heritage
World Commission on Protected Areas

World Heritage and the Pacific

The 16 November 1997 marks the 25th anniversary of the negotiation of the "Convention concerning the protection of the world cultural and natural heritage", commonly known as the World Heritage Convention. With 149 sovereign states which are parties to the Convention and a total of 506 sites inscribed on the prestigious World Heritage List, the Pacific region remains the most under represented region in the world.

The Origins of the Convention

In the 1960s, UNESCO had initiated International Campaigns to fund salvage and restoration work on features considered to be the heritage of all. Examples were seeking funding and technology to raise the temples at Abu Simbel in Egypt above the waters of the Nile River as they rose behind the Aswan High Dam. Nearer home, international cooperation coordinated by UNESCO helped in the huge task of restoring the great temple at Borobodur in Indonesia. These one-off efforts led those involved with UNESCO to see the need for a standing mechanism to support conservation of outstanding examples of the world's heritage.

A 1965 report of the Committee on Natural Resources of the White House Conference on International Cooperation recommended the concept of a World Heritage Trust recognising that ***"Certain scenic, historic, and natural resources are part of man's (sic) heritage, and their survival is a matter of concern to all."*** One of the authors of the recommendation, Russell Train became the first chair of the US Presidential Council on Environmental Quality and was able to give the World Heritage concept a real push. As a result, part of President Nixon's Message on the Environment in 1971 said that *"It would be fitting by 1972 (the centennial of the establishment of Yellowstone National Park) for the nations of the world to agree to the principle that there are certain areas of such unique worldwide value that they should be treated as part of the heritage of all mankind and accorded special recognition as part of a World Heritage Trust. Such an arrangement would impose no limitations on the sovereignty of those nations which choose to participate, but would extend special international recognition to the areas which qualify and would make available technical and other assistance where appropriate to assist in the protection and management."*
The idea had been bubbling up in other circles. IUCN notes that early initiatives on the idea of a convention in relation to the natural heritage came from the 1966 IUCN General Assembly in Lucerne.

All these streams came together and the World Heritage idea came to a significant point of progress at the UN Conference on the Human Environment in Stockholm in 1972 after interested parties had agreed to a United States proposal that the conference be presented with a single draft for a convention to identify and protect the cultural and natural heritage of the world.

At the Stockholm Conference, participants in plenary agreed that the proposed World Heritage concept *"marks a significant step towards the protection, on an international scale, of the environment"*. They

voted overwhelmingly to invite governments to examine the draft Convention *"with a view to its adoption at the next General Conference of UNESCO."*

This was accomplished and, at the General Conference of UNESCO at its seventeenth session in Paris on 16 November 1972, the Convention was adopted. It has proved to be very well supported by nations - States Parties - as they are known in Convention language. This is evident from the fact that there are now 149 States Parties and 506 sites inscribed on the World Heritage List, 380 for their cultural values, 107 for natural values and 19 for both.

The Convention and Operational Guidelines

The Convention is regarded as largely immutable and continued growth in the number of parties are seen to make a renegotiation among the States Parties very difficult. This lack of flexibility in the Convention is overcome by the Operational Guidelines for the Implementation of the World Heritage Convention adopted by the management structure of the Convention and periodically modified to reflect the evolution of the World Heritage concept.

The text of the Convention notes that *"parts of the cultural and natural heritage are of outstanding interest and therefore need to be preserved as part of the world heritage of mankind"*. It states that the purpose of the Convention is to establish *" an effective system of collective protection of the cultural and natural heritage of outstanding universal value, organised on a permanent basis and in accordance with modern scientific methods."*

For this purpose, the Convention identifies both the concepts of cultural heritage and natural heritage and provides for the establishment of a World Heritage List and, for those sites on the list considered to be seriously threatened, a List of World Heritage in Danger. A World Heritage Fund is provided for to assist States Parties in the identification and protection of sites in their sovereign territory.

The Convention's Management Structure

The World Heritage Committee is responsible for implementing the Convention. It consists of representatives from 21 countries, elected by the General Assembly of the States Parties which meets every two years during the UNESCO General Conference. Seven of the 21 form the Bureau which processes nominations when its meets each June/July and again briefly in late November immediately before the Committee meets to make decisions such as inscription on the List or the "in Danger" List, and handling applications for preparatory and technical assistance, training etc.

The Committee and Bureau are serviced by the World Heritage Centre located in the UNESCO headquarters in Paris.

To advise it on cultural sites, the Bureau and Committee receive reports from ICOMOS and for natural sites from IUCN with a third advisory body, ICCROM, giving advice on training for cultural site management.

Criteria for listing

The Committee's Operational Guidelines include detailed criteria for both cultural and natural sites to assist it in determining if the site is *"of outstanding universal value"* and to determine if the site meets the *"test of authenticity"* in the case of cultural sites and the *"conditions of integrity"* in the case of natural sites.

Focussing on natural sites, the four criteria applicable (in summary) are that the nominated site is considered *"of outstanding universal value"* exhibiting:

- (:i) geological processes and geomorphological features;
- ecological and biological processes;
- superlative natural phenomena/exceptional natural beauty and aesthetic importance;
- biological diversity including threatened species

One classification in the cultural area of particular interest to those involved in the natural heritage and to the Pacific Islands is that of ***"cultural landscapes"***.

World Heritage in the Pacific

In the Pacific region covered by SPREP (the South Pacific Regional Environment Programme), only Australia and New Zealand have so far been active in implementing the Convention and the insular Pacific remains a largely unrepresented region on the World Heritage map.

In 1974, Australia became the seventh country in the world to ratify the Convention, New Zealand following suit in 1975. Among other states in the Pacific region, Papua New Guinea has just joined Fiji and the Solomon Islands as parties to the Convention while there is current interest in joining from Federated States of Micronesia.

Australia has been one of the leading States among members of the Convention both in serving on the Committee and Bureau and in the high profile given to World Heritage within the Commonwealth. Australia has 11 properties on the World Heritage List, all of them inscribed as natural properties with four of those also inscribed for their cultural values. They include the largest World Heritage site in the world - the Great Barrier Reef.

New Zealand has two World Heritage Sites, Tongariro National Park and Te Wahi Pounamu (South-West New Zealand) including four national parks of Westland, Mount Cook,, Mount Aspiring and Fiordland. As discussed later, Tongariro National Park is inscribed both as a natural site and as a cultural landscape.

Outside Australia and New Zealand, there is only one site listed in the region covered by SPREP and that is the uninhabited Henderson Island in the Pitcairn group nominated successfully by the United Kingdom. Beyond the SPREP region, the United States has the Hawaii Volcanoes National Park on the list; Ecuador has the Galapagos National Park; and Chile has had Rapa Nui, Easter Island listed as a cultural landscape.

The Solomon Islands Government, with New Zealand Official Development Assistance support, has nominated during 1997 East Rennell Island with an excellent document and has been investigating the nomination of Marovo Lagoon, both involving substantial consultation of the customary owners involved.

The future of World Heritage in the region was the subject of a resolution from the first meeting of IUCN Members from the Oceania Region in Sydney in June 1996. The resolution was taken forward to the First World Conservation Congress in Montreal in October 1996 and was adopted there unanimously.

The resolution noted *"the rich and diverse natural and cultural heritage of Oceania (South Pacific)"*, noted that few of the 22 island states of Oceania are signatories to the Convention and identified a need

to promote awareness of the Convention among them. In the resolution, the Congress adopted the following wording (subject to final editing):

"CALLS UPON IUCN members in the Australia and Oceania region to:

a) promote awareness of the potential benefits and relevance of World Heritage to the island nations of the Pacific through culturally appropriate means;

b) actively encourage more island States to become signatories to the World Heritage Convention;

c) initiate, with ICOMOS and SPREP, a collaborative survey of the islands and seas of Oceania to identify potential options for World Heritage nominations including possible serial sites by the relevant island nations.

REQUESTS the Director General, within available resources to:

a) actively seek the provision of resources to facilitate information, survey, identification, nomination and management of any World Heritage sites in Oceania;

b) support the above action in respect of Oceania (South Pacific) by including a sub-programme on World Heritage in Oceania in the IUCN triennial programme;

3. REQUESTS the Director General, within available resources, and Council to communicate the text of this resolution to the Director General of UNESCO and the Director of the World Heritage Centre, urging that the existing UNESCO presence in Oceania be enabled to serve as an effective focal point to promote the World Heritage Convention in the region."

Since then, I have led a session on World Heritage at a training course mainly for Pacific cultural heritage experts but including some with a natural heritage background. The course, organised by ICCROM and ICOMOS and part funded from the World Heritage Fund, was titled *Conserving Pacific Heritage* and was held here in Pohnpei in November 1996. The group brainstormed informally and produced lists of possible World Heritage themes and potential sites, both cultural and natural.

The opportunity to follow this up with an emphasis on natural aspects of the Convention has presented at this conference, coincidentally, once more in Pohnpei. Our discussion here also builds on the outputs of the 3rd Global Strategy Meeting for the *Identification of World Heritage Properties in the Pacific* organized by the UNESCO World Heritage Centre in association with the Fiji Museum held in Suva, 15-18 July 1997.

So the field is open for positive action to see the Pacific Islands region better represented on the World Heritage List.

Over the years, concern has been expressed by the World Heritage Committee about imbalances in the World Heritage List, for example, the geographical imbalance. An analysis made in 1994 showed that of the cultural properties then listed, 48 per cent were in Europe and 21 per cent in Asia with **only 1 per cent in Australasia/Oceania**. At the same time, analysis showed an imbalance in the types of cultural properties with 30 per cent archaeological sites, 20 per cent historic town and 20 per cent Christian monuments but only 2 per cent Hindu monuments and traditional settlements and landscapes representing only 1 per cent or less. A similar situation appears in relation to funding with an article in *The UNESCO Courier* of September 1997 entitled *Words and Deeds* by Georges Zouain, Deputy Director of the World Heritage Centre pointing out that no funding had been allocated by the Committee

for international assistance in the Asia and Pacific region from January to May 1997, presumably because none had been applied for.

However, there have been initiatives in the implementation of the Convention which, I believe have made the Convention increasingly relevant to this region.

Cultural Landscapes and the Pacific

One of the issues of debate in World Heritage circles in the 1980s was whether or not there was a place on the World Heritage List for sites which have a combination of cultural and natural values which separately may not meet the criteria for cultural and natural sites but where their uniqueness stems from the combination of these values.

The World Heritage Workshop at the World Parks Congress in Venezuela in February 1992 discussed the issue and one of the Congress recommendations urged *"that the World Heritage Convention criteria be amended to take account of natural/cultural landscapes/seascapes and living cultures which are an harmonious blend of nature and culture."*

That reference to *"living cultures"* recalled to my mind a Seminar on Sustainable Tourism Development in South Pacific Countries held at Suva in November 1991 jointly organised by ESCAP (Economic and Social Council for Asia-Pacific), TCSP (Tourism Council of the South Pacific) and SPREP. I had been asked to lead a session World Heritage Convention and I asked buzz groups to look at the Convention's criteria and its relevance to the insular Pacific.

The record of that seminar includes the following: *"World Heritage sites could be inscribed for either cultural or natural value, based on selection criteria which were considered (by the seminar) to be oriented more to the European situation than to the Pacific. Hence, there was a consensus among the participants that in any review of the Convention and its operational guidelines, attention should be given to modifying the criteria in order to include the heritage of the Pacific Island countries".*

The seminar report went on to say that *"The prospect of World Heritage listing has considerable appeal to some countries in the region....The Pacific region might have a special case to recognise not only the manifestations of past cultures, but also the present interaction of contemporary societies with their natural environment".*

This message was communicated to the World Heritage Centre and was a message I took to a World Heritage expert meeting held at La Petite Pierre, France in October 1992 where European experts were joined by participants from Canada, Sri Lanka, Australia and New Zealand. This meeting recommended amendments to the Operational Guidelines to recognise the concept of cultural landscapes. This was achieved when the World Heritage Committee met at Santa Fe, New Mexico, USA in December 1992. where the Committee noted that, while Article 1 of the Convention identifies as one of its goals that of conserving the *"combined works of man and nature"*, the strict application of the Convention had led to a separation of natural from cultural aspects.

The World Heritage Committee adopted recommendations from the La Petite Pierre workshop and modified the cultural criteria to recognise the concept of "cultural landscapes". Since 1992, the revised criteria and operational guidelines for the Convention recognises landscapes which illustrate both specific land-use techniques and/or a spiritual communion with nature. Under the revised operational guidelines, cultural landscapes can be classified broadly in three categories:

- Clearly defined landscapes designed and created intentionally by man, such as, for example, gardens and parks;

- Organically evolved landscapes resulting from successive social and economic imperatives and in response to the natural environment.

- In some of these landscapes, the evolutionary process may have come to an end, in which case they have become relict or fossil landscapes. Others are continuing landscapes retaining an active social traditional way of life in which the evolutionary process is still in progress.

- Associative cultural landscapes are those which justify inclusion on the World Heritage List by virtue of the powerful religious, artistic or cultural associations of the natural element, rather than material cultural evidence.

This, I believe is a very helpful change for the Pacific.

Significantly, too, the requirements to maintain the authenticity of cultural sites were amended to accept "traditional protection" mechanisms alongside legal mechanisms. However, no corresponding change was made to the Conditions of Integrity for natural sites even though most potential natural sites in Pacific island countries are likely to rely mainly on this form of protection.

The first cultural landscape to be listed was as an associative landscape - New Zealand's Tongariro National Park, which was already a WH natural site. In 1993, it became the first cultural landscape to be listed in recognition of its "outstanding universal value" as an associative cultural landscape and not from any physical evidence of cultural relationships. The associations of the Maori iwi (tribe) of Ngati Tuwharetoa with the volcanic mountains provide both a geographical and a cultural connection to their Pacific origins. Other cultural links are clearly demonstrated in the oral history of Ngati Tuwharetoa as the peaks are spoken of with the same reverence and feeling as tribal ancestors ensuring that the connection is one of spirituality as well as culture.

Interestingly, the Maori concern for Tongariro National Park, whose nucleus had been their gift to the nation in 1887, had earlier led to the deferral of New Zealand's nomination of the national park as a natural site until the authorities revised the park management plan by placing an upper limit on skifield development out of deference to Maori sensitivity.

When, subsequently, Tongariro was nominated also as a cultural site under the associative cultural landscape heading, the Ngati Tuwharetoa iwi cooperated in preparing the nomination as did the Ngai Tahu Trust Board in the nomination of Te Wahipounamu/South-West New Zealand as a World Heritage site.

The cultural landscape concept undoubtedly paved the way for the 1994 listing of Australia's Uluru-Kata Tjuta National Park in Australia as a cultural site to complement its existing natural site listing. The links between the traditional owners of Uluru, the Anangu people, and the site are similar to the situation of potential World Heritage sites in the Pacific which are likely to be in customary ownership. In a workshop I was involved in June 1997 with a group of Anangu, the focus was on what World Heritage status meant to them. My interpretation of their responses are these:

- for the first time, the world has recognized the value of our culture: we can hold our heads high;

- we can require that our sacred sites are respected and we have a strong input into the management of the park's natural resources to ensure that management follows the traditional patterns;

- our culture is being interpreted in our way in a new cultural interpretive centre to both educate our own young people and the public who visit;

- our people are getting employment opportunities in the tourism field in interpreting our heritage;

- if there should, at any time, be a government in power which is unsympathetic to us, there is an international group interested in us.

These are very perceptive responses and are, to my mind, an effective answer to those who may consider that World Heritage status may mean a loss of status and control for traditional owners.

Of interest, too, in a region such as the Pacific where there is such a close integration between sustainable living and the natural environment, is the fact that the first organic continuing landscape inscribed on the World Heritage list is in the Philippines where the Rice Terraces of the Philippines Cordilleras were inscribed in 1995.

Serial Sites and the Pacific

The Operational Guidelines adopted by the World Heritage Committee include provision for so-called serial sites, a concept which also has potential for the Pacific.

The Guidelines say that States Parties may propose in a single nomination a series of cultural or natural properties in different geographical locations, provided that they are related:

- because they belong to the same historico-cultural group,

- the same type of property which is characteristic of the geographical zone or the same geomorphological formation, biogeographic province or the same ecosystem type; and provided that it is the series as such, and not its components taken individually, which is of outstanding universal value.

The possibility of serial sites in the Pacific opens up some exciting prospects in both the natural and cultural fields with the recent Global Strategy meeting, for example, talking of the history of voyaging, settlements and agriculture in the Pacific region crossing the boundaries between countries.

The Future

The World Heritage Convention is an important global instrument for conservation. It is my hope that the future will see more Pacific island countries involved in, contributing to and taking advantage of the Convention to provide global recognition and support for places in the Pacific of outstanding universal value to all humankind.

World Heritage - The Solomon Islands Experience

Ben Devi
Deputy Director,
Ministry of Culture, Tourism and Aviation
Solomon Islands

Elspeth Wingham.
Environmental Consultant,
New Zealand

Current Situation

There are two possible areas for listing as natural sites within the Solomons . They are Rennell, which is an upraised coral atoll and Marovo Lagoon. The nomination document for East Rennell was submitted to the World Heritage Centre in Paris, in June 1997. Around March next year, two assessors from the World Heritage Centre will visit East Rennell. They will check that the natural values are of "international significance" and if there are mechanisms in place to manage the natural resources of the area. The assessors will report back to the World Heritage Centre in June 1998 and a decision on listing will be made in December.

The people on Rennell and East Rennell are Polynesian, the project is working with five villages with a population of around 600 people. In Marovo Lagoon, the people are Melanesian and there are approximately 54 villages and a population of 8,500 people.

Background

To become a State party to the World Heritage Convention, the Solomon Island Government required a sponsor country to nominate it and to assist with the procedures for listing of sites. The country chosen was New Zealand which currently has two World Heritage sites. In 1989 the Solomon Island Government gave Cabinet support in principle for World Heritage listing for Lake Tegano on Rennell and Marovo Lagoon in Western Province and approved application for membership of the World Heritage Convention. In 1992 the Solomon Islands became a member of the Convention. The New Zealand Government has assisted under the bilateral aid programme to the Solomons.

The New Zealand Government has provided eight consultancies since 1989 for the World Heritage Programme. In 1990 John Mackinnon of the Geography Department, Victoria University of Wellington, carried out an initial appraisal. In 1991 Bing Lucas who is Chairman of the World Conservation Union's Commission on National Parks and Protected Areas, advised on the implications of becoming a State party to the World Heritage Convention and of having sites on the World Heritage List.

In 1992 Charles Darby of Conservation Development Services developed a public awareness programme and prepared a plan to achieve World Heritage listing. His suggestions included provision of small business development. In 1994 a draft Strategic Management Plan was prepared by Claire Massey. It is based on the findings of the Lees Evans Partnership which was completed in 1993. Their study included recommendations on conservation and development, small business development, administration and management.

In 1994 the New Zealand Ministry of Foreign Affairs and Trade appointed Elspeth Wingham as Project Manager to live in the Solomons and to prepare a Project Implementation Document. In 1995 Rob

Greenaway prepared a draft Ecotourism Plan for Rennell and Marovo Lagoon and Nancy Sheehan prepared a draft Plan for Small Business Development.

The Project Implementation Document was approved by both Governments in 1995 and implementation began. At East Rennell the focus up to 1997, has been on achieving World Heritage listing while in Marovo Lagoon progress has been made in establishing small-scale ecotourism lodges. There has also been development of tourism related small businesses and infrastructure. The project was reviewed in 1996 and to complete implementation, an interim Management Services Contract was given to Elspeth Wingham. Currently, the Technical Adviser, John Preece is based in Honiara while completion of tourism infrastructure proceeds.

Customary Land Tenure

One of the major issues in achieving World Heritage listing is dealing with customary land tenure. Both areas are under customary land ownership and there is an area of 10,000 hectares of Government owned, alienated land in Marovo.

As the communities of the Solomon Islands have always been in groups so customary land tenure is structured similarly. The groups, by and large, consist of blood related individuals. Traditionally, some of those individuals held various ranks as elders of the groups. In some cases there are chiefs who are head of the group and in other cases, the priests perform a dual role as community leaders as well as religious leaders.

The groups are further categorised as patrilineal and matrilineal. Where they are matrilineal, the male members of the group would act mainly as spokesmen, but the land is owned by members of the female line. Unfortunately, this is at present being confused and members of the male lines very often wrongly claim ownership of the land, ignoring the female line. This action threatens and directly undermines the customs of these areas. A person claiming ownership outside of custom is acting under false pretences. This results in custom being abused yet the claimant will declare that they are acting in accordance with custom.

Customary land tenure can also be considered as conveying various categories of rights such as ownership and usage and these signify the relationship between the people and the land. These are very important points of consideration for they have numerous benefits for individuals. Further analysis of these rights can be made in the following way :

	Rights	**Status**	**Category**
1.	Primary	Ownership	Group
2.	Secondary	Residence	Sub-group
3.	Tertiary (public)	Usage	Individuals

If you have primary rights, you have ownership and the category involved is a group. If you have secondary rights, you may have residence and the category is that of a sub-group. If you have tertiary or public rights, you have usage only and that category applies to individuals.

The primary rights can only be held by the group or tribe or clan owning the land. This includes the right to reside, use and give away land as may be necessary according to custom. But there is a distinction here

in that residency and use are rights which relate mainly to individuals and may be exercised individually. Whereas right of ownership is limited to the groups and should be excercised collectively.

In communities where the line is patrilineal, secondary rights are held by members of the female line and vice versa in areas with matrilineal ownership. They have the right to reside and use the land but are subjected to the overall administration of those who own the land. These people cannot assume ownership of the land, regardless of how long they have lived there except in rare circumstances where there are no surviving members of the land owning group.

Tertiary or public rights, are those which by reason of humanity are essential for the daily needs of an individual. These include passage without hindrance, collecting water, firewood, wild vegetables but excluding valuable trees such as nuts and breadfruit, the right to hunt and to fish. In some areas, water rights are held by the land owning group with regards to fishing in big rivers or over reefs.

Customary land tenure in the Solomon Islands is a complex issue. There are three component parts that make up the social structure of local communities ; they are God, tribes and the people. To live, the people need the land, rivers and sea. The interaction between the social structure and resources that people need have been managed by custom for thousands of years. It is critical that any development takes into consideration the customary land tenure and rights that are operating in that area.

God Land

CUSTOM

Tribe People Rivers Sea

Questions often asked by customary land owners are, what are the advantages and disadvantages of becoming a World Heritage area? The advantages are; increased exposure of the area which will provide opportunities for ecotourism and other related small businesses. The disadvantages are that there will be more visitors which could put a strain on resources and they may not respect local culture.

All of the activities that are needed to maintain the peoples' customary lifestyle can continue such as; cutting down trees for houses, preparing gardens and fishing. Extraction of resources in a non-sustainable way is not permitted inside a World Heritage area. This means small businesses can be developed as long as they are sustainable i.e. longterm and environmentally friendly.

Program Design

This must meet the needs of the Governments involved and the local communities. For East Rennell, a program was developed that has three components:

- World Heritage listing involving public awareness and education,
- ecotourism and conservation, and
- small business development and resource management planning.

To implement the programme, there needs to be a system to allow consultation and participation at the local level. Support from the local people is essential to the success of the programme and public awareness and education are needed to ensure that the local people understand what World Heritage means and that they understand what they are committing themselves to.

Problems

1. At Government level, approval was given to proceed with World Heritage listing but the decision ultimately belongs to the local landowners. It is essential that there is good communication between Government and local levels.

2. It is necessary for the Government of the country to "preserve and protect" the area being proposed. Various Governments have been in power during the course of this project and some have preserved and protected the areas while others have encouraged unsustainable development such as logging and mining.

3. The sponsor country should make it clear that it has a longterm commitment to the project. As contracts for staff were finishing, local people would produce lists of goods needed for their small business because they thought that would be the end of the funding. This lack of continuity causes confusion and mistrust.

4. At a local level on Rennell, the people initially had a "compensation" mentality. They asked how much they would be paid to become a World Heritage area. They saw World Heritage listing as being restrictive and were not aware of the advantages.

5. At East Rennell, up to six education and public awareness visits were made to each village before they were asked if they wanted to proceed with listing of the area. The visits covered a period of two years and some people became impatient. Both Governments wanted to be sure that the local people understood what they were agreeing to before the small business developments proceeded.

6. It is easy to work in areas where the traditional power structure is still strong. This is being undermined in both locations as some people are aware of the value of resources and want to take more than their share. They see World Heritage as a threat to their plans and these people have actively spread wrong information about the programme.

7. The local people did not understand the need for baseline information about their lifestyle and the Government's need for the information so that it could monitor the effect of the programme. This led to the person who was doing the participatory rural appraisal survey (PRA) being sent back to Honiara twice.

8. There has been interference by local and provincial politicians. Money that was meant for education and public awareness was used to buy 30 chainsaws and frames and these were distributed just before the provincial elections. They caused many problems through the wrong message that was conveyed, the jealousy over who received the chainsaws and how they were to be used. The policy now is that Government money is not released as cash but is used for training and materials for lodges and small businesses.

9. Any ecotourism or small business development that the project supports takes at least one to two years to establish. Logging is seen as easy money. There is no work required and very little delay in being paid. To counter this it is necessary that the programme is efficient in implementation so that communities that are committed to conservation do not become discouraged.

10. Different strategies need to be developed for different areas. In East Rennell where there are five villages, education and public awareness was the first step. In Marovo Lagoon where the population is much larger and there is considerable pressure to log, ecotourism was developed to demonstrate that it was possible to earn money and look after the environment. There are some communities in Marovo

that want their land registered as being a conservation or sustainable development area so the people will not be pestered by logging companies. They are interested in the small business development programme that is being established on East Rennell and would like to do something similar. If the World Heritage programme supports these communities, then it is likely that neighbouring clans will ask to join in. In this way it may be possible to win support of the Marovo people for World Heritage.

Conclusions

Achieving World Heritage status for an area is a slow process and should be a longterm goal especially in a culture where there is customary land tenure.

The World Heritage Programme in the Solomons operates on two different levels; Government and local community. It is essential that there is good communication between the Government representatives and local people.

It is essential to consult widely with the customary landowners. Most of them want to preserve the environment and if the programme can meet their needs, they are keen to support World Heritage.

World Heritage Convention
-the Fiji Experience

Birandra B Singh
Director – National Trust for Fiji

Before I share with you some experiences of heritage management in Fiji, I would like to acknowledge that most of what I am presenting today has been the collective work of colleagues in Fiji, some of who are here in Pohnpei and in no small part the work of Kate Vusoniwailala, Director of Fiji Museum. We all represent the team of Government and Non-government agencies, which work together with and for the community to conserve and manage our country's cultural and natural heritage.

Economic and geographic information

Fiji comprises 300 islands, scattered over 1.3 million square kilometres. There are two large islands, Viti Levu and Vanua Levu, which comprise 87 per cent of the total land area and holds 75 per cent of the population. The archipelago has one of the best-developed coral reef systems in the Pacific, where all major reef types are represented. Unique marine features include alkaline pools, marine lakes and caves and stunning landscapes such as the Ogea and Vulaga lagoons. Whilst Fiji's vegetation and wildlife are small in numbers they are of great scientific and genetic interest because of the high proportion of endemic forms. Rainforest is the dominant terrestrial ecosystem, although today only 750,000ha remains of Fiji's natural forest.

Pre-history

Current archaeological research indicates that Fiji was inhabited over 3,590 years ago. Evidence suggests that these early inhabitants were coastal dwellers who depended largely on the resources of their coastal environment. They have been described as 'Lapita people' as a result of the distinctive dentate stamped pottery that they produced. This pottery has also been found from New Caledonia, through Vanuatu and the Solomon Islands to Fiji, telling a tale of exploration and discovery which is unique to mankind. Radiocarbon dating indicates that from Fiji, the Lapita people spread out to populate the area known today as Polynesia.

Subsequent migration to Fiji and settlement from Melanesian countries occurred roughly around 100BC and 500AD. This is again illustrated in the specific pottery type associated with particular periods. It is also reflected in the increased amount of occupation located more centrally in the main islands, and in increased defensive earthworks.

The constant interchange of cultures and technologies with its close island neighbours has resulted in a rich cultural tapestry, enhanced further over recent decades through contact with other cultures and peoples. The evidence of this is again tangibly illustrated in Fiji's unique historic buildings found in concentration in the historic town of Levuka in Ovalau.

Heritage Management

Cultural heritage in its many manifestations forms an integral part of our life in Fiji, reflecting the rich traditions and diversity of our many communities. It is through an understanding of our cultural heritage that we have better insight into what our community was like in the past and we are better able to define who we are today.

Our cultural heritage includes those intangible resources, such as oral traditions; song; dance, custom, and traditional medicinal knowledge. Tangible resources include crafts; arts; earthworks; historic buildings; and objects relating to Fiji's cultural and historical events.

Fiji's predominant land tenure – communal ownership – is a manifestation of the cultural concept of 'vanua' reflecting the relationship between the Fijian people and their land and surroundings. This relationship with the land plays an integral role in the manifestations of culture in many forms and has a direct impact on Fiji's political and economic policies today.

These many broad areas are managed by a host of different Government departments and NGO's.

What Agencies Currently Exist to Manage Fiji's Cultural Heritage Sites?

Organizations directly responsible for the management of Fiji's intangible cultural heritage include:

- National Trust for Fiji : Historic buildings and, archaeological and historic sites, parks and reserves (terrestrial and marine).
- Fiji Museum : recordings of music
  : recordings of oral traditions related to archaeological sites
- Native Lands Commission: oral traditions/genealogies related to native land
- Organisations indirectly associated with the management of cultural heritage in Fiji include:
- Native Land Trust Board : administration of the land
  : information bases on land information including sites
- Fijian Affairs Board : liaises with communities to assist and advise on issues related to heritage management
- Department of Tourism : development of eco-tourism projects dealing with archaeological sites
- Department of Environment : Responsible for EIA's
- NGO's:
- SPACHEE : general cultural information
- Foundation for the Indigenous Peoples of the South Pacific : general cultural information.

Heritage Site Management Policy

A new national heritage policy to manage heritage sites was adopted by Cabinet in 1996. This policy has for the first time provided the required structure for National Trust for Fiji to take a lead role in management of the heritage sites in collaboration with government agencies and community groups.

What Legislation Exists to Manage and Protect our Cultural Heritage

- Native Lands Act
- Fijian Affairs Act
- National Trust for Fiji Act
- Town Planning Act
- State Land Act
- Preservation of Objects of Archaeological & Palaeontological Interest Act
- Fiji Museum Act

Listed Sites

Fiji became party to the Convention for the Protection of the World Cultural and Natural heritage, the World Heritage Convention in 1990. In 1994 four sites were selected and nominated for the World Heritage Centre tentative list. This list has had to be redone within the guidelines of the new criteria.

Sigatoka Sand Dunes

Gazetted as a National park in July 1989, the Sand Dunes are significant because :

- Of its geomorphology and ecology – the sand dune ecosystem which covers 650 acres are very rare in the tropical pacific;
- The sand dunes hold an archaeological site of international significance, a site that is one of the most important in the Pacific and of immense significance to an understanding of Fiji's early inhabitants. Research indicated that the first settlers arrived 3,590 years ago after navigating successfully southwards through New Caledonia, Solomon Islands and from Fiji, these early settlers populated the area known today as Polynesia. The distinct dentate stamped pottery produced by these coastal dwellers is found in abundance at the sand dunes site, along with a significant number of ritual burials. This site also contains different occupation layers illustrating later settlements in Fiji.

The Nakauvadra Range

- The Nakauvadra Range lies in the north eastern part of Viti Levu within the province of Ra.
- The distinctive feature of this range is forested landscape surrounded by grasslands on lowerslopes. This area also contains a wide presentation of endemic flora and fauna of the country.
- The range is one of the largest remaining intact dryland forest tracts in Fiji. The area is rich with legend and mythology relating to ancient occupation of the land and evidence of very old village sites in the form of stone walls and agricultural terraces can be found inside the range.

Iguana Sanctuary

This 70-hectare island off the coast of Vanua Levu, in the province of Bua, is Fiji's first wildlife sanctuary, established in 1980. Yadua Taba holds one of the world's rarest lizards – the crested iguana. Since this new species of lizard was reported in 1979, small populations of the lizard have also been found in the Yasawa/Mamanuca group. However, Yadua Taba is an ideal sanctuary because it's eco-system is not impacted on by human habitation, as with the other islands. Previous problems such as the high goat population on the island are slowly being addressed by the management body – the National Trust for Fiji, who are working with the traditional land-owners and international experts to protect the crested iguana.

Levuka, Ovalau

Levuka, the historic capital of Fiji is a significant heritage site because:

- It was the seat of Fiji's first capital from the 1860's
- It was the focus of much British, Australian, German and American commercial activity until the early 1880's
- It was the site of the Cession of Fiji to the British Crown in 1872
- It has an excellent range of early building types and architectural styles
- It is one of the best examples of settlement reflective of European colonization in the Pacific
- The island of Ovalau not only holds Fiji's first capital but also many koromakawa sites and strategic forts. During the period that Levuka was being established as a town, the strategic stronghold of the Korolevu hill fort, was still holding out successfully against the Paramount Chief of that time – Ratu Seru Cakobau.

This history is all intertwined to represent a unique experience and outstanding tangible record of that crossing of cultures, over a hundred years ago.

Some of the Lessons Learnt from the 3rd Global Strategy Meeting held in Suva, Fiji in July, 1997 (taken from the UNESCO meeting report)

I. We recognised that the Pacific Islands region is an explicit and unique aquatic continent covering an area of three million square kilometres, an ocean in which only two per cent of the area comprises land.

II. We noted that there is an inseparable connection between the outstanding seascapes and landscapes in the Pacific Islands region which are woven together by the rich histories, oral and life traditions of the Pacific islands peoples. These elements comprise the cultural heritage of the region which while diverse, are nevertheless bound through voyaging, kinship, trade and other relationships.

III. We recognized the immense range, richness and uniqueness of natural and cultural heritage in the region. The natural diversity of the region forms an ocean of islands which gives rise to a special relationship between land and sea for Pacific Island peoples and includes coral atolls, high volcanic islands and some continental land masses which often contain unique assemblages of plants and animals.

IV. This natural diversity is paralleled by an extraordinary richness of cultural heritage expressed in thousands of different languages, and distinct cultural traditions.

V. We also noted that the region contains a series of spectacular and highly powerful spiritually valued natural features and cultural places rather than an extensive range of monuments and human built permanent features. These places are related to the origins of peoples, the land and sea, and other sacred stories. These places are often linked and are interpreted and understood only through cultural traditions.

VI. However, we also recognised the critical threats to the natural and cultural environment in the Pacific Islands region is posed by the unsustainable exploitation of natural resources in both the land and the sea.

And recommended that any decisions on the access to, and use of, the knowledge and traditions associated with these sites must remain with the traditional custodians. This calls for particularly sensitive consultation with traditional custodians in all heritage conservation matters in this region. This requires a process of partnership building.

We recognised that the Global Strategy initiative in the Pacific Islands region and the Third Global Strategy meeting held in Suva, Fiji from 15–18 July 1997 is the start of a process of engagement and of building working relationships and capacity in heritage conservation in the region. In this way greater world recognition can be given to the cultural and natural heritage to the Pacific Islands region.

Participants emphasised that the context for the operation of the World Heritage Convention in the region can only be effected through recognition of local customary and other forms of tenure of land and sea, and traditional custodianship of cultural heritage. This region is unique because of the high degree to which land remains in customary ownership. It was recognized that significant time and resources are needed to build meaningful partnerships with these local heritage owners and custodians by the relevant national agencies and that this will require resources not currently available in these countries and territories.

And recommended that in the Pacific Islands region, decisions about World Heritage conservation have to be formulated in partnership with, and with the agreement of, local communities and individual land

holders who are the custodians and who have the sites under direct political, spiritual and traditional control.

Participants also recognised the impacts, and local uses, of foreign contact and that this poses particular challenges for heritage conservation in the region.

It was agreed that is vital for the protection of the cultural heritage in the region for all of the countries and territories and peoples of the region to be encouraged and enabled to participate in future initiatives. Governments should support the participation of territories in the region.

The World Heritage Convention in the Pacific Islands Region

The unique features of the Pacific described above offer special opportunities for implementing the World Heritage Convention, notably:

Transnational serial sites and layered cultural landscapes

Potential World Heritage sites in the Pacific Islands region are likely to be serial sites and multi-layered cultural landscapes. Preference should be given to these serial nominations linked by themes of relevance to the region as a whole extending over vast distances.

These serial sites attest to the history of voyaging, land and sea routes, and of trade, the first landings, activities, settlements and agriculture in the Pacific Islands region. Other series of sites reflect the different waves of migrations. Other serial sites manifest the history of Pacific peoples before and after European contact. As serial sites they form lines crossing the boundaries between countries and are therefore transborder and transnational sites.

The participants therefore recommended that resources be provided to foster cooperation between countries and territories of the region to ensure that these serial sites and layered cultural landscapes are adequately conserved.

Places of origin, spiritual routes and other sacred places

The participants emphasised that places of origin, spiritual routes and other sacred places are powerfully bound by spiritual and natural connections with the life and destiny of Pacific peoples. Such sacred places are sometimes monumental architecture whilst others are sacred natural landscapes.

Accordingly, any approaches regarding the identification and designation of such places, in their tangible and intangible aspects, will need to be undertaken with appropriate restraint, wisdom and sensitivity. This will require the direct participation and agreement of the indigenous custodians of the resource/site and cultural heritage in all discussions regarding the same.

The participants recommended that the process for preparing tentative lists, nominating and applying selection criteria for World Heritage Conservation must be carefully conducted with constant reference to the specific features, needs, cultural traditions and knowledge, and the dominance of custom based land tenure of the region.

Participants further recommended that assistance be provided to Pacific island countries that are considering accession to the World Heritage Convention in order for them to fully assess the benefits and commitments involved.

Whilst recognising the sovereign rights of states and territories in the region new partnerships for World Heritage conservation are required in this region. The participants requested that assistance be provided

through the World Heritage Fund or other bilateral and multilateral sources, to build effective networks of regional and international, government and non-environmental agencies working on cultural and natural heritage conservation initiatives (these will include, but may not be limited to SPREP, PIMA, ICOMOS, IUCN, ICCROM, UNESCO Apia, SPC etc).

Participants noted the value of collective experience created by the 3rd Global Strategy meeting and recommended a further regional meeting in two years time.

In alerting the World Heritage Committee to the fact that there are to date very few Pacific Islands signatories to the World Heritage Convention, the participants of the 3rd World Heritage Global Strategy meeting respectfully requested that the Committee consider whether it is at all possible for education and awareness raising programs in country to raise the profile of heritage conservation and particularly the Convention in the region be provided as a special allocation from the World Heritage Fund including for non Member States of UNESCO and non States Parties of the Convention.

Participants requested assistance for educational and awareness raising programs in country to raise the profile of heritage issues and particularly the World Heritage Convention.

Assistance is also required for activities such as the following at the national and regional levels:

Networking for effective heritage conservation

Training of specialists, building upon existing human resources and initiatives advice on the preparation and development of conservation legislation, policy and planning identification, evaluation and recording of sites, cultural landscapes and seascapes design and preparation of national and international inventories consideration of the establishment of tentative lists of potential World Heritage sites regional specialised research and workshops (with publication and dissemination of results) capacity building for site management.

Where are we at present?

In Fiji we have formed a committee, which has met, and decide to send the tentative list to Cabinet before resubmitting the list to World Heritage Centre.

This same committee will be responsible to seek nomination preparatory grants and providing the guidance. The National Trust for Fiji is expected to provide the technical support and help in management of sites in close collaboration with other governmental and non-governmental agencies.

In conclusion we would like to acknowledge the support of the World Heritage Centre in providing funding support at the request of Fiji's National Commission for UNESCO for some of us to attend this meeting.

World Heritage Convention – a Tool for Conservation?

Ernest Bani
Environment Unit, Vanuatu

Abstract

The Pacific Island Countries (PICs) continued accession to regional and international environmental conventions, treaties and co-operations are seen as very essential to environmental protection. Combined with traditional and national mechanisms for environmental protection, PICs have to look at the reality of what an international convention like the World Heritage Convention is set out to achieve. The number of conventions may be impressive, but when looking at the reality of environmental degradation as compared to protection all over the world, one wonders whether conventions are effective tools for environmental conservation. This paper looks at just how effective the World Heritage Convention is to environmental protection in the Pacific Island Countries.

Introduction

The biodiversity of the South Pacific region is of regional and international importance. Changes accompanying developments have undermined the Pacific's traditional social systems, including their capacity for resource management, and the environment has suffered as a result. Today we are faced with the real challenges to protect our biodiversity, and to build relationships with the environment that ensure we do not continue to lose the variety of species and their habitats that is our biodiversity heritage. Outside models for conservation of our biodiversity values, such as international conventions have been tried, but these tend to conflict with traditional practices and values in the Pacific.

The World Heritage Convention

The legally binding convention concerning the Protection of the World Cultural and Natural Heritage is the World Heritage Convention which was adopted by the 17th Session of the United Nations Educational Scientific and Cultural Organisation (UNESCO), during it's General Conference, in Paris, on 16 November 1972.

There are many international conventions. They are established and used by co-operating countries to promote ideas and increase world understanding. After 22 years since the World Heritage Convention came into force in December 1975, only three countries (Vanuatu, Papua New Guinea and Fiji) from the Pacific Island Countries have ratified the convention.

The Convention provides for the protection of those cultural and natural properties deemed to be of outstanding universal value. It aims to encourage co-operation among nations to promote worldwide recognised cultural and natural properties. However, the convention is not intended to provide for the protection of all properties of great interest, importance or value, but only for a select list of the most outstanding of these from an international viewpoint. The outstanding universal value of cultural and natural properties is defined by Articles 1 and 2 of the Convention. These definitions are interpreted by the committee by using two sets of criteria: one for cultural property and another set for natural property. Like every other international convention, countries signing the World Heritage Convention commit themselves to help identify, protect, conserve and preserve world heritage properties.

The Convention is administered by a World Heritage Committee. The Committee has set specific criteria for assessing natural and cultural heritage for nomination to the list. The World Heritage List was established by UNESCO through the convention. This includes properties which have outstanding universal value and form part of the signatory country's cultural and natural heritage.

For listing as a natural property, the submission must be an example of outstanding universal value which represents the major stages in the following:

- evolutionary history of the planet,
- ongoing geological processes, biological evolution and humanity's interaction with its natural environment,
- contains exemplary natural phenomena formations or features,
- areas of the highest degree of natural beauty,
- unparalleled combinations of natural and cultural elements, and
- contains the natural habitats where threatened species of animals and plants of universal value still survive.

Included in criteria to nomination of cultural property is the requirement that it must be authentic in design, materials, workmanship and setting, and be outstanding example of the one of the following:

- a unique artistic achievement, a masterpiece of creative genius,
- have exerted great influence on developments in architecture, monumental arts, or town planning and landscaping,
- bear a unique or at least exceptional testimony to a civilisation which has disappeared, or
- be outstanding example of a traditional human settlement which is representative of a culture and which has become vulnerable under the impact of irreversible change, or
- be directly and tangibly associated with events or with ideas or beliefs of highly respected universal significance.

The Convention provides for only national governments of the countries who are signatories to the convention who can nominate areas for the World Heritage List.

The implementation of this convention requires the full commitment of the signatory governments to ensure that they have adequate legal, and/or contractual, and/or traditional protection and management mechanisms in place to ensure the conservation of the nominated cultural and natural properties. The existence of legislation at the national, provincial and municipal level and a well established contractual or traditional protection as well as adequate management mechanism is therefore essential.

Many countries in the Pacific have began this process, either specifically or more generally, with a view to putting in place adequate mechanisms, both administration and legal, with other international conventions like the Convention on Biodiversity and the Convention on Climate Change to meet the obligations under those conventions, but it is not happening with the World Heritage Convention.

Effectiveness of the World Heritage Convention

Like many other international conventions, the effectiveness of the World Heritage Convention is determined by the extent to which it is ratified and implemented by a State Party. Whether a State is interested in implementing the convention depends on a number of factors such as the relevance of obligations to national requirements and, the significance of an issue at the international level. Such conventions can be useful and important in providing a framework for national policies and legislation.

For many Pacific Island Countries, fulfilling international obligations has important resource implications. The provision of funding for national implementation of conventions is an important consideration. This has always been a constraint for PICs when they have financial difficulties to meet the obligations under the convention.

Constraints of the Convention in PICs

To become a signatory to an international convention is not a problem, but, the reality is how to make the convention work effectively in the island countries. Here are some reasons as to why it is not possible to implement such convention:

- lack of adequate administration to implement the convention,
- lack of understanding of the convention,
- lack of national policies and legislation to enforce the convention,
- a country has to be a signatory to the convention before nominating sites,
- conflict of interest between traditional and modern management planning,
- lack of funds to meet financial obligations of the convention, and
- lack of government commitments.

Conclusion

International Conventions provide important framework for conservation of Pacific Island Biodiversity only to an extent where it is possible to implement the conventions. There has not been any real achievements with the World Heritage Convention as a tool for biodiversity conservation, with only three PICs current signatories to the convention. Pacific island countries have difficulties in meeting convention obligations. Priorities of governments change and in order for such conventions to be effective, incentives have to be provided to give encouragement to governments to join.

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General conference paper session

The IUCN Sustainable Use Initiative - Origins and Objectives

Robert W G Jenkins
Environment Australia

Stephen Edwards
IUCN US Office

Introduction

Wild species and ecosystems are used by people. Whether those people live in cities or rural villages, in industrialised or developing countries, their survival depends on using such animals, plants and ecosystems. People the world over are striving to conserve species of animals and plants; to meet their subsistence requirements; for the intrinsic biological values of the species, and for cultural, religious and ethical reasons. Irrespective of peoples' motivation, if populations of wild species are not conserved, they will become extinct and our own future could be in jeopardy. To conserve these resources, we must find ways to make their use sustainable - so they will survive and our needs and aspirations can be met. The challenge is to conserve these resources while they are being used - in essence this is what is termed "sustainable use".

Background and Rationale

For the last 20 years a major goal of the conservation movement has been to identify the common ground that recognises the political imperative of economic and social development while, at the same time, also permits implementation of strategies to conserve biological diversity without creating conflict. IUCN - The World Conservation Union has been a leader in the international debate on this issue, being instrumental in preparing the World Conservation Strategy in 1980 and *Caring for the Earth: A Strategy for Sustainable Living* in 1992.

The concept of sustainable use was first articulated in the World Conservation Strategy. The Strategy recognised that most human use of renewable natural resources was not sustainable. To respond to this need the Strategy identified "sustainable utilisation of species and ecosystems" as one of its three main objectives. To achieve this objective, it stated that harvests must not exceed production. In economic terms, natural populations were described as the "capital" and the harvest equated to the "interest". Based on the arguments presented in the Strategy, it was generally assumed that:

- Natural populations of plants and animals have a certain production, which can be harvested without affecting the survival of the natural population or standing crop, and

- If people do not harvest more than the production, then the resource could be exploited in perpetuity - that is, the resource could be used sustainably.

However, the concept of sustainable use varies in different ecological and cultural contexts around the world. The extent, variety and significance of uses of wild species and ecosystems, and the ecological, social and economic benefits derived from them are poorly understood.

To use natural resources sustainably and optimise the benefits to people who occupy the same habitats requires a better understanding of the factors that influence, both positively and negatively, the sustainability of those uses. There is urgent need for better advice regarding management and use of

natural renewable resources. Governments, non-government organisations (NGOs), donors and international instruments are all seeking more substantial guidance on how to enhance the sustainability of uses of natural renewable resources from implementation of field projects to framing national and global laws and policies.

With a membership of more than 850 governments, Government agencies and non-Government organizations spanning virtually every country in the world, IUCN - The World Conservation Union provides a unique forum to facilitate dialogue across multiple sectors. The Union's extensive global networks, comprising thousands of volunteer specialists in the social and biological sciences, from government and private sectors, represent an enormous wealth of scientific and technical expertise relevant to sustainable development and the conservation of biodiversity.

Foundation and Formation

The present IUCN Sustainable Use Initiative (SUI) derives its existence from two resolutions adopted by the IUCN membership which recognised that uses of wild species should be sustainable and that wild species should be conserved for the benefit of people. Resolution 18.24 (Annex 1) adopted by the 18th Working Session of the IUCN General Assembly (Perth, 1990) represents a significant milestone in the international debate on sustainable use. It acknowledged that properly managed programs involving the sustainable use of wildlife can create economic incentives to enhance the conservation of wildlife populations and their ecosystems. This resolution was reaffirmed by the 19th Working Session of the IUCN General Assembly (Buenos Aires, 1994) with the adoption of Resolution 19.54 (Annex 2). The SUI was conceived in 1994 and formally initiated in January 1995. It represents a unique "marriage" between the Species Survival Commission and a programmatic element of the Secretariat.

IUCN is uniquely situated to undertake the SUI. Its Species Survival Commission (SSC), the largest and most active of the IUCN networks, provides a framework within which the regional sustainable use groups are being developed. IUCN's regional and country offices are positioned to provide support to each of the regional groups. Most of IUCN's regional and country offices are headed by experts from the regions or countries in which they are located, thus ensuring the best available knowledge and sensitivity to local issues, problems and needs. IUCN's global links also ensure efficient and productive contributions to global policy debates.

Mission and Objectives

The SUI mission is to contribute to an understanding of the factors and conditions that enhance the likelihood of sustainability in the use of wild living natural resources to conserve biological diversity and benefit people. In order to achieve this mission, the SUI has adopted the following three objectives:

- to improve understanding of the human and ecological factors that contribute to the sustainability of uses of wild species and their ecosystems;
- to promote that understanding to IUCN members, decision-makers and others, and
- to assist in the application of that understanding.

Structure and Activities

The SUI is being implemented through three voluntary components. Based on early analyses of wildlife use systems, it became apparent that it was not possible to prescribe a universal set of criteria for sustainability. The sustainability of any particular system of wildlife use is highly contextualised - being influenced heavily by prevailing local political, social and economic characteristics. The formation of a Sustainable Use Specialist Group did not follow the normal paradigm of established SSC specialist

groups. The IUCN/SSC Sustainable Use Specialist Group comprises an aggregation of a series of geographically distinct regional specialist groups (Figure 1), each with a chairperson elected by the regional membership. Membership incorporates a diverse array of disciplines including sociologists, economists and biologists from government, NGOs and the private sector. Leadership is provided by a global chairperson appointed by the Chair of the Species Survival Commission with the agreement of the Director General of the Union.

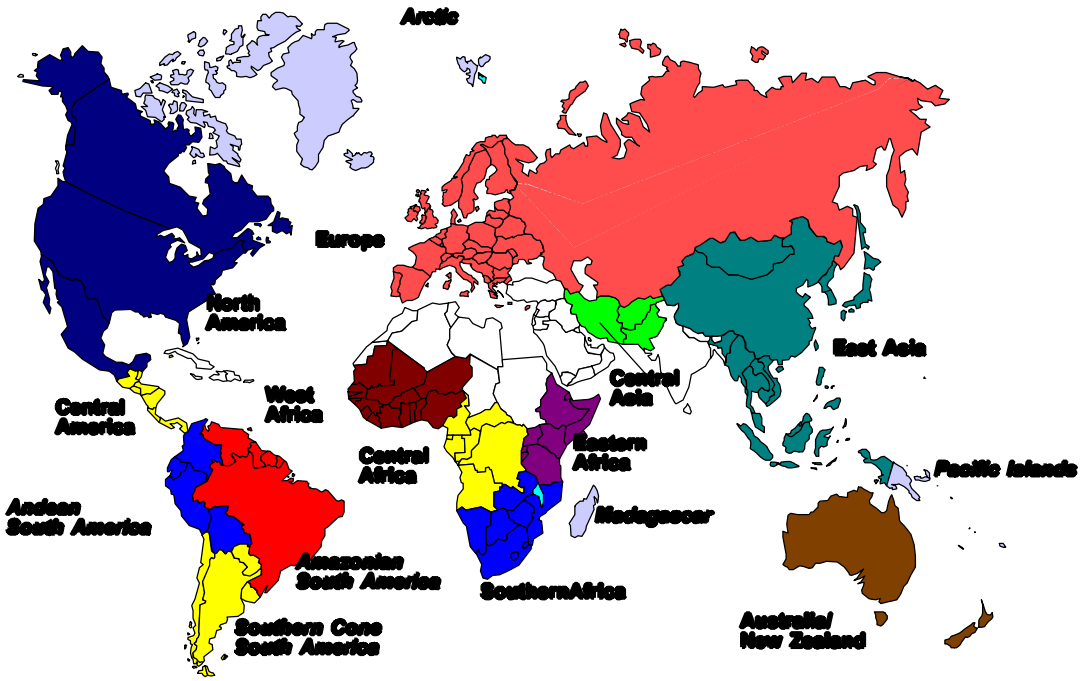

Figure 1 Geographic distribution of Regional Specialist Groups

These regional specialist groups represent the foundation of the SUI and are the principal means by which the SUI will achieve its objectives and overall mission. They decide their own memberships, activities and priorities, in the context of a global framework adopted by a Steering Committee. The Steering Committee, which comprises the chairs of the regional specialist groups, meets annually and facilitates inter-regional coordination and collaboration. It is a forum for the leaders from all regions to share their experiences, identify and discuss common issues, develop global frameworks or guidance and agree to priorities and activities to be addressed by the regions. The Steering Committee has elected an Executive to oversee and guide implementation of the SUI. The Executive sets technical standards, monitors the contributions from the regional specialist groups and advises IUCN on policy matters pertaining to sustainable use. It meets twice per year and confers monthly by tele-conference. A support system of regional Secretariat staff provides administrative services and facilitates the work of the regional groups.

While IUCN regional and country offices are serving this role in the initial phase of establishing the regional specialist groups, these responsibilities will likely be taken over by local NGOs in the long-term. A global support team, located in Washington DC, with support staff located in Southeast Asia, Central Africa and Australia assists in the formation of the regional specialist groups, coordinates regional contributions to global activities and assists in fund-raising for the regional groups. As the regional specialist groups develop, the global support team will be more involved in policy analysis and facilitation of inter-regional exchanges. Figure 2 provides a schematic arrangement of the functional

relationship between the different elements in the SUI as the Initiative relates to the international debate on conservation and sustainable use.

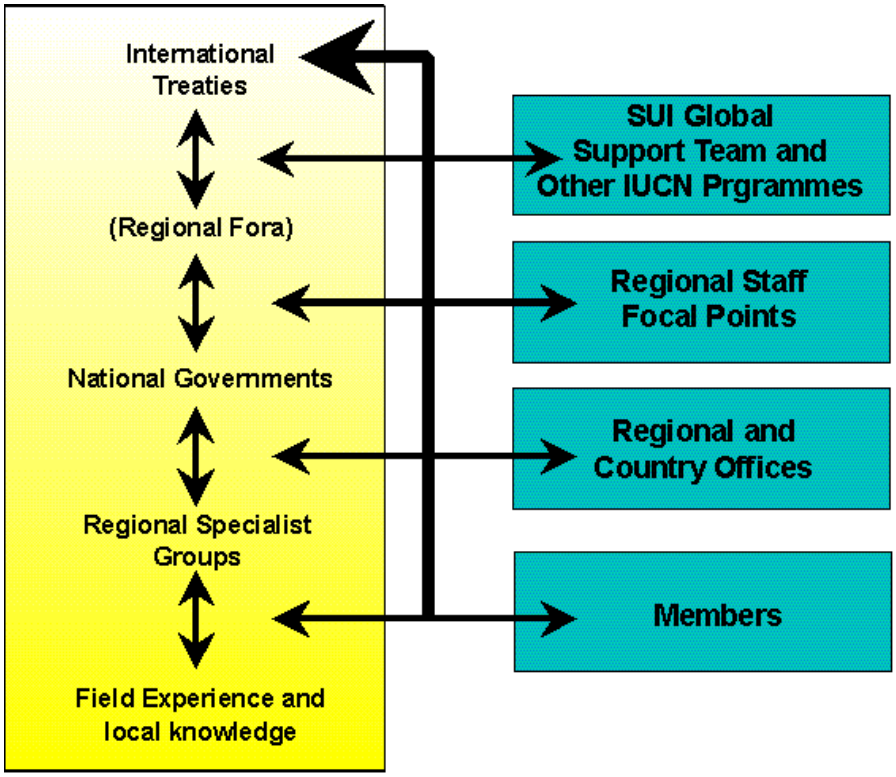

Figure 2 Relationships between the SUI and related elements

Because rural prosperity is linked to the sustainability of uses of natural resources, the SUI is examining uses of forests, fish and other wildlife resources. The regional groups, which comprise the SUI provide an interdisciplinary framework to enhance knowledge about the social and biological factors that influence the sustainability of uses of wild renewable natural resources. The approach is decentralised, bottom-up and non-prescriptive. Each regional group is addressing use issues and problems specific to its region. By exchanging information with other regional groups, local capacities and expertise are being enhanced. As part of a global learning process, people from different regions are gaining a better understanding of the factors that affect the sustainability of uses of natural resources. Concurrently, the SUI provides a framework for the lessons learned in the regions to be communicated to IUCN's members, partner organizations and governments to support and augment conditions that optimise benefits to ecosystems and local people.

Products and Outcomes

The principal products of the SUI in this initial phase are the formation of interdisciplinary regional specialist groups, comprising local people, with the capacity to; i) respond to regional and local issues and ii) advise and assist governments, donors, and NGOs. Regional groups are analysing different uses of renewable natural resources to identify indicators of sustainability and to begin documenting the social and ecological benefits derived from uses of the resources. Based on these analyses regionally applicable "Principles of Sustainability" are being identified. At the global level, knowledge of sustainable use will be improved by synthesising global principles from these regional contributions. Mechanisms are in

place to analyse regional contributions to identify patterns and trends that will serve as the basis for framing global policy guidance that responds to local conditions. A publication series will provide the means for communicating advances in knowledge and understanding of sustainable use. Regional SUSGs are being formed in a phased manner. Over the next three years as many as 20 oriented regional networks will be developed, based on language and cultural affinities, to provide comprehensive global coverage.

During 1995 the principal effort went into developing regional specialist networks and a structure for interregional coordination. The investment has been in developing processes to identify specialists in the regions, to enhance the capacities of the regional groups to address regional and local issues, to analyse use regimes in the regions and to synthesise global principles of sustainability, based on those regional analyses. Many regional groups have completed analyses of different types of uses of wild species in their regions. The scope and scale of these analyses varies between the regions. Examples of uses that have been analysed are the American Alligator (North America), Mangroves of Meso America (Central America), artisanal fisheries (West Africa). In an effort to ensure that these analyses were conducted uniformly, all regions used a common "analytical framework", developed by the Advisory Committee. This approach facilitated inter-regional comparisons and the identification of global principles.

The regional specialist groups that were started in 1995 have made great strides in establishing themselves as local resources that are available to serve local IUCN members, partners, and other institutions seeking advice or guidance related to uses of natural resources. The IUCN regional and country offices supporting the SUI are also developing the capacity to serve as regional reference centres on managed uses of natural resources.

Future Development

In order to achieve a global coverage, a priority for the forthcoming twelve months is the establishment of specialist groups in those regions that remain absent in the SUI (*e.g.* North Africa, Antarctic, Caribbean, Madagascar, Southern Asia and West Asia). With increasing interest to pursue issues of sustainability in relation to marine systems, consideration will be given to forming marine-oriented networks. Mechanisms will be adopted to formalise inter-regional collaboration and exchanges on issues of common interest.

SUI will initiate a strategy to communicate the lessons learned to various audiences, including: local non-government agencies, governments and their constituent agencies, regional cooperation agreements, global conventions and policy bodies, bi-lateral and multi-lateral development assistance agencies, private development assistance agencies. Greater effort will be made to translate and distribute all documents prepared under the SUI in English, French and Spanish (the three official languages of the Union).

Annex 1

18.24 Conservation of Wildlife through Wise Use as a Renewable Natural Resource

RECOGNIZING that use of wildlife may be consumptive or non-consumptive;

NOTING that some countries successfully conserve many species of their wildlife without using them consumptively, and that in many other countries the use of wildlife is necessary for the well-being of their people.

RECALLING that two fundamental aims of the World Conservation Strategy are to ensure the conservation of species and ecosystems for their intrinsic value and for the benefit of humankind;

ACKNOWLEDGING that the mission of IUCN is to provide leadership and promote a common approach for the world conservation movement in order to safeguard the integrity and diversity of the natural world, and to ensure that human use of natural resources is appropriate, sustainable and equitable;

RECOGNISING that some wildlife conservation programmes provide for sustainable use;

CONSCIOUS of the complementary role provided by protected area management for wildlife conservation and the importance of such protected areas in maintaining biological diversity;

UNDERSTANDING that a country's lands (including its rivers, wetlands and territorial seas) are fundamental assets due to their potential for producing food and other natural products and that there are economic and humanitarian constraints on the extent to which they can be maintained as natural habitats;

RECOGNIZING that more effective mechanisms must be found that contribute towards the future economies of countries through wise use and conservation of their renewable natural resources;

CONCERNED that the decline of species and the loss of genetic diversity are often due to loss of suitable habitat and exploitation at levels that cannot be sustained;

BELIEVING that properly managed projects for the sustainable use of wildlife can enhance the conservation of wildlife populations and their ecosystems because of the economic and other benefits that such use provides:

NOTING that governments, IUCN members, development assistance agencies, and others are seeking guidance and assistance in the formulation of policies and the practical design and implementation of field projects on sustainable use of wildlife;

RECOGNIZING that the process of developing IUCN guidelines (including safeguards) for sustainable use of wildlife was initiated by a Workshop on Sustainable Utilization of Wildlife, held at this session of the General Assembly;

The General Assembly of IUCN-The World Conservation Union, at its 18th Session in Perth, Australia, 28 November-5 December 1990:

1. AFFIRMS that ethical, wise and sustainable use of some wildlife can provide an alternative or supplementary means of productive land-use, and can be consistent with and encourage conservation, where such use is in accordance with adequate safeguards, namely:

    a. sound, scientifically-based monitoring mechanisms to ensure that such use is maintained at levels which be sustained by the wild populations without adversely affecting the species' role in the ecosystem or ecosystem itself;

    b. compliance with national and international legal obligations and policies;

    c. provision for the protection of wild animals from avoidable cruelty and suffering;

    d. conformity with the IUCN guidelines to be developed in accordance with sub-paragraph 5(a) below;

2. URGES all countries to:

a. establish an adequate system of protected areas as an adjunct to the development of sustainable wildlife use programmes to further ensure the conservation of the species involved in such programmes;

b. consider whether such sustainable use programmes based on IUCN guidelines, to be developed in accordance with sub-paragraph 5(a) below, would create economic and other incentives for the retention, rehabilitation and management of natural habitats and their biological assemblages outside such protected areas;

c. urgently review, where necessary and desirable, current programmes and practices involving the use of wildlife and modify them to ensure their sustainability and conformity with the IUCN guidelines to be developed in accordance with sub-paragraph 5(a) below;

3. RECOGNIZES that, consistent with national and international legal obligations and policies, trade in clearly identified products derived from properly managed sustainable use of wildlife carried out in accordance with agreed guidelines and safeguards (as developed in accordance with sub-paragraph 5(a) below) can confer incentives that enhance the conservation of the species or population involved;

4. ENCOURAGES range states of shared populations of wildlife to cooperate in the conservation of such populations through international agreements;

5. REQUESTS the Director General to coordinate IUCN programme activities, in consultation with the Species Survival Commission and in collaboration with IUCN members, to:

a. develop guidelines based on scientific, socio-economic, and traditional knowledge, the principle of equitable allocation of resources and distribution of benefits, and on other criteria recommended by the Workshop on Sustainable Utilization of Wildlife, for consideration by the Council;

b. work to achieve the agreement of IUCN members to endorse and implement those guidelines;

c. undertake or sponsor field projects to research and test factors needed to ensure successful sustainable use of wildlife;

d. review as appropriate existing programmes and practices involving the use of wildlife and recommend modifications necessary in order to conform with the IUCN guidelines;

6. REQUESTS the Director General to investigate mechanisms to ensure, in so far as practicable, the equitable distribution of income and other benefits derived from the use of wildlife as set forth in this recommendation.

Annex 2

19.54 Sustainability of Nonconsumptive Uses of Wild Species

ACKNOWLEDGING the great interest in the sustainable use of wild species as a conservation tool;

RECALLING that both the World Conservation Strategy and *Caring for the Earth* emphasize that wild species should be conserved for their intrinsic value and for the benefit of people;

NOTING that uses of wild species involve plants as well as animals, and that uses may be consumptive and nonconsumptive;

NOTING further that the development of guidelines for ecologically sustainable use does not imply, where existing range State legislation sets as effective standard of protection for a specific wild species within that State, that such protection should be removed;

AWARE that numerous cases exist where wild species are not being used sustainably and that these undermine conservation and public confidence in arguments for sustainable use;

RECOGNIZING the extensive work carried out by the IUCN/SSC Specialist Group on the Sustainable Use of Wild Species and the IUCN Sustainable Use Programme to prepare draft Guidelines for the Ecological Sustainability of Nonconsumptive and Consumptive Uses of Wild Species as called for in Recommendation 18.24 of the 18th Session of the General Assembly;

AWARE, however, that a meeting of the IUCN/SSC Specialist Group on the Sustainable Use of Wild Species and the Workshop on Sustainable Use of Living Natural Resources recommended that the Guidelines not be adopted by the General Assembly, but instead be tested and revised in consultation with a wide range of IUCN members;

The General Assembly of IUCN - The World Conservation Union, at its 19th Session in Buenos Aires, Argentina, 17-26 January 1994:

1. Reaffirms that Recommendation 18.24 defines IUCN policy and is the basis for all relevant IUCN decisions on the sustainable use of wild species, and that this policy is an integral part of the Mission of the Union;

2. URGES all States to ensure to the extent possible that any use of wild species is ecologically sustainable;

3. REQUESTS the Director General and the Chair of SSC, within available resources, and in cooperation with the members of the Union and interested governments:

   (a) to test the draft Guidelines in the context of enhancing the conservation of species and habitats;

   (b) to ensure that the revised guidelines take into account *inter alia* the different parts of the world;

4. REQUESTS the Director General, within available resources:

(a) to provide revised draft Guidelines for consideration at the 20th Session of the General Assembly;

(b) in cooperation with members and Commissions, to strengthen the IUCN programmes concerned with ecologically sustainable use:

(i) to take a lead in communicating the role and importance that ecologically sustainable use of species can have in conserving biodiversity;

(ii) to work, as a priority, with governments to correct situations in which wild species are being used unsustainably.

Cooperation: A Conservation Tool of Compromise or Influence?

Peter Taylor (Director) and Alice Woodruff (Project Officer)
Environment Australia

Abstract

As we move toward the next millennium pressure is mounting to become more serious about effectively conserving and managing our natural resources for our children and our children's children. Some may argue that we need to get very tough with those whose activities are not truly sustainable. Others may assert that too much regulation exists and we are not exploiting enough in order to sustain ourselves now. Creating a symbiosis between development and conservation relies on facilitating a cultural change in attitudes and practices among our policy makers and our industry decision makers. In illustrating a set of "tools" for establishing this symbiosis, the paper draws on recent Government directions in pursuing a new paradigm for conserving marine biodiversity. Since declaring its Exclusive Economic Zone in 1994, the Australian Government has commenced this pursuit by developing a National Oceans Policy. Underpinning its development is a national commitment to ecologically sustainable development of our ocean resources. An important tool to assist this policy will be a national commitment to establishing a National Representative System of Marine Protected Areas to conserve representative samples of our marine ecosystems. The paper outlines some mechanisms for cooperatively establishing marine protected areas and related conservation strategies with marine users. It is argued that cooperation may be a more useful tool in influencing resource users as opposed to the traditional approach of attempting to determine conservation strategies without resource user involvement. The risks of compromise through cooperation are real but are outweighed by the benefits of cooperative decision making.

The tools being developed and utilised by Environment Australia to develop Commonwealth marine protected areas and related conservation strategies are outlined in the paper. They include:

1. Framework tools, which include the mandate and commitments to work with stakeholders;
2. Decision making and planning tools; and
3. Integrated management tools.

Introduction

The emergence of National Parks and Protected Areas has proven to be an effective strategy to ensure the protection of significant and unique biodiversity in both marine and terrestrial environments. Following the boom of protected area development in Australia in the 1970s however came the realisation that this strategy was not enough to adequately protect the integrity of our diverse ecosystems:

> *'The protected area system is a crucial asset for the maintenance of biological diversity, yet the interactions of these core protected areas with their surrounding landscape and regional context has received relatively little attention, with protected areas often managed as islands of conservation within the landscape largely unsupported by complementary management on surrounding lands, and without community involvement.' (Thackway et al, 1997)*

In the Australian context considerable work has been undertaken to develop "off-reserve" conservation strategies in partnership with marine resource users. While there may often be pressure to compromise

conservation objectives in favour of increased productivity and wealth generation, Australian conservation agencies are becoming more sophisticated and creative in working collaboratively with these users to balance resource use with sustainable practices. One benefit of involving the user is the potential to ultimately wield mutual influence: on the one hand, greater conservation influence and on the other, enhanced certainty for the resource user. Concepts which have arisen over the last 20 years to assist in striking balance between resource use and conservation include the development of the IUCN management categories, the UNESCO Biosphere Reserves Program, and various innovations in "off-reserve" management.

If we are to develop and manage a national representative system of marine protected areas (which incorporate "off-reserve" strategies) we cannot depend wholly on governments to pay for these. We need substantial and urgent action to redefine how we achieve comprehensive, adequate and representative conservation of our marine ecosystems in collaboration with the resource users.

Environment Australia is facilitating the development of the Australian Oceans Policy on behalf of the Federal Government. As part of this we are determining a policy framework which will ensure that the development of our Exclusive Economic Zone is underpinned by ecosystem integrity. The concept of a National Representative System of Marine Protected Areas lies at the foundation of a continuum of marine conservation strategies, from traditional "no-take" protected areas through to "off-reserve" innovations in conservation, facilitated and managed by governments and relevant resource users.

Through direct negotiation with industry, government and community, Environment Australia intends accelerating the declaration of marine protected areas. The following provides the mandate tools Environment Australia is utilising or developing in order to pursue cooperative marine conservation strategies. The next section identifies some of the tools for decision making and planning and the last section outlines some possible management tools.

Marine Conservation Tools

Mandate Tools

If Environment Australia is to influence resource development decision makers to embrace marine conservation outcomes, it will need strong mandates and the ability to work collaboratively. The mandates need to be pragmatic and achievable. Notwithstanding the broad mandates such as International and National agreements on Biodiversity Conservation and Ecologically Sustainable Development, Environment Australia is utilising some specific mandates, which include:

Oceans Policy

The principles of ecologically sustainable development are used to negotiate a way for competing interests in the marine environment to be reconciled with conservation objectives. The Commonwealth Government's Oceans Policy, to be launched in 1998 for the International Year of the Oceans, aims to provide a comprehensive and integrated approach to sustainably using and managing the marine environment. It is being developed in consultation, not only with other levels of government, but also with key community, indigenous and industry stakeholders in the marine environment. The policy draws together current sectoral strategies for marine management by providing a framework for integrating environmental, social and economic goals. This proposed policy framework has a number of objectives which include:

- to understand, monitor, conserve and sustainably use the ocean environment and its resources;
- to promote economic development through ecologically sustainable ocean industries;

- to improve and use our expertise and capabilities in ocean related science, technology, research and engineering; and
- to accommodate identified and agreed community interests and responsibilities. (Commonwealth of Australia, 1997)

Following from the principles of ecologically sustainable development, these objectives embrace a "multiple use" approach to management as a way of reconciling biodiversity conservation with other uses and management interests. Establishing a National Representative System of Marine Protected Areas is a key component of the Oceans Policy and recognises the importance of conserving biodiversity *in situ*.

Legislation

Environment Australia administers the *National Parks and Wildlife Conservation Act 1975* which identifies the legislative responsibilities for establishing marine protected areas in Commonwealth waters in the Exclusive Economic Zone out to 200 Nautical Miles. The Act enables the Commonwealth to declare such areas and has the capacity to restrict certain activities. This provides the legislative basis for selective and controlled multiple use within protected areas. The Act also enables cooperative arrangements with indigenous groups and others in achieving conservation objectives.

A review of legislation is needed to adequately address integrated approaches to environmental management. To date, legislation governing uses and protection of the marine environment has been reactive and fragmented. Each State and the Northern Territory has its own legislation by which it can declare marine protected areas in their territorial waters. A range of other Commonwealth legislation relates to various aspects of the living and non living marine environment, including resource use, regulation of shipping, and sea-bed and sub soil activities.

Policy for the National Representative System of Marine Protected Areas

The Minister for the Environment recently noted "the current network of marine protected areas has developed in an ad hoc way over time, reflecting particular conservation concerns as they have arisen" (Hill, 1997**).** At present there are seven marine protected areas in Commonwealth waters and only two of these are in temperate regions. A more strategic program of declarations needs to be established if we are to achieve representative conservation of Australia's marine biodiversity. The Government in cooperation with State and Territory Governments has committed itself to establishing a strategic framework to achieve a National Representative System of Marine Protected Areas (NRSMPA). Currently under development, the NRSMPA will include an ecosystem-based approach to selection, identification, and establishment of marine protected areas and associated "off-reserve" conservation strategies. In establishing the NRSMPA Environment Australia will be pursuing a rigorous and accessible scientific basis for decision making. A key desire of the NRSMPA is for selected areas to be managed as components of larger ecological systems thereby necessitating the negotiation of "off-reserve" conservation strategies in cooperation with relevant users.

A tiered system of marine protected areas has been proposed for the NRSMPA that will distinguish between core biodiversity conservation areas and sustainable use areas. Thus the "multiple use" mandate for conservation may apply both within and outside these protected areas. The International Union for the Conservation of Nature and Natural Resources (IUCN) has developed guidelines for identifying various management categories for conservation areas. These guidelines enable management strategies to be clearly defined.

IUCN categories

The IUCN has identified six protected area management categories. These categories, as outlined in Appendix A, recognise that protected areas may be established for various purposes and have diverse management goals. This approach allows a greater, and more representative, range of protected areas to

be created. The IUCN categories range from "wilderness" protected areas managed mainly for wilderness protection; to "managed resource protected areas" managed mainly for the sustainable use of natural ecosystems (ANCA, 1996). Australia has shown its commitment to the IUCN guidelines by working with the States and Territory Governments to establish an Australian Handbook on the consistent application of the categories for all Australian protected areas.

Indigenous Protected Areas

Environment Australia is currently developing Indigenous Protected Areas in cooperation with indigenous communities throughout Australia. This concept draws together the conservation of both natural and cultural values. Historically, biodiversity conservation initiatives have often been seen as another way of excluding indigenous owners from their land and sea. Indigenous Protected Areas will provide a way for indigenous land/sea owners to manage their estate primarily for the protection of natural and cultural values, in accordance with the IUCN management guidelines (Szabo, 1996).

Planning and Decision Making Tools

In addition to having the backing of clear mandates, Environment Australia is developing a number of tools to assist with the planning and decision making for marine conservation. These are essential for negotiating strategies to achieve conservation outcomes with resource developers, while minimising compromise. As with all sectors of activity these tools need be flexible and sensitive to cross-sectoral (environmental, socio-cultural, and economic) planning and decision making processes. Tools currently being utilised by Environment Australia include:

Bioregionalisation

Environment Australia has developed an ecological planning framework as a basis for establishing representative systems of protected areas in both the marine and terrestrial environment. The Australian terrestrial environment has been divided up at a broad scale into distinct bioregions. This Interim Bioregionalisation of Australia (IBRA) provides common ecological criteria for identifying deficiencies in the existing protected areas system. The IBRA is mirrored in the marine environment by the Interim Marine and Coastal Regionalisation for Australia (IMCRA). IMCRA when complete will provide an important interpretation of ecological information and data at the regional scale for coastal and marine environments. Both these terrestrial and marine bioregional planning frameworks are important tools for decision making for biodiversity conservation. IMCRA will serve as a basis for proposing marine protected areas as part of the NRSMPA.

Multiple Use Management and Integrated Planning

Drawing linkages between identified conservation areas and the broader environment is part of a multiple use approach to biodiversity conservation. Walton and Bridgewater comment that a "protected area can have no greater value...than its structural and functional interaction with the surrounding landscape"(1996)**.**

Pragmatic environmental management opportunities are being developed by applying the principles of multiple use management within and outside the Australian network of protected areas. Multiple use management is a way of considering and managing "the combined effect of the suite of uses impacting on the environment" (Sainsbury et al, 1997). This approach follows from the principles of ecologically sustainable development: maintaining ecosystem integrity; wealth generation and resource use; equity within and between generations, and a participatory framework for decision making (Sainsbury et al 1997).

To achieve a balance of outcomes consistent with these four principles of multiple use management, socio-cultural values and economic concerns must be considered as further layers in the decision making

process. Multiple use management recognises the role of stakeholders in driving conservation initiatives and their role in environmental management.

Environment Australia is currently refining a set of principles and definitions of multiple use management to be used as tools when negotiating the development of marine protected areas.

Biosphere Reserves

Biosphere reserves are another adaptation of the traditional reserve system which have been developed at an international level. The UNESCO Biosphere Reserves Program identifies a continuum of management areas from core conservation reserves to buffer areas, to zones of cooperation that enable sustainable resource use (Thackway, 1996). This allows management to occur at a "landscape level", rather than being fragmented, linking the natural and cultural environment.

Scientific and Technical Basis

The government must bring to planning forums, not only a strong mandate for conservation, but one that is supported by rigorous scientific research, in order to fully justify pursuing conservation initiatives such as the establishment of protected areas. Thorough scientifically based conservation assessments are needed at a local and regional level to strengthen arguments in favour of conservation, especially when there are persuasive economic reasons that may sway decision making processes. IMCRA provides a useful tool for assisting the decision making and planning processes.

Equally, we must recognise the importance of indigenous management approaches. Both indigenous and non-indigenous "scientific approaches have valid roles in contemporary resource management and both knowledge systems can inform the other to their mutual benefit" (DLMAC, 1997).

Consultation and Integrated Decision Making

A credible decision making process over multiple use management of marine protected areas demands timely and well informed consultation with stakeholders. Consultation among stakeholders enables sector-specific concerns and priorities to be integrated into management plans while recognising that management strategies developed through this process may generate less than optimal outcomes for some users (Sainsbury et al, 1997). Without such an iterative consultation process stakeholders may feel excluded and more antagonistic to proposals for establishing marine protected areas.
This process of integrated decision making is being applied to a proposal for developing a marine protected area within the Great Australian Bight in our southern temperate waters. The proposed site will take in fishing areas important to the South Australian fishing industry. The boundaries of the proposed site have been negotiated with the relevant resource users, as have the proposed management intentions. The affected users (in particular the regional fishing industry) were involved in negotiating proposed boundaries and management intentions. These outcomes provide Environment Australia with a credible marine protected area proposal that has at least reasonable support and ownership of the users. If this proposal proceeds the next challenge will be to determine integrated cross-sectoral management arrangements.

The Great Australian Bight proposal has provided Environment Australia with valuable lessons in consultation and negotiation processes. It has highlighted the benefits of not entering the negotiation process with pre-determined outcomes. In this case the outcomes were different to the originally conceived proposal. The risks of compromising conservation objectives by generating involvement and ownership from users are potentially significant. A focus however on pursuing a shared vision which establishes common agreement has to be rigorously pursued. Agreement on a shared vision enables competing interests to be dealt with in a manner which will not risk the overall vision. In theory at least it is at this point that the danger of compromising conservation objectives is at its highest.

Integrated Management Tools

Building on shared visions to achieve pragmatic management of the marine environment requires flexible and integrated management tools. Consultation with stakeholders and capacity building remain central to this suite of tools. The emphasis must be on developing long term cooperative partnerships with the range of stakeholders involved in using and conserving the marine environment.

Cross Sectoral management and mechanisms to manage conflict

The Great Australian Bight consultation process highlighted a need for certainty and clarity in the marine protected area proposal process to help reduce conflict between different resource users. The provisions of a clear and adequate consultation period helped to reduce conflict arising from a lack of understanding over government intentions. If this proposal is successful, and a marine park is declared, a program of integrated management could be developed through two broad areas:

a) "*improved cross-sectoral multiple use management of the Bight*. The program could provide both the Commonwealth and the State Governments, industry planners and managers, with a rigorous and accessible scientific basis for decision making. This will include tools that provide efficient combinations of information from many sources to address management issues; that improve understanding by visualising the combined effects of the different uses of the ecosystem; that allow scenario examination; and that allow examination of the effectiveness of monitoring strategies. These tools will improve the scientific basis for sectoral and cross-sectoral planning and decision making, and the availability of this information to decision makers. This enhanced and shared information will increase the transparency, certainty, efficiency and effectiveness of resource use and planning for sustainable regional development.

b) *enhanced effectiveness of the sector specific efforts in support of ecologically sustainable development*. The program provides multiple use "value adding" to the existing sectoral effort. In particular it will provide the ecosystem-wide food-chain and regional oceanographic context that under-pins biological productivity, and the important spatial and interannual variability in that productivity" (Sainsbury, 1997).

Partnership: shared visions, mutual influence

Coupled with the development of site specific consultation strategies, Environment Australia has also been exploring partnerships with peak industry bodies. The purpose of this tool is to ensure a strategic alliance with those industry bodies who are better placed (than government) to assert influence on members. Similarly, representative bodies are in a stronger position than individual industry members to influence government policy and decision making.

In 1996, the Biodiversity Group within Environment Australia developed its first cooperative agreement with the Australian Petroleum Production and Exploration Association (APPEA). This Association represents the member petroleum and gas companies around Australia. Most of this industry's activities are offshore and the potential exists for conflict between conservation interests and oil and gas development. While there were some tensions in forging this Government/industry relationship, both parties were keen and willing to establish a shared vision with the objective of mutually influencing each other's responsibilities. Through the establishment of a shared vision and a better understanding of each other's business, both parties are now better equipped to quarantine conflict and deal with it constructively without damaging the integrity of the overall relationship.

The mutual work undertaken between APPEA and the Biodiversity Group, through an annual workplan has been very successful, with a number of tangible outcomes of benefit to both conservation and industry interests. For example the robust relationship enabled a number of major issues concerning the

Great Australian Bight proposal to be effectively settled, where conflict most certainly would have previously prevailed. The APPEA agreement has also helped to show that marine protected areas need not be seen as a threat to the viability of ocean industries. Consideration is now being given to establishing a whole-of-portfolio agreement with APPEA modelled on the existing work of the Biodiversity Group.

Environment Australia is also examining partnerships with other industry sectors. Arrangements that recognise cultural, economic and social aspirations enable feasible conservation strategies to be developed rather than be stymied by divisive opponents. While the risk of compromising conservation objectives is possible, it is incumbent on Environment Australia to develop and maintain strong policy mandates that provide achievable and realistic benchmarks. Having an understanding of industry requirements and aspirations is essential in setting these benchmarks.

Capacity building and resources

The Commonwealth Government does not have the resources to independently manage marine protected areas. Other sectors must be involved in the long term management of protected areas as well as in their establishment. This requires capacity building initiatives by Environment Australia to promote an improved understanding of the interconnectedness and inherent complexity of marine ecosystems and the fact that marine wildlife cannot be conserved by simply establishing underwater parks or reserves. Integrated programs of management involving all users of the marine and associated terrestrial environment will ultimately be the preferred model.

Recently, Environment Australia has cooperatively developed draft plans of integrated management with the relevant resource users of the marine environments around Christmas Island and Cocos Keeling Islands. These are providing useful models for promoting integrated monitoring and management.

Environment Australia has also held preliminary discussions with APPEA concerning possible voluntary contributions to marine conservation in areas where the Commonwealth legislation is unable to declare marine protected areas (*The National Parks and Wildlife Conservation Act, 1975)* cannot declare marine parks in areas where mining or petroleum interests or leases exist).

Conclusion

There are risks of economic objectives dominating decision making when considering the establishment of marine conservation strategies. The tools discussed in this paper represent a suite of mechanisms which may influence the tangible achievement of ecologically sustainable management of marine resources. Issues of self regulation, environmental levies (for research and monitoring) and contributions directly to marine conservation management, are all desirable outcomes which may arise from greater collaboration with resources industries. In return these resource users may acquire greater certainty, streamlined assessments of proposals, less regulation and greater community support for their activities.

If relationships are robust and mutually influential, a wide range of innovative marine management models is likely to emerge which move us beyond a narrow and traditional paradigm of marine protected areas. At the same time, risks and the potential for conflict will be considerable. There may well be circumstances where certain conservation agendas may need to be "compromised" in favour of achieving enhanced conservation influence over a larger scale. In order to wield this conservation influence, Environment Australia will need to be flexible in the way it conducts its negotiations with user groups. The development of the National Oceans Policy arguably provides our best opportunity to enshrine pragmatic benchmarks in marine conservation aimed at ensuring the sustainable management of our whole Exclusive Economic Zone.

In concluding, the benefits of working collaboratively with marine users rather than attempting to regulate their activities from the "outside" is worth the risks. There will be arguments for compromise to conservation objectives. A strong conservation policy mandate and a flexible suite of integrated planning and management tools will be the most effective means of minimising compromise and maximising influence.

APPENDIX A: Summary of IUCN Guidelines for Protected Area Management Categories

Category Ia Strict Nature Reserve: Protected Area managed mainly for science

Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

Category Ib Wilderness Area: Protected Area managed mainly for wilderness protection

Large area of unmodified or slightly modified land and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.

Category II National Park: Protected Area managed mainly for ecosystem conservation and recreation

Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for this and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

Category III Natural Monument: Protected Area managed for conservation of specific natural features

Area containing one or more specific natural or natural/cultural feature which is of outstanding value because of its inherent rarity, representative or aesthetic qualities or cultural significance.

Category IV Habitat/Species Management Area: Protected Area managed mainly for conservation through management intervention

Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.

Category V Protected Landscape/Seascape: Protected Areas managed mainly for landscape/seascape conservation and recreation

Area of land, with coast and seas as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, cultural and/or ecological value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

Category VI Managed Resource Protected Areas: Protected Area managed mainly for the sustainable use of natural ecosystems

Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

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Conservation of Native Terrestrial Biota in French Polynesia: We've Only Just Begun

Dr Jean-Yves Meyer
Délégation à la Recherche
Tahiti
French Polynesia

The uniqueness of the native flora and fauna

French Polynesia (South Pacific Ocean) is formed by 118 oceanic islands (of which 34 are atolls and 84 are high volcanic islands) divided into five archipelagoes (Austral, Gambier, Marquesas, Society, Tuamotu) and dispersed on 4.2 million km² of ocean. Islands are characterized by strong geographic isolation (between 4000 to 5000 km from the nearest continent), young geological age (between 0.5 to15 million years old), and small terrestrial surface (a total of ca. 3520 km²). As a result, the terrestrial native biota is disharmonic (e.g. no native mammals, amphibians or gymnosperms), but rich and original (960 vascular plants (Florence 1987), 167 spiders (Lethinen 1996), 78 land snails (Pearce-Kelly *et al.* 1995), 15 land birds including 40 subspecies (Thibault 1988)), with a high level of endemism (58 per cent for vascular plants and up to 67 per cent for Angiosperms, 100 per cent for land snails, 50 per cent for terrestrial birds, 50 per cent for spiders). The high terrestrial biotic richness of French Polynesia may be largely explained by a wide diversity of ecological habitats, that range from coastal vegetation on atolls and beaches and lowland dryforests through mesic- and rainforest of low and middle elevation to montane forests (cloud-forest and subalpine vegetation) of high elevation (up to 2241 m at Mount Orohena in Tahiti, the highest summit of French Polynesia). The deep valleys and the high peaks provide specific microclimate and marked isolation which may have facilitated cases of evolutionary radiation in the fauna and the flora (*e.g.* the genus *Mecyclothorax* (Coleoptera: Carabidae) has 70 species in Tahiti, all endemic (Perrault 1988), the genus *Miocalles* (Coleoptera: Curculionidae) with 67 endemic species in Rapa (Paulay 1985) and the genus *Rhyncogonus* (Coleoptera: Curculionideae) with 23 endemic species in the Marquesas (Van Dyke 1932)).

The threats on the terrestrial biodiversity

The insular native biota of French Polynesia is extremely susceptible and vulnerable to disturbances, especially those caused by man (by the Polynesian migrants starting 2500 years B.P., then by the Europeans starting 1769). The main threats on the terrestrial biodiversity in French Polynesia are habitat destruction (fire, wetland drainage, deforestation for timber and agriculture), overkill (e.g. the endemic ground-doves *Gallicolumba spp.* and the endemic giant pigeons *Ducula spp.*), overexploitation by man (e.g. the endemic sandalwood *Santalum insulare* and the endemic lobeliad *Apetahia raiateensis*), introduction of grazing and browsing alien mammals (e.g. goats, sheep, cattle, horses, pigs), introduction of alien predators (e.g. rats, the carnivorous snail *Euglandina rosea*, the swamp harrier *Circus approximans*) and aggressive competitors (e.g. ants such as the bigheaded ant *Pheidole megacephala*, birds such as the common myna *Acridotheres tristis* or the red-vented bulbul *Pycnonotus cafer*), and last but not least biological invasion by alien introduced plants (e.g. the overwhelming miconia *Miconia calvescens*, the strawberry guava *Psidium cattleianum* or the thimbleberry *Rubus rosifolius* in native wet forests). Effects of alien pathogens and parasites are not known yet but may play a non-negligible role to French Polynesian biodiversity erosion.

As a result, ca. 60 of the 84 endemic spiders are highly endangered (Lethinen 1996), ca. 58 endemic land snails are already extinct in the wild (Pearce-Kelly *et al.* 1995), and 21 endemic plant species (J.

Florence, pers. comm.) and 12 endemic bird species (Thibault 1988) have already disappeared since the arrival of the first Europeans in the 18th century. According to French botanist J. Florence, about 60 of the 560 endemic plant species in French Polynesia belong to the most endangered categories defined by IUCN (i.e. CR and EN).

Past and present regulation of nature conservation

Until very recently, there were no specific regulations concerning nature conservation nor any particular regulations governing the creation and the management of protected areas in French Polynesia (Paine 1991, Fontaine-Vernaudon 1993). Regulation of nature protection in French Polynesia (a French Overseas Territory), which is under the Territorial Government jurisdiction since 1972 (Law n°77-772), was insufficient and sometimes complex (Y. Vernaudon, pers. comm.): e.g., the creation of the first terrestrial reserves in 1971 (the uninhabited islets of Eiao and Hatutu in the Marquesas) was enabled by a general Planning Code that allowed listing of natural sites and monuments, for which conservation or preservation is of "historic, artistic, scientific legendary or folkloric interest" (Articles D.151: 1-14 of the 1984 Code). Environmental studies or ecological assessments of terrestrial native ecosystems were sparse and rarely involved local researchers and/or managers: e.g., the uninhabited islet of Mohotani in the Marquesas was declared a "nature reserve" in 1971 without any ecological survey (Meyer 1996). Likewise, the "Natural Park of Faaiti" , a 750 ha valley located in Tahiti (Society) was created in 1989 but still remains a "paper park" without management.

The biological invasion of the native wet forests by *Miconia calvescens* in the Society Islands (Tahiti, Moorea, Raiatea and Tahaa) was certainly the triggering factor that lead to a higher conservation awareness in French Polynesia. This alien invasive species, a small tree (up to 15 m tall) native to tropical America and introduced to Tahiti in 1937 as an ornamental, has expanded on over 70,000 ha on Tahiti. Half of the 107 plants endemic to Tahiti are directly threatened by this plant invader, and many of them are on the verge of extinction (Meyer & Florence 1996). *M. calvescens* was legally declared a "harmful species" in French Polynesia in 1990 (Arrêté territorial n°90 CM) and its propagation, selling and culture is forbidden. Unfortunately, isolated plants or small populations have been very recently found in Nuku Hiva (June 1997) and Fatu Iva (September 1997) in the Marquesas (Meyer, unpub. data).

A regulation text on nature protection (Délibération n°95-257 AT relative à la Protection de la Nature), prepared by the Délégation à l'Environnement (administrative and executive service of the Ministry of Environment) in collaboration with other Territorial services, was approved in December 1995 by the French Polynesian Territorial Assembly. Its aims are to identify and protect selected endangered endemic species, to classify and protect selected areas of ecological interest, and to forbid the introduction of any new alien species which could become a potential threat to the biodiversity in French Polynesia. A preliminary list of 26 protected bird species and 19 protected plant species was drawn in March 1996 (Arrêté territorial n°296 CM), and a technical report describing the protected plants of the Society and the Marquesas islands, their distribution and main threats, and recommendations for conservation was written (Meyer 1996); the entire family Partulidae was proposed for protection in May 1997 (Meyer, in press); the valley of Vaikivi in the island of Ua Huka (Marquesas) was proposed as a protected area in July 1996 after an ecological assessment (Meyer 1996) and the consultation of local community; a preliminary list of 6 dominant alien invasive plants was recently compiled by the Délégation à l'Environnement to be classify as "harmful species" (M. Guérin, pers. comm.).

Another regulation text on plant protection (Délibération n°96-42 AT portant sur la Protection des Végétaux), prepared by the Service du Développement Rural (administrative and executive service of the Ministry of Agriculture), was approved in March 1996 by the Territorial Assembly. One of its aims is to prevent the introduction of noxious organisms (especially plant pathogens and insects, but also alien plant species) that could become agricultural or environmental pests in French Polynesia and their

transport between islands: a preliminary list of ca. 75 alien plant species that are currently invasive in French Polynesia or that are potential/incipient invaders in French Polynesia (already present or still absent) was compiled (Meyer, unpub. data).

Past, present and future actions for nature conservation

The conservation of the native terrestrial biota in French Polynesia is strongly faced with the nearly complete absence of research and management. Although marine ecosystems (especially coral reefs and fisheries) receive a considerable amount of attention, the Université française du Pacifique, the French Overseas Research Organization ORSTOM, and the Centre C.R.I.O.B.E/E.P.H.E of Moorea do not currently conduct research programs on terrestrial ecosystems. The Délégation à l'Environnement has been coordinating environmental and ecological research studies, but no local conservation biologists or technicians have been hired yet and most of the previous studies were conducted by French or foreign biologists during their short stays in French Polynesia. The Service du Développement Rural, which has numerous employees in most of the high islands of French Polynesia (some of them deeply interested in nature conservation), is managing only governmental agricultural lands and forestry plantations. It is noteworthy that the two local "gardes-nature" (park rangers) formely employed by the Délégation à l'Environnement in 1990 to manage the Natural Park of Faaiti have been dismissed three years later (Y. Vernaudon, pers. comm.)

For several years, active and successful conservation programs have been led by some dedicated and persevering persons working in these Territorial services, and in the newly created service of the Délégation à la Recherche (administrative and executive service of the Ministry of Research), in collaboration with French and foreign biologists: e.g. the translocation of the ultramarine Lori *Vini ultramarina* in the island of Fatu Iva (Marquesas) in collaboration with the San Diego Zoo; the reintroduction of extinct *Partula spp.* in the wild in a small land snail reserve set up in Moorea, in collaboration with the Zoological Society of London; the intensive manual and chemical control of *Miconia calvescens* in Raiatea and Tahaa (Meyer & Malet 1997) and the prospects for biocontrol agents in collaboration with the State of Hawaii Department of Agriculture; the publication of the first volume of the "Flora of French Polynesia" in collaboration with French botanist J. Florence of ORSTOM/Muséum national d'Histoire naturelle of Paris; the organization of two botanical expeditions in the Marquesas (1995 and 1997) for the inventory of the flora and the definition of natural areas of highest value for biodiversity conservation in collaboration with the National Tropical Botanical Garden of Kaua'i, Hawaii; the organization of the "First Regional Conference on Miconia Control" in August 1997 in Tahiti.

Projects in the near future are the organization of an "Austral Islands Botanical Expedition" in 1998; the protection of the Temehani Ute Ute plateau in the island of Raiatea (Society) where most of the endemic plants of this island are located (including the endangered and legally protected *Apetahia raiateensis*); the recovery of the endangered flycatcher *Pomarea nigra* in Tahiti and control of its predators in collaboration with French Polynesian Society of Ornithology; and above all the active management of "special ecological areas" invaded by *Miconia calvescens* in Tahiti to preserve critically endangered plant species *in situ*, and a collaboration with botanical gardens and plant conservatories for an *ex situ* conservation.

Conclusion

Despite these achieved and planned conservation programs, it seems obvious that without a strong conservation agency in French Polynesia supported by local conservation biologists and trained technicians, and/or without a comprehensive strategic plan for nature conservation with adequate funding and a continuous political support, these protected areas will remain "paper parks". A concerned effort for the education and the information of people (especially the youth) and the local authorities to revive the traditional conservation ethic and to affirm the values (scientific, cultural and touristic) of the unique natural environment of French Polynesia is needed. We've only just begun…

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A few words about the author

Jean-Yves Meyer is a 29 years old Tahitian biologist. He received his Ph.D (dealing with the mechanisms of invasion by *Miconia calvescens* in French Polynesia) at the University of Montpellier, France, in 1994. Then, he worked for two years at the Délégation à l'Environnement for his national service (as the fauna and flora specialist, the curator of the herbarium of French Polynesia, and the scientist in charge of the "Miconia Research and Control Program"). He has just completed a one year (Sept. 96-August. 97) post-doctoral study (with a grant offered by the Délégation à la Recherche) at the University of Hawaii at Manoa (Department of Botany, Cooperative National Parks Resource Studies Unit) where he worked on the management of invasive plant species in protected native forests. With the Délégation à la Recherche, he organized the "First Regional Conference on Miconia Control" held in Papeete, Tahiti, in August 1997. As a member of the "Pacific Island Land Snail Group" (IUCN), the "Société d'Ornithologie de Polynésie française" , the "Hawaiian Botanical Society", and the "Association for Tropical Biology", he is highly involved in the conservation of native biota in French Polynesia and particularly interested in the management of alien invasive species in native forests. The islands of his expertise in French Polynesia are: Bora Bora, Moorea, Raiatea, Tahaa, Tahiti, Tetiaroa (Society), Hiva Oa, Mohotani, Nuku Hiva, Ua Huka, Ua Pou (Marquesas) and Rangiroa (Tuamotu).

Palau Coral Reef Research Center : A Concept Paper

Thomas Patris and Judy Dean

This concept paper is the product of a Technical Working Group on the Coral Reef Research Center Project, chaired by the Vice President of the Republic of Palau (please refer to the attached list of members). The Technical Working Group was created by Executive Order No. 144 issued by the Honorable Kuniwo Nakamura, President of the Republic of Palau. The group represents participation from a broad spectrum of agencies and organizations concerned with marine resources, education, economic development, conservation and public administration. It is the desire of the Technical Working Group that this concept paper will provide the basis for Palau's position as it enters into talks with other governments to further define the scope of the coral reef research center project.

As the turn of the century approaches, Palau faces an increasing number of decisions pertaining to its development. These decisions carry economic, technological, and environmental consequences. Because Palau is an island nation, practically every one of these decisions has a potential consequence for some aspect of our marine environment and the related ecosystems.

For generations of Palauans and most other island/coastal populations of the Pacific, the coral reefs have traditionally provided food, betelnut lime, building materials, and shells for utensils and jewellery, as well as providing sheltered harbors. Palau's traditional chiefs have long enforced conservation practices in managing the reefs. More recently, however, Palau has begun exploiting the tourist value of its coral reefs, as well as their potential as a source of aquarium fishes and invertebrates and pharmaceutical chemicals. This exploitation is developing at an alarming rate. This, combined with illegal or unwise fishing practices, has resulted in increased stress on our reef system, such that already we are noting areas which have been, if not destroyed, severely degraded.

The state of equilibrium of a coral reef ecosystem hinges upon delicately balanced interactions between biotic and abiotic components, as well as within biotic factors themselves. Critical disturbance, even if occurring in only one parameter of the ecosystem, can cause an imbalance leading to the destruction of the entire community. The noted marine biologist Robert Johannes, commenting on the importance of coral organisms to the reef ecosystem, stated, "So central are corals to the integrity of the reef community that, when they are selectively killed, migration or death of much of the other reef fauna ensues. Therefore, the environmental tolerances of the reef community as a whole cannot exceed those of its corals."

It is evident, not only to Palauans but to the international community, that immediate steps are required to stem the degradation of coral reefs for the benefit of present and future generations. The abundance and diversity of Palau's corals make them an ideal choice for study. This, combined with the desire of the Palauan people to preserve and protect their vital marine resources, makes Palau a prime candidate for the location of a center to facilitate coral reef research. Palau has maintained close and friendly relations with the governments of Japan, the United States, and Australia, as well as the other Freely Associated States in Micronesia, which should facilitate international involvement in the development of such a center.

Name

Palau International Coral Reef Research Center

Mission

The mission of the Center is to create a center of excellence for marine research, training and educational activities in the Asia-Pacific region. The center's facilities and program objectives will be to:

a) carry out research that will enhance the state of knowledge in Palau and the world about coral reef systems (and associated marine environments), their status, and the conservation and management thereof, especially for the Asia/Pacific region;

b) educate the public about the ecological, economical and cultural importance of coral reefs and their associated marine habitats;

c) provide venue and facilities to support research, professional training, workshops and conferences in coral reef/marine environment research, sustainable management and related activities;

d) generate revenues which will be utilized in a manner to allow the center to become financially self-sustaining over time;

e) collaborate and exchange information with other coral reef/marine environment research, education, and training institutions and organizations, and disseminate information to the public, as well as to interested individuals and private businesses;

f) provide needed information, expertise, assistance and other relevant support to all local government and private agencies and non-government organizations whose missions require operating in the marine environment;

g) promote sustainable economic development in the region through the transfer of marine science technology to interested individuals, private businesses and non-government organizations;

h) establish a training program directed towards integrating sustainable coral reef/marine environment management and tourism, with an emphasis on ecotourism;

i) collaborate with Palau Community College to develop a marine science and technology certification program, and provide assistance to the College in developing and implementing related programs, especially through its Continuing Education and extension programs;

j) provide educational resources and assistance for development of marine environment studies programs for the entire Palau education system; and

k) provide information and technical support to Palau's traditional chiefs in their role of managing the reefs and implementing traditional conservation practices.

Legal Status and Management Structure

It is recommended that the Center be established by Palauan national law as a Public Corporation and be subject to the corporate laws of the Republic of Palau to the extent such laws do not conflict with the law creating the Center or in any way distort the public character of the corporation. As a public corporation, the Center should be exempted from all national and state taxes or fees, though employees of the Center, suppliers and independent contractors of the Center should not be exempted from their tax obligations.

The Center should also be liable for employers' contributions to the Social Security System and the Civil Service Pension Plan of the Republic in a manner provided by law.

The affairs of the Center shall be directed, and its corporate powers exercised, by a Board of Directors. The enabling legislation for the Center may consider other criteria for the composition of the Board, such as representation by government and non-government organizations and the expertise of its directors. It is the strong recommendation of the Technical Working Group that the Board be structured in such a way that there will be Palauan control in the development of policy and decision-making, but that international links are assured. The Board should be granted the power to establish whatever advisory committees it feels may be needed to provide expertise lacking on the Board.

The Board shall appoint and hire a Director with appropriate training and experience as the Center's chief executive officer and to serve as a non-voting member of the Board. The Director, in accordance with the policies established by the Board, will have responsibility for operation and maintenance of the facilities, programs and construction of any additions and modifications to the Center's facilities. Additionally, the Director will have the authority to recruit, select, hire and terminate the employees of the Center, as well as to contract for professional, legal, accounting, management, training, concessionaire, and technical advisory services.

Relationship to Existing Programs

The Center will seek to establish relationships with a variety of agencies and organizations currently conducting research in marine technology and resource management. A prime example is the Palau Mariculture Demonstration Center (PMDC - formerly Micronesian Mariculture Demonstration Center or MMDC), which operates alongside the Republic of Palau Division of Marine Resources. This program developed the technology for the successful breeding and growing of giant-clams, as well as developing several niche markets in both the aquarium and seafood trades. As another example, research endeavors to mariculture both hard and soft corals for the aquarium trade are also in progress in Palau. The Center's establishment would significantly enhance the chances of success for such projects, as well as possibly accelerate the supply of cultured corals to the market, resulting in the conservation of coral reefs throughout the region. Another area which has received significant interest is the development of an industry for the culture of black and gold lipped pearl oyster. While neither the facilities nor technology are locally available to culture these pearls, marine biologists believe with appropriate facilities and technology, Palau may be an ideal site to launch this potentially lucrative initiative. The establishment of the Center will compliment these and other on-going marine research, conservation, education and eco-tourism activities locally and regionally, as well as open up new avenues for endeavors requiring higher technology and sophisticated scientific knowledge.

The Center will collaborate with existing local government and non-government agencies, institutions, and organizations whose missions and activities are in line with those of the Center. Because Palau's coral reefs and marine environments are relatively pristine, diverse, and grouped together in a very compact geographical area, it will make an efficient location for local and regional institutions to conduct their research, education and training activities. Additionally, due to its location in the heart of the Indo-Pacific region, the Center will provide its clientele from Asia, Oceania, the Pacific, and elsewhere a convenient and accessible venue for their work. In addition to the academic and scientific research opportunities which would be afforded Palau Community College, the University of Guam, University of the Rykyus, Tokyo University, the University of California at Los Angeles, the University of Hawaii System, Kagoshima University, James Cook University and others, the Center could provide facilities for training programs such as those of the United Nations Environment Programme (UNEP), the International Center for Living Aquatic Resources Management (ICLARM), the South Pacific Regional Environment Programme (SPREP), Pacific Area Travel Association (PATA), Australian Institute of

Marine Science (AIMS), and a host of other organizations and programs in a wide variety of subjects. The Center's facilities would be provided to these institutions on a cost recovery plus overhead basis to help ensure its financial self-sufficiency.

Establishment of the Center would also provide added incentives for Japan's Overseas Fisheries Cooperation Foundation (OFCF) and Japan International Cooperation Agency (JICA) to continue and possibly expand their fisheries development programs in Palau and throughout the Asia-Pacific region. One current project in Palau that is directed toward the development of deep water bottom fish resources holds excellent prospects for successfully developing a high value fisheries throughout the entire region.

Tourism, with its 10-15% annual growth rate, is a major factor in Palau's fledgling economy, as well as numerous other countries in the region. Last year some 40-45,000 tourists visited Palau, with over half of these visitors diving the coral reefs. With this tourism base and its potential for growth, a unique opportunity exists to provide and sustain a small, yet high quality aquarium as a key component of the Center. Many visitors currently vacationing in Palau seek activities other than diving during their stay. An aquarium, in addition to its entertainment value, could be designed as an environmental educational tool that could reach a very high percentage of the island's visitors. This addition to Palau's existing tourist attractions will significantly enhance the island nation's reputation as a premier destination for marine recreation and ecotourism. As marine ecotourism continues to expand and grow, Palau's economic well-being will become clearly linked to this sector of the economy. The result should be better policies which provide incentives to protect coral reefs in Palau and across the Indo-Pacific Ocean. The aquarium should also create a steady stream of revenues from admission fees and sales which can be used to support and finance the on-going operation and maintenance of the Center.

Location of Site and Physical Structure

Important criteria for choosing a site for the Center include access to power and water, access to deep, clean seawater, shelter from weather, adequate mooring space for boats, and easy access to reefs and sea. Additionally, a site that requires minimal earthmoving and other preparation, as well as already having some of the needed infrastructure or facilities is considered desirable.

All States were requested to present options for the siting of the Center. Both Koror State and Peleliu State indicated their desire to host the Center. Koror State went so far as to designate possible sites for which they would make land available, including Long Island, Ngetmeduch, the dump site near M-dock, and the T-dock area. However, after careful consideration of these and other possible sites, the recommendation of the Technical Working Group is that the Palau International Coral Reef Research Center be situated on M-Dock, replacing the Public Works Garage facility.

M-Dock has clean, fresh seawater, with rapid water exchange primarily through Llebuchel Channel to the western lagoon. It is accessible to small boats and shallow-draft research vessels, within walking distance of Palau Community College and close to several hotels. The site is large enough to accommodate all the buildings and most of the initial mariculture facility. Expanded mariculture projects or substations might later be developed elsewhere (including Peleliu, Anguar, Babeldaob, Kayangel, and the Southwest Islands). The disadvantage of M-Dock is the present proximity of the major dump for Palau; but this dump is dangerously close to the city of Koror, and it will be closed soon because of health considerations. Reclamation of the area for public facilities is already being planned. Slow seepage of wastes from the closed dump will have negligible effect on seawater quality because of the high flushing rate through Llebuchel Channel.

The new Center will require the following physical plant and facilities:

1.Main facility:

- Administration Offices
- Visitor Reception/Exhibit Area/Public Restrooms
- Reference Library and Computer Room
- Research Laboratory
- Staff Lounge/Restrooms
- Auditorium/Classroom (audio-visually equipped)
- Communications station

2. Mariculture facilities:

- Raceways (holding tanks for fish, clams, etc.)
- Equipment and supply storage sheds
- Oxygenated tanks
- Possibly other facilities to culture marine species yet to be determined

3. Docking facilities:

- Boat Ramp
- Pier
- Storage shed for equipment/supplies
- Fuel storage tank

4. Recommended additional facilities:

- Aquarium
- Museum/gift shop
- Dormitory for visiting researchers and trainees

A preliminary equipment list for the center includes:

- Boats, motors, trailers
- Computers, printers, and office equipment
- Laboratory Equipment
- Aquarium Equipment
- Pumps and other mariculture equipment
- Media Equipment (Cameras, a/v recording and editing, slide presentation, etc.)
- Communications Equipment (telephone, facsimile machine, two-way radio)
- Furnishings for offices, classrooms, lounge, living areas, etc.
- Power Generation Equipment

An aquarium will provide unique environmental educational experiences and entertainment to both Palauan and foreign visitors to the Center. Advice would be sought from reputable and established aquariums in Japan and the U.S. on the appropriate size, scale, design, and level of technology which should be utilized in Palau. A museum/gift shop should be constructed, with the primary purpose of raising revenues to support and finance the operations and programs of the Center. Such facility could also serve as a marketing outlet for the aquarium.

The architects and builders of the Center should incorporate surveillance, safety and security precautions into the design of this facility. The design should be for a facility that can withstand earthquakes and typhoon strength winds of up to 150 mph. Additionally, the Center should be built incorporating the most energy-efficient and environmentally sensitive design possible. Photovoltaic, hydrodynamic and hydrothermal technologies should all be given serious consideration.

Programmatic Workplans

Research

One of the Center's primary functions will be to facilitate scientific research which increases understanding about the ecological processes of coral reefs and their associated marine habitats. The Center will encourage research projects where the results can be applied to relevant needs for coral reef and in-shore fisheries management in the Indo-Pacific Region. Research and development programs for mariculture will be designed to be ecologically sound and relevant to the emerging needs and pressures for marine resources in the region. Additionally, some research initiatives might be designed to follow on the early coral reef and tropical marine research endeavors accomplished by Japanese scientists at Palau's Biological Research Center during the 1920s and 30s.

It is suggested that the Center's research and training agenda for mariculture and field experiments be established by a Scientific Advisory Council and approved by The Center's Board. The Council will be comprised of a high caliber group of scientists from Palau, Japan, the U.S., Australia, and other countries. This Advisory Council will be responsible for collaborating with international research and monitoring organizations (IOC,IUCN, ICLARM, UNEP, etc.) which are also working on marine, climate change, and related research programs. An information sharing and exchange program will be activated as Palau becomes an established research site for monitoring long term marine environment change.

While the research agenda will be set by the Advisory Council, some preliminary topics and projects are suggested below:

- studies directed at reef-fish spawning and aggregation sites to determine populations, behavior, and impacts of human activities;
- studies designed to measure and monitor water quality;
- conduct ecological surveys;
- monitoring coral reefs, fishes, and other marine environments;
- projects involving coral reef restoration;
- reproductive and genetic research on endangered species, including sea-turtles, dugongs, and crocodiles;
- experimental village fisheries management for severely depleted species;
- fisheries cooperative management schemes;
- grouper aquaculture initiatives;
- mariculture of the black-lipped pearl oyster and giant clams and trochus;
- study of traditional knowledge of marine resources;
- studies to monitor sea-level rise and global climate change;
- researching biomedical substances; and
- toxicological studies.

Training

Many of the training programs envisioned will closely parallel the research initiatives that will be on-going at the Center, such as in-shore fisheries management, mariculture, sea-turtle tagging, etc. This approach to training will allow students, government employees, and junior scientists to be involved in relevant research projects, as well as apprentice with senior scientists. This strategy will also provide a consistent and steady stream of research assistants, enabling the Center to carry out long-term research and monitoring endeavors. The Center will give priority to Palauans, other Pacific Islanders and Asian candidates for vacancies and slots available for training projects, seminars, and research related activities.

The Center should also establish a training program directed towards integrating coral reef management and tourism, with an emphasis on eco-tourism. One of the economic competitive advantages held by island nations in the region is the marine-oriented tourism sector. Because of its importance to these emerging economies, the Center should develop a training program primarily tailored for private sector companies involved in the industry. Marine recreation and dive operators, resort owners, and selected marine park managers would be trained in a variety of topics. Numerous skills and techniques would be taught and demonstrated which will enable Pacific Island and Asian reef managers to encourage compatible marine recreation and ecotourism in their countries. Some of those activities might include training in:

- the installation and use of mooring buoys for dive boats and cruise ships;
- the various aspects of developing a small-scale sports fishery;
- dive site monitoring and management;
- enhancing interpretation skills and knowledge base as "marine guides";
- environmentally sensitive etiquette for diving and other marine-related activities; and
- scuba certification and "safety at sea" courses for marine park managers and tour operators.

The Center may want to consider offering training courses on other important marine environmental topics which are not readily available in the Asia-Pacific region, such as:

- how to conduct marine ecological surveys;
- how to conduct a marine oriented environmental impact assessment (EIA); and
- marine law enforcement procedures.

Education and Awareness

A key purpose and commitment of the Center will be to enhance the local and regional environmental awareness level, including programs about the need to balance the goals of ecotourism with our way of life. The utilization of both the educational center and the aquarium can be prioritized for use by Palauans and include a strong focus upon developing organized activities and tours for the nations' youth and school children. Should these educational programs be successful, then they should be exported as "models" for other Asia-Pacific countries. The Center's education division would be utilized to produce and publish environmental educational materials for both local and regional distribution, acting as a clearinghouse to organize and disseminate marine educational materials around the region. The Center will become an important resource for the development of marine conservation studies curricula for both elementary and secondary levels, as well as assisting PCC in developing its marine and tourism related programs. An important aspect of educational benefits is the transfer of knowledge to teachers and trainers.

The aquarium, in addition to its use to educate Palauans and visitors about the benefits of maintaining and restoring their reefs to a healthy and productive condition, should be open to the public on a fee/admission basis and strive to have the following educational objectives:

- provide a clear explanation and interpretation about the uniqueness and importance of Palau and the Indo-Pacific marine environment;
- provide an informative conservation message for marine-oriented tourist about proper coral reef etiquette when entering and using Palauan or any coral reef waters;
- provide opportunities for captive breeding of rare or unusual marine species when these measures contribute to furthering the conservation of that species; and
- transfer aquarium technology to the private sector.

Information Management

In keeping with its scientific and educational mission, and in order to effectively carry out the programs described above, the Center will need to maintain a strong information management program. The Center will serve as a source and clearinghouse of local and regional scientific information and should therefore provide the following services:

- scientific specimen reference collections;
- reference library and archive collections;
- coordination of exchange of information via local, regional and international
- telecommunications systems; and
- a regular newsletter of Center activities and articles of interest to Center participants and patrons.

An Educational Tool for Community-Based Conservation

María Schefter and Christopher S. Lobban
University of Guam

Abstract

Education is recognized as an important element in community-based conservation development and implementation. If both traditional and modern/scientific knowledge are to be used, we must move away from the myth of science as authoritative. We must instead present it in ways that validate and accept traditional knowledge.

Our efforts so far have focused on (1) presenting science as a culture that can be explored and understood without being embraced and without disparaging traditional culture and knowledge; (2) encouraging critical thinking and showing the uncertainty in science, to break the popular myth of science as an authoritative body of facts; (3) linking environmental education to traditional legends to underline the importance of traditional knowledge; (4) writing a locally relevant materials, including a textbook (*Tropical Pacific Island Environments*), that embody these principles. We offer insights into the process of creating reader-friendly text and illustrations.

We are seeking partnerships with NGOs and others to help put this new tool in the hands of educators in the region.

Introduction

Successful conservation areas are those that are perceived as necessary by the local people. Education often plays a crucial role in shaping people's perceptions of environmental situations, but much needs to be done to bridge the gap between traditional knowledge and modern scientific knowledge.

This paper is about interdisciplinary collaboration at the college level, in which we strive to present environmental biology in ways that are not merely culturally sensitive, but culturally empowering. We have an ongoing dialogue, in which we invite you to participate. We are here to share; to listen and learn, not to teach. We do not have the answers, but we think we are making progress on two questions that are the focus of this paper:

- How can those of us from the "West" educate Pacific Islanders in western scientific knowledge without indoctrinating them in it?
- How can we teach science in ways that validate traditional knowledge and encourage Island people to use that knowledge, together with western science, in planning, implementing, and monitoring community-based conservation areas?

We would like to tell you about four things we are trying. These are:

1. presenting western science as a culture itself, which can be explored and understood without being embraced and without disparaging traditional culture and knowledge;
2. illuminating the scientific processes and methods to encourage critical thinking, emphasizing the uncertainty in science, to break the popular myth of science as an authoritative body of facts;
3. linking environmental education to traditional legends as examples of the wisdom embodied in traditional knowledge;

4. writing a locally relevant textbook that embodies these principles and is readable and well illustrated; following through with student and teacher guides.

Western Science as a Culture

Science (by which we will mean western science) is a culture with its own methods of working and of evaluating data. It has a set of beliefs [which Thomas Kuhn (1970) called paradigms] and theories that structure how scientists approach future questions (see Arámbula-Greenfield, 1997). Science has a language in which these ideas are expressed (O'Toole, 1997). These paradigms and theories rest on tested (or at least testable) hypotheses and can be overturned (sometimes with difficulty). In our own century one paradigm that changed was the notion of a static crust on the Earth; now most scientists accept plate tectonics, but the change was slow to happen.

The public, and that includes our general education students taking environmental science courses, needs to understand the nature of scientific inquiry and logic if they are to know how science can and cannot be used in addressing island issues.

We lead students through the basic differences between deductive and inductive reasoning (see Salmon, 1973):

- In *deductive* reasoning: the conclusion is contained in the premises. As such it is a certain conclusion, but tells us nothing new. Deductive reasoning is essential for testing hypotheses. An example:

Premise: All butterflies are insects.
Premise: The blue-spot-king-crow is a species of butterfly.
Conclusion: Therefore a blue-spot-king-crow is an insect.

- In *inductive* reasoning: the conclusion goes beyond the premises. As such the conclusion cannot be certain, but it gives new information that is probable to some degree. Inductive reasoning is used in developing hypotheses and theories. An example:

Premise: 75 per cent of the beans in a barrel of coffee are observed to be grade A.
Conclusion: Therefore probably 75 per cent of all the beans are grade A.
[This conclusion assumes that the samples was sufficiently large and unbiased.]

Deductive and inductive reasoning are not unique to science, but because of the complexity of the questions in science, scientists must be more rigorous in their use of logic than is commonplace. Here is an example of a traditional legend which illustrates inductive reasoning. According to the legend of the turtle, from Palau (Alonz, 1990),

There was once a young boy from Peleliu and a maiden from Ngerekebesang who fell in love with each other. As the distance between the two islands was great, the lovers decided to make a rendezvous on Ngemelis, a small island halfway between Peleliu and Ngerekebesang. As agreed, they met in Ngemelis on the night of the new moon and they made love far into the night.

When they awoke the following morning the girl found that her skirt had disappeared and could not find it despite a search of the whole island. Near spot where she had slept, they found the prints of a turtle. Finally the girl had to make another skirt from coconut leaves and said good-bye to her lover, promising to meet again on the island during the full moon.

On the appointed evening, the boy and the girl met again on Ngemelis. Their lovemaking was interrupted by the noise of a turtle crawling toward them. As it approached they noticed something entangled in one of its flippers. Looking more closely, they found it was dragging the same skirt that the girl had lost on the previous new moon. Through this incident, they learned that the egg laying cycle of the turtle occurs every fifteen days. This knowledge is being used today by turtle hunters.

The importance of logic may be emphasized by considering an example of false logic. A report from a prominent environmental organization was quoted in our local newspaper as stating that the 1996 hurricane season in the western Atlantic was a sign that global warming is upon us. There was an

unusually large number of hurricanes. The news report also mentioned that there had been an equally bad year in 1933, and quoted another scientist as being of the opinion that the high number of storms was just part of a natural cycle.

The logic of the report was apparently like this:

Global warming could cause there to be more storms.
The Caribbean is having an unusually large number of storms this year.
Therefore global warming is here. [NOT]

In case the falsity of that logic is not apparent, consider this parallel example:

The postman causes our dog to bark.
Our dog is barking now.
Therefore the postman has come. [NOT]

The problem, of course, is that the exceptional number of storms and the dog barking are not likely to be due only to single causes. Thus the effect is not sufficient evidence for that cause. We also use this news story to coach students in critical thinking, as will be explained later.

Scientific Processes

We want to show how scientists learn about islands and how they develop hypotheses and theories about natural phenomena. This involves a two-fold effort: to show researchers gathering and evaluating evidence about island environments and to emphasize the role of communication that leads to ever better descriptions of nature. In this way we seek to encourage recognition that understanding uncertainty is essential to appreciating the spirit of scientific inquiry, to developing critical thinking, and to effectively using scientific knowledge in public policy debates. It is important to redress what Jay Lemke has called the "mystique" of science. The public has the impression that science is authoritative, factual. They expect a level of certainty that scientists cannot give, and they are disconcerted when different reports seems to have contradictory "facts".

Uncertainties in science follow from the inductive reasoning. All hypotheses and theories rest on inductive logic and are therefore true only with some degree of probability. The more they are tested, the more confident we are in them. Yet, they can never be certain. It is important for people to understand this and to look for the tentative language (e.g., probably, possibly, it is thought that) with which careful scientists express their degree of confidence in their conclusions.

If you doubt the importance of this, consider the difference in the degree of certainty between the theory of gravity and the predictions of sea level rise. Gravity has been well tested, and the effect, at least has been observed so often that people will not just step off the top of a tall building. Sea level rise, however, while a probable consequence of global warming, remains only a *possibility*, not a *probability*, given that global warming only a *possible* consequence of global climate change.

Using Traditional Legends

Western scientists have little access to traditional knowledge (and much of what we have is reported by western anthropologists or ethnobiologists and therefore filtered through western paradigms and cultural norms). However, we want islanders to respect and value their indigenous knowledge, to seek it out, maintain it, and use and develop it before it is lost. We try to validate local knowledge as we teach science. One way to show that we respect and value traditional knowledge is to incorporate traditional legends into the lessons. This may seem strange to mainland biologists, whose curriculum is often overloaded with biological information. The Pacific Islands have a wealth of traditional legends, many of

which suggest traditional knowledge or wisdom about the natural world. For several semesters we had students finding legends with an environmental interpretation.

There is a pitfall, however. Our early attempts to use legends sometimes seemed to set up a "straw man" to be knocked down by the "correct" scientific view. Consider, for instance, this story concerning the origin of the Palau islands. It is the legend of the giant 'Uab (Alonz, 1990).

The Palau islands are separated by numerous channels and lagoons, but long ago, the islands are believed to have been one large land mass. How the land was broken into islands, and why people have different characteristics on the islands, is a story often told in Palau.

Today, the island of Angaur sits some five miles across the seas from its neighbor, Peleliu. It is believed, however, that Angaur and Peleliu were once a single piece of land. On the area of land there lived a very unusual man named 'Uab.

> When 'Uab was only a child he would not play with other children, but was content to eat large amounts of food and sleep. Even when he was very young he would eat much more food than adults, and so he grew enormous. As he got older, he ate more and more. Soon he was eating all of the food that his family could produce, and then he consumed all of the food of his neighbors as well. And he continued to grow larger and larger. 'Uab even had to move out of his house because it became too small for his huge body. Day by day, week by week, and year by year, 'Uab continued to grow. Finally he was eating all of the food in the community and the people were starving, just to feed the ever-hungry 'Uab.
>
> 'Uab's neighbors had to do something or they would all soon starve to death. They all met together and decided to burn the gigantic 'Uab and end their misery. So they built a large fire in a circle around the unsuspecting giant. The fire raged around the giant, but 'Uab remained upright. At last he started to topple over. As he hit the ground he gave a violent kick with his enormous foot and pushed Peleliu far away from Angaur, where it remains today. The partly submerged body of the fallen giant then formed islands. His legs became Koror, which has the most activity, and his penis became Aimeliik next to Koror, which today has the most rainy weather. The stomach of 'Uab formed Ngiwal, which is very rich in food crops, and his head rested at Ngerchelong, whose people are known for their intelligence.
>
> And so it is today. The Palau Islands are separated, and different people have different characteristics, all because of the giant 'Uab who burned and toppled, because he could not control his appetite.

You can see that if you set up this legend as an introduction to island formation, and then present Darwin's hypothesis of atoll formation, it is rather like doing the origin of the world versus Genesis. This does not generate respect for traditional knowledge—and is not likely to generate respect for the scientific account either! Instead, our students showed us that this story can be used to illustrate carrying capacity, and we pair it with a report on how the people of Eauripik Atoll maintain a stable population size that their small island resources can support.

Materials Development

One of the biggest problems in teaching environmental science in the Pacific Islands has been the lack of a regional environmental science textbook. Our class materials gradually evolved to the point that we decided to polish them into a book. *Tropical Pacific Island Environments* (Lobban and Schefter 1997), just published, is the result of close interdisciplinary cooperation between a biologist, a sociolinguist with a special interest in the language and culture of science, and a graphic artist.

Our writing has been motivated not only by the need to have locally relevant materials, but to ensure that these materials are readable by our students, who are not science majors and often have limited science background and limited Academic English skills even if they are native speakers of English. One of María Schefter's roles in this interactive process is to identify what makes scientific writing "reader-

friendly." Among the things she tries to ensure in our writing are (not necessarily in order of importance):

- limiting *clause* and *sentence length* (measured by computer formulae);
- limiting each paragraph to *one main idea* and clearly stating that in a sentence;
- making sure that relationships between ideas are explicit; the *topic and comment* relationships between the sentences in a paragraph need to be clear;
- ensuring that even in *passive* sentences it is clear who did what to what;
- adding *cohesive markers*, also called signposts, to guide readers through relationships in the text;
- eradicating *embedded clauses* that separate the subject and verb in a sentence;
- limiting the *lexical density*, that is the number of content words per clause;
- limiting use of *grammatical metaphors*, for example use of a noun out of what is expressed as a verb in common parlance;
- avoiding *jargon*, using a minimum number of *technical words* (defined in the text and in a glossary) and *subtechnical words* (actually much more troublesome because teachers assume students know them, e.g. factor, mechanism);
- limiting the number of *idiomatic phrases*, *hidden negatives*, *stacked modifiers*, *two-word verbs* (especially those whose meaning together is different from that of the parts), and unexplained references from academic and popular culture;
- *following "this" with a noun* to refresh the reader's memory about the concept under discussion.

Illustrations are important in science books—unlike literature, which depends on words to paint pictures, science depends on visual aids for understanding the text. Unfortunately, people are often not used to reading diagrams and tend to skip over them, while faculty assume the students can and do study the diagrams. These pictures are worth a thousand words only if they are as clear as possible and if the students are guided to understand them. We considered the readability of the illustrations and their captions as carefully as the readability of the text, and we are now working on study materials to coach students in maximizing the meaning potential of diagrams and graphs. Working back and forth with our graphic artist, we redrew and sometimes redesigned illustrations from the literature, because the original illustrations were often aimed at a technical audience. They often had too much detail, or sometimes not enough context. By changing them we could better communicate with *our* audience.

Finally, we work in both the book and the study materials to guide students in decision making, specifically in establishing criteria for making choices. Teaching decision making is an essential pedagogical progression, which begins with showing students that there is not simply one "correct" view but several choices. The uncertainty inherent in science compels us to make choices. The next step is to go beyond the "Baskin Robbins" stage at which all choices are equal. (Baskin Robbins is a major US ice cream chain that advertises 31 flavors.) By establishing criteria, students can begin to evaluate science reports. (One case in point is the hurricanes news story: we ask students to evaluate the hypothesis that the hurricanes are part of a natural cycle. What would lead them to judge the hypothesis as totally absurd; what to judge it as almost certainly true? Then we get them to fill in the probable/possible/improbable in the middle of a Likert scale, as shown in Figure 1.) The last step in critical thinking is to use those judgments in making decisions. Here we emphasize the difference between science and policymaking, especially the importance in policy decisions of including not only relevant scientific opinions but also economic, social, cultural, and other criteria.

Conclusion

As our materials have evolved, we developed a philosophy that includes the four principles listed earlier: presenting science as a culture as well as a body of knowledge and a view of the world, and illuminating scientific processes, introducing the uncertainty in that world view, and encouraging critical thinking;

presenting science in a way that validates traditional knowledge, for example through links to traditional legends; and preparing locally relevant, readable text and visual materials.

We are motivated by Paul Cox's warnings about "ecocolonialism" (Cox & Elmqvist, 1993). We feel that a good defense against this danger is to teach students to think, to challenge western science, and to understand how its conclusions are reached, how theories change, and how much confidence scientists have in them.

Traditional use of the environment may not have been sustainable, or was sometimes sustained by accident rather than design, but western-style resource use is clearly unsustainable at present. We think that sustainable community-based conservation planning on islands can be approached by developing new ideas out of suitable selections of traditional and western knowledge and values, ultimately unique to each island. Since our islands are in the world economy, resource management and other environmental issues require new approaches; traditional knowledge alone may no longer be sufficient. On the other hand, it is clear that western science and especially western environmental management do not have all the answers either. A constructively critical blend of both traditional and western knowledge may work, but it will be up to those who have access to island knowledge to make those blends. As the epigraph for our book we chose Christ's parable of the householder: "Do you understand all these things?" [Jesus asked.] They answered, "Yes." And He replied, "Then every scribe who has been instructed in the kingdom of heaven is like the head of a household who brings from his storeroom both the old and the new" (Mt. 13:51-52.). As for us western science educators, we can first do our best to facilitate people's access to scientific knowledge, and second deepen our knowledge of and respect for island cultures to better reflect those values in our presentations.

Our experience has chiefly been in educating college students, and that includes future school teachers. We agree with Fijian educator Premila Kumar (1997), who says that for significant changes in the general public attitude toward the environment, there must be meaningful environmental education for the teachers so they can carry it effectively into their classrooms. Teachers must have the resources and be continually supported in using them. We will welcome dialogue with SPREP conference participants about how we can better direct our efforts, and how our work can be of more use to you in encouraging community-based conservation.

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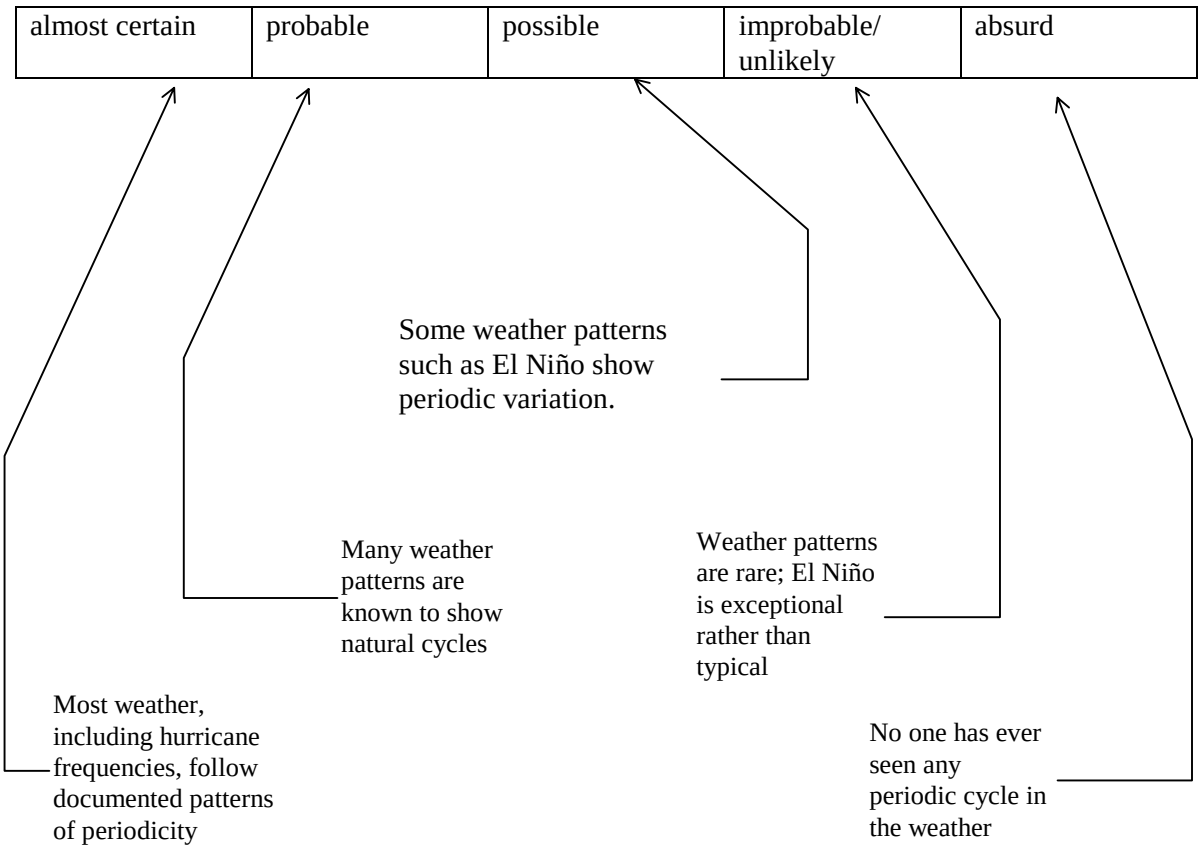

Figure 1. Example of establishing criteria for a Likert scale, in this case judging the hypothesis that the rash of storms in the Caribbean is part of a natural cycle.

Expanding Partnerships and Support for Community-based Protected Areas – Implications from Global Experience for the South Pacific

David Sheppard
IUCN

Abstract

Recent years have witnessed a revolution in the way in which protected areas are established and managed around the world. From an early focus on the establishment of national parks, often associated with exclusion of human use, there is now an increasing recognition that each country needs a full range of protected areas, from those managed strictly for conservation to those managed for both conservation and sustainable use. An important recent trend has been the development of practical, community based conservation programmes. Underlying the development of such programmes is the need to mobilise the support and involvement of local communities. Experience has shown that such involvement is a clear investment in the future of protected areas, even though it may make protected area management more complex and expensive. Community based conservation programmes have been developed in many countries and regions; the South Pacific, particularly through the implementation of the South Pacific Biodiversity Conservation Programme (SPBCP), is a pioneer in this field. This paper will review practical experience from around the world in relation to community based management of protected areas and will draw out some lessons for the management of protected areas in the Pacific. Emphasis will be placed on innovative approaches that have "worked", such as the ADMADE Community Benefit Scheme in Zambia, and analysing the potential application of such approaches in the South Pacific. It is emphasised that any approaches must be tailored to the unique circumstances existing within each country.

Introduction

Protected areas have been established throughout the world and recent times have seen a rapid increase in the number of such areas, as well as an increase in the range of purposes for which they have been set aside. Protected areas now cover nearly 12.8 million square kms, approximately 9.5 per cent of the total area of all countries (WCMC, 1997). Recent years have witnessed a revolution in the way in which protected areas are established and managed around the world. From an early focus on the establishment of national parks, often associated with exclusion of human use, there is now an increasing recognition that each country needs a full range of protected areas, from those managed strictly for conservation to those managed for both conservation and sustainable use.

An important recent trend has been the development of practical community-based conservation programmes. Underlying the development of such programmes is the need to mobilise the support and involvement of local communities. Experience has shown that such involvement is a clear investment in the future of protected areas, even though it may make protected area management more complex and expensive, at least in the initial stages. Community based conservation programmes have been developed in many parts of the world. There are many lessons that can be drawn from this experience which are relevant to the Pacific.

Conversely, there are many lessons relating to community based conservation programmes in the Pacific which have great relevance and applicability in other regions of the world. For example, the South

Pacific Biodiversity Conservation Programme (SPBCP), is regarded on the global stage as a pioneer programme and an excellent model for application elsewhere.

This paper reviews approaches that have been used around the world to improve community involvement in protected areas and draws out lessons for the management of protected areas in the Pacific. Emphasis is placed on the application of innovative approaches for involving local communities and benefit sharing in protected area management, such as the Campfire Programme in Zimbabwe, and analysing the potential application of such approaches in the Pacific.

Protected Areas – the Global Context

Protected areas play a vital role in conserving nature and life on this planet. A well managed system of protected areas is an essential building block for national efforts to conserve biodiversity and to promote sustainable development. This role is recognised in the Convention on Biological Diversity (CBD), to which a number of Pacific countries are signatories.

Modern protected areas trace their origins back to the Yellowstone National Park, established in 1872 in the United States. This provided a model for the protection of areas of outstanding natural value for the benefit of current and future generations. However, protected areas are not new. Systems for the protection of natural resources have existed long before the establishment of the Yellowstone National Park. For example, the Roman Emperor Hadrian (117-138 AD) noted the destruction of the Lebanese Cedar forests and ordered the designation of an imperial domain. In many South Pacific countries, village communities practised traditional conservation methods for thousands of years, such as the Ra'ui system in the Cook Islands, which restricted the use of natural resources in certain areas and at particular times of the year. Sacred sites also served to protect resources in many countries, such as the sacred groves or kayas in Kenya and the dusuns or Gardens of the Forest in Irian Jaya.

Nevertheless, the Yellowstone National Park marked a turning point. Most countries of the world have established formal systems of protected areas. Protected area concepts are changing and it is important to clearly define terms. IUCN, through its World Commission on Protected Areas (WCPA) has developed the following definition:

"An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means." (IUCN, 1994)

Confusion often comes when we move down to the country level where there are a vast range of terms which describe protected areas, such as: National Park, National Reserve, Game Reserve, Forest Reserve, Marine Park and Nature Reserves. IUCN/WCPA has tried to address this through identification of six categories of protected areas.

Category 1. Strict Nature Reserve/Wilderness Area

managed mainly for scientific biodiversity conservation or wilderness protection.

Category 2. National Park

managed mainly for biodiversity conservation and recreation.

Category 3. Natural Monument/Natural Landmark

managed mainly for the preservation of a specific cultural or natural heritage feature.

Category 4. Habitat and Species Management Area

managed mainly for biodiversity conservation through management intervention to maintain particular species, habitats and ecosystems.

Category 5. Protected Landscape/Seascape

managed mainly for the protection and enjoyment (through recreation) of visual scenery as a heritage feature.

Category 6. Managed Resource Protected Areas.

managed for the sustainable use of natural resources and the protection of environmental services.

These categories represent an attempt to focus on the management objectives -- what agencies are trying to achieve in the management of a particular area of land or sea -- rather than to focus on the title of the particular protected area. The different categories imply a gradation in the level of human intervention, with category 5 and 6 protected areas involving the integration of conservation and appropriate sustainable use activities. All categories are important for conservation.

The world can be justly proud of its protected areas. However, such areas face unprecedented challenges as we move into the next century. Intense pressure for the use of natural resources and land degradation, often stemming from population growth, are likely to increase. Associated pressures on many protected areas will be significant. These and other challenges were brought into focus at the IVth World Parks Congress held in Caracas, Venezuela in 1992, which outlined a number of recommendations for the future establishment and management of protected areas throughout the world. A central message from Caracas was that protected areas require a more outward focus if they are to survive into the next century and that, specifically local communities need to be more effectively involved.

In responding to these challenges, protected areas throughout the world are looking for ways to more creatively manage existing protected areas and to build better relationships with the local communities that live in and around such areas.

Protected Areas – The Pacific Region Context

The Pacific, the world's largest ocean, is home to the most varied array of islands anywhere in the world, with an unparalleled scale and pattern of biological diversity. Pacific island ecosystems have high levels of endemism. Many of these ecosystems are acutely threatened, particularly as a result of mounting pressures on land and resources from rapidly increasing human populations, and from the harmful effects of introduced alien species.

Attempts to protect areas of important biological diversity through the establishment of "traditional" national parks have generally been unsatisfactory. Very few Pacific countries have well developed protected area systems in the formal "western" sense. Where protected areas have been established, they are usually too small to be ecologically viable in the long term and they are often poorly resourced and managed.

However, on the other hand the conservation of important ecosystems has long been an important element of the local cultures of Pacific islands people. Conservation of important natural resources

has a long history in the Pacific. As for most other parts of the world, the environment has been strongly influenced by human action. In the Pacific virtually all land is communally owned and the interface between nature and humans is often "blurred".

Conservation efforts have thus focused on systems of conservation which mirror the unique circumstances of Pacific islands and, specifically, build on traditional approaches to conserve natural resources and engage local communities as full partners. These principles have given rise to innovative programmes such as the South Pacific Biodiversity Conservation Programme and community based conservation programmes such as those implemented by The Nature Conservancy.

It is clear that future conservation efforts in the region must build on these approaches and also learn from relevant experience elsewhere. For example, the World Heritage Convention has proved a useful tool in many parts of the world to assist countries in their conservation efforts. A number of potential World Heritage Sites have been identified in the South Pacific and this could provide a useful impetus for conservation in the region.

The potential to link with relevant international initiatives, such as the International Year of the Reef, should also be explored and fully utilised. Such initiatives have particular relevance in the Pacific, where the management of sensitive coastal ecosystems is a major priority.

Overall, there has been significant recent progress in relation to conservation in the Pacific region, particularly in the field of community based management of natural resources. However, significant challenges remain.

Why is support vital for protected areas?

There are a number of reasons why support and partnerships are vital for the future viability of protected areas, both in the Pacific and globally.

The long term viability of protected areas depends on support

The world can be justly proud of its protected areas. Such areas protect the outstanding features on earth, and can be rightly considered as the world's "crown jewels". However such areas face many challenges as we move into the next century. One of the most important is the need to build a base of support for protected areas at all levels. If local communities do not support the objectives and programmes of protected areas, then the management of such areas becomes extremely difficult, and in most cases, will not be viable in the long term.

An example from Africa illustrates this point. In many African countries, national parks have often been seen as areas set aside from local communities, mainly for the exclusive use of foreign tourists. An implication has often been high levels of encroachment within such areas and poaching of various wildlife species. This was certainly the case in Zimbabwe in the 1980s. In response to this a programme was established called CAMPFIRE, which aimed to involve local communities around protected areas in decisions related to management of these areas, particularly related to wildlife use, and to establish mechanisms for distributing revenues from such use to these communities. This involved the establishment of local advisory groups, which included representatives from local communities and relevant government agencies. These activities have provided tangible and direct benefits to local communities which in turn has often resulted in a significant positive change in attitude towards protected areas from neighbouring communities. The main implication is that such areas and resources are now viewed as important for the local communities and they have a stake in their protection. Models

such as these need have broader application and the principles involved are as applicable to the Pacific as they are to other regions of the world.

Political and financial support for protected areas are often linked with local support

It is clear from many examples around the world, that levels of local support for protected areas are often reflected in levels of political and financial support, both at local and national levels. Where a local community, for example, is hostile to the establishment and/or management of a particular area, this is often reflected in an adverse political reaction, and often, in turn, this will directly influence the effectiveness of management of the area and direct financial allocations for the area. Often when local support exists, donors tend to be more willing to provide funding and assistance.

Better enforcement and co-operation

Experience has shown that there is a higher possibility of local communities adhering to rules and regulations associated with protected areas, when they are directly involved in the development and, where appropriate, the policing of these rules. For example, in Laos, local communities have been working with local authorities and IUCN in a number of community based protected areas to establish workable rules which protect important species and ecosystems while allowing continued, controlled use of natural resources necessary for their livelihood. The need for "heavy handed" enforcement is often reduced when local communities are involved, in a participatory manner, in decisions relating to protected areas. This aspect is reinforced when rules build on customary approaches and laws.

Local knowledge can improve management

People from local communities have a much better understanding of natural resources and issues associated with particular areas, than protected area management staff recruited from "outside" locations. The challenge is thus to "tap into" this local knowledge in a way which enhances the effectiveness of protected area management.

Steps to improve support and forge partnerships for protected areas

How can support for protected areas be enhanced? There are a number of strategies which may work, such as to:

Involve communities in planning and decision making through formal and informal structures

One approach is to establish management structures which ensure that key individuals and organisations are represented and have the opportunity to influence the management of specific protected areas. For example, in Australia, the New South Wales (NSW) National Parks and Wildlife Service has developed a series of District Advisory Committees, comprising representatives of key local groups, to advise on the management of protected areas within specific district areas. These committees have built a strong constituency of support for protected areas in NSW. Such structures can be developed both at the site and national level. There are many other examples from around the world. The key principle is that those likely to be most affected by decisions should have the opportunity to influence those decisions through appropriate structures and mechanisms. Such structures need to reflect the unique needs and circumstances of each country. In the Pacific, for example, such structures must reflect village based systems of governance.

Identify and promote benefits of protected areas

Support for a system of protected areas is strengthened when it generates benefits to people. Protected areas provide a wide range of benefits, both to local communities and also to regional and national economies. However these benefits are often not clearly identified or assessed, and, even when they are, they are often not communicated to the right target audience. There is also, in many cases, greater scope

for increasing the direct benefits to local people without compromising biodiversity conservation objectives.

It is thus important that the economic contributions of protected areas be clearly identified and communicated. Examples from around the world indicate that protected areas provide significant economic benefits, particularly through tourism, and that there is considerable potential to provide positive benefits to surrounding local and regional communities.. For example, Canada is expected to generate 6.5 billion Canadian dollars in Gross Domestic Product from the expenditures of participants in wildlife related activities, which sustains 159,000 jobs and creates 2.5 billion dollars in tax revenue each year. Australia receives over A$2 thousand billion in expenditure from 8 national parks - at a cost to government of A$ 60 million. In Costa Rica it has been found that a US$ 12 million per annum investment in national parks, generates income of more than US$330 million in foreign exchange was generated in 1991 with 500 000 visitors arriving, representing the second largest industry in the country.

Ecotourism has high potential in the Pacific, given the high potential of the natural environment. However, it is important to sound a note of caution. It is critical that tourism is carefully planned and does not destroy the natural resource on which it is based in the first place. There are many examples around the world of high tourist use of protected areas, coupled with poor planning, which have caused significant environmental impacts. Given careful planning however, ecotourism can be a sustainable industry If protected areas are managed effectively, benefits will be available now and for future generations. They are not a once-off “cash crop” benefit, such as returns from the use of resources through mining, for example.

Benefits arising from protected areas are often not calculated and thus do not figure in land use decision making. Information arising from benefit studies needs to be more widely undertaken. They also should be clearly segmented in terms of the level of contribution, whether at the local, regional or national level, for example. Information also needs to be targeted at the right agencies, such as Ministries of Finance, which are often making decisions relating to the allocation of financial resources for government agencies, including those responsible for protected areas.

It is important not to raise unrealistic expectations in relation to the economic contribution of protected areas. It is clear that, with the exception of some East African Countries, few countries in the world today can “pay they own way” in relation to protected areas. Thus, government, or external, sources of support will always be necessary. It is also worth noting that the ability of protected areas to generate funding varies generally within countries. For example, protected areas with high visitation levels will often generate increased revenues. However, there are many other protected areas which do not attract high visitor numbers but have important and even higher value for biodiversity conservation.

There are many other direct and indirect benefits from protected areas, such as the value of such areas in ensuring clean water, and the benefits of protected areas in acting as carbon sinks. Many of these are difficult to put a monetary value on, but this does not detract from their significance.

The extent to which benefits from protected areas will lead to increased public support will vary in relation to how the benefits arising are distributed and also how the benefits are communicated.

The experience of CAMPFIRE and other benefit sharing systems, such as Admade in Zambia, indicate that where local communities can see and derive tangible benefits from protected areas that there is a greater likelihood that they will support such areas.

Benefits need to be targeted at the “right” audience. For example, at the level of the local community the benefits may be best expressed in terms of the provision of clean water as a consequence of protecting an

adjacent catchment area. For a decision maker, however, it may be better to promote the benefits of protected areas in terms of income generated. The target audience should ideally be clarified before the assessment of benefits is undertaken.

Target influential individuals and agencies

Within any community, there are always influential people, whose voices "count". Such people are often in a position to influence broader community attitudes towards a range of issues, including protected areas. An important strategy for protected area agencies is to identify, "reach out" and involve such people. If possible, such people should be directly engaged in decision making relating to protected areas. Another facet of involving local communities, is to employ local staff within protected areas; there are many benefits associated with such engagement. Another useful strategy is to involve influential people in key events associated with protected areas. For example, to invite local politicians to open new tourist facility areas in their "local" protected areas or to give an opening address to seminars or conferences within their local area. This can often prove to be a useful investment in building future commitment and support.

Undertake market research

It is important to know what it's meant by "local communities". For example who is involved, what are their expectations, what are their perspectives. An example in relation to the use of market research is provided by the Wet Tropics Management Authority in Australia. This Authority was established to manage the "Wet Tropics World Heritage Area" in the late 1980's. At the time this park was established, market research indicated a high level of community antagonism to the establishment of the park, largely associated with an anticipated loss of income and jobs from the closure of timber mills, after the establishment of the World Heritage area. The survey also indicated that the timber industry, at that time, contributed AU$45 million per annum to the local economy. Times change: it is interesting to note that a recent market survey (1995) in the same area now indicates a dramatic reversal. There is now an 80 per cent level of community support for the Wet Tropics Management Authority and tourism associated with the World Heritage Site, is now generating 640 million Australian dollars per annum, well in excess of benefits from the timber industry. This example shows both the impact of establishing a World Heritage Site, as well of the value of clear and focused market research.

The level of such research will obviously vary with the circumstances and can cover a range from sophisticated analysis to basic participatory rural appraisal techniques. There is no right answer as there is a need to tailor approaches to local circumstances and needs.

Raise awareness and excitement about protected areas

Protected areas protect the most exciting and visually stimulating areas on earth. There is thus the potential to build awareness and support for protected areas through information, which highlights this factor, and which is in turn targeted at the key audiences. The countries and territories in the Pacific region feature superlative scenery: for example the Marovo Lagoon in the Solomon Islands, the island of Aitutaki in the Cook Islands. The "raw materials" are there for generating interest and excitement. Another important element in building an awareness of the value of protected areas is to instil a sense of pride within local communities in relation to their natural heritage. World Heritage Sites provide an excellent example. There are a number of proposed or potential World Heritage sites in the region and these represent a unique "honour role". Such areas provide an excellent vehicle for raising pride both at local, regional and national levels

Engage key partners and networks

There are many organisations and individuals involved in protected areas; it is important that they be engaged. This can occur at many levels:

At the Government level

There are usually many Government agencies with a "stake" in the establishment and management of protected areas. It is important that there be coordination between such agencies, to achieve common conservation objectives. Often, mechanisms for coordination are not present, or are poorly developed, and this is often reflected in competition and less than optimal management of protected areas. Steps to enhance coordination between government agencies could include establishing neutral forums and non-threatening mechanisms for bringing different parties together and building support. Often co-operation on the implementation of specific tasks, such as the preparation of a management plan, may provide such a mechanism. Another recent trend in many countries has been the rationalising or streamlining of government agencies with conservation responsibilities One interesting and growing trend in many African countries is the establishment of Parastatal bodies with responsibility for protected area management. Such agencies, which have been established in African countries such as Kenya, Tanzania and Uganda, have a greater level of independence and autonomy than traditional government agencies, particularly in relation to the ability to generate and retain revenue. Key principles underlining such agencies are the need for greater efficiency and also the need to be more responsive to the needs of local communities. The results indicate that this approach may have great potential for improving the efficiency of protected area management and for generating increasing levels of community support

The role of NGOs

A key feature of the last decade has been the increasing involvement of Non-Governmental Organisations in conservation, ranging from large international NGOs, such as WWF (World Wide Fund for Nature) and TNC (The Nature Conservancy) to small localised NGOs, such as the Solomons Islands Development Trust in the Solomon Islands. Experience has shown that NGOs have a clear and important role to play in the establishment and management of protected areas. They often have particular strengths in working with and through local communities. In the Pacific, it is clear that NGO's have major potential in the field of protected areas and that their role will only increase in significance. NGOs play a critical role in building support at local levels, given that that are often working at the "grass roots" level with local communities on practical conservation problems and issues. There are at least two critical aspects in relation to NGOs. Firstly, the need to build more effective and long term partnerships with government agencies involved in protected areas. In many cases the relationship between Government and Non Government organisations is marked by suspicion. This needs to be replaced by an attitude of co-operation and partnership. Secondly, the need to build up the capacity and effectiveness of NGOs so that their full potential and trust can be realised.

Protected areas and the private sector

There is considerable potential for developing creative and effective partnerships with the private sector in protected areas. This appears to be an area with potential, although not without pitfalls. There are a number of interesting examples from around the world. For example, in Japan, the Amway Japan Company has establish the Amway Nature Centre, which is implementing a range of conservation programmes within Japan, in partnership with Government and non-Government organizations. In Indonesia a mining company is providing direct support for the management of the Kutai National Park. In South Africa an increasing number of conservation areas are in private hands and it is anticipated that this will increase.

In the Pacific, there may also be an important role for the private sector in protected area activities. Potential advantages of private sector involvement in protected areas are the high level of motivation, relative efficiencies in management, and economies of scale available to large companies. On the other side of the coin, is the need for care, to ensure that conservation objectives are not subsumed by the "profit motive" and also the concern that very few private companies are currently “geared up” for effective conservation management..

Engage regional networks

At a regional level, cooperation can be enhanced through the development of networks, such as emerging networks relating to World Heritage site managers in Asia and the Pacific. IUCN through a number of its voluntary Commissions such as the World Commission on Protected Areas, also has the potential to assist with the more effective establishment and management of protected areas in the region.

There is also a need to link with and support existing regional intergovernmental organisations and institutions. In Africa, for example, SADC, the South African Development Community, has made a significant impact in increasing the levels of support for wildlife and environmental conservation, as well as promoting technical exchanges between countries. In the Pacific, the South Pacific Regional Environment Programme (SPREP) has developed into a very effective regional environmental body and is one of the most effective regional environmental organisations in the world.

Such regional networks and organisations offer considerable potential for building support and partnerships. Networks such as the World Heritage Managers network and WCPA can play a potentially valuable role and should be a critical component of approaches to improve protected area management in the region. To work effectively they must have a clear focus and be adequately resourced. The strengthening and harnessing of such networks is a very important challenge and opportunity for protected area management in the Pacific region.

Increase environmental education efforts

It is important to formally and informally incorporate environmental considerations at both formal (e.g. school curricula), and informal (e.g. local community extension programmes) levels. This represents an investment in the future, in terms of nurturing a positive attitude towards the environment amongst the leaders of tomorrow. Unfortunately, this is often not given sufficient emphasis and there is a need for a greater profile, and funding, for this particular issue. There have been, however, a number of excellent education programmes developed in the Pacific, particularly those targeted at local communities in countries like Vanuatu and the Solomon Islands. Examples such as these should reviewed in developing extension and environmental education programmes in other countries and territories in the region.

Build on Success

Innovative approaches should be tried. A key element of more effective community involvement is to build on success - to seek out the examples of successful community involvement in protected areas and to examine why they work, what makes them successful, and then disseminate this information.

There have been many recent successful initiatives to more effectively involve local communities in many parts of the world, such as the CAMPFIRE scheme in Southern Africa, some of the Integrated Conservation and Development Programmes in Southeast Asia and the South Pacific Biodiversity Conservation Programme.

From experience to date the key elements of successful community based projects appear to be:

- identification of clear and achievable objectives

- the selection of appropriate team leaders, who are competent and respected by relevant agencies and local communities
- an effective local management committee comprising key local stakeholders and relevant government agencies
- clear and effective communication at all stages of the process with relevant parties
- clarity in determining important conservation resources and options for protecting them
- adequate enforcement of these prescriptions, in a manner which involves local communities
- compensation for resources foregone

Conclusions

There has been significant progress in relation to protected areas in the Pacific region, particularly in relation to working with communities to conserve natural resources.. It is important that this progress be consolidated. Challenges still remain and it is important that these are tackled effectively and, wherever possible, on a regional basis. A number of key conclusions are drawn from this paper in relation to expanding partnerships and support for community based protected areas in the Pacific.

- Support is vital if protected areas are to survive in the next century, and this support must come from all levels;
- There are many approaches which can be used to improve the level of support for protected areas and many of the approaches under way in the Pacific can show the "way forward" on protected areas for many other regions of the world;
- Approaches developed must be tailored to the needs of each country and Territory in the Pacific region, and must aim to build a better link between people and nature. The approaches used in the region, particularly lessons learnt, need to be widely disseminated to relevant parties;
- Clear national and regional strategies for protected areas need to be developed, building on existing work such as the existing South Pacific Nature Conservation Strategies. Such strategies need to include focused and relevant elements to build local support.
- Institutions and capacities for protected area management in the Pacific This relates equally to government agencies, NGO's and the private sector.
- New and innovative partnerships need to be explored in the Pacific. Existing links should be strengthened. Many interesting partnerships are being developed in many regions of the world, such as with the Private Sector. These need to be nurtured and extended.
- IUCN's World Commission on Protected Areas has a strong potential role in the Pacific region in relation to nature conservation and protected areas. It is hoped that the potential of this role can be fully realised over the coming years.

Community-Based Biodiversity Surveys and Conservation Action Plans as Tools for Nature Conservation in the Pacific Islands: Lessons Learned from Fiji, Tonga and Kiribati (Melanesia, Polynesia and Micronesia)[16]

R. R. Thaman[17]*, B. Eritaia and*[18] *S. Faka'osi*[19]

Introduction

This paper suggests that, in the Pacific Islands, where biodiversity is usually controlled and best understood by the resource owners and users, the most effective approach to biodiversity conservation, the protection of "intellectual property rights" and the successful implementation of both the South Pacific Biodiversity Conservation Programme (SPBCP) and the Convention on Biological Diversity (CBD) is the development of community-based biodiversity conservation action plans at the resource owner and user levels. The paper suggests that participatory recording, analysis and application of local ethnobiological knowledge (traditional environmental knowledge), by local people and for their use, is perhaps the most effective way of promoting both biodiversity conservation and the protection, preservation and application of biocultural property rights by, and for, the benefit of local communities. Moreover, it may be the most cost-effective means of developing workable short- and long-term plans, programs and policies to conserve and sustainably use biodiversity, to inventory and monitor biodiversity, to promote its *in situ* and *ex situ* conservation, and to protect, record and promote the use and application of indigenous or traditional knowledge as a basis for sustainable development for all rural Pacific Island communities - all central objectives of both the SPBCP and the CBD.

It is further suggested that, although there is increasing emphasis internationally on the establishment of conservation or protected areas, protection of endangered species, protection of intellectual, biological and cultural property rights (herein referred to as "biocultural property rights"), the promotion of "profitable environmental projects" (e.g., "ecotourism"), sustainable development bills, the development of environmental impact assessment capabilities, and a range of international initiatives and legal instruments for the protection of endangered ecosystems, biota and intellectual property rights (e.g. the CBD, CITES), if such initiatives are not developed, implemented and experienced at the community level in the Pacific Islands, they will probably fail in the long run. This assumption forms the central component of both the South Pacific Regional Environment Programme (SPREP)'s Global Environment Facility and AusAID-funded South Pacific Biodiversity Conservation Programme (SPBCP) and a MacArthur Foundation-University of the South Pacific Community-Based Biodiversity Conservation (CBBC) Project.

The paper constitutes an analysis of a methodology, preliminary findings and resultant preliminary community-based biodiversity conservation action plans and actions that have resulted from work in Vanuatu, Fiji, Tonga and Kiribati under both the SPBCP and the MacArthur Foundation CBBC Project.

[16] Draft Registered Complementary Paper for TOOL Working Group Session on Community-Based Conservation Areas, The Sixth South Pacific Conference on Nature Conservation and Protected Areas, 29 September - 3 October, 1997, Pohnpei, Federated States of Micronesia.

[17] Professor of Pacific Islands Biogeography, The University of the South Pacific, Suva, Fiji.

[18] SPBCP Conservation Area Support Officer (CASO), Environment Unit, Ministry of Environment and Social Development, South Tarawa, Republic of Kiribati.

[19] Conservation Area Support Officer (CASO), South Pacific Biodiversity Conservation Programme, Environment Planning Unit, Ministry of Lands, Survey and Natural Resources, Nuku'alofa, Kingdom of Tonga.

The development of the methodology has also been supported by UNESCO through the Kew Gardens-UNESCO-WWF collaborative "People and Plants Initiative". Particular emphasis is placed on showing how community-based participatory surveys and workshops, involving both men and women, can: 1) facilitate national biodiversity and ethnobiological inventories and regional biodiversity and ethnobiological data bases; 2) help preserve and protect traditional environmental knowledge and biocultural property for the use and benefit of local communities; 3) identify terrestrial, freshwater and marine ecosystems and plants and animals that are rare, endangered or of particular economic, cultural or ecological importance to local communities, and which are in need of protection or enhancement; 4) identify types of development that are unsustainable or destructive of biodiversity at the community and national levels; and, 5) identify traditional and non-traditional actions that can be taken at the local, national and international levels to protect biodiversity and ethnobiological knowledge and to support the objectives of the SPBCP and the CBD. Ways are also suggested as to how the findings of such surveys can be extrapolated and duplicated at the community-level throughout the Pacific Islands in an effort to conserve and enrich both biodiversity and ethnobiological knowledge as the natural and cultural capital needed as the basis for sustainable development for future generations of Pacific Islanders.

The balance of the paper examines: 1) the concepts of biodiverstiy and biodiversity conservation in the context of CBBC and the SPBCP; 2) the methodology used for community-based ethnobiological surveys; 3) the preliminary results; and 4) the production of CBBC Action Plans and the application of the results of the surveys to the promotion of CBBC and the protection and use of cultural property (biodiversity and ethnobiological knowledge) as a basis for sustainable development and the generation of income in the Pacific Islands.

Biodiversity and Biodiversity Conservation in the Context of Community-based Biodiversity Conservation

The way in which the concepts of biodiversity and biodiversity conservation are defined are central to the success of CBBC and the CBD.

Definition of Biodiversity

In the context of CBBC "biodiversity" would include:

1. All terrestrial and marine ecosystems (e.g. forests, grasslands, swamps, freshwater bodies, agricultural areas, towns, reefs, lagoons, mangroves, etc.);

2. All plant and animal species and genetic varieties found in these ecosystems (e.g., all species of trees, shrubs, vines, herbs, grasses, ferns, mammal, birds, reptiles, terrestrial invertebrates, seaweeds, sea grasses, finfish, turtles, shellfish, beche-de-mer, crustaceans, corals, sponges, other marine invertebrates, and all genetic varieties/races of wild and domesticated plants and animals, such as cutivars of yams, sweet potatoes, sugarcane, coconuts, breadfruit, mangoes, pandanus, etc.);

3. The knowledge, uses, beliefs and language ('ethnobiological knowledge") that local communities have in relation to their biodiversity. This would include the time-tested "biodiversity-management systems" which have served as a basis for the relatively sustainable habitation of the islands for thousands of years, beginning long before the expansion of the global market economy over the islands.

In a sense, 1, 2 and 3, could together be seen as constituting "biocultural property", because in most Pacific Island countries, rural communities "own", control, use and manage the local ecosystems, the plants and animals found within them, and the ethnobiological knowledge of the ecosystems and plants and animals.

Biodiversity Conservation in the Context of the SPBCP

In the context of the SPBCP, biodiversity conservation is seen as synonymous with sustainable use. It is argued, based on the experiences of other areas of the world, that if the biodiversity of Pacific Island communities is not conserved or used on a sustainable basis, and if traditional sustainable management practices, and the knowledge and language (e.g., plant and animal names and language associated with farming and fishing techniques, seasons, tides, etc.) are not maintained or strengthened, that all other modern development (e.g., business, political, social, education, etc.) may fail in the long term. Moreover, as stressed in the SPBCP programme document, biodiversity conservation is best achieved if it is done by the resource owners and users at the community level.

Biodiversity Conservation in the Context of the Pacific Islands

For most rural and many urban Pacific Island communities, "biodiversity" is not just a matter of scientific, economic (in monetary terms), recreational or ecological value. It is a capital inheritance, which has been passed on, relatively intact or in some cases enhanced, by past generations to current generations. Biodiversity is not income that should be spent or destroyed. It is the "capital" needed for development and maintenance of the local communities and upon which almost all "income" (both cash and non-cash) is derived.

The predominant focus for most rich-country motivated biodiversity conservation includes uniqueness or endemism, scientific importance, importance as potential gene pools for genetic engineering, biotechnology, plant breeding, medicinal discoveries or other technological breakthroughs for the benefit of humankind, export or touristic potential, or the ecological benefits of biodiversity and ecosystem preservation. For the people of the Pacific Islands, however, the focus of biodiversity conservation should be the CONSERVATION OF THEIR BIODIVERSITY as the basis for ecological, cultural and economic survival of THEIR local communities. Particular stress is placed on the fact that an estimated 25 to 90 per cent of the real income of Pacific Island rural or outer island communities is in the form of non-cash income derived from local terrestrial and marine plant and animal resources. Moreover, this income is relatively unaffected by inflation and deterioration in terms of trade which have historically caused imported goods (e.g., petrol, outboard engines, medicines, flour, sugar, kerosene, clothing, fishing nets, etc.) to increase in cost more rapidly than increases of wages in the cash economy or payments received in return for products exported overseas or sold locally (e.g., cash crops, fish, handicrafts, etc). The availability of such locally available products is also not effected by the unreliability, breakdown or non-existence of transportation networks.

Moreover, if cultural survival and sustainability (i.e., the "reproduction" of existing systems of cultural and economic activity), the focus of biodiversity conservation programmes must include not only native and endemic terrestrial and marine species (many of which do not even have local vernacular names), or larger "charismatic megafauna", such as the whales, dugongs, sea turtles, giant clams, birds-of- paradise, etc., but must also include a wide range of endangered or ecologically and culturally important ubiquitous indigenous and exotic (non-indigenous), and wild and domesticated, species or varieties. This is seen as particularly critical in the context of smaller islands and atolls that have limited terrestrial ecosystem diversity and few if any endemic plants or animals of global scientific interest, but where the protection of often ubiquitous plants and animals, both indigenous and exotic, must be given at least equal priority as the protection of rare, highly endemic biota of larger islands, because it is their ONLY biota. For example, a large proportion of coastal and inland secondary forest tree species of cultural and economic importance in Tonga, Kiribati and coastal or outer island Fiji are rare or endangered due to overexploitation, indiscriminate ploughing, destruction by cyclones or failure of the current generation to replant, and, as a result, are in need of protection or re-establishment. Because of situations like this, the biodiversity of these small islands is much more endangered and much more in need of management than that of the larger

islands in the western Pacific, such as most of the larger islands of Papua New Guinea, Solomon Islands and Fiji.

Community-based Ethnobiological Inventories

One of the first steps in the promotion of CBBC, using the model proposed here, is the conduct of biodiversity inventories or baseline studies. The paper suggests that the conduct of participatory "ethnobiological inventories" (the recording, analysis and application of local ethnobiological knowledge/traditional environmental knowledge, by local people and for their use) is perhaps the most appropriate way of doing this, although such information can be usefully supplemented by more in-depth scientific surveys in critical habitats such as designated marine or terrestrial reserves or proposed ecotourism sites, or to identify endemic plants, many of which have no local names and no local cultural uses (e.g., the in-depth inventory of the flora of Tofua and Kao which can supplement the community-based ethnobiological survey conducted on the main inhabited islands within the Ha'apai Conservation Area in Tonga).

The biodiversity surveys discussed here were conducted using a Community-Based Biodiversity Conservation (CBBC) questionnaire survey and participatory methodology developed over a four-year period as part of a John D. and Catherine MacArthur Foundation-University of the South Pacific Community-Based Biodiversity Conservation (CBBC) Project working in Fiji and Vanuatu. Additional testing, use and development of the questionnaire and associated community workshop methodology have been carried out during community-based integrated rural development and resource-use planning workshops; during community-based planning sessions during the preparation of the Project Planning Documents (PPDs) for the Ha'apai Conservation Area in Tonga in January and April 1995 and the North Tarawa and Kiritimati Island Conservation Areas in Kiribati under the South Pacific Biodiversity Conservation Programme (SPBCP); and during the SPBCP community-based survey conducted in Ha'apai in September 1997. A copy of the questionnaires used during this survey is provided in the Appendix.

Objectives of Survey

The overall objective of the community-based biodiversity surveys and associated community workshops and informal discussions was to rapidly gather and discuss, relatively in-depth information on biodiversity that could be used by the communities themselves to clearly identify actions that can be taken at the community or resource owner/user level to protect, improve and sustainably use their terrestrial and marine biodiversity as the basis for almost all cash and non-cash income, now and in the future.

Types of Information

The types of information needed by local communities to help them plan the protection and sustainable use of their biodiversity and that the survey was designed to gather include:

1. Types of cultivated or domesticated and wild terrestrial, marine and freshwater plants and animals that are of particular economic or cultural importance to the men and women of a given community.

2. Terrestrial and marine plants and animals that are rare or endangered.

3 Ecosystems that are endangered, being degraded or used unsustainably.

4. Biodiversity management and use practices that seem to be unsustainable and contributing to the overexploitation, endangerment or extinction or a given species or ecosystem.

5. Existing, former or potential biodiversity management and use practices or activities that could be promoted by local communities to ensure the sustainable use of biodiversity to satisfy the subsistence and monetary needs of the local community, now and in the future.

6. Actions that can be taken by local communities to protect or replenish/rehabilitate overexploited, and marine plants, animals and ecosystems).

7. Organisms or indicators that could be used to monitor or evaluate, at the community level, the effectiveness of biodiversity conservation efforts.

8. External assistance that is needed by local communities from government and non-government organisations to assist their efforts in the promotion of sustainable use, protection and rehabilitation of their ecosystems and biodiversity.

Organisation of the Survey and Conservation Planning Workshops

The community-based biodiversity survey questionnaires were translated into the local language, e.g., into Tongan or Fijian (Appendix) and supplied to the persons responsible for the administration of the surveys (e.g., Conservation Area Support Officers, USP student assistants, NGOs, local counterparts, etc.), along with guidelines for the conduct of the survey. The nature, objectives and conduct of the survey were then discussed with community representatives (e.g., village chiefs, district and town officers, heads of women's organisations, and relevant government and non-government persons. This process has been followed in community-based biodiversity surveys already conducted in: 1) North Ambrym, Vanuatu; 2) Verata, Namosi, Koroyanitu and Muaivuso, Fiji; 3) Ha'apai Tonga; and, 4) North Tarawa, Kiribati.

Preliminary meetings were held between community leadership responsible for organising the surveys and associated workshops and conducting and organising the actual biodiversity questionnaire survey component of the workshop. This was to make clear the objectives of the biodiversity survey and workshop, the procedures that would be followed, and to explain clearly how the questionnaire survey should be conducted. It was stressed that the survey and discussions were designed to help them develop an action plan for the conservation and sustainable use of their biodiversity resources, and that they would be contributing their time for the benefit of future generations of their own people. It was stressed that participation by as wide a cross section of the community as possible was important (e.g., male and female, young and old, high-ranked and low-ranked, farmers and fishers, long-term and short-term residents, formally educated and non-formally educated, etc.). Wide participation was seen as particularly important during the public presentation and compilation the questionnaire survey results and in the identification of: 1) ecosystems and plants and animals that were rare, endangered or of particular cultural or economic importance; 2) activities that threaten these ecosystems and plants and animals; and 3) activities that could form part of a Community-Based Biodiversity Conservation Action Plan (CBBCAP). Both processes, the actual administration of the questionnaire survey about the biodiversity resources of the community and the presentation and discussion of results, showed to be highly educational and informative, and should help to gain consensus, on a long-term basis, in terms of total village support of the resultant Action Plan and its suggested actions/activities.

It must be stressed that in some cases, it was not possible to hold true workshops, but only community-based discussions off the preliminary results, often held during the actual biodiversity survey. In some

cases, in-depth community-based workshops will be/were held and organised to discuss the finalised results and the draft or suggested Community-Based Biodiversity Conservation Action Plans (CBBCAP). In some cases the preliminary analysis of the results were used to prepare SPBCP "Project Preparation Documents", e.g., for the Ha'apai and North Tarawa Conservation Areas.

Important Assumptions and Considerations

The questionnaire is designed to ask questions about types and uses of biodiversity in a manner that most closely approximates the classification and use systems found in Pacific Island rural areas. Although the questionnaire may not fit the specific needs, ecosystems or perceptions of all communities (e.g. Lofanga in Ha'apai has no extensive intertidal reef flats and no surface water, and Namosi and Koryanitu in Fiji have no marine ecosystems), and may lead to some duplication or confusion, either between communities, within a given community, between different individual respondent groups, or between male and female groups, experience shows that variable interpretation, in fact, commonly yields valuable answers or information that may not be anticipated by the persons conducting the questionnaire, and may open up new areas of enquiry, or areas of concern or opportunity for biodiversity conservation and use, within a given community.

General Guidelines

The following guidelines for the conduct of the questionnaire survey were followed to obtain relatively unbiased and representative results and to maximise the educational and participatory impact of the survey and discussions within the participating communities.

1. The questionnaires were in most cases, filled in by groups rather than by individuals. This has shown to create greater interest and consensus, as well as increasing the educational impact and spread effect of the survey.

2. The ideal number of groups for a given community are 4 to 8, although this number can be reduced if there are a number of participating communities in a given area or which use a common language. To minimise duplication and bias in the results, the groups were discrete, in that no group included members from another group, and were physically separated so that no group could hear the answers of other groups (e.g., they were not allowed to sit next to each other in a community hall).

3. The groups were broken down into separate male and female groups because experience has shown that men and women have different information, some of which is often not forthcoming or expressed in the presence of the opposite gender group (e.g., women often know more about small fish and shellfish, and have different knowledge about medicines, much of which relates to specifically female medical problems).

Use of results

Upon completion, the questionnaires from each village were subjected to a preliminary analysis and some of the results tabulated so that the persons responsible for the survey and the conduct of the workshop or preparation of action plans could have a general idea of: 1) the important ecosystems and species for a given community; 2) what species and ecosystems were considered to be rare, endangered or of particular economic or cultural importance, and why; 3) what practices seemed to be unsustainable or responsible for the loss or endangerment of biodiversity; and, 4) what could be done locally and by government to address these issues.

The results of the questionaires were then presented to meetings of the communities. The results of the study were hung on the walls of meeting houses and the major issues and important species and important interventions were discussed.

Examples of Preliminary Results

To provide an example of the types of information on biodiversity and biocultural property that can be generated, discussed, and used in the formulation of community-based AND national biodiversity action plans, the following preliminary results are presented from surveys conducted in Ha'apai, Tonga in 1995 and 1996 to establish, the entire Ha'apai island group as Tonga's Conservation Areas under the SPBCP.

Terrestrial and Marine Biodiversity of Economic Importance

To stress the economic, in particular monetary, importance of biodiversity the target communities were asked to list those plants and animals they sold to earn money (see questionnaire in the Appendix). They were also asked to list plants of particular economic and cultural importance that were used for food, medicine, fuel, body ornamentation and a number of other purposes. The analysis of the results indicate that are over 120 finfish species, over 40 shellfish and 20 crab species are eaten, many of which are also main sources of cash income to villages. The same surveys indicated that there are over 300 plants that have economic or cultural significance. For example, are at least 74 food plants, 66 plants used medicinally, 42 as fuelwood, 35 classified as sacred or fragrant **kakala** used for garlands and scenting coconut oil, 28 for timber, 27 for animal feed, 21 for woodcarving, 19 for living fencing and hedging and 15 each for weaving and plaited ware and as dyes.

The survey showed that there is a vast diversity of terrestrial plants and animals of particular economic importance which are either sold locally or shipped to Tongatapu or overseas for commercial gain. The results of the survey clearly show: 1) the economic importance of biodiversity in terms of its cash-earning role; and 2) that, for isolated rural communities, for which there is generally no single terrestrial or marine product that can make them rich or provide them with sustainable incomes throughout the year, that the protection of the widest range of biodiversity is the best way of ensuring that rural families cash and subsistence incomes can be sustained.

Terrestrial Plants of Commercial Importance

Table 1 shows the diversity of cultivated and wild plant products reportedly sold by the target communities in the HCA, with almost 100 species being mentioned (68 cultivated and 25 wild species). (Although some species are both planted and found growing wild, e.g., guava, ivi, mango and si, each species was only placed in the category considered to be most common, and not listed twice). Of the 68 cultivated species, the most frequently mentioned are a range of fruit trees. The most important are mangoes, papayas (pawpaw), oceanic lychee, coconut, plantains and bananas, a range of citrus trees and Malay apple which were all mentioned as being sold by at least half of the 22 respondents. Some of these such as mangoes,

most citrus fruits, oceanic lychee and Malay apple are seasonal sources of income, whereas the remainder are sold throughout the year. Other commercially important fruit trees include breadfruit, Tahitian chestnut, Polynesian vi-apple, avocado, sweet sop, canarium almond, and soursop (Table 1).

Also reportedly sold are: 1) staple root crops including taro, yam, cassava, giant taro, sweet potato, sweet yam and potato; 2) non-tree fruits including sugarcane, passionfruit, pineapple, watermelon and granadilla; 3) export crops such as squash or butter pumpkin (which was exported to Japan in 1996) and vanilla; 4) supplementary food plants including, English and Chinese cabbage, hibiscus spinach (**pele**), peanuts, tomatoes, carrots, corn, beans, sweet capsicum and chillies; 5) handicraft plants such as pandanus (used to make mats, baskets, hats and other plaited ware), paper mulberry (used to make tapa cloth), and Polynesian arrowroot (used as an adhesive for tapa cloth); 6) a range of culturally important plant products used for scenting coconut oil, leis or garlands (**tuitui, hehea, mohokoi, lagakali, si, sinamoni, heilala, 'olive** and **puaTonga**); 7) the important social and ceremonial beverage, **kava**, and coffee; and, 8) a number of timber species including raintree, kauri, Caribbean pine, eucalyptus and West Indian cedar (Table 1).

Wild plant produced reportedly sold include: 1) guava and pomelo (**moli Tonga**), the fruit and firewood of both being sold; 2) sandalwood, which is sold to Asian traders; 3) **milo, feta'u, puataukanave** which are used in woodcarving; 4) the inner bark or bast fibre of **fau** which is used for making dancing skirts and in other handicrafts; 5) **piini Tonga** which is used both as human and animal food; 6) a range of trees that are sold for carving, construction or firewood purposes, which include **kanume, fotulona, koka, lopa, fao, kalaka, sialemohemohe, tavahi, tatangia, telie, toa** and **toi**; 7) **lopa** and **moho**, the bright red seeds of which are used to make necklaces and other handicrafts; 8) and a number of other culturally valuable plants, **huni**, **hulufe** and **longolong'uha**, which is an edible weedy plant. Although **tongo**, or mangroves do not grow on the islands where the study was conducted, one respondent reported the sale of **tongo**, possibly referring to the sale of its sap, obtained from trees elsewhere in Tonga, which is used as a dye and tannin for tapa cloth.

Table 1. Cultivated and wild plants or plant products reported as sold to obtain money in a survey of 22 groups of men and women (11 each) from the target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/22
MAINLY CULTIVATED OR PLANTED			
mango	mango	*Mangifera indica*	19
lesi	papaya, pawpaw	*Carica papaya*	18
tava	oceanic lychee	*Pometia pinnata*	17
niu	coconut	C*ocos nucifera*	15
hopa	Pacific plantain	*Musa* AAB Group	14
moli	citrus trees	*Citrus* spp.	14
siaine	Cavendish banana	*Musa* AAA Group	14
fekika	Malay apple	*Syzygium malaccense*	14
moli lemani	rough lemon	*Citrus lemon* x *medica*	13
talo	taro (general), including tannia	*Colocasia esculenta* and *Xanthosoma sagittifolium*	12
'ufi	yam, greater yam	*Dioscorea alata*	11

manioke	cassava, manioc	*Manihot esculenta*	10
to	sugarcane	*Saccharum officinarum*	10
kape	giant taro	*Alocasia macrorrhiza*	9
kumala	sweet potato	*Ipomoea batatas*	8
lou'akau (tofua, paongo, kie)	pandanus	*Pandanus whitmeanus*	8
mei	beadfruit	*Artocarpus altilis*	8
pata	bluggoe plantain	*Musa* ABB Group	8
ifi	Tahitian chestnut	*Inocarpus fagifer*	7
vaine	passionfruit	*Passiflora edulis*	7
faina	pineapple	*Ananas comosus*	6
meleni	watermelon	*Citrullus lanatus*	6
tuitui	candlenut tree	*Aleurites moluccana*	6
vi	Polynesian vi-apple	*Spondias dulcis*	6
hiapo, tutu	paper mulberry	*Broussonetia papyrifera*	5
hina	squash	*Cucurbita maxima*	5
moli peli	mandarin orange	*Citrus aurantifolia*	5
‘avoka	avocado	*Persea americana*	4
hehea	-	*Syzygium corynocarpum*	4
mohokoi	perfume tree, ylangylang	*Cananga odorata*	4
moli inu, moli kai	sweet orange	*Citrus sinensis*	4
‘apele Tonga	sweetsop, sugar apple	*Anonna squamosa*	3
kapisi	cabbage	*Brassica oleracea* var. *capitata*	3
kola	sour orange, Seville orange	*Citrus aurantium*	3
pele	bush hibiscus spinach	*Ablemoschus manihot*	3
pinati	peanut, groundnut	*Arachis hypogaea*	3
temata	tomato	*Solanum lycopersicon*	3
vanila	vanilla	*Vanilla planifolia*	3
‘ai	canarium almond	*Canarium harveyi*	2
kava	kava	*Piper methysticum*	2
laimi	lime	*Citrus aurantifolia*	2
langakali	-	*Aglaia saltatorum*	2
mamae	banana cultivar	*Musa* cultivar	2
pateta	potato, Irish potato	*Solanum tuberosum*	2
si	ti plant	*Cordyline fruticosa*	2
sinamoni	bay rum	*Pimenta racemosa*	2
‘ufilei	sweet yam, lesser yam	*Dioscorea exculenta*	2
‘apele ‘Initia	soursop	*Annona muricata*	2
fua melie	-	*Morus alba*	1
heilala	-	*Garcinia sessilis*	1
kaloti	carrot	*Daucus carota*	1
kapisi Siaina	Chinese cabbage	*Brassica chinensis*	1
kasia	raintree, monkeypod	*Samanea saman*	1
kaute	common hibiscus	*Hibiscus rosa-sinensis*	1
koane	corn, maize	*Zea mays*	1
kauli	Fijian kauri	*Agathis vitiensis*	1
kofi	Arabica coffee	*Coffea aribica*	1
mahoa'a Tonga	Polynesian arrowroot	*Tacca leontopetaloides*	1
‘olive	mock orange	*Murraya paniculata*	1
paini	Caribbean pine	*Pinus caribaea*	1
pasione	granadilla	*Passiflora quadrangularis*	1

piini	French bean	*Phaseolus vulgaris*	1
polo	sweet capsicum	*Capsicum annuum* var. *grossum*	1
polo fifisi	perennial chili pepper	*Capsicum frutescens*	1
pua Tonga	pua	*Fragraea berteroana*	1
pulukamu	eucalyptus	*Eucalyptus saligna*	1
sita	West Indian cedar	*Cedrela odorata*	1
talo Tonga	true taro	*Colocasia esculenta*	1

MAINLY WILD

kuava	guava	*Psidium guajava*	13
moli Tonga	pomelo, shaddock	*Citrus grandis*	9
ahi	sandalwood	*Santalum yasi*	7
milo	Thespian's tree	*Thespesia populnea*	6
fau	beach hibiscus tree	*Hibiscus tiliaceus*	5
piini Tonga	hyacinth bean or lima bean	*Lablab purpureus* or *Phaseolus lunulatus*	5
kanume	coastal ebony	*Diospyros elliptica*	4
fotulona	Chinese lantern tree	*Hernandia numphaeifolia*	3
feta'u	Alexandrian laurel	*Calophyllum inophyllum*	2
koka	Java cedar	*Bischofia javanica*	2
lopa	red-bead tree	*Adenanthera pavonina*	2
moho	rosary pea	*Abrus precatorius*	2
fao	-	*Neisosperma oppositifolium*	1
huni	-	*Phaleria disperma*	1
kalaka	-	*Planchonella grayana*	1
longoongo'uha	sow thistle	*Sonchus oleraceus*	1
puataukanave	sea trumpet	*Cordia subcordata*	1
sialemohemohe	leucaena	*Leucaena leucocephala*	1
hulufe	sword fern	*Nephrolepis hirsutula*	1
tavahi	-	*Rhus taitensis*	1
tatangia	beach acacia	*Acacia simplex*	1
telie	tropical almond	*Terminalia catappa*	1
toa	casuarina, ironwood	*Casuarina equisetifolia*	1
toi	-	*Alphitonia zizyphoides*	1
tongo	mangrove	*Bruguiera gymnorrhiza*	1

Terrestrial Animals of Commercial Importance

Table 2 shows that six domesticated animals are sold to obtain money in Ha'apai, the most important of which are pigs, horses and cattle.

Pigs are central to Tongan social and ceremonial life, with no important feast (**faka'afe**) or important meal being complete without a roasted or baked (in the earthen oven or **'umu**) pig. Pigs are also very important presentations, and part of most ceremonial exchanges. Horses are a very important means of transportation in Ha'apai, and are occasionally eaten as a delicacy, whereas beef cattle are also important for feasts and an important part of the Tongan diet. Goats are occasionally sold, as are chickens, which are very common, but mostly raised for susbsistence consumption.

Table 2. Domesticated animals reported as sold to obtain money in a survey of 23 groups of men and women from the target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/22
puaka	pig	*Sus scrofa*	22
hoosi	horse	*Equus equus*	16
pulu	cattle	*Bos taurus*	15
kosi	goat	*Capra hircus*	10
moa	chicken, fowl	*Gallus gallus*	6

Finfish of Commercial Importance

The questionnaire survey indicated that over 50 named species of fish are sold locally or transported for sale to Nuku'alofa (Table 3). This number would be far higher if different species that are referred to by the same name were identified individually or if the respondents had been asked to list more commercial species.

Those finfish that were reportedly sold by over a third of the 23 groups of respondents included: 1) rabbitfish, **ma'ava** and **o** (*Siganus* spp.); 2) parrotfish, **hohomo, sikatoki, pose, kiliofu** and **'ufu** (*Scarus* and *Leptoscarus* spp.); 3) jobfish and deepwater snappers, **palu** (*Apharaeus, Pristipomoides* and *Etelis* spp.); 4) goatfish, **vete** (*Mulliodichthys, Parupeneus* and *Upeneus* spp.); 5) rockcods or coral trout, **ngatala** and **tonu** (*Cephalopholis, Plectropomus* and *Epinephelus* spp.); 6) surgeonfish, **pone** and **manini (***Acanthurus* spp.and *Ctenochaetus striatus*); 7) seaperch, **hoputu, ngugutoa, fangamea** and **fate** (*Lutjanus* spp.); 8) big-eye scads, **'otule** (*Selar crumenophthalmus*); 9) unicornfish, **'ume** (*Naso* spp.); tunas, **valu**, '**atu** and **takuo** (*Gymnosarda, Katsuwonus* and *Thunnus*); and 10) emperors, **koango, mangaa, ngutukao** and **tokonifusi** (*Lethrinus* spp.).

Other highly sought after fish that are sold include mullets, **kanahe** (*Crenimugil* and *Liza* spp.); the sabre squirrelfish, **ta'a** (*Sargocentron spiniferum*); trevallys, **lupo** (*Carangoides, Caranx* and *Gnathanodon* spp.); Japanese sea bream, **kulapo** (*Gymnocranius euanus*); barracudas, **ogo, momotu** and **hapatu** (*Sphyraena* spp.); and, Maori wrasses, **lalafi** (*Cheilinus* spp.)(Table 3).

Together these finfish constitute a extremely important and potentially sustainable resource, if managed wisely.

Table 3. Finfish species reported to be sold and of commercial value, based on a survey of 23 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Names	x/23
ma'ava	forktail rabbitfish	*Siganus argenteus*	17
hohomo	parrotfish	*Scarus* spp.	16
palu	jobfish, deepwater snapper	*Apharaeus, Pristipomoides* and *Etelis* spp.	15
vete	goatfish	*Mulliodichthys, Parupeneus*	15
ngatala	rockcod, coral trout	*Cephalopholis, Plectropomus* and *Epinephelus* spp.	14
pone	surgeonfish, bristletooth	*Acanthurus* spp.and *Ctenochaetus striatus*	14
hoputu	Maori seaperch	*Lutjanus rivulatus*	12
'otule	big-eye scad	*Selar crumenophthalmus*	11
'ume	unicornfishes	*Naso* spp.	8
valu	dogtooth tuna	*Gymnosarda unicolor*	7
sikatoki	steephead parrotfish	*Scarus microrhinos*	7
kanahe	mullets	*Crenimugil* and *Liza* spp.	6
koango	spangled emperor	*Lethrinus nebulosus*	6
'atu	skipjack tuna	*Katsuwonus pelamis*	5
mangaa	sweetlip emperor	*Lethrinus miniatus*	5
ta'a	sabre squirrelfish	*Sargocentron spiniferum*	5
lupo	trevallys	*Carangoides, Caranx* and *Gnathanodon* spp.	4
manini	convict surgeonfish	*Acanthurus triostegus*	4
kulapo	Japanese sea bream	*Gymnocranius euanus*	3
momotu, ogo	yellowtail barracuda	*Sphyraena flavicauda*	3
?ngungutoa	black-banded seaperch	*Lutjanus semicinctus*	3
ngutukao	long-nose emperor	*Lethrinus olivaceous*	3
pose	young parrotfish	*Scarus* spp.	3
kiliofu	young parrotfish	*Scarus* spp.	2
hapatu (j), ogo	great barracuda	*Sphyraena barracuda*	2
lalafi	Maori wrasses	*Cheilinus fasciatus/trilobatus*	2
matu	silver biddys	*Gerres* spp.	2
nga'a	chub mackelel	*Rastrelliger kanaguria*	2
o	rabbitfish	*Siganus fuscescens/spinus / vermiculatusi*	2
tokonifusi	yellowlip emperor	*Lethrinus xanthochilus*	2
'anga	sharks (general)	?	1
fangamea	red seabass	*Lutjanus bohar*	1
fate	seaperch	*Lutjanus* spp.	1
haku	longtoms	*Platybelone* and *Tylosurus* spp.	1
heli	robust hardyhead	*Atherinomorus lacunosus*	1
huli	fusiliers	*Caesio* and *Pterocaesio* spp.	1
ihe	garfish	*Hemiramphus* spp.	1
lupolupo	bigeye trevally	*Caranx sexfasciatus*?	1
mahimahi	dolphin fish	*Coryphaena hippuris*	1
mohu'afi	large rockcods	*Epinephelis cynopodus/hoedti*	1
ngatala kula	coral cod	*Cephalopholis miniatus*	1
takape	crescent-tail bullseye	*Priacanthus hamrur*	1

takuo	yellowfin tuna	*Thunnus albacares*	1
talataha?	-	?	1
tanga'u?	?	?	1
tofua'a	sperm whale	*Physeter macrocephalus*	1
toke	moray eel	*Gymnothorax* spp.	1
?tonu	spotty cod	*Epinephelis maculatus*	1
toutao	smooth flutemouth	*Fistularia commersonii*	1
'ufu	slender parrotfish	*Leptoscarus vaigiensis*	1

Plants that are Rare, Endangered or in need of Protection or Re-establishment

The results of the surveys of the target villages in January 1995 and September 1996 indicate that all villages are very concerned about the loss of a very wide range of useful plants and feel very strongly that something must be done to address the situation. These include a wide range of trees, shrubs, vines, grasses and sedges, herbs and ferns, all of which are of some economic or cultural value. Reasons were also given for the endangerment of these plants and actions that could be taken to protect of re-establish them.

Endangered Trees and Shrubs

Tables 4 lists 103 trees or shrubs that are reported to be rare, endangered or in short supply in some or all of the villages included in the HCAP surveys. These include 28 large wild trees, 32 large cultivated trees, 19 wild small trees or shrubs, and 24 planted small trees or shrubs. Some plants, such as **ivi**, **tava**, **lesi**, **hehea** and **toa**, which could be placed in both categories bcause they are both wild and cultivated, have been placed in the category were they seem to be most common. Tables 5 and 6 list the reasons for their endangerment and possible actions that could be taken to address the situation.

Species Considered Endangered

Species mentioned by over half of all respondents, as being scarce or endangered, were **koka**, **toi**, **vi**, **fekika**, **ahi**, **heilala** and **hehea**. **Koka** is a tree which was formerly always protected when clearing for new gardens because of the value of its bark as the source of tapa dye and tanin, and its use for medicine, firewood and trellising (**felei**) for yams. **Toi** is a very important timber and firewood tree and an important source of medicine. **Vi** (Ploynesian vi-apple) and **fekiki** (Malay apple) are two important fruit trees for local sale and consumption, as well as being two of the most important medicinal trees. **Ahi** (sandalwood) has, over the past 15 years, or so been heavily exploited for export to the Asian market. **Heilala** and **hehea** are two important fragrant and culturally important plants that are used for making garlands (**kakala**) and for medicine.

Other trees that were mentioned as being scarce by over 25 per cent of the respondents include: 1) the important multi-purpose fruit trees, **moli Tonga** (pomelo), **tava** (oceanic lychee), **ifi** (Tahitian chestnut), **'ai** (canarium almond), **'avoka** (avocado), **mango** (mango), **moli inu** or **moli kai** (sweet orange), and a range of other **moli** (citrus trees), most of which are also used medicinally and for firewood; 2) a range of culturally important fragrant plants, including **pipi kakala** or **pipi tui**, **pua Tonga**, **mapa**, **koli** and **langakali**, most of which are also used medicinally; 3) the important medicinal plants, including **loupata**, **pukovili**, **masikoka**, **malolo**, **mangele**, **manonu**, **takafalu** and **uhi**; and 4) a range of other important timber or multipurpose tree including **kalaka**, **'ovava Tonga**, **puko**, **tavahi** and **toa** (Table 4).

Table 4. Trees and shrubs reported to be rare or endangered in a survey of 20 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/20
LARGE TO MEDIUM-SIZED TREES (Mainly Wild)			
koka	Java cedar	*Bischofia javanica*	18
toi	-	*Alphitonia zizyphoides*	13
pukovili	-	*Gyrocarpus americana*	9
loupata	macaranga	*Macaranga harveyana*	8
moli Tonga	pomelo, shaddock	*Citrus grandis*	7
'ovava Tonga	native banyan	*Ficus obliqua*	7
kalaka	-	*Planchonella grayana*	6
puko	pisonia	*Pisonia grandis*	6
tavahi	-	*Rhus taitensis*	6
masikoka, malolo	-	*Glochidion ramiflorum*	5
toa	casuarina, ironwood	*Casuarina equisetifolia*	5
feta'u	Alexandrian laurel, tomano	*Calophyllum inophyllum*	4
lopa	red-bead tree	*Adenanthera pavonina*	4
fau	beach hibiscus tree	*Hibiscus tiliaceus*	3
kanume	coastal ebony	*Diospyros elliptica*	3
kotone	wild nutmeg	*Myristica hypargyraea*	3
mafua, fekika vao	-	*Syzygium clusiifolium*	3
milo	Thespian's tree	*Thespesia populnea*	3
telie	tropical almond	*Terminalia catappa*	3
fao	-	*Neisosperma oppositifolium*	2
fo'ui	-	*Grewia crenata*	2
mo'ota	stinkwood	*Dysoxylum forsteri*	1
ngatae Fisi	dabdab	*Erthrina fusca*	1
ngatata	-	*Elattostachys falcata*	1
puataukanave	sea trumpet	*Cordia subcordata*	1
telie'amanu	-	*Terminalia litoralis*	1
tongo	mangrove	*Bruguiera gymnorrhiza*	1
toto	-	*Cerbera odollam*	1
LARGE TO MEDIUM-SIZED TREES (Mainly Planted)			
vi	Polynesian vi-apple	*Spondias dulcis*	15
heilala	-	*Garcinia sessilis*	13
fekika	Malay apple	*Syzygium malaccense*	10
mapa	-	*Diospyros major*	9
tava	oceanic lychee	*Pometia pinnata*	9
ifi	Tahitian chestnut	*Inocarpus fagifer*	7
pipi kakala, pipi tui	-	*Hernandia moerenhoutiana*	6
'ai	canarium almond	*Canarium harveyi*	6
koli, koli toto	-	*Syzygium neurocalyx*	6
moli	citrus trees	*Citrus* spp.	6
'avoka	avocado	*Persea americana*	5

langakali	-	*Aglaia saltatorum*	5
mango	mango	*Mangifera indica*	5
moli inu, moli kai	sweet orange	*Citrus sinensis*	5
pua Tonga	pua	*Fragraea berteroana*	5
mei	breadfruit	*Artocarpus altilis*	4
sinamoni	bay rum	*Pimenta racemosa*	4
mohokoi	perfume tree, ylangylang	*Cananga odorata*	3
moli lemani	rough lemon	*Citrus lemon* x *medica*	3
‘ohai	poincianna, flame tree	*Delonix regia*	2
tamaline	tamarind	*Tamarindus indicus*	2
tuitui	candlenut tree	*Aleurites moluccana*	3
manaui	-	*Garuga floribunda*	2
moli peli	mandarin orange	*Citrus aurantifolia*	2
ngatae	coral tree	*Erythrina variegata*	2
pipi failolo	-	*Atuna racemosa*	3
kasia	raintree, monkeypod	*Samanea saman*	1
kola	sour orange, Seville orange	*Citrus aurantium*	1
laimi	lime	*Citrus aurantifolia*	1
mau	-	*Cryptocarya fusca*	1
‘oke	silky oak	*Gevillea robusta*	1
tiulipe	African tulip tree	*Spathodea campanulata*	1

SMALL TREES OR SHRUBS (Mainly Wild)

ahi	sandalwood	*Santalum yasi*	10
mangele	-	*Trema cannabina*	5
manonu	-	*Tarenna sambucina*	5
takafalu	-	*Micromelum minutum*	5
kuava	guava	*Psidium guajava*	4
kavakava’ulie	wild kava	*Macropiper puberulum*	3
volovalo	-	*Premna serratifolia*	3
‘akauveli	wild indigo	*Indigofera suffruticosa*	2
nonu	Indian mulberry	*Morinda citrifolia*	2
sialemohemohe	leucaena	*Leucaena leucocephala*	2
talatala	lantana	*Lantana camara*	2
vi vao	-	*Ximenia americana*	2
ate	beach sunflower	*Wollastonia biflora*	1
fa	pandanus, screwpine	*Pandanus tectorius*	1
kaho	sword grass	*Miscanthus floridulus*	1
lepo hina	-	*Ricinus communis*	1
mo’osipo	hibiscus burr	*Urena lobata*	1
te’ehoosi	Cuba jute	*Sida rhombifolia*	1
tutu’uli	wild jasmine	*Jasminum simplicifolium*	1

SMALL TREES OR SHRUBS (Mainly Planted)

hehea	-	*Syzygium corynocarpum*	12
uhi	island musk	*Euodia hortensis*	6
‘apele Tonga	sweetsop, sugar apple	*Anonna squamosa*	3
vavae Tonga	sea island cotton	*Gossypium barbadense*	3
fehi	orchid tree, bauhinia	*Bauhinia monandra*	2

huni	-	*Phaleria disperma*	2
kaute	common hibiscus	*Hibiscus rosa-sinensis*	2
‘olive	mock orange	*Murraya paniculata*	2
polo fifisi	perennial chili pepper	*Capsicum frutescens*	2
poloTonga	-	*Solanum viride*	2
paingane	eggplant	*Solanum melongena*	2
si	ti plant	*Cordyline fruticosa*	2
vavae Tonga	sea island cotton	*Gossypium barbadense*	2
‘aplele ‘Initia	soursop	*Annona muricatai*	1
falahola	pandanus	*Pandanus tectorius* variety	1
fiki	physic nut	*Jatropha curcus*	1
fua melie	-	*Morus alba*	1
kukuvalu	pandanus	*Pandanus* cultivar	1
lesi	papaya, pawpaw	*Carica papaya*	1
paongo	pandanus	*Pandanus whitmeanus*	1
siale matalateau	gardenia	*Gardenia augusta*	1
siale Tonga	Tahitian gardenia	*Gardenia taitensis*	1
tapanima	carambola	*Averrhoa carambola*	1
te’elango	candelabra bush	*Senna alata*	1

Types of Useful Trees that are Rare or Endangered

Surveys of trees used for specific purposes showed that there was particular concern over the loss of food trees, fragrant or sacred trees and shrubs and medicinal plants most of which were trees. Tables 5, 6 and 7 show the food trees (**‘akau fua**), fragrant and sacred plants (**‘akau kakala**) and medicinal plants (**‘akau faito’o**) that are considered to be scarce or endangered in some or all of the villages. These findings reinforced the findings from the more general questions dealing with rare and endangered trees in general.

Table 5 list 28 fruit trees that the people said were increasingly rare or endangered in some villages. These responses support the fact that **vi**, **fekika**, **‘ai** and **‘avoka** seem to be rare almost everywhere, with other fruit trees, **tava**, **ifi** and a range of citrus fruits (**moli**) also increasingly rare in many areas. As can be seen, even more common fruit trees, such as coconut palms, papaya, breadfruit and mango, and many others, almost all of which are reportedly sold, are reported to be increasingly scarce by some villages.

Table 5. Fruit trees and shrubs reported to be rare, endangered or in short supply in a survey of 20 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/20
vi	Polynesian vi-apple	*Spondias dulcis*	18
fekika	Malay apple	*Syzygium malaccense*	12
'avoka	avocado	*Persea americana*	11
'ai	canarium almond	*Canarium harveyi*	10
tava	oceanic lychee	*Pometia pinnata*	8
lesi	papaya, pawpaw	*Carica papaya*	6
moli	citrus trees	*Citrus* spp.	6
moli peli	mandarin orange	*Citrus aurantifolia*	5
moli Tonga	pomelo, shaddock	*Citrus grandis*	5
ifi	Tahitian chestnut	*Inocarpus fagifer*	4
kanume	coastal ebony	*Diospyros elliptica*	4
moli inu, moli kai	sweet orange	*Citrus sinensis*	4
mapa	-	*Diospyros major*	3
mei	breadfruit	*Artocarpus altilis*	3
niu	coconut palm	*Cocos nucifera*	3
'apele Tonga	sweetsop, sugar apple	*Anonna squamosa*	2
hehea	-	*Syzygium corynocarpum*	2
kola	sour orange, Seville orange	*Citrus aurantium*	2
kuava	guava	*Psidium guajava*	2
mango	mango	*Mangifera indica*	2
moli lemani	rough lemon	*Citrus lemon* x *medica*	2
piu, niu piu	Pacific fan palm	*Pritchardia pacific*	2
'apele 'Initia	soursop	*Annona muricata*	1
fua melie	-	*Morus alba*	1
laimi	lime	*Citrus aurantifolia*	1
lopa	red-bead tree	*Adenanthera pavonina*	1
moli vailkeli	unidentified citrus fruit	*Citrus* sp.	1
pomakanite	pomegranate	*Punica granatum*	1
telie	tropical almond	*Terminalia catappa*	1

Table 6 shows that some 20 fragrant and spritually important plants are considered to be rare or in short supply. Again, the most commonly mentioned species include **langakali** and **heilala**, both of which are considered to be "titled" plants of chiefly rank (**kakala hingoa**). Others which are very important for scenting coconut oil (**loloTonga**) and making garlands for festive occasions (**sisi** and **kahoa**), include **pua tonga**, **pipi**, **mohokoi**, **mapa**, **hehea**, **koli** and a number of special pandanus (**lou'akau**) cultivars. All of these plants have special cultural importance in Tonga and are critical component of "cultural biodiversity", something that can not be replaced with money or overseas imports.

Table 6. Fragrant and spiritually important trees and shrubs (**'akau kakala**) reported to be rare or endangered in a survey of 22 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/22
langakali	-	*Aglaia saltatorum*	18
heilala	-	*Garcinia sessilis*	16
pipi kakala, pipi tui	-	*Hernandia moerenhoutiana*	9
pua Tonga	pua	*Fragraea berteroana*	9
mohokoi	perfume tree, ylangylang	*Cananga odorata*	8
mapa	-	*Diospyros major*	6
hehea	-	*Syzygium corynocarpum*	5
koli, koli toto	-	*Syzygium neurocalyx*	5
falahola	pandanus	*Pandanus tectorius* variety	4
huni	-	*Phaleria disperma*	4
siale Tonga	Tahitian gardenia	*Gardenia taitensis*	4
sipaisi	allspice	*Pimenta dioica*	4
sinamoni	bay rum	*Pimenta racemosa*	3
kalosipani	frangipani	*Plumeria* spp.	2
nukonuka	island myrtle	*Decaspermum fruticosum*	2
pipi failolo	-	*Atuna racemosa*	2
kukuvalu	pandanus	*Pandanus* cultivar	1
kulukona	-	unknown plant	1
'olive	mock orange	*Murraya paniculata*	1
tuitui	candlenut tree	*Aleurites moluccana*	1

Table 7 lists 31 medicinal trees that were considered by Ha'apai communities to be scarce or endangered in their area. This is considered to be particularly disturbing since few if any modern medicines are available in villages on the outer islands of Ha'apai. About the only medicines that are to be found in outer island dispensaries are Panadol or aspirin and penicillin, with almost all sicknesses and injuries being treated using traditional herbal medicine. In many cases, these traditional medicines, the majority of which come from trees, are the exact same medicines that have been used and tested for their effectiveness for hundreds of years in south China, Indonesia, Malaysia and India where most of these same plants are found and used to treat the same sicknesses and injuries. In effect, these medicinal trees, and their protection and replanting, represents an extremely valuable resource in terms of it monetary value when compared to the cost of store-bought modern medicines, not to mention its value in terms of health benefits to local communities.

Table 7. Medicinal trees and shrubs reported to be rare or endangered in a survey of 20 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/21
uhi	island musk	*Euodia hortensis*	14
manonu	-	*Tarenna sambucina*	10
hehea	-	*Syzygium corynocarpum*	6
kavakava'ulie	wild kava	*Macropiper puberulum*	5
toi	-	*Alphitonia zizyphoides*	5
fekika	Malay apple	*Syzygium malaccense*	4
koli, koli toto	-	*Syzygium neurocalyx*	4
heilala	-	*Garcinia sessilis*	3
lekileki	cannonball tree	*Xylocarpus granatum*	3
masikoka, malolo	-	*Glochidion ramiflorum*	3
siale Tonga	Tahitian gardenia	*Gardenia taitensis*	3
te'epilo 'a Maui	-	*Geniostoma rupestre*	3
fao	-	*Neisosperma oppositifolium*	2
lalatahi	beach vitex	*Vitex trifolia*	2
loupata	macaranga	*Macaranga harveyana*	2
mangele	-	*Trema cannabina*	2
mapa	-	*Diospyros major*	2
nukonuka	island myrtle	*Decaspermum fruticosum*	2
pua Tonga	pua	*Fragraea berteroana*	2
takafalu	-	*Micromelum minutum*	2
vi vao	-	*Ximenia americana*	2
mafua, fekika vao	-	*Syzygium clusiifolium*	1
milo	Thespian's tree	*Thespesia populnea*	1
monomono'ahina	wild mussaenda	*Mussaenda raiateensis*	1
mo'ota	stinkwood	*Dysoxylum forsteri*	1
ngahu	saltbush	*Scaevola taccada*	1
te'ete'emanu	-	*Ervatamia obtusiuscula*	1
telie	tropical almond	*Terminalia catappa*	1
telie'amanu	-	*Terminalia litoralis*	1
vavae Tonga	sea island cotton	*Gossypium barbadense*	1
vi	Polynesian vi-apple	*Spondias dulcis*	1
volovalo	-	*Premna serratifolia*	1

Reasons for Loss or Endangerment of Trees and Shrubs

As can be seen from Table 8, 28 reasons were given for the increasing scarcity of trees and shrubs in general in Ha'apai, and for the increasing scacity of given species. As can be seen from the results (which have been translated from Tongan), some reasons overlap or are interrelated. They, however, clearly point out some of the reasons for deforestation and the elimination of valuable trees and shrubs from forests, agricultural lands, villages and other habitats in Ha'apai.

Apart from the answer that a given species was always rare or scarce, or that the trees were detroyed by strong winds or tropical cyclones ("hurricanes"), all of the reasons seem to relate to human practices that can be addresses to reverse serious trends of deforestation and the loss of trees.

Foremost among the answers was the **failure to plant or replant trees** in general, a practice that seems to be much more prevalent among the current generation. It was very commonly stated that, in the past, the parents and grandparents of today's residents used to plant and protect trees because of their percieved value. This could be related to the answers related to the **general neglect of trees** and the **ignorance of the importance of trees** as important contributing factors to the loss of trees (Table 8). It is important to note that the failure to plant or replant was seen almost universally as the main reason for the scarcity of trees whether it was related to the replacement of trees that had been used or felled deliberately, trees that had been killed by cyclones or had died naturally, or trees that were naturally scarce in Ha'apai, but which were highly desired.

Many of the reasons relate to changing agricultural practices that have, over the past 30 years or so, led to rapid "agrodeforestation" - the removal or failure to replant trees within the traditional tongan shifting agricultural system. These include **indiscrimate felling**, **agricultural clearance**, including the **elimination of trees groves/habitat destruction**, **indiscriminate burning** and the **increasing use of the plough**, all of which have accompanied the gradual shift away from the traditional mixed agroforestry system in which fruit trees and other culturally useful trees, bananas and plantains, yams and taro were the primary crops, to more monocultural production of crops such as cassava, sweet potato and tannia, and cash crops such as watermelons, peanuts, all of which are more sunloving and are generally grown as monocultures. In short, the focus became more on maximising production of a single crop rather than on the sustainable production of crops and trees together. Particulary serious are indiscriminate burning and the increasing use of the plough, both of which favor the spread of grasses species, such as Guinea grass or **saafa**, over tree seedling, as well as mature trees. Also associated with this was the **failure to protect tree seedlings**, a common practice in the past where farmers protected self-sown or naturaly regenerated tree seedling, a practice commonly referred to as "selective weeding". Trees most commonly killed due to the intensification of agricultural clearance, indiscriminate burning and ploughing include **fau**, **koka**, **lopa**, **loupata**, **manaui**, **masikoka** or **malolo**, **ngatae**, **nonu**, **pua Tonga**, **puko**, **telie** and **toa**, as well as many important fruit trees, including **ivi** (Tahitian chestnut), **tava** (oceanic lychee), **vi** (Tahitian vi-apple), **fekika** (Malay apple) and a range of citrus trees (**moli**). The clearance of remaining tree groves for agricultural expansion have led to the shortage of many of the same trees plus others that are normally only found in such areas. These include **mafua** or **fekika vao**, **mangele**, **ngatata**, **'ovava Tonga**, **tavahi**, and **toi**.

The clearance of the inner portions of the coastal littoral forest, to extend agricultural plantings seaward or for other development (e.g., quarries, tourist developments or wharves) has been responsible for the loss of many culturally important trees. These include **feifai**, **feta'u**, **fotulona**, **futu**, **kalaka**, **lekileki**, **milo**, **puataukanave**, **puopua** and **touhuni**, some of which, although not mentioned in the questionnaire surveys were reported to be rare or extinct in discussions with communities. **Lekileki**, for example, although reportedly present in Ha'apai in the past, has been possibly been brought to extinction or near extinction, due to overuse for its firewood and medicine.

Also related to agricultural change is **destruction due to animals** as a result of the large number of cattle and horses, and in some cases, goats, which when left untethered or unfenced, lead to significant damage to young trees. **Fo'ui** and **manaui**, for example, are reportedly eaten by animals. Free ranging pigs, which root up trees and seedling, are also a very serious problem in and around villages, making it very difficult to plant and maintain tree seedlings.

Indiscriminate use which destroys or kill trees, without replacing or replanting them is another major factor leading to the loss of important trees and unsustainability. Among the most serious causes is the

excessive removal of the bark, mainly for medicinal use, which leads to the death of the tree. This has reportedly been a main cause of the loss of important medicinal plants such as **fekika**, **kavakava'ulie**, **koli**, **loupata**, **mangele**, **manonu**, **mapa**, **pokovili**, **takafalu**, **toi**, **vi** and **volovalo**. **Uhi**, a shrub or small tree, is reportedly also killed when too many leaves or shoots are taken for medicinal purposes. Excessive removal of the inner bark of the **koka** tree, for the use as red-brown dye and tannin for the socially-important tapa cloth (**ngatu**), is reportedly a major cause of the death of this tree.

Another major cause of the loss of trees is **use for firewood.** Major uses of firewood include everyday cooking, for cooking in the earthen oven (**'umu**) on Sundays or for other special occasions, for boiling pandanus (**lou'akau**) for making mats (**fala** and **kie**), and most recently, for drying and smoking beche-de-mer. The main species considerred to be hig quality firewood include **fau**, **fo'ui**, **ifi**, **kalaka**, **koka, kuava**, **lekileki**, **lopa**, **loupata**, **mango**, **mafua** (**fekika vao**), **moli Tonga**, **sialemohemohe, tava**, **tavahi**, **telie**, **toi** and **toa**.

Species reportedly depleted for canoe or boatbuilding include **fotulona**, **mango**, **pukovili** and **tavahi**. Species depleted to satisfy local timber demands include **fao**, **feta'u**, **kalaka**, **lopa**, **tava**, **tavahi** and **toa**. Trees that are overexploited for woodcarving or sold commercially to woodcarvers include **feta'u**, **kasia**, **milo**, **puataukanave**, **puopua** and **toa**. Discussions indicate that **puataukanave** and **puopua** are both very rare in most parts of Ha'apai.

The species under the greatest threat due to **felling for commercial purposes** is sandalwood or **ahi**, which over the past 20 years or so has been purchased by often unscrupulous Asian traders who require that entire populations of trees be removed from a given site.

Of great concern to the communities was the extremely large number of trees that were killed by or died after Tropical Cyclone Isaac ('Aisake) in 1983. Trees reportedly killed by this cyclone or subsequent cyclones include **fekika**, **fo'ui**, **ifi**, **kalaka**, **kasia**, **koka, langakali**, **lekileki**, **lopa**, **loupata**, **mango**, **mapa**, **mei**, **moli**, **'ohai**, **'ovava Tonga**, **puko**, **pukovili**, **tava**, **tavahi**, **te'elango** and **vi**. There are some species that have died naturally of old age. These include **ifi**, **kotone**, **langakali**, **pua Tonga**, **'ovava Tonga**, **puko**, **tava**, **toa** and **vi**. **Te'elango** reportedly died off during recent droughts, and large stands of **sialemohemohe**, a very important firewood resource, was devastated by Pacific-wide psillid insect (*Heteropsilla cubana*) infestations about ten years ago and have never totally recovered.

A major reason given for the decline in tree numbers and the failure to replant is the lack of planting material for many species. These include **ahi**, **'ai**, **'avoka**, **hehea**, **heilala**, **kotone**, **mapa**, **moli Tonga**, **pipi**, **sinamoni**, **tapanima** and **vi**. Some of these, such as **ahi**, **'ai** and **heilala** are very difficult to propagate, and possibly require expert assistance for the Forestry Division. Some species, such as **ahi**, are also very slow growing.

Table 8. Reasons given for the increasing scarcity of trees and shrubs in Ha'apai based on surveys of 10 men's groups and 10 women's groups in the HCAP target villages in September 1997.

Reasons	x/20
Failure to Plant or Replant	19
Indiscrimate Felling	18
Excessive Bark Removal	15
Agricultural Clearance	13
Indiscriminate Burning	13
Use for Firewood	11
Excessive Medicinal Use	11
Killed by Tropical Cyclones	10
Overuse for Dyes	10
Felling for Commercial Purposes	9
Died Naturally with No Replanting	9
Lack of Planting Material/Seeds	9
General Neglect of Trees	7
Failure to Protect Tree Seedlings	6
Overuse for Woodcarving	5
Use for Fence Posts	5
Naturally Scarce	5
Destruction Due to Animals	4
Use for Boatbuilding	4
Difficulty in Propagation	4
High Demand for Timber	3
Increasing Use of the Plough	3
Elimination of Trees Groves/Habitat Destruction	2
Ignorance of the Importance of Trees	2
Killed by Drought	2
Very Slow Growing	1
Killed by Pests	1
Eaten by Animals	1

Endangered Vines or Lianas

Another class of plants that are extremely useful to the people of the Pacific Islands and Ha'apai are vines or lianas. The surveys showed that 26 different species considered to be vines were reported to be rare or endangered in somewhere in Ha'apai. These are listed in Table 9. The reasons for their endangerment are listed in Table 10.

Table 9. Vines or lianas reported to be rare or endangered in a survey of 20 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/20
piini Tonga	lima bean	*Phaseolus lunulatus*	14
vaine	passionfruit	*Passiflora edulis*	12
pasione	granadilla	*Passiflora quadrangularis*	11
alu	taro vine	*Epipremnum pinnatum*	7
lautolu, lautolu tahi	beach bean	*Vigna marina*	6
maile	-	*Alyxia stellata*	6
vanila	vanilla	*Vanilla planifolia*	6
hina	pumpkin	*Cucurbita pepo*	4
kaloni kakala	Rangoon creeper	*Quisqualis indica*	4
piini 'a e puaka, piini 'a e hoosi	hyacinth bean, lablab bean	*Lablab purpureus*	4
valai, pa'anga sipi	St. Thomas bean	*Entada phasioloides*	4
aka	kudzu bean	*Pueraria lobata*	3
fue, fue tahi	beach morning-glory	*Ipomoea pes-caprae*	3
vaine Tonga	wild passionfruit	*Passiflora maliformis*	3
kava Fisi	derris root	*Derris malaccensis*	2
moho	rosary pea	*Abrus precatorius*	2
fue 'a e puaka	sea bean	*Canavalia rosea*	1
fatai	beach dodder	*Cassytha filiformis*	1
hoi	air yam	*Dioscorea bulbifera*	1
kalepi	grape	*Vitis vinifera*	1
kumala	sweet potato	*Ipomoea batatas*	1
lole 'a e kuma	bitter gourd, balsam pear	*Momordica charantia*	1
meleni	watermelon	*Citrullus lanatus*	1
pulu kaukau	scrubber gourd	*Luffa cylindrica*	1
taupo'ou	asparagus fern	*Asparagus setaceus*	1
vaine 'a e kuma	wild passionfruit	*Passiflora foetida*	1

Table 10. Reasons given for the increasing scarcity of vines in Ha'apai based on surveys of 10 men's groups and 10 women's groups in the HCAP target villages in September 1997.

Reasons	x/20
Failure to Plant or Replant	13
Indiscrimate Felling/Uprooting for Use	12
Lack of Planting Material/Seeds	9
Excessive Medicinal Use	8
Indiscriminate Burning	6
Killed by the Sun or Lack of Shade	6
Eaten by Goats	6
Indiscriminate Hoeing/Weeding	5
Eaten by Horses	4
Eaten/Destroyed by Animals (general)	4
Increasing Use of the Plough	3
Rooted Up by Pigs	3
Agricultural Clearance	3
Died Naturally with No Replanting	2
Elimination of Trees Groves/Habitat Destruction	2
Low Market Prices/Uneconomic	2
Killed by Tropical Cyclones	1
Eaten by Rats	1

As can be seen from Table 10 the reasons given for the declining abundance or loss of vines in Ha'apai are very much the same as for trees and shrubs, with the failure to replant and overuse (indiscriminate felling or uprooting for use) for handicrafts, medicine, body ornamentation and other purposes, without replanting, being the highest on the list followed closely by the lack of planting material.

Vines that were reportedly rare because of the failure to replant included granadilla (**pasione**), passionfruit (**vaine**), cotton (**vavae Tonga**), watermelon (**meleni**), vanilla (**vanila**) and a number of ornamentals such as chrysanthemum (**hone**), Rangoon creeper (**kaloni kakala**) and crinum lily (**samoa**). Plants for which it was difficult to obtain seeds or planting material included granadilla and scrubber gourd (**pulukaukau**).

Indiscriminate burning, hoeing and weeding and the increasing use of the plough, loss of shade or intense sunlight and agricultural clearance, in general, were also major reasons for the loss of vines. This would also include the elimination of tree groves and secondary and coastal forest in and around garden areas. Imporant vines lost due to these processes included **fatai**, **piini** (all species), **vaine Tonga**, **valai**, **lole 'a e kuma**, **vaine 'a e kuma** and kudzu vine (**aka**), the latter, a tuberous vine which is primarily affected by increasing ploughing. Plants reportedly most affected by increasing sunlight and loss of shady habitats included **alu, lautolu, pasione** and **pasiole**.

Plants that were reported to be seriously overused included **maile**, for making leis and garlands (**kahoa** and **sisi**); **moho** for making necklance and handicrafts; **alu**, **valai**, and **lautolu**, all important medicinal plants; and **piini** (*Phasiolus* and *Lablab*) for feeding animals.

Vines affected seriously by free-ranging animals include all the **piini** which are reportedly eaten by pigs, goats, horses and rats. Goats were seen as particularly responsible for the loss of **kaloni kakala**, and pigs for **aka**, with a wide range of vines being threatened by all animals.

Plants that have not been planted because of low market prices include vanila and passionfruit.

Actions that could be taken to address the loss of important vines are very much the same as for trees and shrubs (see Table 8). The most widely suggested solution were again systematic government and community-level replanting and propagation efforts, outright prohibition on the use or killing of endangered species or control on overexploitation and destructive practices, improved control of animals, forest and tree grove protection, and improved public awareness or eduction. Additional suggestion related specifically to some vines included the fencing of cultivated species in village areas, the deliberate watering or irrigation of species particularly susceptible to drought, and the indentification of new or more lucrative markets for species such as vanilla and passionfruit.

Endangered Grasses and Sedges, Herbs and Ferns

As can be seen from Tables 11, 12 and 13, there is also a wide range of plants classified as grasses, sedges, herbs (non-grassy soft plants) and ferns that are considered to be rare or endangered.

The most widely mentioned grass species, mentioned as being increasingly rare was **vailima**, considered to be one of the most important fodder grass for grazing animals. Other fodder grasses such as **matamanu**, **salapona**, **takataka'aleala**, **kola**, and even the very abundant **saafa** were mentioned as being increasingly scarce in some areas. Other species include **pako** and **pakopako**, the small pungent nut-like root tubers of which are used to scent coconut oil, and Job's tears or **hana**, the attractive gray seeds of which are used to make necklaces and handicrafts.

Table 11. Grasses or sedges reported to be rare or endangered in a survey of 20 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/20
vailima	sour grass, T-grass	*Paspalum conjugatum*	12
pako	-	*Cyperus stoloniferus*	3
matamanu, mata-pekepeka	seedgrass	*Chrysopogon aciculatus*	3
salapona	Natal red-top grass	*Rhynchelytrum repens*	3
mohuku Siamane, takataka'aleala	wiregrass, crow's-foot grass	*Eleusine indica*	2
hana	Job's tears	*Coix lachryma-jobi*	1
kola	Johnson grass	*Sorghum sudanense*	1
mohuku'apopoa	crabgrass	*Digitaria setigera*	1
pakopako	nut sedge	*Cyperus rotundus*	1
saafa	Guinea grass	*Panicum maximum*	1

As can be seen from tables 12 and 13, herbs or soft plants (not including grasses and sedges) and ferns are also increasingly rare, although the number of ferns would be much higher for larger, high islands of Melanesia, compared to the low, deforested small islands of the Ha'apai group.

Table 12. Herbs or soft plants reported to be rare or endangered in a survey of 20 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/20
kihikihi	wood sorrel	*Oxalis corniculata*	10
ango kula, ango	turmeric	*Curcuma longa*	8
angoango	wild ginger, shampoo ginger	*Zingiber zerumbet*	7
pasiole	patchouli	*Pogostemon cablin*	7
tevunga	-	*Etlingera cevuga*	7
tono	Asiatic pennywort	*Centella asiatica*	6
sinisa	ginger	*Zingiber officinale*	5
kanini, kaningi	wandering Jew	*Commelina benghalensis*	4
mahoa'a	Polynesian arrowroot	*Tacca leontopetaloides*	3
teve	Elephant-foot yam	*Amorphophallus paeoniifolius*	3
te'epulu	-	*Senna tora*	3
akataha	-	*Boerhavia repens*	2
faina	pineapple	*Ananas comosus*	2
kavapui	shell ginger	*Alpinia zerumbet*	2
lose	rose	*Rosa* spp.	2
polo pa	bladderberry	*Physalis angulata*	2
tamatama	prickly chaff-flower	*Achyranthes aspera*	2
filo	plantain	*Plantago lanceolata/major*	1

hone	chrysanthemum	*Chrysanthemum morifolium*	1
hongohongo	-	*Laportea interrupta*	1
kakamika	-	*Sigesbeckia orientalis*	1
longolong'uha	sow thistle	*Sonchus oleraceus*	1
lile	spider lily	*Hymenocallis littoralis*	1
mangiki	angelonia	*Angelonia angustifolia*	1
mateloi	sensitive plant	*Mimosa pudica*	1
mohuku vai	wandering Jew	*Commelina diffusa*	
polosomo	garden balsam	*Impatiens balsamina* and *I. wallerana*	1
pula	petunia	*Petunia* x *hybrida*	1
samoa	crinum lily	*Crinum xanthophyllum*	1
taupo'ou	asparagus fern	*Asparagus setaceus*	1
temata vao	wild tomato	*Solanum lycopersicon* var. *cerasiforme*	

Table 13. Ferns reported to be rare or endangered in a survey of 20 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/20
laufale	scented fern	*Pymatosorus scolopendria*	4
hulufe hina	sword fern	*Nephrolepis hirsultula*?	3
hulufe kula	fern	*Sphaerostephanos invisus*?	3
hulufe fale, pasivaka?	-	*Stenochlaena palustris*	1
ta'eta'e	unidentified fern	?	1

Endangered Birds

Survey results indicated that most of the indigenous birds of Ha'apai are considered rare or endangered in some areas and in need of some protection. As can be seen from Table 14, land birds most often mentioned as being rare or endangered include larger birds such as the purple-crowned fruit-dove (**kulukulu**), the Pacific pigeon (**lupe**), the Pacific reef heron (**motuku**), the blue-crowned lorikeet (**henga)**, the red-breasted musk parrot (**kaka, koki**), the purple swamphen (**kalae**) and the Pacific black duck (**toloa**), all of which were reported to have been killed to eat. Other species considered to be rare by some communities include the wattled honeyeater (**fuleheu**), the Polynesian starling (**misi**), the collared kingfisher (**sikota**), the Fiji shrikebill (**fuiva**), the barn owl (**lulu**), and the many-coloured fruit-dove (**manuma'a**). Even the once abundant banded rail (**veka**) and jungle fowl (**moa kaivao**), the latter a very important and almost ubiquitous food resource in the past, are considered to be rare or endangered in some areas. Also mentioned as increasingly rare are flying foxes (**peka**), which although not birds, were included in this category by many respondents.

Many seabirds that used to be extremely abundant on some of the uninhabited islands in Ha'apai, and which were important in the local diet, are now considered to be rare or endangered by most communities. These include noddies (**ngongo**), terns (**tala**), tattlers, godwits, and plovers (**kiu**), frigate birds (**lofa**), boobies (**ngutulei**), tropic birds (**tavake**), and petrels and shearwaters (**lafu**).

The main reasons for the disappearance of the land birds seems to be the gradual elimination of trees, tree groves and forests, and the trees that many of these fruit-eating birds depend on. The elimination of wetlands, such as the drying up of the freshwater wetland area on Foa, a favoured habitat of wild ducks and a number of migratory birds, has also been a factor. Indiscriminate killing and consumption of birds such as doves and pigeons (**kulukulu, lupe)**, parrots and lorikeets (**henga**), wild ducks (**toloa**) and the purple swamphen (**kalae**) has also been responsible for declining populations of species that are eaten. Seabird populations, in particular, have been devastated by the over-consumption of both eggs and birds, both of which are considered delicacies, and which are commonly eaten after roasting over coals on an open fire while on fishing expeditions to uninhabited islands.

As stressed by Steadman (1995), parrots, doves, pigeons, ducks and seabirds have been subjected to local extinction (extirpation) throughout Polynesia and Micronesia, including Tonga, in the past, and there is evidence that the current recorded ranges of many species of both land and seabirds were once much wider than at present, and that overconsumption of birds in places, such as Tonga, the Cook Islands and French Polynesian has brought many birds to local extinction (extirpation). The process seems to be continuing, and if strict measures are not taken to protect Ha'apai's endangered land and sea bird populations, the process of local extinction will undoubtedly continue. **The most important initiatives would be to place an immediate moratorium on forest removal and the killing or consumption of any birds placed on a list of endangered species**.

Table 14. Bird species reported to be rare or endangered in Ha'apai in a survey of 20 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996 (* = name applies to more than one species, with exact species which is rare not identified; ? = unconfirmed record).

Tongan Name	Common Name	Latin Name (status)	
LAND BIRDS			
kulukulu	purple-crowned fruit-dove	*Ptilinopus porphyraceus*	14
lupe	Pacific pigeon	*Ducula pacifica*	13
motuku	Pacific reef heron	*Egretta sacra*	12
henga	blue-crowned lorikeet	*Vini australis*	7
kaka, koki	red-breasted musk parrot	*Prosopeia tabuensis* (?)	7
kalae	purple swamphen	*Pophyrio porphyrio*	7
toloa	Pacific black duck	*Anas superciliosa*	6
fuleheu	wattled honeyeater	*Foulehaio carunculata*	3
misi	Polynesian starling	*Aplonis tabuensis*	3
sikota	collared kingfisher	*Halcyon chloris*	3
fuiva	Fiji shrikebill	*Clytorhynchus vitiensis*	2
lulu	barn owl	*Tyto alba*	2
malau	Niuafo'ou megapode	*Megapodius pritchardii* (?)	2
manuma'a	many-coloured fruit-dove	*Ptilinopus perousii*	2
kalevaleva	long-tailed cuckoo	*Eudynamis taitensis*	1
veka	banded rail	*Gallirallus philippensis*	1
moa kaivao	jungle fowl	*Gallus gallus*	1
pekepeka	white-rumped swiftlet	*Collocalia spodiopygia*	1
sikiviu	Polynesian triller	*Lalage maculosa*	1
taiseni	swamp harrier	*Circus approximus*	1

SEA BIRDS

*ngongo	brown noddy	*Anous stolidus*	13
*ngongo	black noddy	*Anous tenuirostris*	13
*tala	created tern	*Sterna bergii*	12
*tala?	black-naped tern	*Sterna sumatrana*	12
*kiu	Mongolian plover	*Charadrius mongolus*	11
*kiu	wandering tattler	*Heteroscelus incanus*	11
*kiu foa'unga	bar-tailed godwit	*Limosa lapponica*	11
*kiu	lesser golden plover	*Pluvialis dominica*	11
*lofa, helekosi	lesser frigatebird	*Fregata ariel*	7
*lofa, helekosi	great frigatebird	*Fregata minor*	7
*ngutulei	brown booby	*Sula leucogaster*	6
*ngutulei	red-footed booby	*Sula sula*	6
*tavake oma	white-tailed tropic bird	*Phaethon lepturus*	4
*tavake toto	red-tailed tropic bird	*Phaethon rubricauda*	4
*lafu	southern giant petrel	*Macronectes giganteus*	3
*lafu	Phoenix petrel	*Pterodroma alba*	3
*lafu	herald petrel	*Pterodroma arminjoniana*	3
*lafu	black-winged petrel	*Pterodroma nigripennis*	3
*lafu	wedge-tailed shearwater	*Puffinus pacificus*	3
tala tahi	sooty tern	*Sterna fuscata*	2

Sources: Adapted from Pratt *et al*. 1987; Watling 1982.

Marine Plants and Animals considered to be Rare or Endangered

Although there are undoubtedly more terrestrial plants and land animals than there are marine plants and animals that are in danger of extinction, there are numerous species of marine plants and animals that are considered by the people of Ha'apai to be rare or endangered due to overexploitation and a number of other reasons. These species are listed in Tables 15 to 19 below.

Rare or Endangered Finfish

Table 15 lists almost 100 species or groups of species of finfish that were reported to be rear, endangered or in short supply in Ha'apai. Of these, at least 16 species are sharks or rays, and ten are eels, the most highly threatened species being the conger eel (**tuna**) and a number of moray eel species (**toke**). The balance is comprised of a wide range of smaller reef fish, large reef fish and deep water or pelagic species (Table 15).

Table 15. Mammals, turtles and finfish (sharks, rays, eels and small and large fish) reported to be rare or endangered in a survey of 18 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996 (Notes: 1) gen. = general term for a number of similar species; 2) unidentified fish refers to fish names given by respondents and listed in the Tongan dictionary; 3) ? = unverified name).

Tongan	English Name	Scientific Name	x/18
SHARKS			
fai pala, fai palapala	black-blotched stingray	*Taeniura melanospila*	6
tenifa?	tiger shark	*Galeocerdo cuvier*	6
fai manu	spotted eagle ray	*Aetobatus narinari*	5
‘anga‘angamofai	shovelnose ray	*Rhinobatus djiddensis*	4
‘anga kopoa	nurse shark	*Nebrius concolor*	3
takaneva	leopard shark	*Stegostoma fasciatum*	3
‘anga fakahiku‘ulua	unidentified shark	?	2
‘anga tu’a	grey reef shark	*Carcharhinus amblyrhynchos*	2
fai kili	thorny stingray	*Urogymnosus africanus*	2
hahau	white-tipped reef shark	*Triaedon obesus*	2
mataolo‘i	unindentified small sharks	?	2
‘aho	unidentified shark	?	1
fa’emi	whale shark	*Rhincodon typus?*	1
ika manu	manta ray	*Manta alfredi*?	1
kapakau hingano	blacktip reef shark	*Carcharhinus melanopterus*	1
matai	hammerhead shark	*Sphyrna lewini*	1
EELS			
tuna, toke tuna	black-edged conger eel	*Conger cinereus*	14
toke pokulu?	marbled moray eel	*Uropterygius marmoratus*	11
toke ngatala	Javanese moray eel	*Gymnothorax javanicus*	7
toke ‘akau, toke kula	yellowmargin moray eel	G*ymnothorax flavimarginatus?*	5
toke kula, toke ‘akau	yellowmargin moray eel	G*ymnothorax flavimarginatus*	3
toke tea	greyface moray eel	*Siderea thyrsoidea*	2
toke ‘akau?	whitemouth moray eel	*Gymnothorax meleagris*	1
toke moana	unidentified eel	?	1
toke‘uli	?	?	1
toke‘ulu‘ulu?	?	?	1
SMALL REEF FISH			
tukuku	gregorys, damselfish and angelfishes	*Stegastes* spp., Pomacentridae and Pomacanthidae	6
heli	robust hardyhead	*Atherinomorus lacunosus*	5
manini	convict surgeonfish	*Acanthurus triostegus*	5
te’efo	young mullet	*Liza* and *Valamugil* spp.	5

vete	goatfishes	*Mulliodichthys, Parupeneus and Upeneus* spp.	5
kanahe	warty-lipped mullet	*Crenimugil crenibilisi*	4
kopoa	striped catfish	*Plotosus lineatus*	4
lokua	blennies and gobies	Blennidae and Gobiidae	4
o	mature rabbitfishes	*Siganus* spp.	4
matu	silver biddys	*Gerres* spp.	3
huli	fusiliers	*Caesio* and *Pterocaesio* spp.	2
ihe	garfishes	*Hemiramphus* spp.	2
ma'ava	forktail rabbitfish	*Siganus argenteus*	2
matapula	copper sweeper	*Pempheris oualensis*	2
'otule	big-eye scad	*Selar crumenophthalmus*	2
pone	surgeonfish, bristletooth	*Acanthurus* and *Ctenochaetus*	2
sifisifi	batfish, butterflyfishes and angelfishes	Ephippidae, Chaetodontidae and Pomacanthidae	2
telekihi	yellowstriped squirrelfish	*Neoniphon aurolineatus*	2
ali	flounders/soles	*Bothus* and *Paradachirus* spp.	1
humu	triggerfish	*Balistapus, Balistoides* and *Rhinecanthus* spp.	1
lupolupo	small trevallys	*Caranx spp.*	1
malili	yellowfin goatfish	*Mulloides vanicolensis*	1
momoa	cowfishes and boxfishes	*Lactoria* and *Ostracin* spp.	1
mutumu	sergeants	*Abudefduf* spp.	1
nga'a	chub mackelel	*Rastrelliger kanargutai*	1
nofu	reef stonefish	*Synanceia verrucosa*	1
pokumei	juvenile rabbitfish	*Siganus* spp.	1
pose	young parrotfishes	*Scarus* spp.	1
sipesipa	common ponyfish	*Leiognathus equulus*	1
talataha	?	?	1
tu'akefu	scad? (similar to 'otule)	*Decapterus* sp.?	1
tukuku	damselfishes and angelfishes	*Amblyglyphidodon, Centropyge, Chromis, Chrysiptera, Dascyllus, Plectroglyphidodon, Pomacentrus,* and *Stegastes* spp.	1
'ufu	slender parrotfish	*Leptoscarus vaigiensis*	1

LARGE REEF FISH

ngatala	rockcods and coral trout	*Cephalopholis, Epinephelus* and *Plectropomus* spp.	7
sikatoki	steephead parrotfish	*Scarus microrhinos*	7
'ava	milkfish	*Chanos chanos*	3
menenga kalia	bumphead parrotfish	*Bolbometopon muricatum*	3
mu	sea breams	*Gymnocranius* spp.	3
tangafa	humphead Maori wrasse	*Cheilinus undulatus*	3
tokonifusi	yellowlip emperor	*Lethrinus xanthochilus*	3
'ao'aohina (t)	bluebarred parrotfish	*Scarus ghobban*	2
fangamea	red seabass	*Lutjanus bohar*	2
hoputu	Maori seaperch	*Lutjanus rivulatus*	2
'ono	barracuda	*Sphyraena barracuda*	2

tuna, toke tuna	black-edged conger eel	*Conger cinereus*	2
‘ava tahi	milkfish (large)	*Chanos chanos*	1
fai	stingrays	Dasyatidae and Myliobatididae	1
Myliobatididae			
hohomo	parrotfish	*Scarus* spp.	1
holoholoveka	parrotfish	*Cetoscarus bicolor* and *Scarus niger*	1
lalafi	Maori wrasses	*Cheilinus* spp.	1
ngutulimu	parrotfishes	*Scarus* spp.	1
nue	drummers	*Kyphosus* spp.	1
sokisoki	porcupinefishes	*Diodon holocanthus*	1
ta'a	sabre squirrelfish	*Sargocentron spiniferum*	1
tanutanu	thumbprint emperor	*Lethrinus harak*	1
toke	large moray eels	*Gymnothorax* spp.	1
‘ume	unicornfishes	*Naso* spp.	1

DEEPWATER AND PELAGIC FISH

tofua’a	sperm whale (mammal)	*Physeter macrocephalus*	11
‘anga	sharks (general)	-	6
palu	jobfish, deepwater snapper	*Apharaeus, Pristipomoides Etelis* spp.	5
hakula	marlins and other billfish	*Makaira, Istiophor, Xiphias* and *Tetrapturus* spp.	4
mohu’afi	large rockcods	*Epinephelis* spp.	4
‘atu	skipjack tuna	*Katsuwonus pelamis*	2
takuo	yellowfin tuna	*Thunnus albacares*	2
tafa’uli	giant trevelly	*Caranx lugubris*	2
valu	wahoo, dogtooth tuna and Spanish mackerel	*Acanthocybium, Gymnosarda* and *Scomberomorus*	2
lupo	large blue trevallys	*Carangoides* and *Caranx* spp.	1
mahimahi	dolphin fish	*Coryphaena hippuris*	1
mala	?	?	1
momotu, ogo	yellowtail barracuda	*Sphyraena flavicauda*	1
ngutukao	long-nose emperor	*Lethrinus olivaceous*	1
ngutula	?	?	1
valu Tonga	dogtooth tuna	*Gymnosarda unicolor*	
‘ulua	giant trevally	*Caranx ignobilis*	1

Rare or Endangered Shellfish

Table 16 lists 33 species or groups of species of shellfish reported to be rare or endangered in Ha’apai. The most commonly mentioned were sea mussels (**kuku**), giant clams (**tokanoa, matahele, kukukuku** and **vasua**, the general term for giant clams), turban snails (**‘elili** and **topulangi**), a variety of clams (**tava’amanu**, **to’o** and **mehingo**), the black-lip pearl oyster (**tofe**), the spider conch (**angaanga**), the triton shell (**kele’a**), the ark shell or cockle (**kaloa’a**) and topshells or trochus (**takaniko**). The declining yields of these shellfish constitute a serious nutritional and economic problem as they are one of the most reliable food and commerical resources of most Ha’apai communities. Many of these shells are also used in the manufacture of handicrafts and sold as shells to tourists.

Table 16. Shellfish reported to be rare or endangered in a survey of 15 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/15
kuku	sea mussels	*Modiolus* spp.	10
tokanoa	smooth giant clam	*Tridacna derasa*	10
'elili	turban shells	*Turbo* spp.	9
tava'amanu	youthful venus clam	*Periglypta puerpera*	8
tofe	black-lip pearl oyster	*Pinctada margaritafera*	8
tofe, ufi?	Indo-pacific pen shell	*Atrina vexillum*	8?
angaanga	orange spider conch	*Lambis lambis*	7
kele'a	trumpet triton shell	*Charonia tritonis*	7
matahele	fluted giant clam	*Tridacna squamosa*	7
kaloa'a	ark clams	*Anadara* spp.	6
to'o	tumid venus clam	*Gafrarium tumidum*	6
vasua	giant clams (general)	*Tridacna* spp.	6
kukukuku	elongate giant clam	*Tridacna maxima*	5
mehingo	palate tellin	*Tellina palatam*	5
takaniko	pyramid top shell	*Tectus pyramis*	4
topulangi	gold-mouth turban	*Turbo chrysostomus*	4
fai'ahu?	jewel box shells and ducal spiny oysters	*Chama* and *Spondylis* spp.	3
fotu'ohua	thorny oysters (large)	*Spondylus* spp.	3
hihi	nerite snails	*Nerita* spp.	3
nge'esi taha	abalones	*Haliotus* spp.	3
tu'e	wormshell	*Siphonium maximus*	3
kivikivi	rock shells and vase shells	*Thais* and *Vasum* spp.	2
'ohule	beach clam	*Atactodea striata*	2
potupatu	ramose murex	*Chicoreus ramosus*	2
pule	cowrie	*Cypraea* spp.	2
tu'ahi	cockles	*Trachycardium* spp.	2
tu'ulalo	luncina clams	*Codakia* spp.	2
fole	pen shells	*Atrina* spp.	1
kaipo	pitar venus clams	*Lioconcha* and *Pitar* spp.	1
kekeho	ventricose ark clam	*Arca ventricosa*	1
paloa	terebellum conch	*Terebellum terebellum*	1
teve	unknown shellfish	?	1
tui	moonsnails	*Polynices* spp.	1

Rare or Endangered Beche-de-Mer or Holothurians

Table 17 lists 17 species of bech-de-mer that are reported to be rare or endangered in Ha'apai. This supports the current Secretary of Fisheries' warning that stocks of almost all commercially important beche-de-mer species in Tonga are severly depleted, and that a moratorium should be immediately placed on the exploitation of these animals for export purposes.

Table 17. Beche-de-mer or holothurians reported to be rare or endangered in a survey of 15 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/15
mokohunu	black teatfish	*Holthuria (Microthele) nobilis*	12
holomumu	greenfish	*Stichopus chloronotus*	10
telehea	deepwater redfish	*Actinopyga echinites/lecanora*	10
matamata	brown sandfish	*Bohadschia argus*	9
nga'ito	sandfish	*Holothuria (Metriatyla) scabra*	4
huhuvalu	white teatfish	*Holothuria fuscogilva*	4
te'epupulu	-	*Holothuria leucospilota*	4
finemotu'a?	unidentified sea slug	?	3
loli	lolly fish	*Holothuria (Halodeima) atra*	3
pulukalia	pineapple fish	*Thelenota ananas*	3
hulali	-	*Holothuria conusalba*	2
lomu	-	*Stichopus horrens*	2
elefanite?	prickly redfish	*Thelenota ananax*	1
fefena?	unedible seaslug	?	1
loli hina	-	*Holothuria* sp.?	1
loli kula	-	*Holothuria (Halodeima) edulis*	1
sioka	-	?	1

Other Rare or Endangered Marine Animals

Table 18 lists over 40 other marine invertibrate animals that are considered to be rare or endangered in Ha'apai. Some of these animals, such as the cake urchin (**tukumisi**), lobsters (**'uo** and **tapatapa**), a wide range of crabs (**ve'e'uli, tafola, tolitoli** and **'u'u**), octopi (**feke**), sea anemones (**umana**) and sea hares (**ngou'a**) are delicacies and/or important commercial species and sources of cash income to local communities.

Table 18. Other marine invertibrate animals (not including shellfish and holothurians) reported to be rare or endangered in a survey of 15 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/15
ECHINODERMS (Sea Urchins, Starfish, etc., not including holothurians)			
tukumisi	cake sea urchin	*Tripneustes gratilla*	6
vana	sea urchin	*Echinometra mathaei*	2
alamea	crown-of-thorns starfish	*Acanthaster planci*	1
mangamanga'atai	starfish	Asteroidea	1
vatuke	slate pencil sea urchin	*Heterocentrotus mammillatus*	1
LOBSTERS, PRAWNS AND SHRIMPS			
tapatapa	slipper lobsters	*Parribacus caledonicus/ Scyllarides squamosus*	12
'uo	rock lobster (gen.)	*Panulirus* spp.	10
valo	mantis shrimps	*Gonydactylellus, Lysiosquilla* and *Odontodactylus* spp.	4
uloula'avai	sea prawn	*Penaeus* sp.?	2
'uo tavake	painted rock lobster	*Panulirus versicolor*	1
CRABS			
ve'e'uli	dark-finger coral crab	*Etisus dentatus*?	10
tafola	box crab	*Calappa hepatica*	6
tolitoli	mud crab	*Scylla serrata*	5
'u'u	coconut crab	*Birgus latro*	5
ve'etutu?	unidentified crab	?	3
kamakama	grapsid shore crab	*Grapsus albolineatus*	4
keviki	ghost crab	*Ocypode cerathopthalma*	4
'unga	land hermit crab	*Coenobita perlatus*	4
niu motu'u	three-spotted reef crab	*Carpilius maculatus*	3
tupa	land crab	*Cardisoma carniflex*	2
'unga	hermit crab	*Dardanus* spp.	2
kuka	mangrove crab	*Metopograpsus/ Sesarma*?	1
popotu	unidentified small crab	?	1
pule'o'o	three-spot reef crab	?	1
tu'apulepule	swimmer crab	*Lissocarcinus laevis*	1
kalamihi	unidentified crab	?	1
tu'akula?	unidentifed crab	?	1
tulu	unidentified crab	?	1
OCTOPI AND SQUID (Cephalopods)			
feke	octopus	*Octopus cyanea*	2
'atalava	broadclub cuttlefish	*Sepia latimanus*	1
ngufeke	bigfin reef squid	*Sepioteuthis lessioniana*	1

OTHER INVERTIBRATES

umana	sea anemones/tube anemones	*Actiniidae, Ceriantheridae, Stichodactylidae.*	7
ngou'a	sea hare	*Dolabella auricularia*	5
'ovava tahi	melithaeid coral, gorgonian fan coral	*Melithaea* sp.	2
toa tahi	antipatharian coral, black corals	*Antipathes* spp.	2
hulihuli	chiton	*Cryptoplax larvaeformis*	2
tekiafo	polyclad flatworm	*Pseudobiceros bedfordi*	1

Rare or Endangered Seaweeds

Table 19 lists 13 named types of seaweed (many of which the scientific names remain undetermined) that are reportedly rare or endangered, in most cases due to overexploitation. Most notable is **limu tanga'u** (*Cladosiphon* sp.), which was exported in large quantities to Japan in 1995 and 1996, and **limu fuofua** (*Caulerpa racemosa*), which is widely marketed and highly esteemed in both Tonga and Japan. The main reasons for the increasing scarcity of many of these species seem to be overexploitation and the destruction of their preferred habitats.

Table 19. Seaweeds or marine plants reported to be rare or endangered in a survey of 15 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996.

Tongan	English Name	Scientific Name	x/15
limu tanga'u		*Cladosiphon* sp.	14
limu fuofua	sea grapes	*Caulerpa racemosa*	9
limu kaka	glassweed	*Gracilaria verrucosa?*	8
limu te'e moa	codium	*Codium geppii*?	6
limu kula	used to roast fish		5
limu te'epuaka			5
limu po'oi	red algae?	*Galaxaura* sp.?	3
limu vai	sea grass	*Ruppia maritima*?	2
limu 'a e fonu?	turtle weed?	*Chloordesma fastigiata*?	1
limu iki?			1
limu loa			1
limu moana?			1
limu pitu?			1

Reasons for the Scarcity or Endangerment of Marine Resources

Table 20 lists the most common reasons for the scarcity or endangerment of so many marine organisms. The most obvious reason was overfishing, which includes increasing commercial fishing activity, increasing fishing by foreign fishers, and the export of high value products such as beche-de-mer and seaweed (**limu tanga'u**) to the rapidly expanding Asian market. Other factors include the use (often

excessive) of fishing techiniques that lead to the overexploitation of a wide range of target species. These include the use of gillnets (particularly small-mesh gillnets), fish fences or fish traps (**pa ika**), fish poisons, spearguns, line fishing, night fishing with waterproof flashlights or torches, dynamite fishing, and the use of scuba or hookah gear for commercial fishing. Other reasons included illegal fishing, consumption of undersized animals, consumption by natural predators, overconsumption, increasing popualtion and food shortages in Ha'apai that have led to a shift dietary emphasis to marine foods. Coral destruction and the ineffectiveness of the Ministry of Fisheries to enforce fisheries regulations were also mentioned as problems. The most widespread concern, however, voiced during discussions of the results of the survey with the local communities, was the fact that local communities had little control over their own nearshore fisheries resources, and that outside fishers from other islands in Ha'apai or from Tongatapu would come into their inshore areas and deplete their stocks of important commercial species using sophisticated fishing equipment beyond the means of local fishers.

Table 20. Reasons that marine species (marine plants, finfish, shellfish and other vertibrates and invertebrates) are rare or in short supply based on a survey of 15 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996 (Note: responses limited to 15 because some respondents did not answer this question).

overfishing (**lahi hono fangota'i/toutai'i**)	10
excessive use of gillnets (**fu'u lahi hono kupenga'i**)	9
excessive use of fish poisons (**lahi hono 'aukava'i/fakakona**	9
excessive use of gillnets (**lahi hono kupenga'i**)	9
excessive commercial exploitation (**fu'u lahi hono fakatau atu/faka komesiale**)	7
increased spearfishing/shooting (**lahi hono fana/sangai'i**)	7
indiscriminate/inappropriate fishing (**ikai ke fakapotopoto founga toutati**)	5
excessive consumption (**lahi hono kai**)	5
exploitation leading to total depletion (**fak'au ke mole**)	4
consumption of undersize fish (**lahi hono kai kei iiki**)	4
too much line fishing (**fu'u lahi tau matau'i**)	4
use of scuba for spearfishing (**lahi ae uku misini/kasa**)	4
too many foreign fishers (**fu'u lahi 'a e kau toutai muli**)	4
excessive exploitation for export (**lahi uta ki muli**)	4
destruction/degradation of coral (**maumau'i a' e feo**)	3
illegal fishing (**toutai ta'o lao**)	3
too many fishers (**fu'u toko lahi 'a e kau toutai**)	3
night fishing with lights (**ama'i**)	3
naturally uncommon (**ikai loko lahi**)	3
use of small-mesh gillnets (**lahi kupenga'i mata iiki**)	3
use of fish fences/fence traps (**pa ika**)	3
slow or limited regeneration (**si'is'i enau tupu mai**)	3
indiscriminate killing (**lahi tamate'i noa'ia**)	3
species considered a delicacy (**fu'u ifo hono kai**)	3
weakness/ineffectiveness of the Fisheries Division (**'oku vaivai 'a e potu gnaue toutai**)	3
sale of seashells to tourists (**fakatau atu ngeesi fingota**)	3
not allowed to regenerate (**ikai pe ke ili**)	2
use of dynamite fishing (**ngaue'aki 'a e fana 'one**)	2
eaten by their predators (**kai e hono fili**)	2
species is slow growing (**tuai ene lalahi/tupu**)	2
night fishing with underwater flashlights/torces (**toutai mo e makakasa**)	2

excessive use of moveable fish drags/barriers (**fu'u lahi hono uloa pe toho'au**)	2
absence of protective areas (**ikai ha pa'ake ke fakaili 'a e me'a mo'ui he tahi**)	2
destruction/loss due to tropical cyclones (**mole pe he afa**)	2
illegal fishing by foreign fishermen (**ngaahi vaka totai kaiha'a**)	2
use of seashells for body ornamentation (**lahi hono 'ai he te'unga tau'olunga**)	2
fishers are too greedy (**f'u manumanu 'a e kau fangota/toutai**)	2
easily exploited (**ma'ungofua hono toutai'i**)	2
found very deep (**nofo fu'u loloto**)	2
excessive trapping or snaring (**lahi hono tauhele**)	1
eaten by pigs (**kai 'e he fanga puaka)**	1
disposal of rubbish in lagoon (**lingi veve ki tahi**)	1
nuclear testing (**'ahi'ahi 'atomi**)	1
construction of causeway between islands (**mate he ngaohi hala 'ahanga**)	1
ban on whaling (**taofi 'a e fangota'i tofua'a 'a e pule'anga**)	1
food shortage (**si'isi'i 'a me'a kai**)	1

The Development of Community-based Biodiversity Action Plans

Armed with the knowledge of what organisms are economically and culturally important, which ones are rare, endangered or in short supply, and the reasons (both natural and cultural) for their declining abundance, actions to address this erosion of biodiversity suggested by the local communities themselves are then discussed and used to form the basis of a "Community-Based Biodiversity Conservation Action Plan" or in the case of the SPBCP Actions Plans for the protection and sustainable use of biodiversity within the proposed "Conservation Areas" (e.g., within the Ha'apai Conservation Area.

Priority Activities for the Conservation and Re-establishment of Terrestrial Plants and Animals

Table 21 lists 30 actions suggested by the local communities to address the loss of their trees and forests. Many of them overlap, but give a good indication of the the actions that could provide some of the main components of a Community-based Biodiversity Conservation Action Plan for the HCAP.

As can be seen by the actions suggested, the main actions suggested by over one-half of all respondents entail prohibitions on the indiscriminate killing or felling of trees, coupled with a systematic program of plant propagation and replanting which would include the strenghtening of a central nursery, the establihment of village-based nurseries and the propagation of desired species, and the provision to villages and individual landowners of planting materials that are difficult to produce in the numbers required.

In terms of the protection of trees, this could include:

1. A ban on the felling or killing of trees specified as endangered in Ha'apai, including bans on the use of endangered species for construction, boatbuilding, woodcarving, firewood, etc. until such time as replacements have been planted. This could include the formalisation of a list of "protected species" or varieties for each village. A moratorium would be placed on the killing or removal of species that appeared on the list. This could be supported by the establishment of a national list of "Endangered Species", the removal of which would be prohibited until such time that stocks have recovered, by a joint committed of the Forestry and Agricultural Divisions, the Environmental Planning Unit and Community Representatives from all major island groups (i.e., Tongatapu, 'Eua, Ha'apai, Vava'u and the Niuas). This could also include the encouragement of selective weeding or controlled hoeing to protect tree seedlings, and pruning or pollarding, rather than tree removal as an integral part of the tradtional shifting agricultural cycle.

2. A ban on burning, especially burning during dry periods or periods when trees are least susceptible or burning after piling extra fuel around the bases of trees.

3. Implementation of procedures for protecting mature trees and seedlings from livestock damage, through improved fencing, tethering, penning, etc.

4. Implementation of tree planting programes in all villages (town reserves) and on school grounds/properties, with associated contests and prizes for the best results to be presented at the annual Agricultural Show (**Faka'ali'ali Ngoue)**.

5. Implementation of programs to create improved boundary plantings and living fencing around bush allotments, with associated contests and prizes for the best results to be presented at the annual Agricultural Show (**Faka'ali'ali Ngoue)**.

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6. Protection of ALL remaining inland and coastal primary and secondary forest stands in Ha'apai as habitats for endangered trees and other endangered plants and animals.

7. Encouragement of people to harvest or use "only what they need" ("**ngaue'aki faka fuofua**") or place restrictions on the commercial use of endangered species (i.e., restrict use to subsistence purposes).

Replanting programs would require:

1. Strengthening of the capacity of the Forestry Division Nursery on Foa, in terms of its technical expertise, increased focus on trees considered to be rare or endangered or which are in demand, and the outreach and distribution capacity of the nursery, including the provision of planting material of species that communities cannot produce for themselves, establishment of local nurseries on each island, possibly at each village or school, where the focus would be on species that could be propagated locally at the community level, and provision of expertise on how to plant and maintain young plants until they are well-established.

2. A concerted effort to adopt a program of the replanting or replacement of all trees valuable trees that been deliberately or accidentally killed by burning, overuse or natural causes such as death due to old age, disease or tropical cyclones.

Other actions to support the above efforts must include a comprehensive public awareness program on the importance of trees and their protection that should be conducted both nationally and at the community levels, as well as in schools throughout Tonga.

Table 21. Actions suggested to address the increasing scarcity of trees in Ha'apai based on surveys of 10 men's groups and 10 women's groups in the HCAP target villages in September 1997.

ACTION	x/20
Prohibition of the Felling of Trees	15
Implement Replanting Programs	13
Prohibitions on the Killing of Trees	9
Prohibition on Burning	8
Provision of Planting Materials to Villages	7
Replacement of all Felled or Dead Trees	7
Restrictions on Firewood Use	6
Production of Seedlings in Villages	6
Planting and Protection of Seedlings	6
Restrictions on Bark Removal	5
Improved Protection from Livestock	5
Protection of Endangered Species	5
Establishment of Local Nurseries	5
Legislation to Protect Forest/Trees	4
Protection of Existing Forests	4
Ban Sandalwood Extraction	4
Keep Gardens and Trees Well-Weeded	3
Restrictions on Medicinal Use	3
Protection of Natural Seedlings	2
Expansion of Government Tree Planting	2
Prohibition on the Uprooting of Trees	2
Education of Farmers on the Importance of Trees	2
Establishment of Fenced Areas	2
Tree Planting Near Residences	1
Teaching in Schools about the Importance of Trees	1
Water Trees and Seedlings during Dry Periods	1
Plants Windbreaks	1
Teach Nursery and Propagation Techniques	1
Indentify Mother Trees to Bear Seeds	1
Provide Subsidies for Tree Planting and Protection	1

Priority Activities for the Conservation and Re-establishment of Marine Plants and Animals

Table 22 lists 37 actions suggested by the local communities to address that loss of the marine plants and animals in Ha'apai. Many of them overlap, but give a good indication of the the actions that could provide some of the main components of a Community-based Biodiversity Conservation Action Plan for the HCAP.

Table 22. Suggested means of protecting endangered marine species (marine plants, finfish, shellfish and other vertibrates and invertebrates) that are rare or in short supply based on a survey of 15 groups of men and women from target communities within the Ha'apai Conservation Area in September 1996 (Note: responses limited to 15 because some respondents did not answer this question).

return to subsistence fishing (**t'o pe fe'unga mo e famili/toutai'i fakafe'unga pe**)	8
formalise and publicise fishing regulations (**fakatu'u ha lao ki tahi**)	7
promote sustainable/wise fishing (**fakapotopoto'i hono toutai**)	7
enforce bans on fish poisoning (**ta'ofi 'aupito 'a e aukava'i**)	7
establish marine reserves (**fokatu'u ha pa'ake ika 'i tahi**)	6
promote fish farming/domestication (**faama'i ha me'a tahi/ai ke lalati**)	6
seasonal restrictions on certain species (**ta'ofi fakataimi/fakangatangata 'a e fangota**)	6
place catch limits on fishing for some species (**fakasi'isi'i hono fangota'i/toutai'i**)	5
restrict the use of gillnets (**fakapotopoto'i hono kupenga'i**)	5
ban or control the use of fish fences (**fakatapu'i 'a e pa ika**)	5
moratorium on fishing for endangered species (**fakatapu'i fakataimi 'a e fangota'i**)	5
ban use of scuba and hokah gear for fishing (**faka tapu'i 'a e uku misini/uku kasa**)	4
restrict or limit linefishing (**fakasi'is'i 'a e taumata'ui**)	4
strict enforcement of fishing laws and regulations (**fakafefeka 'a e tu'utu'uni mo e lao**)	4
strengthen the Fisheries Division (**fakamalohi 'a e Potu Ngaue Toutai**)	4
set size limits for some species (**lao ki he lalahi 'a e ika ke toutai'i**)	4
ban/control spearing of some species (**fakatapu'i 'a e fana'i/fana'i fakataimi**)	4
ban net fishing (**fakatapu'i 'a e kupenga'i**)	4
recognise local fishing rights (**taki taha totai'i he sone fakakolo**)	3
set strict mesh limits on gillnets (**ta'ofi kupenga mata iiki**)	3
public awareness/education (**ako'i kakai he mahu'inga 'a e ngaahi me'a tahi)**	3
restrict the export of endangered species (**tapu'i 'a e uta ki muli**)	3
report people who break fishing laws (**faka'ilo kau toutai ta'e lao**)	3
allow fish to regenerate (**tuku pe ke fakaili/faka fanau ke lahi**)	3
ban commercial fishing for some species (**'oua toe fangota'i 'o fakatau'atu**)	3
ban all outside or foreign fishers (**teke'i 'a e kau toutai muli**)	3
temporarly ban on consumption of some species (**ta'ofi fakataimi hono kai**)	2
ban night fishing (**tapu'i ama'i**)	2
reduce fishing pressure (**fakasi'isi'i hono toutai'i**)	2
obey fishing laws/regulations (**tokanga ki he lao 'o fangota pakapotopot**)	2
reduce coral destruction (**fakasi'isi'i 'a e faka'ulia a' e feo**)	2
provide strong local surveillance (**le'ohi 'a e ngaahi fangota anga**)	2
fish unselfishly (**'oua 'e toutai manumanu 'e fa'ahinga me'a tahi**)	1
designate uninhabited islands as tourist attractions (**ngaue'aki 'a e ngaahi motu iki he matanga**)	1
protect seagrass/seaweed beds (**malu'i 'a e feitu'u 'ku limua**)	1
ban reef gleaning (**'oua toe fangota**)	1
stop shark lasooing (**ta'ofi no'o 'anga**)	1
ban oceanic gillnetting (**ta'ofi 'a e ngaue'aki 'a e holisi 'o mate**)	1

The Use of "Ten Commandments" for Community-Based Biodiviersity Conservation

Based on the findings of the survey an attempt has been made to develop a "Ten Commandments" for the protection and re-establishment of trees in the Ha'apai Conservation Area (Table 23). A similar intitiative, launched during National Environment Week in Fiji 1997, was a "For Life in Fiji: What Can We Do?" campaign which attempted to involve all relevant government, non-government and private institutions, which agree to implement campaignes and programs, within their own areas of responsibility, over a one-year period beginning in June 1997, to promote biodiversity conservation and public and institutional awareness about the importance of biodiversity and our knowledge of biodiversity as a foundation for sustainable development in Fiji. As support for the nationwide initiative, a poster with the "Ten Commandments for the Protection of Life in Fiji" (see Appendix II) and a brochure stressing the objectives of the campaign, the importance of biodiversity, problems affecting biodiversity, and what can be done to protect it and use it sustainably was prepared. Copies of the brochure will be distributed with this paper.

Table 23. The "TEN COMMANDMENTS" for the protection and re-establishment of trees in the Ha'apai Conservation Area.

1. Plant and Protect trees in villages.
2. Do not burn and kill trees when clearing new garden land.
3. Protect all inland forests and tree groves.
4. Protect and replant all coastal and mangrove forests.
5. Replace all trees that die or that you have killed.
6. Fence, tie or pen your domestic animals.
7. Protect native birds and animals that live in forests and trees.
8. Protect and replant all endangered trees.
9. Teach children and the public about the environmental, cultural and economic importance of trees.
10. Protect and nurture young tree seedlings.

Conclusion

In conclusion, this draft information paper is only a first attempt to show how participatory community-based biodiversity and ethnobiological surveys, and the information from such surveys (THEIR living biocultural property), can be used for, and by, the communities concerned to develop "Community-Based Biodiversity Conservation Action Plans". Such plans could theoretically be developed by all rural and urban communities in the Pacific Islands to protect their time-tested biodiversity inheritances, not only for the benefit of the expanding global market economy and genetic engineering and academic "communities", but for themselves, their countries and for future generations, many of whom, if such programs are not implemented, will undoubtedly lose contact with Pacific Island biocultural property inheritances built up

over millennia. If not protected and actively fostered, such biocultural inheritances will probably be replaced by global-market-economy or genetic-engineering heritages, theoretically unproven heritages developed only during the past 200 and 20 years respectively.

It is argued that if such biocultural property is not recorded, made available to the younger generations, and used as a basis for the sustainable use of biodiversity at the community, national and regional levels within the Pacific Islands, intergenerational equity, in terms of both cultural and economic inheritances, and cultural and economic sustainability, will be seriously eroded, thus ushering in an unprecedented (at least in the Pacific Islands) period of unsustainable exploitation, extirpation and extinction of Pacific Island biodiversity for short-term gains (often gains to outsiders). In short, if we become preoccupied with legal instruments to control bioprospecting and to protect biodiversity globally, we may lose the more important battle of protecting the biodiversity and biocultural inheritances at the local level, by and for communities who have shown to have very few opportunities to benefit significantly and sustainably from the global market econoomy, and for whom their biodiversity and their knowledge of it has been a foundation or capital bank account for sustainable living for thousands of years, a bank account which if used sustainably will be thier only source of biodiversified cash and non-cash income for millennia to come.

As a footnote, this is not to argue that the development of legal instruments, memoranda, guidelines and other initiatives to control bioprospecting, biodiversity research and the exploitation of biodiversity, to protect intellectual, cultural and biological rights, and to promote the establishment of conservation areas and the protection of endangered ecosystems and biota are not important. They unreservedly are!! But, at least for most isolated Pacific Island rural communities, and many Pacific Island urban and peri-urban communites, the active development of diversified, multi-purpose, multi-ecosystem, multi-gender, even multi-cultural Community-Based Biodiversity Conservation Action Plans, plans based on, and tailored for, the biocultural property and knowledge of local communities, would seem to be of greatest priority if we are really worried about realising the objectives of the Convention on Biological Diversity, the SPBCP and other worthy biodiversityconservation initiatives for the benfit of the resource-base communities of the Pacific Islands for whom their biodiversity has been and will continue to be, in the foreseeable future, their ONLY source of income, be it through their traditional highly biodiversified resource-use and marketing systems, or from a genetically-engineered goose that will lay “the golden egg”.

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Appendix I.

Questionaire used in the Community-based biodiversity and ethnobiological survey of the target village communities in the Ha'apai Conservation Area September 1996.

HA'APAI CONSERVATION AREA PROJECT
COMMUNITY-BASED BIODIVERSITY USE AND CONSERVATION QUESTIONNAIRE
Group Name_____ Male/Female___ Date____ Village/Place_____.

1. Ko e ha ha fa'ahinga 'akau to 'e 12 oku mou fa'a fakatau atu (List 12 cultivated plants or plant products that are sold to obtain money).

1. _____. 2. _____. 3. _____.
4. _____. 5. _____. 6. _____.
7. _____. 8. _____. 9. _____.
10._____. 11._____. 12._____.

2. Ko e ha ha fa'ahinga 'akau tupu vao 'e 9 'oku mou fa'a fakatau atu (List 9 wild plants or plant products that are sold to obtain money).

1. _____. 2. _____. 3. _____.
4. _____. 5. _____. 6. _____.
7. _____. 8. _____. 9. _____.

3. Ko e ha ha fanga monumanu tauhi 'e 3 'oku mou fa'a fakatau atu (List 3 domesticated animals or domesticated animal products that are sold to obtain money).

1. _____. 2. _____. 3. _____.

4. Ko e ha ha fa'ahinga ika 'e 10 'oku mou fa'a fakatau atu (List 10 marine fish (true finfish) that are sold to obtain money).

1. _____. 2. _____. 3. _____.
4. _____. 5. _____. 6. _____.
7. _____. 8. _____. 9. _____.
10._____.

5. Ko e ha ha fa'ahinga fingota 'e 6 'oku mou fa'a fakatau atu (List 6 marine shellfish that are sold to obtain money).

1. _____. 2. _____. 3. _____.
4. _____. 5. _____. 6. _____.

6. Ko e ha ha toe fa'ahinga me'a tahi makehe 'e 6 'oku mou fa'a fakatau atu (List 6 other types of marine plant or animal products, not including finfish or shellfish, that are sold to obtain money).

1. _____. 2. _____. 3. _____.
4. _____. 5. _____. 6. _____.

7. Ko e ha ha fa'ahinga limu 'e 3 'oku mou fa'a fakatau atu (List 3 types of seaweed or sea plants that are sold to obtain money).

1. _____. 2. _____. 3. _____.
4. _____. 5. _____. 6. _____.

8. Ko e ha ha fa'ahinga 'akau to, lalahi mo mahu'inga 'e 5 kuo faka'au ke mole pe faingata'a ke toe ma'u? Ko e ha e 'uhinga 'oku faka'au ai ke mole atu 'a e fa'ahinga 'akau lalahi ko 'eni? (List 5 useful or culturally important large cultivated trees that are now rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e ngaahi 'akau mahu'inga pehe ni? (What are 2 things that can be done to protect or re-establish these trees?)

1._____.
2._____.

9. Ko e ha ha fa'ahinga 'akau to mahu'inga, kalasi lotoloto, 'e 5 kuo faka'au ke mole pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke mole atu 'a e fa'ahinga 'akau kalasi lotoloto ko 'eni? (List 5 useful or culturally important shrubs or small trees that are now rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau to kalasi lotoloto pehe ni? (What are 2 things that can be done to protect or re-establish these cultivated shrubs or small trees?)

1._____.
2._____.

10. Ko e ha ha fa'ahinga 'akau vao lalahi mo mahu'inga 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'akau lalahi ko 'eni? (List 5 useful or culturally important wild trees that are now rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau vao mahu'inga ni? (What are 2 things that can be done to protect or re-establish these wild trees?)

1._____.
2._____.

11. Ko e ha ha fa'ahinga 'akau vao mahu'inga, kalasi lotoloto,'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'akau kalasi lotoloto ko 'eni? (List 5 useful or culturally important large wild trees that are now rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau vao, kalasi lotoloto pehe ni? (What are 2 things that can be done to protect or re-establish these wild shrubs or small trees?)

1._____.
2._____.

12. Ko e ha ha fa'ahinga 'akau totolo pe kaka, 'oku mahu'inga, 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'akau ko 'eni? (List 5 useful or culturally important climbing or spreading vines or lianas that are now rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau kaka pe totolo ko 'eni? (What are 2 things that can be done to protect or re-establish these vines or lianas?)

1._____.
2._____.

13. Ko e ha ha fa'ahinga 'akau iki mo mahu'inga 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'akau ko 'eni? (List 5 useful or culturally important small plants or herbs that are now rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke mole pe si'i: a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke mole pe si'i: a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke mole pe si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke mole pe si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke mole pe si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau iki pehe? (What are 2 things that can be done to protect or re-establish these herbs or small plants?)

1._____.
2._____.

14. Ko e ha ha fa'ahinga musie pe mohuku mahu'inga 'e 3 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga musie pe mohuku ko 'eni? (List 3 useful or culturally important grasses or sedges that are now rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga musie pe mohuku pehe? (What are 2 things that can be done to protect or re-establish these grasses or sedges?)

1._____.
2._____.

15. Ko e ha ha fa'ahinga hulufe pe laufale mahu'inga 'e 3 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'akau ko 'eni? (List 3 useful or culturally important

ferns or fern-like plants that are now rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau pehe? (What are 2 things that can be done to protect or re-establish these ferns)

1._____.
2._____.

16. Ko e ha ha fa'ahinga me'akai mahu'inga 'e 3 kuo faka'au ke mole pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke mole atu 'a e fa'ahinga 'me'akai ko 'eni? Pea ko e ha ha fa'ahinga kalasi 'e 3 o 'e fa'ahinga me'akai taki taha 'oku faingata'a ke toe ma'u (List 3 useful or culturally important cultivated staple food plants that are now rare, extinct or in short supply. List the reasons why they are rare, extinct or in short supply the reasons that they are rare, extinct or in short supply. When appropriate, list 3 varieties of each cultivated staple crop that are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b) _____. Ko e fa'ahinga kalasi 'e 3 o 'e fa'ahinga me'akai 'oku faingata'a ke toe ma'u i) _____ ii) iii) _____.
2._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b) _____. Ko e fa'ahinga kalasi 'e 3 o 'e fa'ahinga me'akai 'oku faingata'a ke toe ma'u i) _____ ii) iii) _____.
3._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b) _____. Ko e fa'ahinga kalasi 'e 3 o 'e fa'ahinga me'akai 'oku faingata'a ke toe ma'u i) _____ ii) iii) _____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga me'akai pehe? (What are 2 things that can be done to protect or re-establish these cultivated staple food plants?)

1._____.
2._____.

17. Ko e ha ha fa'ahinga 'akau fua mahu'inga 'e 5 kuo faka'au ke mole pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke mole 'a e fa'ahinga fu'u 'akau ko 'eni? Pea ko e ha ha fa'ahinga kalasi 'e 3 o 'e fa'ahinga fu'u 'akau kai taki taha 'oku faingata'a ke toe ma'u (List 5 important fruit trees that are now rare, extinct or in short supply. List the reasons why they are rare, extinct or in short supply the reasons that they are rare, extinct or in short supply. When appropriate, list 3 varieties of each type of fruit tree that are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b) _____. Ko e fa'ahinga kalasi 'e 3 o 'e fa'ahinga me'akai 'oku faingata'a ke toe ma'u i) _____ ii) iii) _____.

2._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____. Ko e fa'ahinga kalasi 'e 3 o 'e fa'ahinga me'akai 'oku faingata'a ke toe ma'u i)_____ ii)_____ iii)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____. Ko e fa'ahinga kalasi 'e 3 o 'e fa'ahinga me'akai 'oku faingata'a ke toe ma'u i)_____ ii)_____ iii)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____. Ko e fa'ahinga kalasi 'e 3 o 'e fa'ahinga me'akai 'oku faingata'a ke toe ma'u i)_____ ii)_____ iii)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____. Koe fa'ahinga kalasi 'e 3 o 'e fa'ahinga me'akai 'oku faingata'a ke toe ma'u i)_____ ii)_____ iii)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau fua pehe ni? (What are 2 things that can be done to protect or re-establish these fruit trees?)

1._____.
2._____.

18. Ko e ha ha toe fa'ahinga 'akau kai 'oku to 'e 3, (ka 'oku 'ikai ko e me'akai maheni) kuo faka'au ke mole pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke mole atu 'a e fa'ahinga 'akau kai ko 'eni? (List 3 useful or culturally important non-staple cultivated vegetable or food plants that are now rare, extinct or in short supply. List the reasons why they are rare, extinct or in short supply the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke mole atu a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau kai ko 'eni? (What are 2 things that can be done to protect or re-establish these cultivated non-staple food plants?)

1._____.
2._____.

19. Ko e ha ha fa'ahinga 'akau kai mahu'inga 'e 5, 'oku to pe tupu he vao, kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'akau kai ko 'eni? (List 5 important cultivated or wild food plants that are now rare, extinct or in short supply. List the reasons why they are rare, extinct or in short supply the reasons that they are rare, extinct or in short supply.).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau kai pehe? (What are 2 things that can be done to protect or re-establish these wild food plants?)

1._____.
2._____.

20. Ko e ha ha fa'ahinga piini mahu'inga 'e 2 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'akau ko 'eni? (List 2 useful or culturally important cultivated bean or pea-like plants that are now rare, extinct or in short supply. List the reasons why they are rare, extinct or in short supply the reasons that they are rare, extinct or in short supply.).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga piini pe pi pehe? (What are 2 things that can be done to protect or re-establish these bean or pea-like plants?)

1._____.
2._____.

21. Ko e ha ha fa'ahinga 'akau kakala 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'akau ko 'eni? (List 5 sacred, fragrant or beautiful plants that are important for making garlands, leis and body ornamentation, for scenting coconut oil or making perfume that are rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau kakala ni? (What are 2 things that can be done to protect or re-establish these sacred and fragrant plants?)

1._____.
2._____.

22. Ko e ha ha fa'ahinga 'akau faito'o 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'akau ko 'eni? (List 5 important medicinal plants that are rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'akau faito'o ko 'eni? (What are 2 things that can be done to protect or re-establish these medicinal fragrant plants?)

1._____.
2._____.

23. Ko e ha ha fa'ahinga manupuna he fonua mahu'inga 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga manupuna ko 'eni? (List 5 useful or culturally important land birds that are now rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga manupuna he fonua pehe? (What are 2 things that can be done to protect or re-establish these land birds?)

1._____.
2._____.

24. Ko e ha ha fa'ahinga manupuna he tahi mahu'inga 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga manupuna ko 'eni? (List 5 useful or culturally important sea or ocean birds that are now rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b) _____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga manupuna (he tahi) ko 'eni? (What are 2 things that can be done to protect or re-establish these sea or ocean birds?)

1._____.
2._____.

25. Koe ha 'a e fa'ahinga monumanu tauhi 'e 2 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga fanga monumanu ko 'eni? (List 3 important domesticated animals that are now rare, extinct or in short supply. And, list the reasons why they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga monumanu pehe? (What are 2 things that can be done to protect or re-establish these domesticated animals?)

1._____.
2._____.

26. Ko e ha ha fa'ahinga monumanu he fonua, (tukukehe e manupuna), 'e 3 kuo faka'au ke mole pe si'i 'ene 'asi? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga monumanu ko 'eni? (List 3 important land animals that are now rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga monumanu pehe? (What are 2 things that can be done to protect or re-establish these land animals?)

1._____.
2._____.

27. Ko e ha ha fa'ahinga inisekita pe monumanu iki he fonua, 'e 3 kuo faka'au ke mole pe si'i 'e ne 'asi? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga inisekita pe monumanu ko 'eni? (List 3 important insects or small invertebrate animals that are now rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga inisekita pe monumanu iki ko 'eni? (What are 2 things that can be done to protect or re-establish these insects or small invertebrate animals?)

1._____.
2._____.

28. Ko e ha ha fa'ahinga ika kalasi iki 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga ika ko 'eni? (List 5 important small reef or nearshore finfish that are rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga ika kalasi iki ko 'eni? (What are 2 things that can be done to protect or re-establish these small finfish?).

1._____.
2._____.

29. Ko e ha ha fa'ahinga ika kalasi lalahi ('oku 'ma'u he hakau) 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga ika ko 'eni? (List 5 important large reef or nearshore finfish that are rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga ika kalasi lalahi pehe? (What are 2 things that can be done to protect or re-establish these large finfish?).

1._____.
2._____.

30. Ko e ha ha fa'ahinga ika, kalasi lalahi (ma'u he tahi loloto) 'e 3 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku

faka'au ai ke si'i 'a e fa'ahinga ika ko 'eni? (List 3 important deepsea or open ocean finfish that are now rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga ika kalasi lalahi pehe? (What are 2 things that can be done to protect or re-establish these large open ocean finfish?).

1._____.
2._____.

31. Ko e ha ha fa'ahinga kalasi 'anga pe fai 'e 3 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga 'anga pe fai ko 'eni? (List 3 important sharks of rays that are now rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga 'anga pe fai ko 'eni? (What are 2 things that can be done to protect or re-establish these sharks and rays?).

1._____.
2._____.

32. Ko e ha ha fa'ahinga toke 'e 3 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga toke ko 'eni? (List 3 important eels that are now rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga toke ko 'eni? (What are 2 things that can be done to protect or re-establish these eels?).

1._____.
2._____.

33. Ko e ha ha fa'ahinga fingota, kalasi iiki, 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga fingota ko 'eni? (List 5 important small shellfish that are rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga fingota kalasi iiki pehe? (What are 2 things that can be done to protect or re-establish these small shellfish?).

1._____.
2._____.

34. Ko e ha ha fa'ahinga fingota, kalasi lalahi, 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga fingota ko 'eni? (List 5 important large shellfish that are rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga fingota kalasi lalahi pehe? (What are 2 things that can be done to protect or re-establish these large shellfish?).

1._____.
2._____.

35. Ko e ha ha fa'ahinga limu 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga limu ko 'eni? (List 5 important types of seaweed or sea grass that are rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) _____
b) _____.

5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga limu pehe? (What are 2 things that can be done to protect or re-establish these seaweeds or sea grasses?).

1._____.
2._____.

36. Ko e ha ha fa'ahinga paka 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga paka ko 'eni? (List 5 important types of crabs that are rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga paka pehe? (What are 2 things that can be done to protect or re-establish these crabs?).

1._____.
2._____.

37. Ko e ha ha fa'ahinga monumanu tahi, he famili 'o e 'uo pe uloula'avai 'e 5, (tukukehe 'e paka), kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga manumanu ko 'eni? (List 5 important types of crustaceans, not including crabs (e.g., shrimp, lobsters, etc.) that are rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga monumanu tahi pehe? (What are 2 things that can be done to protect or re-establish these crustaceans?).

1._____.
2._____.

38. Ko e ha ha fa'ahinga loli pe lomu (famili 'o e loli pe lomu) 'e 5 kuo faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga monumanu ko 'eni? (List 5 important types of sea cucumbers or beche-de-mer that are rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga monumanu tahi ko 'eni? (What are 2 things that can be done to protect or re-establish these sea cucumbers or beche-de-mer?).

1._____.
2._____.

39. Ko e ha ha toe fa'ahinga monumanu pe fingota tahi kehe 'e 5 (te'eki ke fai ki ai ha lau) 'oku faka'au ke si'i pe faingata'a ke toe ma'u? Pea ko e ha e 'uhinga 'oku faka'au ai ke si'i 'a e fa'ahinga manumanu pe fingota tahi ko 'eni? (List 5 important types of sea animals, not including those types listed above, that are rare, extinct or in short supply. List the reasons that they are rare, extinct or in short supply).

1._____.Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
2._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
3._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
4._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.
5._____. Ko e 'uhinga 'oku faka'au ai ke si'i a) b)_____.

Ko e ha ha founga 'e 2 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga monumanu pe fingota ko 'eni? (What are 2 things that can be done to protect or re-establish these types of sea animals?).

1._____.
2._____.

40. Ko e ha ha nagahi tefito'i 'uhinga pe tupu'anga 'e 6, 'o e faka'au ke mole atu mo si'i 'a e fa'ahinga 'akau mo e fanga monumanu mahu'inga 'o e fonua mo e 'atakai? (List the 6 most serious causes of the degradation of the terrestrial environment and the loss and endangerment of terrestrial biodiversity).

1. _____.
2. _____.
3. _____.
4. _____.
5. _____.
6. _____.

41. Ko e ha ha ngahi tefito'i 'uhinga pe tupu'anga 'e 6 'o e faka'au ke si'i pe faingata'a ke toe ma'u 'a e fa'ahinga limu, ika, fingota, pea mo e fa'ahinga me'atahi kehekehe? (List the 6 most serious causes of the degradation of the marine environment and the loss and endangerment of marine biodiversity).

1. _____.
2. _____.
3. _____.
4. _____.
5. _____.
6. _____.

42. Ko e ha ha ngahi founga mahu'inga 'e 6 'e lava ai ke malu'i mo fakaili 'a e ngahi 'akau mahu'inga, kae 'uma'a 'a e fanga monumanu, pea ke fakasi'isi'i 'a e ngahi ngaue ta'efakapotopoto 'oku nau uesia 'a e tolonga mo e mahu 'o e fonua? (List 6 things that can be done or actions that need to be taken to stop or reverse degradation of the terrestrial environment and the loss and endangerment of terrestrial biodiversity).

1. _____.
2. _____.
3. _____.
4. _____.
5. _____.
6. _____.

43. Ko e ha ha founga mahu'inga 'e 6 'e lava ai ke malu'i mo fakaili 'a e fa'ahinga limu, ika, fingota pea mo ha toe fa'ahinga me'atahi kehe pe, pea ke ta'ofi mo fakasi'isi'i 'a e fa'ahinga me'a 'oku nau maumau'i mo uesia 'a e mahu 'o tahi? (List 6 things that can be done or actions that need to be taken to stop or reverse degradation of the marine environment and the loss and endangerment of marine biodiversity).

1. _____.
2. _____.
3. _____.
4. _____.
5. _____.
6. _____.

44. Ko e ha ha founga 'e 3 'e lava ai 'e he Pule'anga pe ko ha Potu Ngaue ke malu'i 'a e mahu 'o tahi, kae'uma'a 'a e fa'ahinga me'atokoni ma'u mei ai? (List 3 things that the government or other outside agencies can do to help stop or reverse degradation of the marine environment and the loss and endangerment of marine biodiversity).

1. _____.
2. _____.
3. _____.

45. Ko e ha nai ha founga fo'ou e 3 'e lava ai ke ma'u ha pa'anga ki he fakalakalaka 'i Ha'apai ni, tupu mei ho no ngaue fakapotopoto'aki 'a e mahu 'o e 'atakai, tatau pe ki 'uta pea mo tahi. (List 3 types of new activities that you think your community would like to promote to gain money for the development of Ha'apai by using your environment and plants and animals in a sustainable manner).

1. _____.
2. _____.
3. _____.

Appendix II. Poster prepared for Fiji National Environment Week 1997 Campaign.

TEN COMMANDMENTS FOR THE PROTECTION OF LIFE IN FIJI

PLAN OUR FAMILIES

Plan our family sizes so that all of Fiji's people can satisfy their basic needs for food, water, medicine, clothing, firewood and housing.

USE OUR FORESTS, LANDS AND MARINE RESOURCES WISELY

Support sustainable cutting of timber from Fiji's inland and coastal forests so that our children and grandchildren will have the same trees (**dakua, yaka**, **vesi, dogo**, etc.) that we have for our use today.
Support the sustainable harvest of our marine plants and animals. Discourage destructive practices such as gillnet fishing, use of dynamite, fish poisoning, harvest of undersize animals and overfishing.

PROTECT THE PLACES WHERE ANIMALS AND PLANTS LIVE

Support the establishment of national parks and conservation areas on our islands and in our marine environment at the national, local and landowner level. **All** landowners can protect and continue to use their biodiversity if they protect some forest, mangroves, reefs, and other areas where plants and animals live.

PROTECT OUR FOOD AND AGRICULTURAL SYSTEMS

Protect Fiji's traditional agricultural systems in which many different types of trees, staple crops, other food and useful non-food plants and animals are found. Our traditional food and agricultural systems are the foundation of good nutrition and good health. Grow food trees and food plants around your home and in town.

PROTECT AND DEVELOP OUR RURAL PEOPLE

Protect the quality of life of our rural people so that they can produce products for themselves and for urban people. Help improve rural living so that more people will not leave for our already crowded towns. Teach our children the advantages of learning the wisdom of rural peoples.

PROTECT URBAN LIFE

Protect the quality of life in our villages and towns. Protect and plant trees in our urban areas. Plant local foods, medicinal plants and other useful plants in your home garden. Teach your children to eat and drink fresh local foods and drinks. Do not destroy, over-use or pollute the rivers, reefs and ocean near our towns and villages.

PREVENT POLLUTION AND WASTE

Control all forms of pollution and waste that affect plants and animals and the places they live. Reduce the use of dangerous pesticides. Support and enforce Fiji' new "Anti-Litter Decree".

SUPPORT AND OBEY ENVIRONMENTAL LAWS

Be honest and ethical. Support national and international laws that protect our environment. These laws are for the benefit of everyone and for the benefit of the health of our planet Earth. Do not hunt animals out of season. Do not catch and sell undersize animals. Do not cut mangroves and other trees illegally. Give your support to the Fiji government's attempts to support international actions to create a nuclear-free Pacific, to stop climate change, the destruction of the Earth's ozone layer and other forms of pollution that affect the Earth's climate. Support international actions to protect rare or endangered plants and animals, such as giant clams, sea turtles, whales, parrots, and seabirds. Obey village rules that protect plants and animals and the environment.

INCREASE ENVIRONMENTAL EDUCATION

Teach our children and our adults, in our schools, in our homes, in our government buildings and in our business houses, the importance of our plants and animals as a foundation for economic and cultural development in our country. Protect the traditional knowledge of the use and protection of our plants and animals that the older people in all of our communities have and which has protected our plants and animals in the past.

PLAN FOR THE FUTURE

Don't be greedy. Use only what you need. Don't harvest too much, don't overfish. Think about future generations. Use wisely and protect Fiji's plants and animals and the environment so that Fiji's children and grandchildren will have a healthy and productive life. Help to ensure that the people of Fiji today do not destroy the plants and animals that our parents and grandparents have left for us.

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RARE Centre's Conservation Education Program

Paul Butler
RARE Centre for Tropical Conservation

Abstract

Over the last nine years, RARE Centre's Conservation Education Campaigns have been generating grass-root support for conservation initiatives by building on national pride. Focusing on a target species - usually an endangered bird - the campaigns bring attention to critical issues like habitat protection, sustainable agriculture, and control of illegal pet trade.

In each country, we work with a local project leader who implements the program by following adapting the outreach techniques outlined in our training manual, *Promoting Protection through Pride.* Techniques include billboards, bumper stickers, church sermons, school presentations, puppet shows, music videos, and community meetings. This local ownership of the project builds capacity for significant and sustainable conservation action.

Public support generated by these campaigns has led to major changes in conservation policy: nature reserves have been established in the Bahamas, Cayman Islands, Dominica, Grenada, and St. Vincent. Endangered populations are re-bounding and local financial support for conservation activities continues.

Assessing community-based conservation in Vanuatu

Suli Siwatibau, Jenny Whyte and A. Tabisue
The Foundation of the Peoples of the South Pacific (International) (FSPI)

Abstract

This paper described an attempt to assess, through participatory research, the success or otherwise of various approaches to community-based conservation in Vanuatu. It discussed the different approaches to conservation used, the different concepts of the term or practice of conservation, and how these may be interpreted in terms of the IUCN/UNEP concept of conservation. It described the methods developed for participatory research and discusses the strengths and weaknesses of these within the context of the project.

It raised some questions about the linkage of community level conservation activities with national environmental strategies and national planning.

Papua New Guinea's Biodiversity Data Management Program

Michael Hedemark
Technical Advisor
Research and Conservation Foundation of Papua New Guinea

Abstract

The PNG Department of Environment and Conservation has engaged in an assessment of its biodiversity data holdings with the assistance of UNEP. The assessment has resulted in a catalogue of biodioversity data holdings, a plan for future data management and a data guideline for data management. This presentation discusses the results and the metadata catalogue.

The 1997 Pacific Year of the Coral Reef: A report of the activities conducted in the Federated States of Micronesia

Dr. Teny Topalian
Micronesian Islands Conservation
Palikir
Pohnpei
Federated States of Micronesia

Abstract

This presentation will be a summary of the activities, workshops, media, school visits and launching of the 1997 Pacific year of the Coral Reef held in the Federated States of Micronesia. The theme is "Coral Reefs: their Health Our future". The goal of this campaign was to increase understanding, awareness and action towards the conservation, resource management and policy making for coral reefs surrounding Micronesia.

Race for the rainforest: Lessons learnt from Papua New Guinea

Michael Hedemark
Technical Advisor
Research and Conservation Foundation of Papua New Guinea

Abstract

This paper outlines the lessons learnt from the 'failed' Integrated Conservation and Development Project in the Southern New Ireland province of Papua New Guinea. It outlines project development, development constraints and counter conservation forces, and actions taken to overcome obstacles. Lessons learned have a bearing on many ICDP projects that face competition for resources by industrial developers.

Eco-Forestry Programme "Promoting Quality of Life in the Solomon Islands through Village-Based Forest Harvesting"

Solomon Islands Development Trust

SIDT Eco-Forestry Programme

"Promoting Quality of Life in the Solomon Islands through Village-Based Forest Harvesting"

Programme Summary

The Eco-forestry programme is collectively promoting, endeavours by Solomon Islands Development Trust (SIDT), Greenpeace, Komuniboli Training Centre (KTC) and the Imported Tropical Timber Group (ITTG) of New Zealand to actively promote quality of life in the villages through sustainable village-based forest harvesting (eco-forestry). Established in early 1995, the programme has been providing education and awareness, training, field extension support services, and marketing to resources owners who opt to stand against commercial logging operations in their land and harvest their forest resources themselves.

Since its establishment, the programme has done 5 training workshops and is currently assisting 18 trained village communities from the provinces of Guadalcanal, Makira, Malaita, Central Islands, and Isabel. (In Isabel, the programme works closely with the Isabel Sustainable Forest Management Project (ISFMP) by providing training, monitoring and marketing outlet). Interestingly, a quarter of our trainees comprised of local women from the villages. Some of the projects we assist have successfully reached the production stage, and up-to-date, the programme has facilitated the marketing of 28.891 cubic metres of eco-timber to New Zealand eco-timber market which brought the village community projects involved a total of SBD $34,494.34. This is a substantial benefit to village resource owners who choose to utilise their forest (timber) wealth (besides other environmental and social benefits) compared to what they will receive if they give their trees to the foreign commercial logging companies or sell their timber products to any middleman in the timber trade.

With the demand for eco-timber from our overseas markets rising steeply, and the increasing threats from the commercial logging companies on our remaining forests, the programme is primarily working towards involving more village community groups – giving them the opportunity to control and sustainably use and benefit from their forest wealth.

Just early this year, European Union (EU) has 'given-light' to the programme, indicating funding assistance for the next 3 years (commencing at the end of this year) through the Foundation for the Peoples of the South Pacific International's (FSPI) regional eco-forestry programme. Through this funding assistance, EU is purposely aiming towards strengthening the current programme's work in the Solomon Islands and involving more village communities in this eco-forestry programme. This will eventually bring some projects to be certified by Forest Stewardship Council's (FSC) accredited certifiers – giving the village community projects an opportunity to be recognised and accepted in the environmentally conscious timber markets around the world.

The programme is also committed and is very willing to work closely with other programmes or projects such as SWIFT, Soltrust, ISFMP and others that are also promoting sustainable forest harvesting in the Solomon Islands. The only way each eco-forestry programmes in the Solomon Islands can fulfil their aspirations is to put up a joint effort (yet respecting each other) to preach the 'eco-forestry gospel' to

every corners of the country, and show the resource owners that this so-called 'eco-forestry practice' is another way of utilising their forest wealth in a sustainable and beneficial manner – not just for this present generation, but the next generations to comes. Currently, this eco-forestry programme is working very closely with the ISFMP of Isabel and their joint efforts has been proved viable and successfully.

Just recently (22 July 1997), the programme has entered into a 'Statement of Co-operation' with the Solomon Islands Eco-Timber Trust (SIETT). With this signed, the programme will involve in preliminary assessment of any communities who want to join SIETT's programme through group identification tours, and carry out field extension support and monitoring to SIETT's community projects. In summary, the programme will look after the community development part of SIETT whilst the SIETT itself will take care of its technical component of its project. This co-operation between the programme and SIETT will commence sometimes late this year when SIETT receives its funding from the ICCO of Netherlands. The Statement of Co-operation is to be renewed annually.

Successes and Lessons – Conclusion

- A team or programme with several partners working together provides a basis to a strong programme.
- Having partners with different expertise such as community development, training, marketing, and coordination is a successful approach.
- We have 18 village-based community groups trained and evolved from 5 different islands in the Solomon Islands.
- It has taken 3 years so far but it is very important to go slow, especially when dealing with village people.
- The biggest barrier for eco-forestry projects setting up on customary owned land is *land disputes.*
- The process that participating communities go through to come to the decision to say 'no' to large scale logging and adopt eco-forestry, and to carry out land use planning on their land is *critical.*
- One of our challenges is to involve more women in the projects, particularly in forest management and book-keeping.

Programme Contact:

Abraham Baeanisia
Director
Solomon Islands Development Trust
PO Box 147
Honiara
SOLOMON ISLANDS. Ph: (677) 23409 / 21130
Fax: (677) 21131
Dannie Andrew Kuata
Programme Coordinator
SIDT Eco-Forestry Unit
PO Box 147
Honiara
SOLOMON ISLANDS. Ph: (677) 21130 / 20455
Fax: (677) 21131 / 20805